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AMRITSAR COLLEGE OF ENGINEERING & TECHNOLOGY
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on

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Organized By

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MESSAGE

I am delighted to pen this message for the Proceedings of two days International Conference on "Data Sciences & Machine Learning (ICDSML-2020)" being hosted by the Department of CSE of Amritsar College of Engineering and Technology on March 19-20, 2020.

The foundation stone of Amritsar Group of Colleges is laid on the essence of academic pursuit and excellence. Excellence in any work can be achieved with utmost dedication, hard work, and perseverance. We, at AGC, have made this dictum our motto and our way of life in every single activity in the campus.

I am sure that deliberations in the conference would bring out innovative ideas and suggestions for technology in related domains. I convey my heartiest greetings to the representatives and coordinators of the conference.

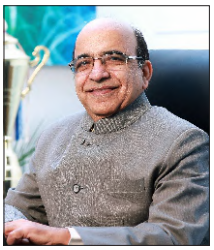
I also take the opportunity to congratulate the Department of CSE for organizing this event. My wishes for this conference to be a grand success.

Chief Patron ICDSML-2020
Advocate Amit Sharma
Chairman & CEO
AGC, Amritsar

MESSAGE

It is a matter of great pleasure that "International Conference on Data Sciences & Machine Learning (ICDSML-2020)" is being hosted by Departments of CSE of Amritsar College of Engineering and Technology on March 19-20, 2020.Research and development forms the backbone of our curriculum. The staff and students are engaged in various path-breaking innovative research activities all throughout the year. We organize conferences and seminars frequently on contemporary and relevant topics in order to facilitate research in those areas which will lead to necessary metamorphosis in the academia as well.I wish the conference all the very best and urge all participants to brainstorm on the various thrust areas of the conference. I also wish all of you a happy stay in our campus and look forward to your wholehearted participation in the event. I would also like to congratulate the Department of CSE for organizing this conference.

Chief Patron ICDSML-2020
Ms Ragini Sharma
Director (Finance)
AGC, Amritsar



MESSAGE

I am pleased to learn that the Department of CSE of Amritsar College of Engineering and Technology, Amritsar have taken the initiative in organizing the two days "International Conference on Data Sciences &Machine Learning (ICDSML-2020)".

I am sure that the Professional ability sponsored up by the experience of the Management and Faculty of this Institute would guarantee that the occasion ends up being a stupendous achievement and all the conference objectives are acknowledged to the greatest advantage of the scholarly world.

The Conference is being held in Amritsar, which is the place of spiritual importance in Punjab and I hope the delegates will have a comfortable stay and they will enjoy the traditional hospitality offered by the Institute.

I compliment the organizers of ICDSML-2020 for holding this event and wish all success to the conference.

Patron ICDSML-2020
Dr. Rajnish Arora
Managing Director
AGC, Amritsar

MESSAGE

On Behalf of Amritsar College of Engineering and Technology, I welcome all the participants to "International Conference on Data Sciences & Machine Learning ICDSML-2020".

The conferences are necessary to bring in culture of information exchange and feedback on developing trends in technologies. I am delighted to note that the Department of CSE of Amritsar College of Engineering and Technology is organizing the "International Conference on Data Sciences & Machine Learning (ICDSML-2020)". Certainly, this type of conference not only brings all the academicians, industrialists and researchers at one platform, but it also inculcates the research culture among the entire fraternity of Education in the country, thereby, contributing to the development of nation.

I hope that this conference would certainly induce innovative ideas among the participants paving way for new inventions in engineering field.

I congratulate, Department of CSE for initiating the conduction of such a conference in our esteemed Institution.

I wish the conference a grand success

Patron ICDSML-2020
Dr. V.K. Banga
Principal
ACET, Amritsar

MESSAGE

It is a matter of honor that Amritsar College of Engineering and Technology, Amritsar is organizing a "International conference on Data Sciences & Machine Learning (ICDSML-2020)" on 19-20 March 2020

The urge to look for advancements in research and experimental techniques today is felt in almost every domain of science engineering and management. This conference is a platform where scholars can share their views and ideas on the subjects related to the objectives of conference.

It would be a matter of great satisfaction, not only to the organizers but the whole research community, if some useful thoughts and directions for prospective development can come out from deliberations of this conference.

We would like to make this conference a memorable event by offering sufficient opportunities and hope that you will enjoy the hospitality.

Convener ICDSML 2020
Er. Sandeep Kad
Registrar
AGC, Amritsar

MESSAGE

It is a matter of great honor that Amritsar College of Engineering & Technology, Amritsar is hosting the international Conference on "Data Sciences and Machine Learning" (ICDSML 2020) on 19th– 20th March 2020.

We at ACET have a mission to achieve academic excellence and responsive of changes in environment through an academic autonomy and prepare out budding engineering and managers for global competition and to nurture with core inner values.

The main objective of the conference is to exhibit the technical dexterity of the budding technocrats, research scholars, representatives from academia and industry. Besides this, the event provides a premiere forum for the dissemination of current technical ideas about the recent developments in the field of Data Sciences, Machine Learning and allied areas. The event focuses on the ingenuity of the charismatic research scholars to be mustered under one roof with a global outlook. It aims and aspires to bring technical faculty across the state/country in pace with the latest developed tools that are currently being used in context to the theme of the conference.

I wish to convey my sincere thanks to all who have contributed for the conference in whatsoever way through encouragement and valuable suggestions.

I hope that the sincere efforts, zeal and vigor of the members of organizing team would be prolific enough in making this event a grant feat.

Best Wishes.

Programmee Committee Chair
ICDSML 2020
Dr. Amarpreet Singh
Professor (CSE)
ACET Amritsar

MESSAGE

It gives me immense pleasure that Department of CSE, Amritsar College of Engineering and Technology, Amritsar is organizing an "International Cconference on Data Sciences & Machine Learning (ICDSML-2020)" on 19-20 March 2020

The conference provides platform for researchers to get networked and exchange the ideas for further progress in research and development. Significant contribution by researchers, academicians from all over the country has done a commendable effort towards the betterment of the society and mankind. Knowledge by sharing, undoubtedly, enhances many folds and at ACET we work with this philosophy.

I hope your experience of being a part of this conference will be wonderful. ACET is a venue where exchange of ideas finds you a global partner for collaboration by which you can explore your research experiences. Hopefully, the conference discussion, presentations and contributions play a significant role to update the knowledge in concerned field.

I wish the conference a great success.

Convener ICDSML-2020
Er. Vinod Sharma
HOD (CSE)
ACET, Amritsar

MESSAGE

I feel proud that Amritsar College of Engineering and Technology, Amritsar is organizing an "International conference on Data Sciences & Machine Learning (ICDSML-2020)" on 19-20 March 2020.

In today's era, new developments are occurring almost on daily basis. These developments are changing the shape of society. Considering the fast pace of globalization, the need of the hour is to provide a platform where experts may share the advances in this field.

In a short period of time the conference has received an overwhelming response from large community of researchers. The papers received in this conference have been closely reviewed by the experts committee and selected on the basis of originality, significance and clarity for the objectives of conference. I am confident that the conference will become a unique experience for academicians, professionals, researchers and students to acquire the latest knowledge in the related fields.

Convener ICDSML 2020
Dr. Sachin Khurana
HOD (DCA)
ACET, Amritsar

MESSAGE

It gives me immense pleasure to announce that our department is organizing International Conference on "Data Sciences & Machine Learning (ICDSML)" on 19 -20th March, 2020. I am of the view that this conference will play a vital role in creating new scientific computerized ideas in our lives.

A conference is a place where true meeting of minds happen. Researchers will come forward and share their thoughts with fellow researchers. The beauty of a conference is that it allows exchanges which will ignite ideas and the ways of improving them. The biggest beneficiaries therefore would be the attendees of this conference.

I feel grateful to the Management, Principal, and staff of ACET for extending their help and cooperation in conducting the international conference.

Coordinator ICDSML-2020
Er. Navneet Kaur Bawa
Associate Professor (CSE)
ACET,Amritsar

International Conference on Data Sciences & Machine Learning

ICDSML-2020

19th – 20th March 2020

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International Conference

On

Data Sciences & Machine Learning (ICDSML-2020)

Proceedings of International Conference on Data Sciences & Machine Learning (ICDSML2020)

Indoor tracking using BLE - Brief Survey of Techniques

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Abstract—**Since many years there has been so much growth in the study of indoor localization. This is due to the tremendous development in the field of wireless technologies, the Internet of Things (IoT). Indoor localization system helps to locate the people in the indoor environment. GPS does not work better in the indoor environment. It is suitable or outdoor environment. In the past few years, researchers proposed many methods using the latest wireless technologies. In this paper, firstly, we discussed very briefly the techniques used in indoor localization and then presents the quick survey on the recent development with the use of Bluetooth Low Energy (BLE) devices which are ubiquitous these days.**

Keywords—Bluetooth Low Energy, Indoor Localization

I. INTRODUCTION

Since the evolution of human beings, geolocating, tracking and navigating resources have been of prime interest. The modern economy today also deals with managing huge landmass, large building infrastructure, warehouses, compounds, ports where the assets needs to be localized in space for deriving operational efficiencies. For this purpose, use of GPS [1] for navigation has now been into existence for decades.

Today GPS is inbuilt in almost all the smart devices and useful for outdoor tracking and navigation, and it requires line of sight to the satellites [2] but for indoor like in Airports, Hospital, Big Malls, etc. it is not suitable. So, for this, an Indoor Positioning System (IPS) is needed. IPS can be defined as the network of devices for locating objects inside the buildings or covered areas and where GPS and other technologies lack precision [3] [4].

In the last few years, researchers proposed many methods using different wireless technologies such as Wi-Fi, Bluetooth Low Energy (BLE), visible light communication, ultra-wideband. However, BLE seems to be promising because of its low power consumption, availability in all devices such as in every mobile phone, low cost.

Bluetooth is an example of Wireless Personal Area Network communication technology. It is based on IEEE 802.15.1 standard and operates in the 2.4GHz unlicensed industrial, scientific, and medical (ISM) frequency band. Bluetooth Low Energy (BLE) is designed for low power operation. It uses Frequency-Hopping Spread Spectrum (FHSS) approach, 40 channels with 2MHz spacing, and GFSK modulation. It supports point to point, broadcast, and mesh network topologies [5].

Location determination systems can be divided into, ranging techniques and range-combining techniques [2] or signal properties and positioning algorithms [6]. Ranging techniques or signal properties include Angle of Arrival (AOA), Time of Arrival (TOA), Time Difference of Arrival (TDOA), Received Signal Strength Indication (RSSI) and Range combining, or positioning algorithms include Triangulation, Trilateration, Proximity, Scene Analysis/ Fingerprinting.

II. TECHNIQUES

A. Ranging techniques or signal properties

Angle of Arrival (AOA): in this technique, antenna arrays (at the receiver side) are used to estimate the angle of arrival from the transmitter. Based on the intersection of several lines, target device coordinates are calculated. The advantage is that no time synchronization is required between antennas; a minimum of two references (antenna) can calculate device location. The distance between the transmitter and receiver should be small for good results. The disadvantage is that it requires complex hardware [2], [7], [8]. AOA positioning method is shown in Fig. 1.

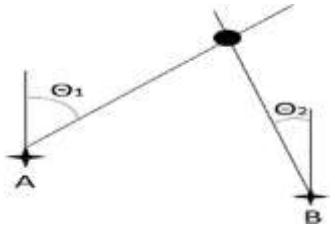

Fig 1. Angle of Arrival (AOA) based positioning

Time of Arrival (TOA): It is a distance-based method and measure the time taken by the signal from the transmitter to reach the receiver. It is also called Time of Flight (TOF). TOA or TOF value is multiplied by the speed of light, which gives the distance between the receiver and transmitter [2], [7], [8]. TOA is shown in Fig. 2.

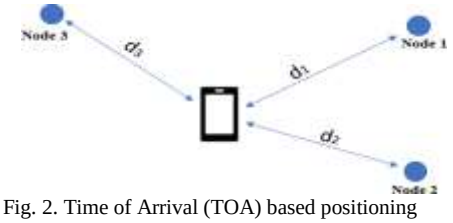

Fig. 2. Time of Arrival (TOA) based positioning

Time Difference of Arrival (TDOA): It is similar to ToA, but sometimes the time is unknown, so the difference between travel time is used. Location can be estimated by the

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intersection of the hyperbole of differential TOA of the signal [2], [7] . TDOA is shown in Fig. 3.

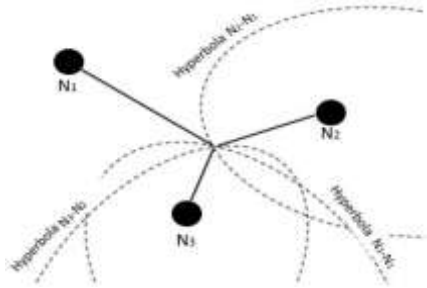

Fig 3. Time Difference of Arrival (TDOA) based positioning [8]

Received Signal Strength Indication (RSSI): In this signal strength is obtained from the target device in decibel-milliwatts (dBm) or milli Watts (mW) and then from signal strength distance is calculated. RSSI is shown in Fig. 4.

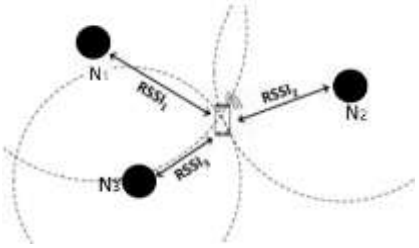

Fig 4. Received Signal Strength Indication (RSSI) based positioning [8]

B. Range combining or positioning algorithms

Triangulation: Position is estimated by using geometric triangle laws of sines and cosines (angular measurements) relative to a known reference point [2], [6].

Trilateration: In this method, the intersection of three circles is the position of the device. Each circle has a radius equal to the estimated distance between the position of the device and the node [2]. Trilateration is shown in Fig. 5.

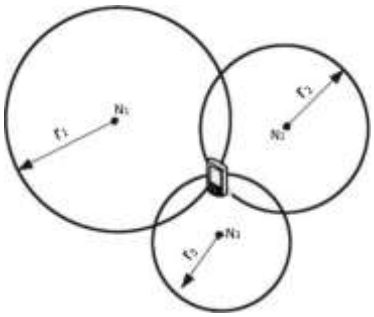

Fig. 5. Trilateration based positioning [2]

Proximity: In this technique, a grid of antenna is used to determine the position. The positions of the antennas in the grid are known. When the moving object comes near to the grid, the closet antenna with the strongest signal is used to calculate the position of the device [6].

Scene Analysis/ Fingerprinting: Fingerprinting is had a two-phase, offline, and online phase. In the offline phase, RSSI values are collected from all the reference points and stored in the database. In the online phase (during real-time), the measurements are compared with stored database. The position estimation is independent of the angel and distance [6][8][9]. There are several algorithm that matches the real- time value with the stored data, and those are Probabilistic Methods, Artificial Neural Networks, k-Nearest Neighbor (kNN), Support Vector Machine (SVM) [8].

III. RELATED WORK

RSSI & Log-normal Path Loss Model: With the use of Rad Beacon Dots as Bluetooth beacon, RSSI values, and Log-Distance Path Loss Model 88% accuracy is obtained with the problem that Beacons send data at a relatively long interval, at 500ms. Measurement during moving object disturbs the result. So, the Dead Reckoning technique for moving object can be used [10]. With the use of RSSI technique, MQTT protocol with trilateration method based on a 2-parts linearization algorithm the accuracy of position estimation is of 1.5 m [11]. Effect of on-chip antennas is also important parameter and can lead to RSSI drops of up to 37 dB. The effect can be reduced by incorporating the antenna effect into the existing log-normal Path Loss Model by including another log-normal random variable [12].

Fingerprinting: RSS based method has several problems in location estimation like multipath propagation and shadow fading effects and also BLE have problem like fast fading and narrower bandwidth. So, the fingerprinting method is good to model the complex environment. In the fingerprinting technique, there are various algorithms, like the k-NN and wk-NN (weighted k-NN) algorithm. For matching the similarity between the already captured data and real-time data, Chebyshev metric is better than the Euclidean metric [13]. Fingerprinting method is also suitable for indoor localization for the elderly people. Wi-Fi has a high transmission power level, so it gives more accurate results, but even at low power transmission levels, BLE also provides good results for the indoor environment [14]. With the use of Radial Basis Function (RBF) with fingerprinting, 1.3m error is obtained which is acceptable for large areas [15]. With the use of hierarchical topological fingerprinting for hybrid Wi-Fi and BLE indoor localization system (ILS), Wi-Fi-RSS data is preprocessed to train the Dendogram-based support vector machine (DSVM) for the Wi-Fi-based localization and obtain a good performance of 96.72%. More precise target position can be estimated by fusing the Wi-Fi and BLE RSS measurements with the Topological Fingerprint (TF) map [16]. With the use of Cramer-Rao lower bound (CRLB) and the low complexity Weighted Fingerprint Construction (WFC) method, accuracy of 1.42 m with a window size of 0.5s is obtained [17].

Neural Network: With the use of Long short-term memory (LSTM) based Neural Network in indoor localization using BLE, the networks take the time series of signal strength as input. In comparison to deep learning-based methods, the trilateration and fingerprinting suffer from noise and packet loss [18].

Others: With the use of Estimote low-cost BLE beacon, Android smartphone and Kalman filter at preprocessing stage, the signal quality form each beacon can be improved and 80% accuracy with error of 2m is obtained [19]. The required number of BLE beacons to be used for obtaining

higher accuracy in indoor localization is also important.

S.No	Author/Year	Method
1.	Pu et.al.[13], 2018	Fingerprinting (k-NN & wk-NN algorithm)
2.	Qureshi et.al.[14], 2019	Fingerprinting
3.	Song et.al.[19], 2018	Developed own algorithm with Kalman Filter
4.	Satan et.al.[10], 2018	RSSI and Log-Distance Path Loss Model
5.	Benaissa et.al.[15], 2018	Fingerprinting and Radial Basis Function
6.	Gomes et.al.[21], 2018	Moving average with a peak suppression Algorithm
7.	Luo et.al.[16], 2019	Hierarchical topological Fingerprinting
8.	Schulten et.al.[12], 2019	Log-normal Path Loss Model
9.	Sadowski et.al.[20], 2019	Trilateration and nonlinear least squares with Kalman and moving average filter

IV. Conclusion

In this paper, we have reviewed several researches on Indoor localization based on Bluetooth Low Energy (BLE). BLE is chosen among other techniques due to its low power operation and availability in all the smart devices. More research is done on the static objects because it is quite simple for the estimation of the location of the static object. For moving objects, location estimation is complex. Because there might occur many problems like involuntarily shielding by the human body, different values of signal strength from different devices in the same environment, and many more. So, there is a need of finding the appropriate algorithm for moving objects. In the future, we will try to implement the simple RSSI and Log-Normal model for distance estimation and localization of the static object.

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A Novel Foreground Based Feature Extraction Technique for Leaf Disease Detection Application

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Abstract - **Plant disease detection plays a significant role in agricultural applications for improving economic yield. Early detection of disease in leaves is essential for preventing crop losses. Machine learning algorithms can be used for classifying the diseases at early stages so that the farmers will be able to take necessary action for preventing further damage to the crops. The main contribution of the paper is to develop an efficient system for monitoring plants for detecting and classifying the diseases at an early stage. The system will make use of the camera sensor to capture the leaf images in the field. A novel feature extraction technique based on foreground is proposed for extracting the features of the affected area for classification. Support vector machine is used for classifying the diseases at the monitoring site. The exhibition of the framework is assessed as far as discovery exactness and order precision.**

Keywords: - **Feature extraction, classification, SVM, disease detection, foreground extraction, accuracy.**

1. Introduction

In agriculture applications, plant disease detection plays a major role as diseases and pests cause great economic loss to farmers. Visual monitoring of plants for diseases is a less accurate and tedious task, hence machine learning automates the process of classifying the diseases based on the features extracted from the images. The image acquisition and feature extraction are done at the field to be monitored. The classification is done at the monitoring site by the experts. Finally, the solution to the problem is advised to the farmers through text messages or mobile app. The camera sensor is placed in the farm to capture the image of the plant leaves. The image is further processed to detect and segment the affected part in the leaves. Features are extracted from the segmented part and are transmitted for analysis by the agricultural expert. Exact information on regions where malady has spread would help the rancher to apply proper measures of pesticides to the influenced territories, in this way yielding both monetary and ecological advantages. In vision-based sickness discovery framework, in vision-based disease detection system, pre-processing and segmentation plays a vital role. For efficient classification extraction of features from the segmented image is important. Image segmentation is a procedure of collection or isolating a picture into various parts [1]. Picture can be portioned utilizing various strategies from easy to complex division methodologies. Highlights are separated based on shading, surface and Classifier is used by the experts for classification. Artificial neural networks and support vector machines (SVM) are normally utilized in the classification process [2]. Vijay and Mishra [3] have proposed a novel image segmentation algorithm for automatic detection and classification of plant leaf diseases. Image segmentation was done using the genetic algorithm, and SVM classifier was

used for classification. The accuracy of the proposed system was found to be 95.71 % and classification accuracy was found to be 97.6 %. Dhakate et al. [4] proposed a strategy which utilizes picture preparing also, neural systems to identify and order the sicknesses in pomegranate plant. The infections considered for exhibit are Fruit Spot, Bacterial Blight, and Leaf Spot. The proposed approach gave palatable outcomes with 90 % precision. Aasha Nandhini, S. et al. [1] have proposed web enabled disease detection system (WEDDS) based on compressed sensing (CS) is to identify and characterize the illnesses in leaves. The system was evaluated using both simulation and experimental analysis for various plants. SVM was used for classification and the results showed an accuracy of 98.5 %. Hence SVM is adopted for classification.

In this work, a novel foreground-based feature extraction (FBFE) technique is proposed for classification of diseases. The key point is to extract features based on the foreground of the image. Initially the foreground is extracted from the leaf image and then features are extracted. The performance of the proposed approach is evaluated in terms of detection accuracy and classification accuracy. The comparison with the existing K-means classification algorithm is also done.

The rest of the paper is organized as follows. Section 2 discusses the proposed framework. Section 3 discusses the performance evaluation in detail. Finally, section 4 gives the conclusion and scope for future work.

2. Proposed work

A novel and simple foreground-based feature extraction (FBFE) technique is proposed for the leaf disease detection (LDD) system. LDD system is used for remote monitoring of the plant leaves in the field. This system eases the task of detecting the diseases at early stage. LDD will capture the image, pre-processes it and segments the image using foreground extraction technique. This system is beneficial as it reduces manual monitoring in big farms and can detect the diseases at very early stage when they appear on plant leaves. Fig. 1 shows the overview of LDD system.

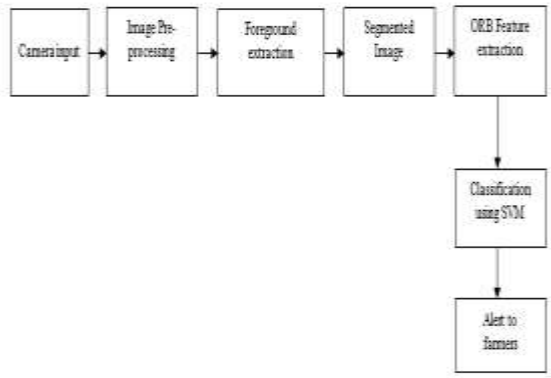

Fig. 1 Proposed FBFE based LDD System

The camera sensor captures the images of the leaves and processes them to segment the diseased part. For segmentation the image is initially pre-processed and then foreground is extracted. The camera is triggered only when there is a change in the colour of the leaf and this will reduce the power. In specific cases, the images are captured at regular intervals. The image is pre-processed before the segmentation process to enhance the quality of the image. The image is enhanced before transforming it to L*a*b* model to improve the quality. Background subtraction along with OTSU thresholding is used to extract the foreground which will be the affected part. ORB descriptors are used for feature extraction. ORB is basically a fusion of FAST key point detector and BRIEF descriptor with many modifications to enhance the

performance. ORB is an excellent alternative to SURF and SIFT detectors.

The extracted features are given as training input to the classification algorithm. SVM is a supervised learning algorithm commonly used for classification [2, 5]. Supervised learning makes use of the training dataset to predict the testing dataset. SVM makes use of the linear kernel function to classify the healthy leaves and diseased leaves. After classification, the detected disease along with the solution is sent to the farmers for appropriate action to improve cultivation yield.

3. Performance evaluation

The proposed LDD system has been validated using MATLAB 2019 software. Tomato leaves was considered for validation and database with 1000 images for training and 400 images for testing was considered for evaluation. The database was taken from Kaggle [6]. The diseases considered for demonstration are bacterial spot, early blight, late blight, leaf mold, Septoria leaf spot and tomato yellow leaf curl virus. The performance of the proposed system is evaluated in terms of detection accuracy and classification accuracy of the system. Fig. 2 shows the input images of the training dataset for various diseases. Fig.3 shows the segmented diseased leaf using FBFE technique.

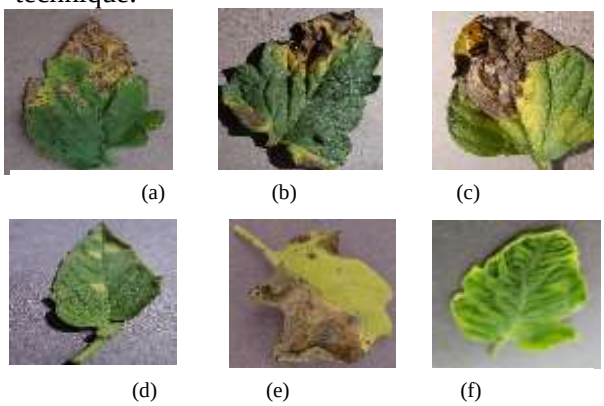

Fig.2 Tomato leaves a) Bacterial blight b) Early blight c) Late blight, d) leaf mold, e) Septoria leaf spot, f) tomato yellow leaf curl virus

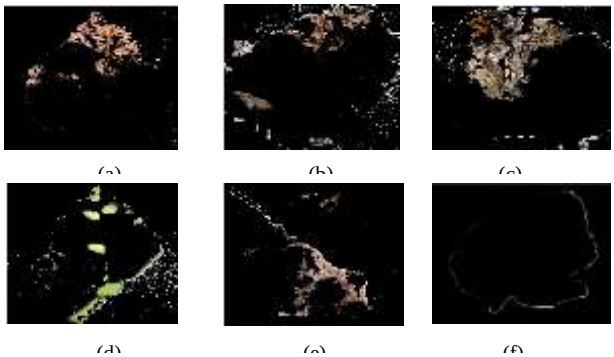

Fig.3 Segmented tomato leaves a) Bacterial blight b) Early blight c) Late blight, d) leaf mold, e) Septoria leaf spot, f) tomato yellow leaf curl virus

calculated using (1).

$$Acc = \frac{P}{T} * 100\% \quad \text{---- (1)}$$

Where P denotes the number of positively classified results and T denotes the total number images considered for testing. The accuracy of the system is tabulated for six diseases of the tomato leaves in Table.1. The proposed FBFE technique is compared with the well-known K-means clustering process-based segmentation.

Crop considered	Disease name	Detection accuracy (%)	
		Existing Work [2]	Proposed LDD
Tomato	Bacterial blight	98.38	97.50
	Early blight	97.67	98.38
	Late blight	96.54	99.20
	Leaf mold	97.46	99.52
	Septoria leaf spot	95.55	98.36
	Tomato yellow leaf curl virus	98.25	98.65
Overall Accuracy		97.30	98.60

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Table.1 Comparison of the proposed work with the existing work

It is observed from Table.1 that the proposed LDD system achieves 98.6 % accuracy on an average, and it is better compared with the existing work reported in the literature. The six different diseases of the tomato leaves are considered for classification and the classification accuracy for each disease are tabulated in Table. 2. The classification accuracy determines the rate of correct classification of the specific diseases from the test images.

The overall classification accuracy is observed to be 99.79 % from the Table 2. The average classification accuracy of the proposed LDD system with FBFE technique and SVM algorithm is better compared to the existing work [2].

Leaf Disease	Bacterial blight	Early blight	Late blight	Late blight	Septoria leaf spot	Yellow leaf curl	Accuracy
Bacterial blight	400	0	0	0	0	0	100
Early blight	0	400	0	0	0	0	100
Late blight	1	0	397	1	0	1	99.25
Leaf mold	0	0	0	400	0	0	100
Septoria leaf spot	0	1	0	0	398	1	99.5
Yellow leaf curl	0	0	0	0	0	400	100
Average							99.79

Table-2 Classification accuracy of the proposed system

4. Conclusion and scope for future work

Plant disease detection is one of the important for agricultural applications to detect diseases at an early stage and improve the yield. The camera sensor at the field can be used for capturing the images at regular intervals or when triggered. The captured images undergo pre-processing stage and foreground based segmentation stage after which the ORB features are extracted. The SVM algorithm is trained with tomato leaf images with six different diseases. The proposed LDD system is simulated using MATLAB, and from the results obtained, it is inferred that the proposed system shows an overall detection accuracy of around 99 % and classification accuracy of around 99.3 %. The proposed system performs better compared to k means clustering algorithm. In future the system will be developed in real time using raspberry pi board and the algorithm will be programmed for testing in the field.

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Prospects of E-Commerce in India

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***ABSTRACT**: E-Commerce is showing tremendous business growth in our country. Increasing internet users have added to its growth. E-Commerce is the future of shopping. Indian E-Commerce Industry has registered impressive growth in the last few years. There are tremendous opportunities of growth in E-Commerce in future also. The present study has been undertaken to describe the present status and examine the barriers of E-Commerce in India and discuss the future of E-Commerce in India.*

Key words: E-Commerce, growth, internet, opportunities, barriers.

I. INTRODUCTION

E-commerce is a boom in the modern business. E-commerce means electronic commerce. E-commerce (Electronic commerce) involves buying and selling of goods and services, or the transmitting of funds or data, over an electronic network, predominantly the Internet. E-commerce (Electronic commerce) is a paradigm shift influencing both marketers and the customers. Rather e-commerce is more than just another way to boost the existing business practices. It is leading a complete change in traditional way of doing business. The e-commerce has transformed the way business is done in India. The Indian e-commerce market is expected to grow to US$ 200 billion by 2026 from US$ 84 billion as of 2020**.** Much growth of the industry has been triggered by increasing internet and smart phone penetration. The ongoing digital transformation in the country is expected to increase India's total internet user base to 829 million by 2021 from 636.73 million in 2019. India's internet economy is expected to double from US$ 125 billion as of April 2017 to US$ 250 billion by 2020. India's E-commerce revenue is expected to jump from US$ 39 billion in 2017 to US$ 120 billion in 2020. growing at an annual rate of 51 per cent, the highest in the world.

II. REVIEW OF LITERATURE

(Ashok Panigarhi 2016) analyzed that e-commerce is connecting rural India for the business hence develop village economy. The future does look very bright for ecommerce in India. India is showing tremendous growth in the E-business. India has an internet user base of over 100 million users. The penetration of e-business is low compared to markets like the US and the UK but is growing at a much faster rate with a large number of new entrants.

(Abhijit, 2013) in his paper opined that e-commerce has unleashed yet another revolution, which is changing the way businesses buy and sell the products and services.. With the development of wireless communication technologies, the internet economy will continue to grow. (Raghunath & Panga,

2013) concluded that initially, new internet users would be reluctant to conduct any kind of business online, citing security reasons as their main concern. In order to increase consumer adoption of e-services, the source of consumer confusion, apprehension and risk need to be identified, understood and elevated. E-Commerce provides tremendous opportunities in different areas but it requires careful application for consumer protection issues. (Madhukar 2015) concluded that ecommerce is future of shopping and gap has been reduced between manufacturer and consumer due to e-commerce. There is vast scope for e-commerce in India but due to weak cyber law, people are facing challenges in India. (Saxena, 2015) in her paper concluded that e-commerce plays a pivotal role in Indian society. It plays an important role in upgrading and developing the Indian economic system. E-commerce also faces some challenges like lack of cyber laws and lack of computer education etc. (H. Ramchandani, 2016) in her paper concluded that the retail e-commerce sales in 2015 as a percentage of total retail sales in India accounted for approximately 0.9% of all retail sales in India. However this figure is expected to grow in near future and is estimated to reach 1.4% in 2018. E-Commerce has greatly impacted the business of physical retailers' especially small retailers. International e-retailers are giving a strong competition to domestic ones.

III. OBJECTIVES

- To understand the present status and trends of E-Commerce; and
- . To know the various problems which are faced by E-Commerce?
- To discuss the future of E-Commerce in India.

IV. METHODOLOGY:

The present study is conceptual survey with exploratory cum descriptive in nature. It is based on the analysis of secondary data. The secondary data is availed from various journals, internet, and books.

V. DEVELOPMENT IN E-COMMERCE

Some of the major developments in the Indian e-commerce sector are as follows:

- In August 2019, Amazon acquired 49 per cent stake in a unit of Future Group.
- Reliance to invest Rs 20,0000 crore (US$ 2.86 billion) in its telecom business to expand its broadband and E-commerce presence and to offer 5G services.
- In September 2019, PhonePe launched super-app platform 'Switch' to provide a one stop solution for customers integrating several other merchants apps.
- In November 2019, Nykaa opened its 55th offline store marking success in tier II and tier III cities.
- Flipkart, after getting acquired by Walmart for US$ 16 billion, is expected to launch more offline retail stores in India to promote private labels in segments such as fashion and electronics. In September 2018, Flipkart

acquired Israel based analytics start-up Upstream Commerce that will help the firm to price and position its products in an efficient way.

- As of March 2019, Flipkart launched its internal fund of about US$ 60-100 million to invest from early stage to seed innovations related to e-commerce industry.

- Paytm has launched its bank - Paytm Payment Bank. Paytm bank is India's first bank with zero charges on online transactions, no minimum balance requirement and free virtual debit card

- As of June 2018, Google is also planning to enter into the E-commerce space by November 2018. India is expected to be its first market. In 2019 Google quietly become India third e-commerce player.

- Reliance retail is going to launch online retail this year. It has already launched its food and grocery app for beta testing among its employees.

- E-commerce industry in India witnessed 21 private equity and venture capital deals worth US$ 2.1 billion in 2017 and 40 deals worth US$ 1,129 million in the first half of 2018.

- Google and Tata Trust have collaborated for the project 'Internet Saathi' to improve internet penetration among rural women in India.

VI. TYPES OF E-COMMERCE MODEL:

There are four main types of ecommerce models that can describe almost every transaction that takes place between consumers and businesses.

1. Business to Consumer (B2C): When a business sells a good or service to an individual consumer (e.g. You buy a pair of shoes from an online retailer).

2. Business to Business (B2B): When a business sells a good or service to another business (e.g. A business sells software-as-a-service for other businesses to use)

3. Consumer to Consumer (C2C): When a consumer sells a good or service to another consumer (e.g. You sell your old furniture on e-Bay to another consumer).

4. Consumer to Business (C2B): When a consumer sells their own products or services to a business or organization (e.g. An influencer offers exposure to their online audience in exchange for a fee, or a photographer licenses their photo for a business to use)

VII. TOP E-COMMERCE SITES IN INDIA

1. Amazon India
2. Flipkart
3. Snapdeal
4. India Mart
5. Book My Show
6. Myntra
7. Firstcry
8. Nykaa
9. 1mg
10. Paytm Mall

VIII. ROLE PLAYED BY THE E-COMMERCE IN NATION BUILDING:

1. E-commerce can potentially create 1 million+ jobs by 2022:

E-commerce is expected to not just create regular corporate jobs but also increase employment in allied industries like logistics and warehousing.

2. While actively supporting and contributing to 20 million+ businesses run by SMEs / entrepreneurs…

With higher revenues and profits, the Internet helps MSMEs in building efficiencies across their operations and in expanding their boundaries and scale.

3. Attracting significant FDI inflows, thereby boosting investor confidence.

Besides benefiting the economy and consumers, this also helps Indian organizations imbibe best practices from their global competitors.

4. Contribute positively towards multiple softer aspects of nation development.

Boosts investor confidence in the Indian consumption story and positively impacts FDI inflows. Enables Indian brands to go global.

IX. PRESENT SCENARIO OF E-COMMERCE IN INDIA:

E-Commerce in India is still in a growing stage, but it offer tremendous opportunities for developing countries like India. The e-commerce sector in India started their operations late nineties among business to business users (B2B). Business to Consumers (B2C) e-commerce started in 1996 in the form of matrimonial portals. The cost and the speed of internet was the limiting factor for their growth at that time. The first E-Commerce website in India was rediff.com, which was one of the most trafficked portals for both Indians and non – residents Indians. Last five years have seen a rise in the number of companies enabling e-commerce technologies and the internet in India. Major Indian portal sites have also shifted towards e-commerce instead of depending on advertisement revenues. Today E-Commerce has become an integral part of our society. There are websites providing any number of goods and services. These websites provide almost all categories of goods and services on a single site. These sites target the buyers of every possible product or service. These websites are known as Multi Product E-Commerce Sites. There are also Single Product E-Commerce Sites, which deal in specialized field only. Technology is changing the way of shopping. Out of the total internet users in India, 60% visit e-commerce sites. Growth shown by Indian players like Flipkart, India Times, Snapdeal etc. and huge investors' interest around these companies showed the immense potentials of the market.

X. PROBLEMS OF E-COMMERCE IN INDIA:

1. Infrastructural Problems:

Infrastructure is an essential part of e-commerce business. It is not possible to continue the business without a good infrastructure. The Internet is an essential tool for e-commerce infrastructure. Since e-commerce needs continuous uninterrupted internet, so it is necessary to ensure it. The major e-commerce infrastructures are available computers, mobile and electronic devices of buyer and seller, available internet service providers and

internet penetration rate, quality and speed of internet connectivity, internet security, and online payment gateway (N. Hajli,2017) Now the traders of various part of India faces poor e-commerce infrastructure, though the penetration rate is 60% in urban areas and 20.26% in rural areas. The growth rate of penetration is increasing day by day.

2. **Absence of Cyber Laws:**

Other big challenge associated with e-commerce market is the near absence of cyber laws to regulate transactions on the Net. WTO is expected to enact cyber laws soon.

3. Privacy and Security Concern:

As of to-day, various issues related to e-commerce are privacy and security. So far, there is no protection offered either by Website or outside watchdogs against hazard created by exploiting one's privacy.

4. Payment and Tax Related Issues:

Issues related to payment and tax is yet another problem continuously hinting e-traders. The electronic payment is made through credit card or plastic money which could, however, not become popular so far in India mainly due to two reasons. First, the penetration of credit card in India is very low (2 per cent of the population). Second, the Indian customers are quite hesitating of paying by credit card with the increasing threat of fraud played by hackers. Similarly, tax administration is yet another complex problem in this e-commerce. As establishing incidence of tax in case of e-commerce transactions becomes difficult, thus, provides ample scope for tax evasion.

5. Digital Illiteracy and Consumer Psyche:

At present, digital illiteracy is one of the main problems e-commerce is facing in India. On the other hand, the continuous exodus of skilled computer engineers to other countries has denuded India of software engineers. This has posed a real threat to the Indian IT industry. Obviously, solution to this problem lies in curbing the computer brain – drain and uses the same in the country.

6. Virus Problem:

That computer virus is also a formidable problem in the execution of e-transactions is confirmed by the computer virus originated in Manila. A computer virus lagged' I Love You' originated in Manila, Philippines on May 5. 2000 rippling across world, inflected millions of computer files causing colossal loss of US $7 billion to the governments and the businesses.

7. **English Specific:**

Last but not the least, the software so far in the country is English specific. But, in order to make e-commerce reach to the small enterprises, it needs to be available in the languages (regional) of the owners of the small enterprises to enable them to adapt e-commerce processes in their operations. Sooner it is done, better will be it for small enterprises to adapt e-commerce.

XI. FUTURE OF E-COMMERCE IN INDIA:

The E-Commerce sector in India is growing rapidly in India. The accelerating growth of e-commerce in India is due to internet penetration and easily available smart phones. Furthermore the favourable

demographics and government effort of digitalisation is also pushing the growth of e-commerce sector in India. Retail sector is one of the largest growing sectors in India at present, which is expected to grow in future with an increasing rate. Table 1 show the growth of ecommerce sales from 2015 to 2021.

Table 1

Year	E-Commerce Sales in Billion US Dollars (2015-2021)
2015	12.19
2016	16.08
2017	20.01
2018	24.94
2019	31.19
2020	38.09
2021	45.17

XII. CONCLUSION:

E-commerce is an emerging trend in Indian economy in the post economic reforms era. The revolution in the IT sector in the recent past has been instrumental in development of e-commerce. E-commerce offers many benefits to the various stakeholders. These benefits are cost effectiveness, quick comparison shopping, better customer service, higher business margins resulting form economy in business operations, information saving and knowledge market development etc. At present there are several stumbling blocks in the development of e-commerce such as computer initial investment, technological issues, computer ill-literacy, legal hassles, and adverse mindset of consumers, privacy and security issues. However, these barriers to e-commerce shall be taken care of in due course and hence e-commerce has bright prospects in India. We need to update ourselves to greet e-commerce and reap its benefits.

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Machine Learning: A Tool of Virtualization

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Abstract*: As** ***we move forward into the digital age, one of the modern innovations we've seen is the creation of *Machine Learning****. This incredible form of Artificial intelligence is already being used in various industries and professions in which computers, software, and devices perform via cognition (very similar to human brain). For Example, Image and Speech Recognition, Medical Diagnosis, Prediction, Classification, Learning Associations, Statistical Arbitrage, Extraction, Regression. Today we're looking at all these Machine Learning Applications in today's modern world.[1] We are continuously trying to develop Something that will make the life more Comfortable. The main idea behind this paper is to develop an application which will capable to control other application with Hand Gestures. One of the best examples is controlling the mouse with the finger Gestures. Machine learning algorithms help to provide an effective way to Detect the movement of Finger that will use to perform other function. This application can provide huge number of applications in day to day life. This paper basically deals with our different Virtual Application: Virtual Mouse, Virtual Reader, Virtual Media Controller, Virtual Game Controller.***

Keywords: Machine Learning, Virtual, Python, Open-cv Threading, Media controller, Reader

1. Introduction

The primary purpose of machine learning is to discover patterns in the user data and then make predictions based on these and intricate patterns for answering business questions and solving business problems. Machine learning helps in analysing the data as well as identifying trends.

1.1 ***Machine Learning*** is a buzzword in the technology world right now and for good reason, it represents a major step

forward in how computers can learn.[2] It is one of the most exciting technologies that one would have ever come across. As it is evident from the name, it gives the computer that which makes it more similar to humans: The ability to learn. Machine learning is actively being used today, perhaps in many more places than one would expect. We probably use a learning algorithm dozens of time without even knowing it. Today, companies are using Machine Learning to improve business decisions, increase productivity, detect disease, forecast weather, and do many more things. With the exponential growth of technology, we not only need better tools to understand the data we currently have, but we also need to prepare ourselves for the data we will have. To achieve this goal we need to build intelligent machines. We can write a program to do simple things. But for most of times Hardwiring Intelligence in it is difficult. Best way to do it is to have some way for machines to learn things themselves. few examples of machine learning are as follow[3]:

- Virtual Personal Assistants
- Predictions while Commuting
- Videos Surveillance
- Social Media Services
- Email Spam and Malware Filtering
- Online Customer Support
- Search Engine Result Refining
- Product Recommendations

And Lot more other applications

In this Paper we will come to Know the application written in Python Programming Language that will help to control the Computer in Somehow different way. We will be able to control the pc with the movement of our hand

- There is Huge Evolution in the field of Computers. When computer was first discovered then when have

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no mouse available. All commands were given with keyboards

- Then introduced wired mouse which Introduced GUI
- Then came wireless mouse which enhance the Comfortable level using Bluetooth Connectivity.
- Now in the world of Machine learning we have the facility to control out mouse with hand Gestures. We can even control GUI Based System without using Mouse. This improve not only increase our comfort level but also enhance the usability of the Computer System, we don't have to carry the mouse everywhere, don't have to find to flat surface to use mouse. This make the computer free from use of mouse. We can directly control the pc immediately without switching towards mouse, we can scroll our web page or document with finger movements, we can control media being played and adjust its setting with fingers.

This paper provides complete description about the concept and working of the virtual mouse, virtual reader, virtual game controller and virtual Media Controller.

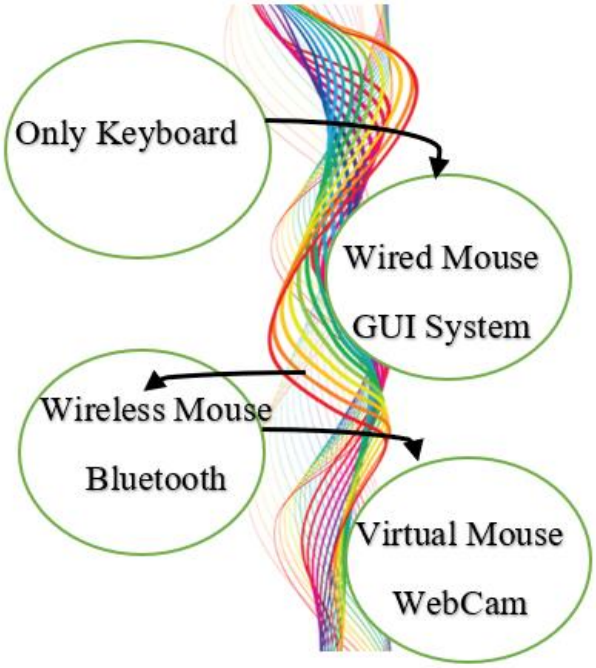

Figure 1: Evolution in Computer

1.2 Pythonis a cross-platform programming language, meaning, it runs on multiple platforms like Windows, MacOS, Linux and has even been ported to the Java and .NET virtual machines. It is free and open source. Python is a powerful multi-purpose programming language created by Guido van Rossum. It has simple easy-to-use syntax, making it the perfect language for someone trying to learn computer programming for the first time.[4]

1.3 Python Modules

1.3.1 OpenCV:

OpenCV was started at Intel in 1999 by **Gary Bradsky** and the first release came out in 2000. OpenCV supports a lot of algorithms related to Computer Vision and Machine Learning and it is expanding day-by-day.[5]

1.3.2 Pyautogui:

The purpose of PyAutoGUI is to provide a cross-platform Python module for GUI automation *for human beings*. The API is designed to be as simple as possible with sensible defaults. PyAutoGUI can simulate moving the mouse, clicking the mouse, dragging with the mouse, pressing keys, pressing and holding keys, and pressing keyboard hotkey combinations.[6]

1.3.3 Threading :

The Thread class represents an activity that is run in a separate thread of control. There are two ways to specify the activity: by passing a callable object to the constructor, or by overriding the run() method in a subclass. No other methods (except for the constructor) should be overridden in a subclass. [7]

1.3.4 Numpy:

NumPy is the fundamental package for scientific computing with Python. It contains among other things:

- a powerful N-dimensional array object
- sophisticated (broadcasting) functions[8]

1.3.5 WMI:

Windows Management Instrumentation (WMI) is a set of specifications from Microsoft for consolidating the management of devices and applications in a network from Windows computing systems. WMI provides users with information about the status of local or remote computer systems.[9]

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1.3.6 Tkinter:

The Tkinter module ("Tk interface") is the standard Python interface to the Tk GUI toolkit from Scripts (formerly developed by Sun Labs).[10]

1.3.7 Pyttsx:

It is a Python package supporting common text-to-speech engines on Mac OS X, Windows, and Linux.
[11]

1.3.8 Pandas:

Pandas is a software library written for the Python programming language for data manipulation and analysis. In particular, it offers data structures and operations for manipulating numerical tables and time series.[12]

1.3.9PIL:

Python Imaging Library is a free library for the Python programming language that adds support for opening, manipulating, and saving many different image file formats. It is available for Windows, Mac OS X and Linux.[13]

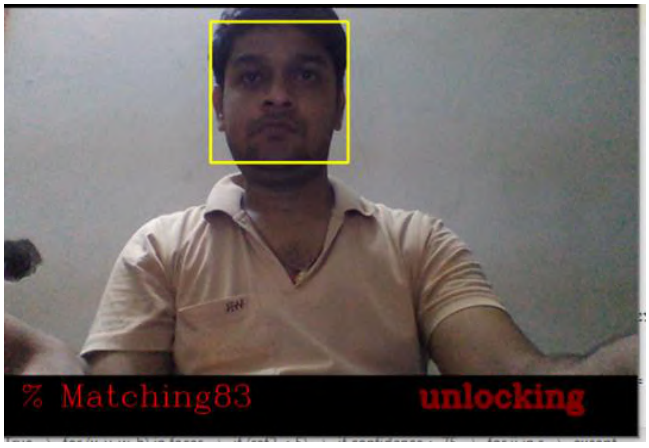

Figure 2 : Login Using Face Unlock

2. Application Description

Application is Divided into four modules defining four different application based on virtualization using Machine Learning.

Login/ Sign up: The first step in the Application is the simple and flexible credential interface where the user/driver must enter the login credentials, orhe/she can Sign up in order to be a part of the Application, the same is shown in the fig as follows. This application helps to log in the application with face ID . this helps to login in without entering password. We know that Facial recognition is a biometric software application capable of uniquely identifying or verifying a person by comparing and analysing patterns based on the person's facial contours. Facial recognition is mostly used for security purposes, though there is increasing interest in other areas of use. This feature help to enhance the privacy and reduce the login time . only one user can use face login feature at a time. You can change face id by signup with password 'Kundan' .

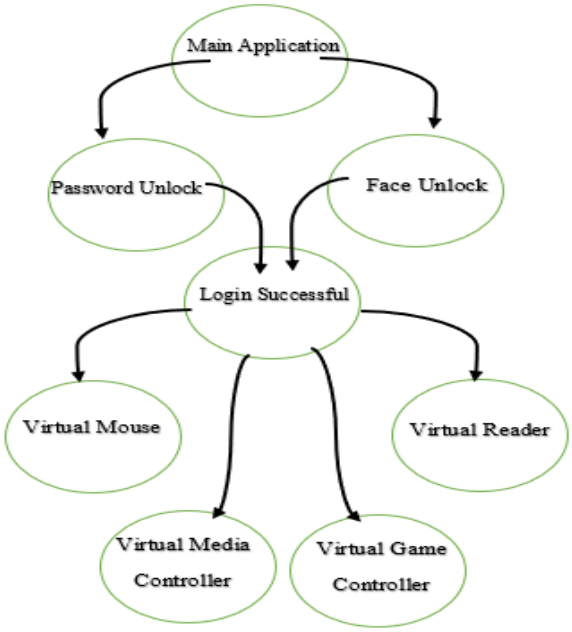

Figure 3: Flow Diagram of Application

i) Virtual Mouse
ii) Virtual Media Control
iii) Virtual Game Control
iv) Virtual Reader

2.1 Algorithm:

1) Make a Tkinter Window of Size 210 x 210
2) Make a frame and put it in label
3) Call Video_Stream()
4) Make the frame attribute "-topmost".

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5) Exit

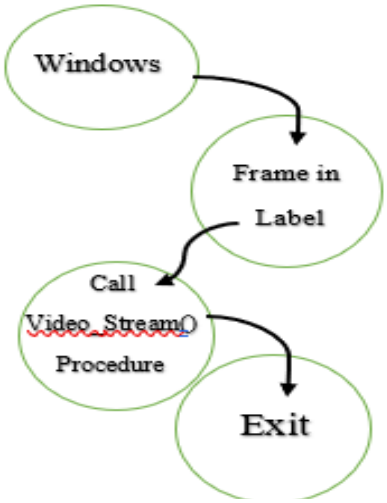


Figure 4: Flow Chart of Algorithm

2.2 Procedure 1: Video_Stream ()

1) Read from camera and save the data into img
2) Select some portion of Image and Store it into img_frame
3) Obtain contours_figure_blue =image_filter_blue(img_frame)
4) Obtain contour_figure_green =image_filter_green(img_frame)
5) Try:

P1,q1=img_shape(contour_figure,img_frame)

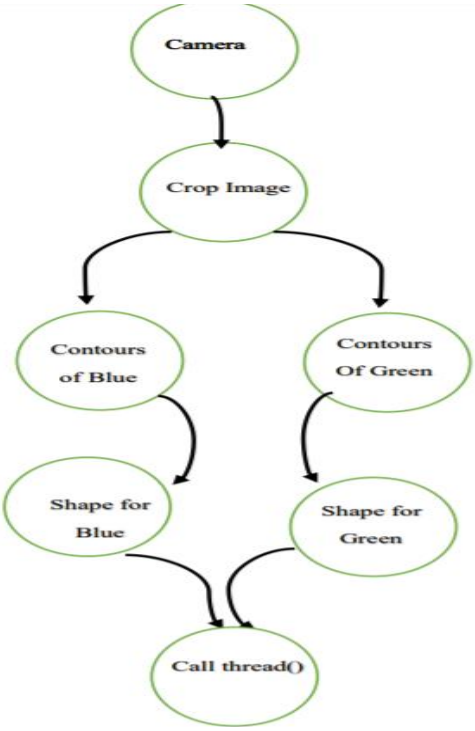
P2,q2=img_shape(contour_figure,img_frame)

T=threading.Thread(name='child',target=thread,args=(p1,q1,p2,q2)

Except:

T=threading.Thread(name='child',target=thread,args=(p1,q1,p2,q2)

Put thread_figure into Label Obtain



Try:

Figure 5: Flow chart of Video_Stream Procedure

2.3 Procedure 2:image_filter_Blue(cropped_image)

1) blur = cv2.GaussianBlur(cropped_image, (3, 3), 0)
2) hsv = cv2.cvtColor(blur, cv2.COLOR_BGR2HSV)
3) mask2 = cv2.inRange(hsv, np.array([94, 80, 2])
4) np.array([126, 255, 255]))
5) kernel = np.ones((5, 5))
6) dilation = cv2.dilate(mask2, kernel, iterations=1)
7) erosion = cv2.erode(dilation, kernel, iterations=1)
8) filtered = cv2.GaussianBlur(erosion, (3, 3), 0)
9) ret, thresh = cv2.threshold(filtered, 127, 255, 0)
10) contours, hierarchy = cv2.findContours(thresh, cv2.RETR_TREE, cv2.CHAIN_APPROX_SIMPLE)

return contours, hierarchy, thresh

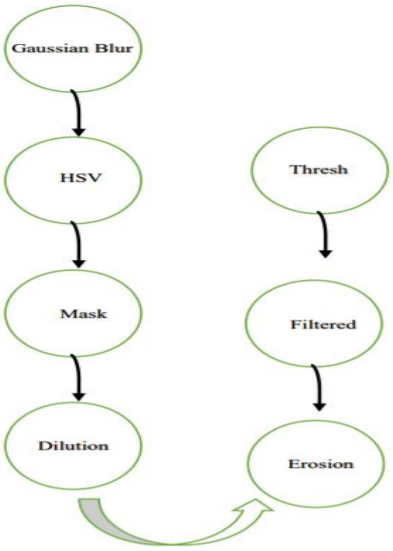


Figure 6: Flow Chart for image_filter_Blue Procedure

2.4 Procedure 3: `image_shape(contours, crop_image):`

1) contour = max(contours, key=**lambda** x:

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cv2.contourArea(x))

x, y, w, h = cv2.boundingRect(contour)

2) cv2.rectangle(crop_image, (x, y), (x + w, y + h), (0, 0, 255), 0)

3) hull = cv2.convexHull(contour)

4) drawing = np.zeros(crop_image.shape, np.uint8)

5) cv2.drawContours(drawing, [contour], -1, (0, 255, 0), 0)

6) cv2.drawContours(drawing, [hull], -1, (0, 0, 255), 0)

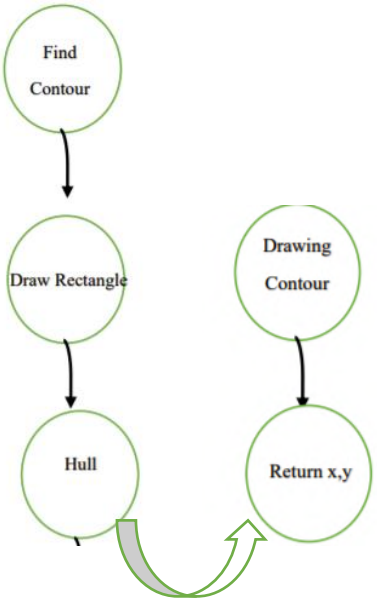

Figure 7: Flow Chart of image_shape Procedure

3. Working of Application

i) **Virtual Mouse**: This is one of the interesting software that helps to control mouse pointer with the movement of hand. Hand behave like mouse..

Figure 8 : Virtual Mouse

If we start, we can control mouse pointer with one right hand. This mode have restricted button functions. You can perform left click and move mouse Pointer from one to other only.

After following the algorithm, we get the value of x and y then use this value in the thread method

```
thread(x1, y1, x2=0, y2=0)
```

According to the value of x1,x2,y1,y2 mouse is moved accordingly by thread function which does the following things:

ii)
iii)
iv)
v)
vi)
vii)

- Move Mouse Cursor Upward Speedly
- Move Mouse Cursor Upward SLowly
- Move Mouse Cursor Left Speedly
- Move Mouse Cursor Left Slowly
- Move Mouse Cursor Right Speedly
- Move Mouse Cursor Left Slowly
- Move Mouse Cursor Down Speedly
- Move Mouse Cursor Down Slowly
- Move Mouse Cursor LeftUp
- Move Mouse Cursor RightUp Speedly

Move Mouse Cursor LeftDown Speedly

ii) ***Virtual Media Control:*** This Application helps in Controlling the Media like video and music with hand.

It can control:

a) Volume up/Volume Down
b) Forward /Backward
c) Brightness Up/ Brightness Down
d) Start /Pause

Figure 9 : Virtual Media Controller

```
thread(x1, y1):
    global brightness
    c = wmi.WMI(namespace='wmi')
    m = c.WmiMonitorBrightnessMethods()[0]
   if x1 > 80 and x1 < 120 and y1 < 25:        Volume Increasing
    elif x1 < 15 and y1 > 60 and y1 < 120:  Backward The Clip or Video
    elif x1 > 140 and y1 > 60 and y1 < 120:    Forward the Video
    elif x1 > 80 and x1 < 120 and y1 > 120:Volume Decrease
elif x1 <= 20 and y1 <= 30
 if brightness < 100:       Increase Brightness
    elif x1 <=20 and y1 > 120:
 Decrease Brightness
    elif x1 > 135 and y1 <= 10:
        Pause the Video
    else:
        pass
```

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Virtual Game Controller:This application helps to play game with the help of hand. We can perform various movement of the game like up,down,left,right etc. movement with the hand.

Figure 10 : Virtual Game Controller

After Following the algorithm we get the value of x and y then use this value in the thread method

```
thread(x1, y1):
   global brightness
   c = wmi.WMI(namespace='wmi')
m= c.WmiMonitorBrightnessMethods()[0]
   if x1 > 40 and x1 < 120 and y1 < 45:
      Move Left
   elif x1 < 35 and y1 > 40 and y1 < 120:
      press('left')   # left
   elif x1 > 140 and y1 > 40 and y1 < 120:
      press('right')       # right
   elif x1 > 30 and x1 < 120 and y1 > 100:
      press('down')       # down
    elif x1 > 135 and y1 <= 30:
      hotkey('altleft','f4')       # right up
   elif x1 > 135 and y1 > 120:
      press('space')
```

iv)Virtual Reader:This helps in Control the Web Page, Pdf File , Windows Cartona ,Closing application more quilkly with hand

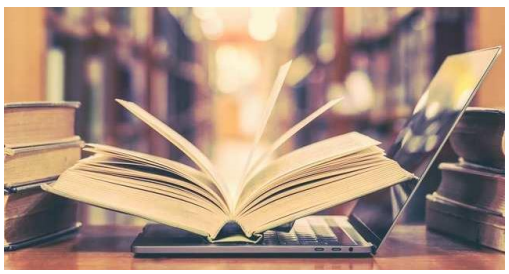

Figure 11 : Virtual Reader

After Following the algorithm, we get the value of x and y then use this value in the thread method

```
thread (x1, y1):
   if x1 > 40 and x1 < 120 and y1 < 45:
      ('Page up')
   elif x1 < 35 and y1 > 40 and y1 < 120:
      ('backspace')       # left
   elif x1 > 140 and y1 > 40 and y1 < 120:
      ('enter')       # right
   elif x1 > 30 and x1 < 120 and y1 > 100:
      (' Page down')       # down   # left up
   elif x1 > 135 and y1 <= 30:
     press('page up Speedly')      # right up
   elif x1 <= 20 and y1 > 130:
      ('Cartona')      # left down
   elif x1 > 135 and y1 > 120:
      ('page down Speedly ')  # rightdown'"
```

4. Conclusion:

On careful Study of all the Test case and the work provided in the paper it can be concluded that virtualization with Machine Learning is a buzzword in the technology world right now and for good reason, it represents a major step forward in how computers can interact with human. The paper discussed about various Technique that changes the way we were using the computers. Helps to perform various tasks of the computer with Hand Gesturethat will make our day to day life easier and more convenient. There can be huge number other application using this methodology like we can Control Mouse , Control Games, control our PDF Reader, Control IOT Devices like Drones or Cars and many more.

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A Study of Various Security Attacks in VANET

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Abstract*—Protection is required whenever a communication takes place between two or more vehicles. The attacker can gain access to the network by compromising either the vehicle or road side unit or the communication medium that transfers the messages between vehicles. Vehicular Ad hoc Network (VANET) have motivated the interest towards the passenger comfort and secure driving environment. However, the open-wide communication becomes a tedious challenge for VANET organization. Because of the wireless self-structured background, VANET are prone to many attackers. In this paper, we are focusing on security issues like DoS, Sybil, DDoS, jamming and flooding attacks as well as techniques like TESLA which causes harm to VANET and also security countermeasures like digital signature which are used to prevent the mentioned security issues that alleviate VANET.

Keywords- *Vehicular communication; VANET; Security attacks; DoS*

I. INTRODUCTION

Nowadays, ad hoc network have induced their comforts in both industrial and defense sector since, it does not demanding any pre-planned structure. Moreover, it has the prominent trait that it has the ability to form a network even though moving from one location to another.

Most of the people are died around the sphere due to road accidents either by slackness of driver, traffic jamming, inadequate road information. To overcome the road accident the proper information about the roads can be given to the driver earlier. For this, a new emerging and booming technology called Vehicular Ad hoc Network (VANET) which has no stable infrastructure with high speed vehicles. The major objective of the VANET is indemnify a secure drive by enhancing the traffic flow and shrinks traffic collisions.

VANET is a distinctive sub class of Mobile Ad hoc Network (MANET). VANET and MANET have some close resemblances with each other such as varying bandwidth, short range connectivity, and unfixed infrastructure. Intelligent Transportation System is a sub structure of VANET that provides smart communication to the vehicles with the usage of transport network. But VANET has its individual distinct features like high mobility, unreliable channels.

The VANET architecture is depicted in Figure.1 VANET offers a direct communication between inside and outside environment of the vehicle through wireless interfaces. Each and every nodes present in the VANET will act as a router as well host due to its decentralized organisation.

security. Electronic License Plate (ELP) it is used for vehicles electronic identity. Event Data Record (EDR) the event that takes place in the vehicle atmosphere are recorded.

The VANET uses Dedicated Short Range Communication (DSRC) protocol to communicate with RSU and other vehicles.

A. Features of VANET

The resemblances of VANET and MANET seem to be alike but VANET has its own distinct features. They are

The structural design of the VANET is divided into three types. They are cellular network, pure ad hoc network and hybrid network. There exist two different types of communication in VANET Vehicle to Vehicle (V2V) and Vehicle to infrastructure (V2I) for these technical components are used to communicate among V2V or V2I it needs some Technical components integrated [1] with hardware and software they are OBU and RSU. On-board Unit (OBU) is mounted in the vehicle through which it can communicate with other vehicle or with RSU. The road side unit (RSU) is placed at the road side to record the traffic patterns. Tamper Proof Module (TPM) it buffers the information that are related to the

1) High Mobility

Due to the vehicle's random speed it makes a tedious task in predicting the vehicles location.

2) Dynamic Topology

Due to fast random movement of the vehicle, topology of the VANET varies repeatedly. Thus, the routing path also differs rapidly.

3) Random disconnection

The fast moving of the vehicle makes the short range of communication with its neighbour causing frequent disconnection.

TABLE I.
FEATURES OF VANET & MANET

S. No	Characteristics of VANET and MANET		
	Parameter	**VANET**	**MANET**
1	Cost	High cost	Low Cost
2	Mobility	High	Low
3	Node density	Thick	Thin
4	Bandwidth	1000 Kps	100 Kps
5	Range	Upto 500 m	Upto 100 m
6	Reliability	High	Low
7	Node Speed	Medium-high (20-100 km/h)	Lower (6 km/h)
8	Topology Change	Medium	Low
9	Energy Constraints	Low	Medium
10	Lifetime of the node	Depends on lifetime of the vehicle	Depends on power source
11	Nodes moving patterns	Regular	Random

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B. Applications of VANET

The applications of the VANET are typically grouped into safety related applications, transport efficiency, infotainment applications.

1) Safety related applications

It contains flair applications that are admitted by Vehicle Safety Consortium (VSC) they are warning of traffic violation, arc speed, changing of lane, stop sign assistance for movement, sensing of vehicle pre-crashing.

2) Transport efficiency

It provides application that are admitted by Car to Car Communication Consortium (C2C- CC) it includes guidance and navigation of routes, merging assistance of lane.

3) Infotainment

It provides information such as online services, nearest gas station, restaurants, gaming application, news updates, weather reports etc.

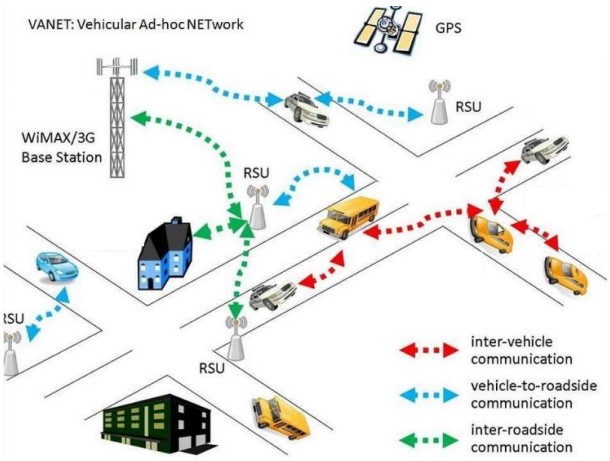

Figure 1. VANET Architecture.

II. SECURITY IN VANET

The VANET are exposed to various types of attacks, vulnerabilities due to its unfixed infrastructural environment. For instance broadcasting of fraudulent threatening messages and clampdown of genuine cautioning messages thus it leads to misfortunes of survival and time.

A. Security Requirements in VANET

Due to the open-wide communication of the VANET, some of the security requirements are found and they are as follows:

1) Authentication

Authentication is a method by which confidentiality of the message transferred is maintained. Before a message is used by a vehicle or RSU it makes sure that the message is received from an authentic sender. In other words, it makes sure that the sender is an impersonator or not.

2) Authorization

After the vehicle has been authenticated the next step is known as Authorization. This authorization is a technique in which the administrator will make sure that the vehicles have the appropriate rights to view or access or modify the data.

3) Trusted Third Party Authentication

The trusted third party (TTP) is sometimes known as trusted authority as its entity is trusted by all other entity in that environment. In some scenario, TTP must protect the resources as long term secrets. The compromising of such secrets may leads to render an insecure communications.

4) Confidentiality

Confidentiality is a technique that makes sure the vehicles privacy is maintained at all times. There are different techniques in VANET that allows the vehicle to maintain privacy. It also makes sure that the vehicles details are not revealed to other vehicles who are not allowed to hear it. Confidentiality of vehicles data has to been maintained in case of V2R and V2V communications. Confidentiality can be identified using encryption and authentication techniques.

5) Integrity

The message send by the sender to the receiver via the network the integrity of the message should be maintained. That is there should not be any modification or tampering of messages.

Figure 2. CIA Triangle.

6) Access Control

Access control is a security technique that can be used to legalize who or what can view or use resources in a computing environment.

7) Non repudiation

It prevents either sender or receiver in the network from disagreeing a transferred message. Thus, when a message is sent, the receiver can prove that the unproven sender in fact the message. Similarly, when a message is received, the sender can prove that the unproven received in fact received the message.

8) Privacy

The passenger's profile or driver information should be preserved against from the malicious attackers.

9) Availability

Ensuring that legitimated parties are able to access the information when needed. Information only has value if the right people can access it at the right times. Denying access to information has become a very common attack nowadays.

B. Types of Attackers

The attacker is a person who wants to destroy or control the entire network. The classification of attackers is as follows:

1) Insider

In a network, they perform the attack by communicating other members in a network. They have some additional advantages when compare to other type of attackers because the insider may have some authorized access to the network moreover they know the target's network architecture.

2) Outsider attacker

In a network, they perform the attack by indirectly communicating with other members in a network. Insider have direct communication with network by which they can perform more attacks in the network. Whereas, the outsider performs less number of attacks as they have restricted to access the resources in the network.

3) Malicious

They perform the attack towards the targeted network with the lack of their own profits. They attack the network not for their individual benefits.

4) Rational

They are opposite to the malicious attackers. They perform the attack towards the targeted network with the surplus profits of their own.

5) Active attacker

When a network receives a packet the attacker captures and modifies the message that are present in the packet and retransmits the message.

6) Passive attacker

When a network receives a packet the attacker captures and sniffs the messages in the packet and retransmits the packet without any modification. Passive attacker is less harmful when compared to active attacker.

C. Security Threats in VANET

VANET faces many security threats along with the attacks. They are as follows:

1) Bogus Information

In this, the attacker broadcast the falsified information to the vehicles that are present in the network. This is done for the attacker's own profit.

2) Masquerade

A vehicle frauds its characteristics and mislead to act as other vehicle for its individual gain.

3) Malware and spam

The insider causes the interception in the network by spreading viruses, spam. They are typically performed when updating the software's of road side unit and on-board units thereby, the effect of the attack gets increased.

4) Intentional Attack

It is very tough to protect the intentional attack. Because it is created by the trustworthy insider. A real node can hold the entire network by rejecting the messages to nearby nodes, attaching false information, not using the bandwidth properly.

5) Man in the Middle Attack

A spurious car may eavesdrop the communication that is exchanged between the vehicles. By which the attacker sends some fake information to the vehicles.

D. Security Issues in VANET

There are various attacks that affects the VANET's performance and are as follows:

1) Denial of Service Attack

The malicious attackers broadcast the fraudulent messages to block the entire communication medium. By which the network performance can be degraded and the efficiency becomes low. The Figure 3 depicts the DoS attack in that the authentic cars are name as A, B, C in which the malicious attackers sends the fraudulent messages like accident ahead, lane ahead.

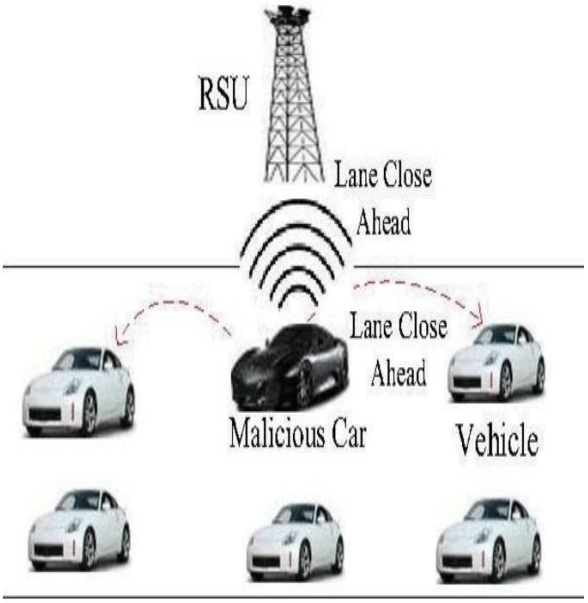

Figure 3. Denial of Service Attack.

2) Sybil Attack

In this type of attack, a node sends numerous message packet to other nodes and every message has a bogus identity in it. The main motivate is to create a vehicle and placing it to the different locations at a same time.

3) Distributed Denial of Service Attack

When compared with DoS attack, DDoS attack has a severe effect. In this type of attack many number of malevolent vehicle attacks the authentic vehicle with a bogus messages in a scattered manner from various locations at various timeslots. The Figure 4 depicts the DDoS attack in which the malicious attackers M1, M2, M3 sends fraudulent messages to the authentic vehicle A so that A can't communicate with other vehicle.

4) Jamming Attack

It intentionally transfers radio signals to falsify the entire communication by reducing the signal to noise ratio. The jammers continuously send frequent signals to interfere with the communication between nodes in the network. The victim feels that the channel is busy. The overall motive of this attack is to degrade the overall QoS services.

5) Flooding Attack

It is a form of denial of service attack in which the attacker brings the network down by flooding continuous services.

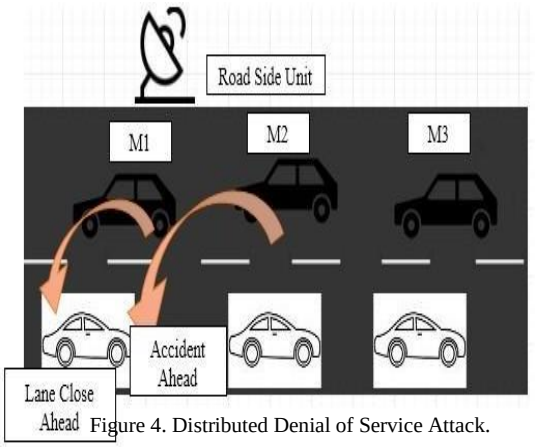

Figure 4. Distributed Denial of Service Attack.

E. Security Countermeasures in VANET

The security countermeasures used are VANET are as follows:

1) Public Key Approaches

Each and every node has two keys secret and public keys. They are handled by the Public Key Infrastructure (PKI). PKI system is used in addition with the in-built two components of the VANET they are Event Data Recorder (EDR) and Tamper proof Module (TPM).

2) Symmetric and Hybrid Approaches

In this scheme the vehicle communicates with each other by sharing the agreeing secret key for communication. In VANET based communication the normal security scheme used are public or symmetric key but new a hybrid system uses both symmetric and public keys for two types of communications they are pair-wise and group communication. When two vehicle communicates with one another pair-wise communication can be used. When more than two vehicle communicates with each other group communication is used.

3) Certificate Revocation Approaches

To provide security in VANET Public Key Infrastructure (PKI) is used which contains certification revocation system. It has the ability to dismiss the membership of the vehicle. It can be done in two ways centralized and decentralized. In centralized approach, the revocation decision is taken by the central authority. In decentralized approach, the revocation decision is based on the neighbor vehicles of the group.

4) ID based cryptography

ID-based online/offline signature (IBOOS) scheme is used for verification purposes. Offline process is first done in RSU or first in the vehicles. During vehicle to vehicle communication online process is used.

5) Digital Signatures

The nodes present in the network transfers the message while sending messages there is a necessity to maintain the security. For this purpose digital signature can be used. By using the public key cryptosystem the sender sign the data with digital signature. At the other end the receiver the hash code to decrypt the data.

III.DETECTION OF DENIAL OF SERVICE ATTACKS

A. Extended Three Party Password Based Authenticated Key Exchange (E-3PAKE)

R. Muthumeenakshi et. al [2] proposed an Extended Three Party Password based Authenticated Key Exchange (E-3PAKE) to defend against Denial of Service (DoS) attack. VANET affords value added services such as internet access, gaming, content sharing, business, infotainment etc. which are termed as non-safety application. The proposed scheme is based on authentication model to improve the security in value added services. The previous existing works also based on value added services but it prone many security issues DoS is one among them. This scheme aims to provide authentication in value added services. For this, it uses batch message dispatch it customizes the roles of the user based on the type of the user category such as primary, secondary, premium. Of these, the primary category are given as the highest priority because it comes under the crisis request such as hospital service etc. The incoming messages are signed by the on board unit along with their keys for authentication purposes and the message are interchanged with road side unit inorder to provide data integrity of the requesting services.

B. Bloom Filter based IP-CHOCK

Karan Verma et. al proposed a method [3] permits the valid service from the authorized vehicle in VANET environment. The abnormal traffic of the vehicle in VANET has been examined by the IP-CHOCK detection algorithm which is divided into three phases. The traffic information of the vehicle that are entering in the VANET are collected and checked by the phase1detection engine. The non-fraudulent, non-malicious IP address of the vehicles' information are stored in the database and the fraudulent, malicious information are stored in decision engine. The final phase is the bloom filter with hash which sends an alert to all the connected vehicle in VANET about the malicious IP address; otherwise it updates the legitimate IP address.

C. VAST (VANET Authentication using signature and TESLA++)

Ahren Studer et. al [4] proposed a framework VAST is deployed as the combination of ECSDA and TESLA++ which is used to verify the each message packet. The role of TESLA++ is to verify the valid incoming messages and filters the fraudulent message and ECSDA uses digital signature. Inorder to ensure the secure message, every message is generated with digital signature, message authentication code and the receiver authenticates the packet by verifying them. This framework thwarts from flooding and computational DoS attacks.

D. TESLA ++ (Time Efficient Stream Loss Torrelant Authentication)

Ahren Studer et. al [4] proposed TESLA++ which is considered to be a small enhancement of TESLA as it overcomes the memory based DoS attacks. In this, the sender transmits the message authentication code before transmitting the message and key. The receiver buffers the message authentication code inorder to reduce the memory overhead. The pitfall of TESLA ++ in lossy network are non- reputation, multi- hop functionality.

E. TESLA (Time Efficient Stream Loss Torrelant Authentication)

The broadcast message in TESLA [4] are authenticated by using symmetric cryptography along with delayed key disclosure. To validate the source message, the sender transmits the packet along with the message authentication code by using sender's key for an interval of time (K_i). At the other end, the receiver buffers the received message and message authentication code until the key is broadcasted by the sender. After a period of time the receiver, receives the key and checks the message and message authentication code with that key. The pitfall of TESLA is it suffers from memory based DoS attack.

IV. DETECTION OF SYBIL ATTACKS

A. Radio Resource Testing

Salam Hamdan et. al proposed [5] a mechanism used for the detection of Sybil attack. It is in supposition that each node is restricted to have number of resources. The resources present in the node are compared with usual nodes if it results less number of resources it is detected as the Sybil node otherwise it is a legitimate node.

B. Sensor based on Position Verification

The techniques proposed by Tim Leinmuller et. al [6] are

1) Acceptance Range Threshold

The maximum acceptance range of the threshold is fixed based on the channel radio of the information. It discards the beacon message that are larger than the current position of the receiver's nodes.

2) Mobility Grade Threshold

The mobility of the supposition nodes is described with a maximum speed. Every node issues a timestamp upon receiving the beacon message. The average speed of the node is computed if there is a variation in the position of the beacon message, MGT discards the node.

3) Maximum Density Threshold (MDT)

The threshold determines the number of nodes that can reside in an area. The sensors predefine the maximum density of the threshold. The threshold restrains the number of nodes that can reside in an intended area. If the entirety of the node exceeds the defined threshold the beacon from that position are discarded.

4) Map based verification

Street maps are used to navigate the position of the vehicle. Also, it can verify whether the vehicle is physically present or not.

V.DETECTION OF DISTRIBUTED DENIAL OF SERVICE ATTACK

A. Genetic Algorithm

The framework proposed by Avleen Kaur Malhi et. al [7] manipulates the genetic algorithm against DDoS attack. In order to overcome the problem of ID based cryptography and public key infrastructure the framework calculates the vehicle's fitness. The sender broadcast the signed message and the receiver validates the message. The sender transmits the signed message and the receiver validates the message. If the authentication of the message were provided then it ensures that the message was from the secured sender. To maintain the message integrity digital signature were used and to preserve the privacy pseudonyms were assigned by the road side to the vehicles.

B. Firecol

François Jérôme et. al proposed a new collaboration [8] Firecol that detects flooding DDoS attack. It encompass on intrusion prevention system which is installed at the service provider. It act as a service through which the customers may subscribe. It develops a virtual protection guard against flooding DDoS attack for the enrolled customers. The framework is composed of selection manager which computes the present profile traffic flow from the saved one it chooses one profile and then it forwards to score manager. The role of the score manager is to allocate score for the adopted rule based on the entropy, frequency. The level of the attack are categorized as high, low based on the threshold

C. IP Traceback based Intelligent Filtering

Minho Sung et. al [9] proposed a scheme to defense against DDoS attack using packet filtering. It contains three modules. The Enhanced probabilistic marking module runs in router background where the presence of DDoS attack exists or not. In attack mitigation decision making module, it constructs the attack path with the help of the IP trace back next based on the probability of the decision the packet may be dropped. In preferential packet filtering module based on the collected packet information it filters the packet if it is detected as the attack packet.

D. Traffic Congestion

Ayonija Pathre et. al [10] proposed a new scheme for traffic congestion. The communication that takes place in the network were monitored by the road side unit. The attacker misguides the fraudulent message endlessly to other vehicles thereby causing congestion in the network. The vehicles that cause the transmission of fraudulent message are identified and discarded.

VI. DETECTION OF JAMMING ATTACK

A. Fuzzy Logic

S.K. Bhavithra et. al [11] identifies the jamming attack by using fuzzy logic. The aim of this paper is to send information in an alternative path if it detects the jamming attack in the network. Fuzzy logic is employed for the detection of the jamming attack. To provide an alternative path Localizability Aided Localization approach is used for sending information to the receiver.

B. Threshold Technique

Gagandeep Kaur et. al [12] proposed threshold based technique [12] for the detection of jamming attack. In a vehicular environment malicious and non-malicious nodes are exist due to the decentralized architecture of the VANET. The threshold values of the data are allocated, if the malicious nodes are identified based on the data packet that are sent in the network. If the value exceeds the allocated threshold it is identified as the malicious jamming node.

C. DJAVAN (Detecting Jamming Attack in Vehicle Ad hoc Network)

Lynda Mokdad et. al [13] proposed an algorithm that uses

packet delivery ratio for the identification of jamming attack. The solution computes the packet delivery ratio and it may

have a drop in a time slot. If the variation drop has a vast difference, then it recognizes the existence of jamming attack.

VII DETECTION OF FLOODING ATTACK

A. FDER (Flooding Detection based on Encounter Record)

Thi Ngoc Diep Pham et. al [14], the flooding attack is detected based on the defined time interval, rate limit of the message that are allocated to the nodes. If the traffic pattern of the normal nodes exceeds the allocated limit it is detected as the attacking node. Moreover, encounter record is used for tracking the nodes behavior.

B. Slow Detection, Fast Recovery

Ding Pengfule et. al [15] proposed a mechanism based on Adaptive threshold detection algorithm is employed. It records the present traffic of the network and changes the threshold value. The value of the threshold is computed based on the current change in the network. If the computed value exceeds the threshold value it is detected as the existence of flooding attack.

VIII. CONCLUSION

VANET is an infrastructure less network which is used for communication between two or more vehicles with the help of On-board unit, Road side unit. Due to the contrasting features of VANET there are different vulnerabilities which cause the network crash down. Over the past decade various researchers have concentrated on different security vulnerabilities and its countermeasures in VANET. So, this paper provides a detailed survey of the latest security related detection techniques in VANET. Based on the survey our research is based on the attacks in the VANET and its countermeasures.

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A Review: Cyber Crime and Our Digital Life

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Abstract:

Cyber security is the activity of protecting information and information systems such as networks, computers, databases, data centers and applications with appropriate technological security procedures and measures. Firewalls, antivirus software and other technological solutions. To protect personal data and computer networks are essential but not sufficient to ensure security. As our nation rapidly develops its IT infrastructure, it is equally important to educate our population to work properly with this infrastructure. Cybernetics, cybersecurity and cybersecurity issues need to be integrated into the educational process that begins at the beginning of the years. Security countermeasures help to ensure the confidentiality, availability and integrity of information systems by preventing or seriously losing resources due to cyber security attacks: cyber security has recently become a consolidated discipline for IT systems and infrastructures . with a focus on protecting the valuable information stored in those opponent systems that you want to obtain, corrupt, damage, destroy or prohibit access to.

I. Introduction

The Internet is one of the rapidly growing areas of technical infrastructure development. In today's business environment, disruptive technologies such as cloud computing such as computing and next generation mobile computing are radically changing the way organizations use information technology to share information and conduct online businesses. Today over 80% of total commercial transactions are done online, so this field requires high quality if security is transparent and the best transactions. Cyber security extends not only to IT system security within the company, but also to the broader digital networks on which they depend, including cyberspace itself and critical infrastructure. Cyber security plays an important role in the development of information technology and Internet services. Improving cyber security and protecting critical information infrastructures are essential for the security and economic well-being of each nation. The company has become dependent on IT systems across the range of human activities, including commerce, finance, healthcare, energy, entertainment, communications and national defense.

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The Internet as a global network was primarily created for military purposes. So it is not surprising that the meaning of security was significant from the start. Later, when the Internet became accessible to almost everyone, criminals also started using it for their own purposes. Cyber security specialists and cybercriminals have started the competition which can be compared to the development of offensive and defensive weapons to resist attacks. Cyber security is the field of science that develops constantly and rapidly, so there are always many interesting topics for research work. Cybercrime is now a global problem affecting many spheres of human life. Police around the world must study how to deal with these crimes, safety lessons for children who prepare them for the dangers of the digital world ... Of course, large companies that have every reason to keep their Data secret and intact. Invest incredible amounts of money to increase digital security worldwide.

II. Cyber security and cybercrime:

Cybercrime and cyber security are problems that can hardly be separated in an interconnected environment. the fact that the 2010 United Nations General Assembly resolution on cyber security addresses cybercrime as a major challenge . Cyber security plays an important role in the continuous development of information technology and Internet services. Improving cyber security and protecting essential information infrastructures are essential for the security and economic well-being of each nation. Making the Internet safer (and protecting Internet users) has become an integral part of developing new services, as well as government policy. Cybercrime determination is an integral part of a national information security infrastructure and a critical information protection strategy . . At national level, this is a shared responsibility. which requires coordinated action in relation to the prevention, preparedness, response and recovery of accidents by government authorities, the private sector and citizens. The legal, technical and institutional challenges posed by the cybersecurity issue are global and far-reaching and can only be addressed through a coherent strategy that takes into account the role of the different stakeholders and existing initiatives within a framework of cooperation

III. Advantages and risks:

The growth of the information society is accompanied by new and serious threats. Essential services such as water and electricity supply now depend on ICT. Cars, traffic control, elevators, air conditioning, and telephones also depend on the proper functioning of ICT.23 Attacks on information technology infrastructure and Internet

services now have the potential to harm society in new and critical ways. Attacks have already occurred against IT infrastructure and Internet services. Online fraud and piracy attacks are just a few examples of cybercrimes that are committed on a large scale every day. The financial damage caused by cybercrime is said to be enormous. On the other hand, most of our industrial IT infrastructure is still fragmented enough to have a window of opportunity to guide its evolution towards better security through the progressive introduction of components, such as interface controllers, which provide more defenses. . effective against hostile attacks. If properly implemented and managed, the aforementioned interface controllers (guards, gateways and firewalls) can significantly improve the security of systems involving the following types of data flow, particularly when they do not benefit from end-to-end encryption. extreme.

IV. Current cyber security measures

The Internet is currently mainly ensured through private regulatory activities, defensive strategies and products, national laws and measures and some limited forms of international cooperation and regulation. 4.1 Private measures Non-governmental entities play important roles in the field of cyber security. Technical standards for the Internet (including current and next generation Internet versions) are developed and proposed by the task of private control. Internet engineering Force the Web Consortium, located at the Massachusetts Institute of Technology, defines technical standards for the web. Other privately controlled entities that play an important role Operational roles in the cybersecurity aspects include major telecom operators, Internet service providers and many other organizations, including. 4.2 National measures many national governments have adopted laws aimed at punishing and therefore discouraging specific forms of cyber attacks or exploitation. The United States, for example, has adopted laws that criminalize various forms of behavior, including intentional and intentional intrusion damage to computer systems. However, these laws have little or no effect on individuals, groups or governments for whom the United States lacks or cannot guarantee crime regulation or jurisdiction. UU. they almost exclusively stress the need for measures to improve cyber security. Recommend national laws to protect the exchange of information on threats and attack methods for government agencies, such as the NSA, to cooperate with private entities to assess the source and nature of cyber attacks; and more effective defenses and responses to cyber attacks and exploitation developed through government-sponsored research and coordination in accordance with cyber security plans.

International Measures

National governments often cooperate with each other informally by exchanging information,

investigating attacks or crimes, preventing or stopping harmful conduct, providing evidence, and even arranging for the rendition of individuals to a requesting state. States have also made formal, international agreements that bear directly or indirectly on cyber security. The international agreements apply to the criminal activities specified, including situations in which the alleged criminals have used cyber systems in those activities. International agreements that potentially bear upon cyber-security activities also include treaties (the UN Charter and Geneva Conventions) and universally accepted rules of conduct (customary law). International law also provides rules related to the use of force during armed conflict that presumably apply to cyber attacks ,Illegal access.

The offence described as ―hacking refers to unlawful access to a computer system , one of oldest Computer-related crimes.Following the development of computer networks (especially the Internet), this crime has become a mass phenomenon. Famous targets of hacking attacks include the US National Aeronautics and Space Administration (NASA), the US Air Force, the Pentagon, Yahoo, Google, eBay and the German Government. Examples of hacking offences include breaking the password of password-protected websites and Circumventing password protection on a computer system. But acts related to the term ―hacking also Include preparatory acts such as the use of faulty hardware or software implementation to illegally obtain a password to enter a computer system, setting up ―spoofing‖ websites to make users disclose their Passwords and installing hardware and software-based key logging methods that Record every keystroke and consequently any passwords used on the computer or device.

Mobile Devices and Apps

The exponential growth of mobile devices drives an exponential growth in security risks. Every new smart phone, tablet or other mobile device, opens another window for a cyber attack as each creates another vulnerable access point to networks. This unfortunate dynamic is no secret to thieves who are ready and waiting with highly targeted malware and attacks employing mobile applications. Similarly, the perennial problem of lost and stolen devices will expand to include these new technologies and old ones that previously flew under the radar of cyber security planning.

Social Media Networking

Growing use of social media will contribute to personal cyber threats. Social media adoption among businesses is skyrocketing and so is the threat of attack. In 2012, organizations can expect to see an increase in social media profiles used as a channel for social engineering tactics. To combat the risks, companies will need to look beyond the basics of policy and procedure development to more advanced technologies such as data leakage prevention, enhanced network monitoring and log file analysis.

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Cloud Computing

More firms will use cloud computing. The significant cost savings and efficiencies of cloud computing are compelling companies to migrate to the cloud. A well designed architecture and operational security planning will enable organizations to effectively manage the risks of cloud computing. Unfortunately, current surveys and reports indicate that companies are underestimating the importance of security due diligence when it comes to vetting these providers. As cloud use rises in 2012, new breach incidents will highlight the challenges these services pose to forensic analysis and incident response and the matter of cloud security will finally get its due attention.

Protect systems rather Information

The emphasis will be on protecting information, not just systems. As consumers and businesses are like move to store more and more of their important information online, the requirements for security will go beyond simply managing systems to protecting the data these systems house. Rather than focusing on developing processes for protecting the systems that house information, more granular control will be demanded - by users and by companies - to protect the data stored therein.New platforms and new devices will create new opportunities for cybercriminals. Security threats have long been associated with personal computers running Windows. But the proliferation of new platforms and new devices - the iPhone, the I Pad, Android, for example - will likely create new threats. The Android phone saw its first Trojan this summer, and reports continue with malicious apps and spyware, and not just on Android.

V. Most common cyber attack

1. Denial-of-service (DoS)
2. Man-in-the-middle attack
3. Phishing and spear phishing attacks
4. Drive-by attack
5. Password attack
6. Eavesdropping attack

Denial-of-service (DoS) and distributed denial-of-service (DDoS) attacks

A denial-of-service attack overwhelms a system's resources so that it cannot respond to service requests. A DDoS attack is also an attack on system's resources, but it is launched from a large number of other host machines that are infected by malicious software controlled by the attacker

Man-in-the-middle (MitM) attack

A MitM attack occurs when a hacker inserts itself between the communications of a client and a server.

Phishing and spear phishing attacks

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Phishing attack is the practice of sending emails that appear to be from trusted sources with the goal of gaining personal information or influencing users to do something. It combines social engineering and technical trickery. It could involve an attachment to an email that loads malware onto your computer. It could also be a link to an illegitimate website that can trick you into downloading malware or handing over your personal information.

Spear phishing is a very targeted type of phishing activity. Attackers take the time to conduct research into targets and create messages that are personal and relevant.

Drive-by attack

Drive-by download attacks are a common method of spreading malware. Hackers look for insecure websites and plant a malicious script into HTTP or PHP code on one of the pages. This script might install malware directly onto the computer of someone who visits the site, or it might re-direct the victim to a site controlled by the hackers. Drive-by downloads can happen when visiting a website or viewing an email message or a pop-up window. Unlike many other types of cyber security attacks, a drive-by doesn't rely on a user to do anything to actively enable the attack — you don't have to click a download button or open a malicious email attachment to become infected.

Password attack

Because passwords are the most commonly used mechanism to authenticate users to an information system, obtaining passwords is a common and effective attack approach. Access to a person's password can be obtained by looking around the person's desk, ''sniffing'' the connection to the network to acquire unencrypted passwords, using social engineering, gaining access to a password database or outright guessing.

Eavesdropping attack

Eavesdropping attacks occur through the interception of network traffic. By eavesdropping, an attacker can obtain passwords, credit card numbers and other confidential information that a user might be sending over the network. Eavesdropping can be passive or active:

Passive eavesdropping — A hacker detects the information by listening to the message transmission in the network.

Active eavesdropping — A hacker actively grabs the information by disguising himself as friendly unit and by sending queries to transmitters. This is called probing, scanning or tampering.

VI. Most Common Types of Cybercrime

Cybercrime involves the use of computer and network in attacking computers and networks as well. Cybercrime is obviously a criminal offense and is penalized by the law. Cybercriminals devise various strategies and programs to attack computers and systems.

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Fraud

Fraud is a general term used to describe a cybercrime that intends to deceive a person in order to gain important data or information. Fraud can be done by altering, destroying, stealing, or suppressing any information to secure unlawful or unfair gain.

Hacking

Hacking involves the partial or complete acquisition of certain functions within a system, network, or website. It also aims to access to important data and information, breaching privacy. Most "hackers" attack corporate and government accounts. There are different types of hacking methods and procedures.

Identity Theft

Identify theft is a specific form of fraud in which cybercriminals steal personal data, including passwords, data about the bank account, credit cards, debit cards, social security, and other sensitive information. Through identity theft, criminals can steal money. According to the U.S. Bureau of Justice Statistics (BJS), more than 1.1 million Americans are victimized by identity theft.

Scamming

Scam happens in a variety of forms. In cyberspace, scamming can be done by offering computer repair, network troubleshooting, and IT support services, forcing users to shell out hundreds of money for cyber problems that do not even exist. Any illegal plans to make money falls to scamming.

Computer Viruses

Most criminals take advantage of viruses to gain unauthorized access to systems and steal important data. Mostly, highly-skilled programs send viruses, malware, and Trojan, among others to infect and destroy computers, networks, and systems. Viruses can spread through removable devices and the internet.

DDoS Attack

DDoS or the Distributed Denial of Service attack is one of the most popular methods of hacking. It temporarily or completely interrupts servers and networks that are successfully running. When the system is offline, they compromise certain functions to make the website unavailable for users. The main goal is for users to pay attention to the DDoS attack, giving hackers the chance to hack the system.

Botnets

Botnets are controlled by remote attackers called "bot herders" in order to attack computers by sending spams or malware. They usually attack businesses and governments as botnets specifically attack the information technology infrastructure. There are botnet removal tools available on the web to detect and block botnets from entering your system

VII. Threats to Cyber Security

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Threats to cyber security can be roughly divided into two general categories: actions aimed at andintended to damage or destroy cyber systems and actions that seek to exploit the cyberinfrastructure for unlawful or harmful purposes without damaging or compromising that infrastructure—cyber exploitation. While some intrusions maynot result in an immediate impact on the operation of a cyber systems, as for example when a ―Trojan Horse infiltrates and establishes itself in a computer, such intrusions are considered cyber attacks when they can thereafter permit actions that destroy or degrade the computer's capacities . Cyber exploitation includes using the Internet and other cyber systems to commit fraud, to steal,to recruit and train terrorists, to violate copyright and other rules limiting distribution of information,to convey controversial messages (including political , and to sell child pornographyor other banned materials.Following are some new threats to cyberspace. With the proliferation of free hacking tools and cheap electronic devices such as key loggers and RF Scanners, if you use e-mail or your company's systems are connected to the Internet, you're being scanned, probed, and attacked constantly. E-mail . and the web are the two main attack vectors used by hackers to infiltrate corporate networks. So, clearly, every company is vulnerable because every company needs to have these functions. Conversely every company needs to guard its systems against unauthorized access through these openings because supposed firewalls offer no protection whatsoever once a hacker has entered.

Cloud Computing

As for cloud computing, outsourcing the filling of data has been around 40 years. What's new is the geographical spread of this storage. The National Institute Of Standards and Technology (NIST) provide the standard definition for cloud computing, a rapid, on demand network to a shared pool of computing resources. These are not the stratosphere; they are basically hangers full of servers. Outsourcing means considerable cost savings and many companies are now using it for computation and data storage. Amazon, eBay, Google, Facebook and all the big names are outsourcing computation to cloud.

VIII. Necessity Of Cyber Security

Information is the most valuable asset with respect to anindividual, cooperate sector, state and country.With respect to an individual the concerned areas are:

1. Protecting unauthorized access, disclosure, modificationof the resources of the system.
2. Security during on-line transactions regarding shopping,banking, railway reservations and share markets.
3. Security of accounts while using social-networking sitesagainst hijacking.

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4. One key to improved cyber security is a betterunderstanding of the threat and of the vectors used by theattacker to circumvent cyber defences .
5. Need of separate unit handling security of theorganization.
6. Different organizations or missions attract different types of adversaries, with different goals, and thus need different levels of preparedness .
7. In identifying the nature of the cyber threat anorganization or mission faces, the interplay of an adversary's capabilities, intentions and targetingactivities must be considered With respect to state and country .
8. Securing the information containing various essentialsurveys and their reports. Securing the data basis maintaining the details of all therights of the organizations at state level.

IX. Types of Cyber Security

All of these serious crimes are committed online and can be stopped or at the least limited to some level by using Cyber Security Tools. Some of the best Cyber Security Tools made available today are:

1. IBMQRadarAdvisor and Watson

This is by far the best security tool in use by any of the organizations. Watson, using artificial intelligence (AI), is a self-learning and self-evolving system. What it does is, before even the threat is detected it eliminates the section. The working goes as such: IBM QRadar tracks the section. It gathers information and links online, offline and within the system with that code. It formulates a strategy to encompass it and then when an incident is raised, it kills the threat. This is one of the best online incidents – kill security tools being used.

2. Wireshark

It is one of the most widely used network analyzer protocol. It assesses the vulnerable sections on the network upon which the user is working. Wireshark can gather or see the minutes of the detail and activities which are going on a network. The incoming and outgoing packets of data and the protocol which is being used in the transmission can be easily viewed. What it does is captures the live data and creates an offline analysis sheet, which helps in tracking.

3. Cryptostopper

It is one of the best tools available online right now to stop the ransomware or malware attacks on a system. What crypto stopper does is that it finds the bots which are encrypting the files and deletes them. It creates a pattern or a deception formula for the threat to latch it on by itself onto the formula, once it latches itself; crypto stopper detects and deletes that code. Cryptostopper makers tend to

make a promise of a 9-second threat detection and elimination challenge.

4. N MAP

It is one of the many primary and open source utilities made available for network securities. NMAP is not only good with small but large networks as well. It recognizes the hosts and the receiver on a network. Along with it, it also runs on all the distributions of operating systems. It can scan hundreds and thousands of machines on a network at a single moment.

5. Burp Suite

It is another web scanning algorithm security tool, which helps to scan web-based applications. The main purpose of this tool is to check and penetrate the compromised system. It checks all the surfaces which might be affected along with the sender and destination's requests and responses for the threat. If any threat is found, it can either be quarantined or can be eliminated.

X. Security Training and Awareness

The human factor is the weakest link in any information security program. Communicating the importance of information security and promoting safe computing are key in securing a company against cyber crime. Below are a few best practices:

1. Use a password that is easy to remember and make sure to use a combination of upper and lower case letters, numbers, and symbols to make it less susceptible to brute force attacks. Try not to use simple dictionary words as they are subject to dictionary attacks – a type of brute force attack.
2. Do not share or write down any ―passphrases.
3. Communicate/educate your employees and executives on the latest cyber security threats and what they can do to help protect critical information assets.
4. Do not click on links or attachments in e-mail from untrusted sources.
5. Do not send sensitive business files to personal email addresses.
6. Have suspicious/malicious activity reported to security personnel immediately. Secure all mobile devices when traveling, and report lost or stolen items to the technical support for remote kill/deactivation.
7. Educate employees about phishing attacks and how to report fraudulent activity.

XI. Cyber-Security Educational System

In education system, the children must be made aware of the possible attacks and types of intruders. They must also be aware of the terms like: Hardware/Desktop Security, Wi-Fi security,

wired security, Password Protection/ (File/Folder) level security, Social networking attacks security and malicious software:

- Phishing, Hoaxes
- Scare ware, Malware, Virus, Worm,
- Trojans, Zombie and Botnet, Spyware, Adware,

Students are acquiring information technology skills marks question on the educator's abilities to ensure that positive habits of on-line behavior are being formed. Whereas, the teacher giving information about security lacks the knowledge and up-to date information related to Cyber awareness issues, particularly with respect to security. Teacher technology training must be provided for skills development and awareness.

XII. Conclusion

The cyber crime is a new invention of crimes made by a class of intellectual,sophisticated criminals. Since long time the criminal jurisprudence was totally ignorant of such types of crimes, although these were committed in different forms during early development of crimes and criminology. One can say that the cyber crimes started to operate when technology reaches its peak and took new tum to satisfy human needs and desires. Because such cnmes being committed with the help of machines and on arithmetical formulation, are different types in nature from that of ordinary types of crimes. These crimes contain the elements of blue colour and white colour crimes. These are blue colour crimes because these are not very different from other prototype crimes, though recognized by various names. These are also white colour in nature because crimes are usually committed by a class of criminals who are having knowledge about science and technologies. For this reason I dare to say that cyber crimes are an amalgamation of blue colour and white colour crimes. The Government oflndia has enacted Information Technology Act, 2000 to deal with cyber crimes. The Act further amends the Indian Penal Code, 1860, the Indian Evidence Act,1872 the Banker's Books Evidence Act 1891 and the Reserve Bank of India Act 1934. The cyber crime cell and police station have also been created for detection and investigation of such crimes. A multi pronged strategy is required to fight along with legal measures.

The cyber crime is a great threat to the human rights. The number of security attacks being designed to steal personal information is increasing with accelerating pace. The attackers are targeting personal information to make a profit out of their operation and threatening the basic philosophy of 'right to live with dignity.

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Extraction of Text and Document Image For Vehicle Number Plate Using Image Processing.

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***Abstract*— Vehicle number plate acknowledgment is the most fascinating and testing research theme from recent years. It is demonstrated that the number plates are diverse shape and measure and furthermore have distinctive shading in various nations. In India the most widely recognized vehicle number plate utilized yellow or white as foundation and dark utilized as closer view shading. This paper proposed a framework to restriction of number plate chiefly for the vehicles in West Bengal (India) and portioned the numbers as to distinguish each number independently. This exhibits a methodology dependent on basic and effective morphological task and sobel edge discovery technique. Likewise present a basic way to deal with fragmented every one of the letters and numbers utilized in the number plate. Subsequent to decreasing clamor from the info image attempt to improve the difference of the binarized image utilizing histogram adjustment. The most part focus on two stages; one is to find the number plate and second is to section all the number and letters to distinguish each number independently.**

***Keywords*—Image Processing, Text Extraction, Character recognition, Number Plate, Segmentation.**

I. INTRODUCTION

These days all over digitization innovation is utilized. Text Acknowledgment normally truncated to OCR technique, includes a framework intended to decipher images of handwritten, printed text into computer editable text or to make an interpretation of images of characters, numbers into a standard encoding plan speaking to them. OCR (Optical Character recognition) started as a field of research in computerized reasoning and computational vision. Text Acknowledgment utilized in authority assignment in which the huge information need to type like post workplaces, banks, universities and so on, all things considered, applications where we need to gather some data from text composed image. Individuals wish to check in an archive and have the text of that record accessible in a .txt or .docx arrange. The point of Optical Character Acknowledgment is to group optical examples (regularly contained in a computerized image) relating to alphanumeric or different characters. [1] The procedure of OCR includes a few stages including division, highlight extraction, and arrangement. On a fundamental level, any standard OCR programming would now be able to be utilized to perceive the text in the portioned casings. Notwithstanding, a hard take a gander at the properties of the hopeful character locales in the sectioned casings or image uncovers that most OCR programming bundles will have critical trouble to perceive the text. Archive images are not quite the same as characteristic images since they contain primarily message with a couple of designs and images. Because of the plain low-goals of images of those caught utilizing handheld gadgets, it is difficult to remove the total format structure (intelligent or physical) of the reports and much more dreadful to apply standard OCR frameworks. Thus, a shallow portrayal of the low-goals caught report images is proposed. [2] If there should be an occurrence of unique electronic records in the archive, the extraction of a similar mark is clear; the PDF or PowerPoint type of the first electronic reports is changed over into a moderately high-goals image (TIFF, JPEG, and so on.) on which the mark is figured. At last, the caught report's mark is contrasted with all the first electronic records' marks so as to discover a match. [3]

II. RELATED WORK

Preprocessing is the initial phase in the handling of filtered image. The examined image is checked for clamor, skew, incline and so on. There are conceivable output of image getting skewed with either left/right introduction or with commotion, for example, Gaussian. Here the image is first believer into grayscale and after that into parallel. Thus we get image which is reasonable for further handling.

After pre-preparing, the clamor free image is passed to the division stage, where the image is disintegrated into individual characters. [4] The binaries image is checked for bury line spaces. In the occasion that bury line spaces are recognized, the picture is divided into sets of areas over the interline opening. The lines in the sections are filtered for level space convergence regarding the foundation. Histogram of the image is utilized to distinguish the width of the level lines. At that point the lines are examined vertical space crossing point. Histograms are used to

recognize the width of the characters. By then the words are weakened into characters using character width count.

Highlight extraction pursues the division period of OCR where the individual image glyph is considered and separated for highlights. Initial a character glyph is characterized by the accompanying qualities like stature of the character, width of the character. [5] Grouping is finished utilizing the highlights extricated in the past advance, which relates to each character glyph. These highlights are breaking down utilizing the arrangement of standards and named as having a place with various classes. This grouping is summed up to such an extent that it works for single textual style type. The tallness of the character and the width of the character, different separation measurements are picked as the contender for characterization when strife happens. So also, the grouping rules are composed for different characters. This strategy is a nonexclusive one since it removes the state of the characters and need not be prepared. At the point when another glyph is given to this classifier square it extricates the highlights and thinks about the highlights according to the guidelines and after that perceives the character and marks it.

III. ALGORITHM

Number plate is an example with high varieties of differentiation. In the event that the number plate is fundamentally the same as foundation it.is hard to recognize the area. Splendor and complexity is changes as light fall changes to it. [6] The morphological tasks are utilized to extricate the complexity highlight inside the plate. The work is separated into a few sections:

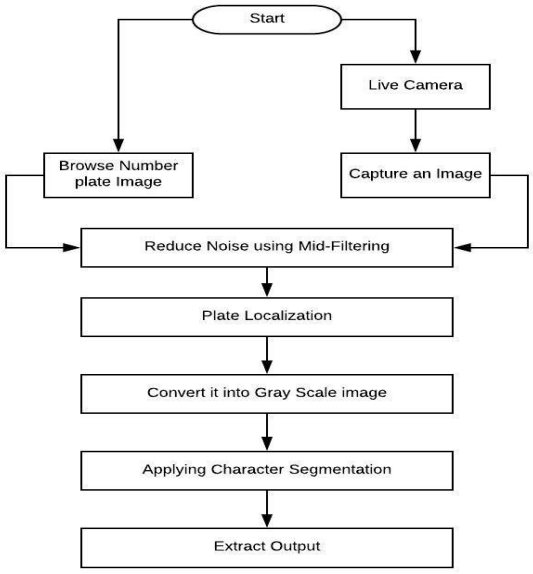

Figure 1: Flow chart of Number plate extraction

- Input raw image
- Image binarization.
- Reduce noise using mid-filtering method
- Enhance contrast using histogram equalizer.
- Plate localization
- Character segmentation

IV. TEXT EXTRACTION

Text extraction and acknowledgment process contains five stages in particular text discovery, text confinement, text following, division or binarization, and character acknowledgment.

Text Detection: This stage takes image or video outlines input and chooses it contains text or not. It likewise distinguishes the text areas in image. [7]

Text Localization: Text confinement blends the text areas to plan the text items and characterize the tight boundaries over the text articles.

Text Tracking: This stage is associated with video data in a manner of speaking. For the lucidity reason, content embedded in the video appears more than thirty progressive housings. Content after stage abuses this transient occasions of a comparable content thing in various consecutive edges. [8] It might be used to revise the delayed consequences of content ID and limitation sort out. It is similarly used to quicken the content extraction process by not having any kind of effect the binarization and affirmation dare to each distinguished thing.

Text Binarization: This progression is used to fragment the text article from the foundation in the limited text items. The yield of text binarization is the paired image, where text pixels and foundation pixels show up in two diverse double dimensions.

Character Recognition: The last module of text extraction process is the character recognition. This module matches the shape of character with the shape of character or numbers images that is located in backend database.

V. RESULTS AND DISCUSSIONS

Text extraction or number plate extraction is the widely used system nowadays. We improve the output quality of this project and also introduce live image capturing function in our project. The output of this system is now up to more than 85%. As per our base paper the accuracy of output is just 65-70%. Sometimes the error has been occurred like system confuses when tow similar texts show like Z or 2. Because the shape of the character and word similar.

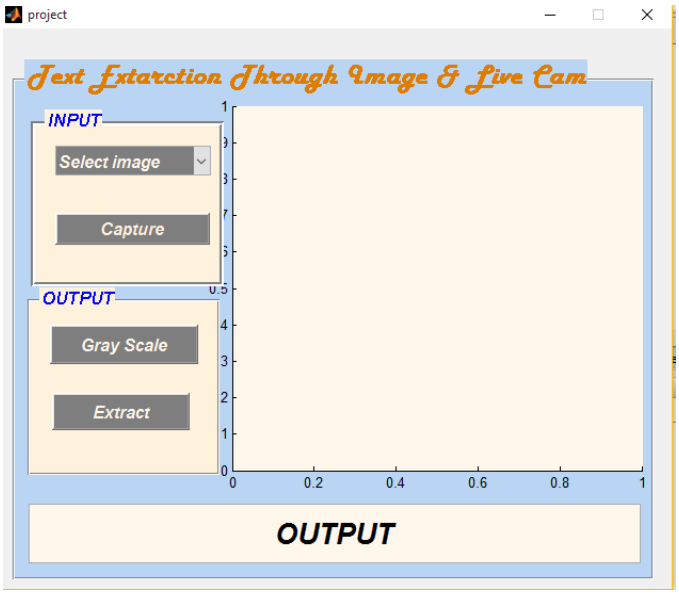

Figure 2: GUI Interface

Figure 2, shows the basic interface of our project. After that simply click on select image and click on browse and open the image in interface. We also use live cam option to take any image. Figure 3, shows the interface after selecting an image.

Figure 3: Interface after select an image.

After select the image convert it into gray scale image as per figure 4. Gray scale image Is very useful to extract text from it.

Figure,4. (Gray Scale Image)

After conversion into gray scale simply click on extract button to view an output. The extracted text will be shown on the edit text block and as well as display text on notepad file.

VI. CONCLUSION

We have actualized number plate acknowledgment. Our calculation effectively identifies the number plate district from the picture which comprises of vehicle number and at that point character division, acknowledgment. We have applied our calculation on numerous pictures also, found that it effectively acknowledgment. The venture was planned remembering the mechanization of the number plate discovery framework for security reason that could supplant the present arrangement of manual passage. This task was an accomplishment in recording the number plate of a vehicle despite the fact that it has got its own impediment of picture preparing and other equipment prerequisites.

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Role of IoT, Fog, Cloud computing and Data mining in detecting Primary Tumors – A Review

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ABSTRACT:- Primary tumor disease is a major health problem in today's time. A primary tumor is a tumor growing at the anatomical site where tumor progression begins and proceeds to yield cancerous mass. In this paper, a review on the role of IoT, fog , cloud computing and data mining in detecting primary tumors has been presented and different application use cases presented in literature are discussed. IoT devices have the capability of sensing and transmitting data in real time. The huge volume of data produced by intelligent IoT devices is processed by fog devices. Fog computing in healthcare is becoming very popular as it brings processing capabilities to the edge of the network. This leads to reduction in propagation latency time, network use and energy consumption. As a result real time response to health related problems is now possible. The data generated by IoT devices is stored in cloud for long term processing to produce statistical results. It assists in high availability as well as robust backups and recovery. In healthcare, data mining process helps in examining large and varied data sets to uncover hidden patterns, correlations and make decision related to person's health.

Index Terms— Cloud, Fog, IoT, Data Mining, Healthcare, Primary Tumors.

I. INTRODUCTION

Cancer is a potentially fatal disease caused mainly by environmental factors that mutate genes encoding critical cell-regulatory proteins. The resultant aberrant cell behavior leads to expansive masses of abnormal cells that destroy surrounding normal tissue and can spread to vital organs resulting in disseminated disease, commonly a harbinger of imminent patient death. [42]Tumor spread from where it first started to grow (primary cancer) to form cancers in other parts of the body (secondary cancers). The primary tumor is generally the easiest to remove. It is very important to find it as it may grow and may arise some other linked tumors called secondary tumors. [37] Detecting the possibly infected users at an early stage and providing preventive measures to possibly infected as well as uninfected users is very important. [21]

Although technologies and solutions enabling connectivity and data delivery are growing rapidly, not enough attention has been given to real-time analytics and decision making as one of the major objectives of IoT. The Internet of Things (IoT) paradigm promises to make "things" including consumer electronic devices or home appliances such as medical devices, cameras, and sensors as a part of the Internet environment. This paradigm opens the doors to new innovations that will build novel types of interaction among things and humans. The IoT envisions a new world of connected devices and humans in which quality of life is enhanced, by supporting intelligent analytics on data generated by devices. Majority of current IoT data processing solutions transfer data collected from IoT devices to cloud for long-term processing. [23]

As big data is transmitted over a network, the chance of error is high because data transmission latency and packet dropping

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possibility are proportional to the volume of transmitted data. In case of emergency, single error in data transmission causes inaccurate diagnosis as well as delay in alerting the user which affects the human life. Therefore, there is a need to reduce the data transmission between mobile end users and cloud servers. Healthcare applications also require immediate analysis of data and real time decision without any delay which is not possible in cloud computing. So, a fog layer is included in between the cloud server and mobile end users. [21] Fog computing extends cloud services to the edge of networks, which results in latency reduction. Another challenge lies in designing resource management policies, which handle scheduling of application components in the pool of fog devices stretching from the network edge to the cloud to meet application level quality-of-service (QoS) requirements such as end-to-end latency or privacy requirements while minimizing resource and energy wastage. [23] Data Mining is used to indentifying hidden information/patterns that can be mapped into a valid knowledge/information. Data mining techniques have a wide scope of applicability in the field of disease diagnosis and prognosis and hidden biomedical and health care patterns. [22] There are various data mining techniques, such as classification, regression, clustering and association rules that are applied on datasets for prediction results. This system focuses on reducing the workload of doctors in predicting primary tumor in patients. Doctors perform various medical tests but still avoids focussing on this disease but it can have severe results afterwards if it spreads in human body. [21]

A. Emerging technologies in healthcare sector

IoT devices are responsible for collecting data about health related symptoms and various events inside and surrounding environment related to the user. The collected data includes various attributes of health data [21]. In addition to that it enhances the standards of human living. It is a channel where in one can linkup everyday things infused with electronic, software and sensors to interact and enabling them to collect and interchange data [12]. As a result enormously large amount of unstructured and structured data is generated online on daily basis. This huge data with increasing volume, variety and velocity is termed as big-data. The size, complexity and rate of growth of data has reached to its highest that traditional systems are incapable to handle and have failed to process big data [23]. As we can currently see that each and everything is moving online these days, so the actual space where everything on network is stored, maintained, processed and accessed in an efficient manner is termed as **Cloud**. It is a huge space owned by some organizations with large computing capacities of storage and their own network that provides rental services to their customers. However, the cloud computing platform is geographically centralized, it often fails to deal demands of billions of geo-distributed IoT devices and sensors. As a result the major drawback with cloud paradigm in IoT environment is high-latency. Due to some inherent challenges in cloud model, a space-age concept of **Fog Computing** has emerged. Fog computing has enabled new genre of applications and services. While the cloud provides globalization, the fog nodes assist in connecting and sensing of small amount of local data, therefore enabling low-latency and context awareness [2]. A brief description of these technologies in healthcare is given below.

B. IoT (Internet of Things) in Healthcare

IoT devices have the capability of sensing and transmitting data in real time. Data are collected from wireless hardware devices embedded into user's body, inside and surrounding places of user [21]. Before the emergence of Internet of things the interactions of doctors, with their patients were limited and there was no immediate aid and 24/7 monitoring of the patients. But IoT has enabled the healthcare to have remote access to health related data. This helps in keeping patients more safe and healthy. It has moved the scheduling of checkups from hospitals to the patients residence [27]. The wearable health devices have changed people's life. Health agencies have become more customizable and secure. There

are various devices such as hearables, ingestible sensors, moodables, glucometer, blood pressure and heart rate monitoring cuffs etc which provide personalized attention to the patient. This helps in collecting the physiological data, emotional data and physical health data of the patient. Even in hospitals various sensors aid in detecting the tumors. Using these devices the doctors can keep track of their patient's health status [33]. On the basis of bottom-up analysis for IoT applications, McKinsey estimates that the IoT has a potential economic impact of $11 trillion dollar per year by 2025,which would be equivalent to about 11% of the world economy. They also expect 1 trillion IoT devices will be deployed by 2025 [23].

C. Cloud Computing in Healthcare

Cloud layer is responsible for storing and processing the large amount of data. There are many benefits of cloud in IoT environment to the healthcare departments. The huge amount of data that the wearable health devices capture is store on cloud. This real-time data is hard to manage without the support of cloud computing platform. Not only that but it also helps the healthcare providers to acquire, analyze and access this data from multiple devices [25]. It aims to provide doctors with real-time tracking so that they can make well-versed decision on time. It assists in high data availability as well as robust backups and recovery. In other words, it offers high availability and accessibility despite of huge data volume, velocity and variety. It offers on-demand host services, large storage and computing for medical data. Hospitals can utilize cloud storage for their own medical data and there is no need in investing in personal storage. Hence, it has made healthcare system more reliable and cost-effective [32].

D. Fog Computing in Healthcare

In IoT and cloud based applications, the density of devices is increasing on daily basis. These IT sensors are different from each other in numerous ways in terms of bandwidth, processing, memory and energy. Hence it becomes challenging to process health data and provide quick response. Therefore, a new layer has been introduced between the data accumulation and cloud computing layer. This layer is termed as fog layer. It computes and stores data at edge itself and avoids unnecessary clouding of data [27].

Fig.1 describes the basic fog computing paragidm.

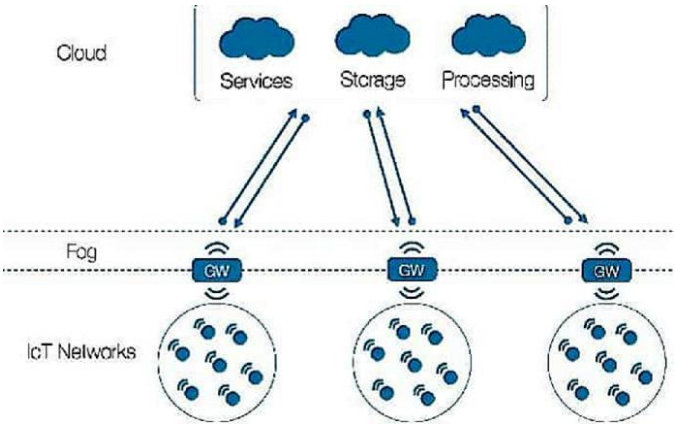

Fig. 1. Basic fog computing paradigm.

Fog computing is a term coined by Cisco and defined as a distributed computing paradigm that extends the services provided by the cloud to the edge of the network.[21] It enables the seamless convergence of infrastructure stretching from the cloud data center to devices on the network edge (including intermediate devices like ISP gateways, cellular base stations, and private cloud deployments) into a continuum of resources, to be provisioned to multiple tenants for hosting applications. There are a number of benefits associated with Fog computing paradigm. The first benefit is the reduction of traffic sent to the backbone network as uncontrolled increase in network traffic may lead to congestion and result in increased latency. Fog computing provides a platform for filtering and analysis of the data generated by sensors by using resources of edge devices. This drastically reduces the traffic being sent to the cloud by allowing the placement of filtering operators close to the source of data. Considerable reduction in propagation latency is the next important advantage of using Fog computing paradigm especially for mission critical applications that require real-time data processing. Some of the best examples of such applications are cloud robotics,

control of fly-by-wire aircraft, or antilock brakes on a vehicle. [23]. Fog computing act as a bridge between IoT sensors and cloud computing layer. It sends immediately real time notification or alert to the user. [3] A Fog-based IoT system consists of three layers termed as, IoT data accumulating layer, fog layer and cloud layer. The actual processing takes place at the fog itself and the results of processed data are later send to the cloud for further decision making and analysis [2]. The first layer is comprised of IoT devices All these devices are geographically distributed. These nodes sense the local data and transmit it for processing and send it to the fog layer. Second layer is composed of fog nodes. This layer is equipped with devices such as routers, switches, gateway, base station etc. These fog nodes follow an integrated prototype where they communicate, contribute and collaborate among themselves [27]. These nodes can be static as well as mobile in nature and are capable to compute, transmit and temporarily store the data received from the first layer. This layer fulfills the requirement of latency-sensitive applications and helps in making decisions in real-time. Third layer is the cloud layer. It can be assigned as the top-most layer in the architecture [2].

II. LITERATURE REVIEW

We conduct the literature search from various Journals and conference papers. We identify IEEE explore, Science Direct, Springer, WILEY etc. The survey is as follows-

Xiaoliang wang et. al. (2019) [1] conduct the survey on Mobile Cloud Computing (MCC) extensively deployed in various healthcare applications. They also described the general architecture and design considerations that should be considered while designing MCC for healthcare scenario. They also presented the state_of_the_art optimization methods on the MCC for meeting the diverse priorities and achieving the optimal tradeoff among multiple objectives. They also discussed privacy and security issues of the MCC in healthcare. **Xiaohuam Li et. al. (2019) [2]** have presented a secure and efficient data management system named as EdgeCare for Mobile Healthcare Systems that supports decentralized and collaborative data management assisted by edge computing that improve overall system performance. For implementation of EdgeCare they have designed hierarchical architecture. **Wenjuan Tang et. al. (2019) [3]** investigate fog enabled smart health towards cooperative and secure healthcare service provision. They provide information regarding overall infrastructure and some applications, including emergent healthcare service, health risk assessment and healthcare notification. They also discussed challenges of fog enabled smart healthcare system. **Sunil Kumar et al. (2019) [4]** discussed the impact of Big data in health care and various tools available in the Hadoop ecosystem for handling it. They also explored conceptual architecture of big data analysis for healthcare. **Mutlag, A.A. et al. (2019) [5]** have aimed this study to present a systematic literature review of the technologies for fog computing in the healthcare IoT systems field and analyze the previous for providing motivation, limitations faced by researchers, and suggestions proposed to analysts for improving this essential research field**. Prabal Verma et al. (2018) [6]** have proposed the remote patient health monitoring in smart home with the help of fog computing at the smart gateway. The proposed model used embedded data mining, distributed storage and notification services at the edge of network. They proposed the BBN classifier based model that has high accuracy and low response time in determining the state of an event when compared with other classification algorithms. **Gaspard Harerimana et al.(2018) [7]** investigated the techniques, technologies, future directions, data sources as well as key challenges in the field of Big data analysis in healthcare. They provided easily understandable and simplified view of various technologies that are used to develop an integrated health analytic application. **Thaha Muhammed (2018) [8]** proposes a ubiquitous health framework named Ubehealth that leverages edge computing, deep learning, big data , high performance computing (HPC) and Internet of Things (IoT) to address the various challenges in healthcare. **Sanaa Sharaf et al. (2018)**

[9] have proposed a flexible, secure, privacy preserved and cost effective cloud based framework for the healthcare environment. This framework aims to provide health services and facilities from Government to citizens (G2C).

Patience E. Idoga et al. (2018) [10] identify various factors affecting healthcare consumers' attitude towards the adoption of cloud based health system. They developed the cloud based health system which provides access to healthcare services remotely to rural communities and reduce the cost/time for medical healthcare delivery by using social technical design approach. **Priyanka Jangra et al. (2018) [11]** have proposed framework for healthcare Monitoring System that will work by computing biomedical signals on real time basis. They proposed framework enhance the utilities of bio sensor based data collection and aggregation. **Abdulhamit Subasi et al. (2018) [12]** presented the intelligent m-healthcare system that is based on IoT technology. This system uses various data mining techniques to provide pervasive human activities recognition. In this paper, for classifying human activities in offline mode, user dependent data mining approach has been presented. They also developed robust and precise human activity recognition model that is based on IoT technology. **Heena wadhwa et al. (2018) [13]** have studied the application of Fog Computing to improve the existing smart healthcare system. They have discussed the architecture of fog computing. They also put the limelight on resource provisioning techniques to identify over utilization of fog nodes. In addition to this, different scheduling terminologies have also been discussed. **Kayo Monteiro et al. (2018) [14]** presents e-health architecture using IoT devices for acquiring data, fog devices for preprocessing the data and for short term storage, and cloud for processing the data, analyze and long term storage. They also describe main challenges to provide an e-health applications with high performance, high availability and accessibility, at low deployment and maintenance cost.

Alam et al. (2018) [15] have highlighted the emerging healthcare applications, including detailed technical aspects required for the realization of a complete end-to-end solution for each application. Their survey explores the key application specific requirements from the perspective of communication technologies. Furthermore, a detailed exploration from the existing to the emerging technologies and standards that would enable such applications is presented, highlighting the critical consideration of short-range and long-range communications.

Zhang, C. et al. (2018) [16] have depicted an efficient and privacy-preserving disease prediction system, called PPDP. In PPDP, patients' historical medical data are encrypted and outsourced to the cloud server, which can be further utilized to train prediction models. **S.Lavanya et al. (2017) [17]** proposed the model that enables patients to improve health related risks and saved time of patients and doctors by providing facilities to patients at his residence. They came with an idea of providing "Medical Box". It tracks the patient to check whether he follows prescribed treatment and notify it to doctor and family members with the help of Real Time Clock (RTC) and sensors. The collected information is stored on cloud. **Sahil Sholla et al. (2017) [18]** have presented a novel method to incorporate ethics in IoT driven connected smart healthcare so that the services provided do not unwittingly infringe on the ethical rights of its beneficiaries. As the autonomy of IoT devices raise serious concerns about the ethical complicity of connected smart healthcare applications. **Niharika Kumar (2017) [19]** states recent advances in design as well as in the architecture of IoT based healthcare system. This paper also explored the architecture of healthcare system like mHealth. Healthcare system and constrained Application Protocol (CoAP) are described in this paper. This paper proposed the curie based healthcare system design and provides comprehensive survey of recent advances in IoT based healthcare. **Hua-Jun Hong (2017) [20]** has proposed an ecosystem of fog computing. He has studied three usage scenarios and optimize the fog computing platform for them. The usage scenarios are content dissemination in challenged networks, crowd sourced fog computing and programmable Internet of Things analytics. He

enhanced the open source projects to realize on fog computing platform. He solved the optimization problem in each usage scenario with novel algorithm. Sample results show that proposed algorithm outperform baseline algorithms. **Yung-Chiao-Chen et al. (2017) [21]** develops a cloud fog computing architecture for IoT applications with resource scheduling function and job classification. The two functions designed by them support quality of service (QoS) by classifying IoT applications and scheduling computer resource. They developed an innovative scheduling algorithm mechanism to optimize the dispatch of fog and cloud resources at minimum cost in a cloud-fog computing environment. **Orestis, Ioannis et al. (2017) [22]** have presented the automated healthcare monitoring system, along with the evaluation of working prototype that collects ECG traces from a tailor made device and utilized the patient's smart phone as fog gateway for sharing them to other authorized entities in secure manner. The prototype developed by them will allow patient to share information with their physicians, monitor their health status independently and notify the authorities rapidly in emergency situations. **Shuqing He et al. (2017) [23]** proposed a hierarchical fog – cloud computing(CEP) architecture ,for personalized service to reduce resource waste and accelerate response time . Architecture includes cloud layer, fog layer and sensor layer. They also proposed the parallel processing policy and partitioning and clustering approach to optimize the fog and cloud computing .They implemented a prototype system based on the architecture namely fogcepcare. **S.K. Sood et al. (2017) [24]** have proposed a IoT assisted fog health monitoring and controlling system to identify infected users from CHV as early as possible, so that the outbreak of CHV can be controlled. In this paper, IoT and fog based healthcare system is proposed to identify and control the outbreak of CHV. Fuzzy-C means (FCM) is used to diagnose the possibly infected users and immediately generate diagnostic and emergency alerts to users from fog layer.

Narander Kumar et al. (2017) [25] have proposed an early disease prediction using random forest. They perform classification using various techniques – Naive Bayes, KNN and J48 and compare these techniques in terms of total time required to build the model, Mean Absolute Error (MAE), Root Mean Square Error (RMSE), Kappa Statistics and ROC (Receiver Operating Characteristics) values. **Gupta, H. et al. (2017) [26]** have evaluated the performance of fog layer by proposing a simulator, called *iFogSim*, to model IoT and Fog environments and measure the impact of resource management techniques in latency, network congestion, energy consumption, and cost. Moreover, scalability of the simulation toolkit of RAM consumption and execution time is verified under different circumstances. **Hu, P. et al. (2017) [27]** have discussed computing paradigm, known as fog computing, proposed as a complement to the cloud solution also addresses how fog computing extends the cloud services to the edge of network, and makes computation, communication and storage closer to edge devices and end users, which aims to enhance low-latency, mobility, network bandwidth, security and privacy. **Prabhal Verma et al. (2017) [28]** have proposed Cloud-centric IoT based disease diagnosis healthcare framework. They implement the diagnosis system using Cloud technology. **George Zaki et al. (2016) [29]** Presents cloud based solution to traditional methods for DIR (Deformable Image Registration) which are usually time consuming, in order to increase the data analysis throughput so that treatment tracking result may be delivered at the time of care. They asses their solution in terms of accuracy and flexibility compared to a commercial tool registering CT (Computed Tomography) with CBCT (Cone Beam CT). **Frank Alexander et al. (2016) [30]** present the review on fog computing in healthcare informatics and classify ,explore and discuss different application use cases in literature .They discussed on which level of network such fog computing tasks can be executed. Their review states that there are significant number of computing tasks in health that require or can benefit from fog computing principles. **Shamsuel Huda et al. (2016) [31]**

achieved fast affordable and objective diagnosis of genetic variant of oligdendroglioma with a data mining approach combining feature selection and ensemble based classification. This approach outperforms the standard techniques used in brain tumor classification problem to overcome the imbalanced characteristics of medical data. **Lo'ai A. Tawalbeh et al. (2016) [32]** discussed the role of mobile cloud computing and big data analytics in healthcare. They described cloudlet- based mobile cloud computing infrastructure and big data applications. They reviewed tools, techniques and applications of big data analytics. **Tania Cerquitelli et al. (2016) [33]** addresses the data mining from different perspective. Data mining system should be designed such that they devise which knowledge could be most interesting to user and extract the knowledge that is actionable from large medical datasets, with minimal user intervention. To able the users to automatically mine massive data repositories, automated data analysis techniques are designed. **B.V Kiranmayee et al. (2016) [34]** focused on detection of brain tumor by making use of essential decision making feature. The proposed methodology has both training and testing phases. Proposed applications can be integrated with Decision Support System in the domain of healthcare for improving quality of services. **Casola, V. et al. (2016) [35]** have examined several key issues and requirements under pinning the use of cloud computing for managing healthcare-related data as well as potential services. **Prieto Gonzalez et al. (2016) [36]** have proposed a study to analyze how embedding of self-powered wireless sensors into cloud computing further enables a system to become a sustainable part of work environment. A clearly outlined three-layer architecture, in the sense of Internet of Things, is presented. It provides the basis for integrating a broad range of sensors into smart healthcare infrastructure. **Yvette E.Gelogo et al. (2015) [37]** have given information regarding background of IoT and its applications to u-healthcare. Their aim of study is to make mobile device gateway and integrated gateway which supports heterogeneous devices for u-healthcare convergence.

Xirdong Wu et al. (2014) [38] have proposed a Big Data processing model from the data mining perspective and presented Hace theorem that characterizes the features of Big Data revolution. The data driven model proposed by them involves mining and analysis, security and privacy consideration, user interest modeling and demand driven aggregation of information sources.**MA. Nishara Banu et al. (2014) [39]** have proposed a prediction system for predicting the heart attack successfully. Different data mining techniques such as association rule, mining, clustering, classification are used to predict heart disease. To make mining more efficient, heart disease database is preprocessed. The preprocessed data is clustered using clustering algorithms. For mining maximal frequent patterns in heart disease database, maximal frequent itemset algorithm (MAFIA) is used. The frequent pattern can be classified using C 4.5 algorithm. **Mehak Naib et al. (2014) [40]** have proposed a multiclass classifier approach for predicting primary tumors using data mining. Classifiers are applied to dataset using WEKA tool. Multiclass classifier with random forest technique is used for classification of data. **Mehak Naib et al. (2014) [41]** have proposed Ensemble Vote approach for predicting primary tumors using data mining. Vote(3) ensemble technique, which combines prediction outputs of three base classifiers- multilayer perception, random forest and K-Nearest neighbours is used for achieving greater accuracy in results. **Priyadharsini et al. (2014) [42]** have presented an overview of knowledge discovery database and data mining concepts. KDD process, Data mining technique, aspects, issues, elements, algorithms are explained. **Biswas et al. (2014) [43]** have proposed model that captures experts' knowledge and imparts such knowledge for future decision-making, for enhancing learning from past experiences, thereby enhancing knowledge acquisition, reuse and creation and it potentially leads to more accurate and efficient retrieval of alternatives that are most similar and most useful to the current

decision situation. **Chenguang He et al. (2013) [44]** proposed a private cloud platform architecture which includes six layers. Massive semi structured or unstructured medical data are accessed adaptively by this cloud architecture. **A.Priyanga et al. (2013) [45]** have used WEKA tool for prediction of cancer. They used two techniques of performance analysis of cancer prediction system namely naïve Bayes and decision tree. **Hiroshi Takeuchi et al. (2006) [46]** have came with an idea of developing a system that enable users to input their daily data through mobile phone and the data entered is transferred to web application server via internet. Data mining service is provided by web application server. Server inform users of important rules concerning their health and lifestyle data by sending message on mobile.

III. FINDINGS

Many authors propose a healthcare framework that levarages Edge computing, Cloud computing, Deep learning, Big data and Internet Of Things. Many authors developed the cloud based health system which provides access to healthcare services remotely to rural communities. Some authors use application of Fog Computing that improve the existing healthcare system based on cloud by providing processing capabilities to the edge devices which accelerate response time and reduce resource wastage, energy consumption and network use. An author develops a Cloud Fog Computing architecture for IoT applications with resource scheduling function and job classification. An innovative scheduling algorithm mechanism is developed to optimize the dispatch of fog and cloud resources at minimum cost. Some authors have proposed a big data processing model from data mining perspective. For predicting diseases, authors have proposed a prediction system that involves data mining techniques which include Naïve Bayes, KNN, J48, Random forest etc and ensemble based classification technique which combines prediction outputs of two or more classifiers.

IV. CONCLUSION

There is considerable number of healthcare tasks across different deployment scenarios and application use cases, that can benefit from fog computing. As computation is necessary element in almost all healthcare applications, and these computations often need to be executed somewhere between sensor layer and cloud layer. As sensors do not have the capability to process the data. Cloud computation in healthcare is not preferred due to delayed response and more chances of error. So, to meet requirements of Healthcare, Fog Computing, with its flexibility to add computation as a part of network infrastructure, appears therefore as a suitable concept for predicting diseases, data mining techniques are used that are applied on dataset. To mine the patterns and produce more accurate results, results of two or more techniques are combined.

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Study of Fingerprint Door Unlock System Using Arduino

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***Abstract*: Security has always been a major concern for the households and the office environment, and for this concern various approaches are in place to address the problem. Most of the major door lock security systems have several loopholes which could be broken down to gainaccesstothedesiredplaces,anditcreatesaconcern for a secure lifestyle and proper working environment. Additionally, terrorism and unauthorized access to places have become a major issue now-days, and thereis a need for a secure system to prevent unauthorized accessespeciallyinsharedaccessenvironment.Withthis consideration, a design and prototype of a biometric fingerprintbaseddoorlocksystemhasbeenpresentedin thispaper.Biometricsystemssuchasfingerprintprovide tools to enforce reliable logs of system transactions and protect an individual's right to privacy. The RFID or password based door lock mechanisms can easily be compromised when the RFID card or passwords are shared or stolen, thus for facilities with shared. Access require biometric- based secure system. In the proposed system, fingerprints of the authorized users are enrolled and verified to provide access to a facility that is usedby multiple users. A user can also be removed and a new usercanbeenrolledinthesystem.Wehaveimplemented a centralized control system from where we can control whocanenterinwhichroomsandwhocannot.Thisisan Arduino UNO device based flexible workingdevice.**

A. INTRODUCTION

These days office/corporate environment security is a major threat faced by every individual when away from home or at the home. When it comes to security systems, it is one of the primary concerns in this busy competitive world, where human cannot find ways to provide security to his confidential belongings manually. Instead, He finds an alternative solution which provides better, reliable and atomized security. This is an era where everything is connected through network, where anyone can get hold of information from anywhere around the world. Thus chances of one's info being hacked are a serious issue. Due to these risks it's very important to have some kind of personal identification to access one's own info. Now a day's personal identification is becoming an important issue all around. Among mainstream personal identification methods we mostly see password and identification cards techniques. But it is easy to hack password now and identification cards may get lost, thus making these methods quite unreliable.

There are certain situations which are very annoying like when a person locks himself out of his house or officeorheleaveshiskeyinsideorsometimeswhena thief just breaks the lock and steals everything. These kinds of situations always trouble people who use manual door lock with keys. Although in some places people use smart cards, there might arise a situation when someone loses the card or keeps the card inside. Theninotherscenariostherearecaretakersforlocking houses or offices and keeping the keys safe. But then again there are times when a person in charge of the keys might not be available or has gone to some emergency routine, which can cause unwanted delay for people who need the key straightaway. These are someofthehasslesthatpeoplemightfacewhenusing keys or smart cards. That is when our system, fingerprint based lock system comes into play. Our design is implemented to provide better securities as users don't need to remember passwords and don't need any sort of keys or cards that often get lost. If someone's fingerprint is authorized in the system he would not face any sort of delays to enter aroom.

Fingerprint recognition is one of the most secure systems because a fingerprint of one person never matches with the others. Therefore unauthorized access can be restricted by designing a lock that stores the fingerprints of one or more authorized users and unlock the system when a match is found. Bio-metrics authorization proves to be one of the best traits because the skin on our palms and soles exhibits a flow like pattern of ridges on each fingertipwhichisuniqueandimmutable.Thismakes fingerprint a unique identification for everyone.The popularity and reliability on fingerprint scannercan

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be easily guessed from its use in recent hand-held devices like mobile phones.

B. BACKGROUND

This study has analyzed current lock systems that are used in houses and offices at present. It has been found that although these methods are helpful in the initial days, eventually they become outdated and pose much threat to securityissues.Theyhavealsobeenidentifiedas quiet expensive. Below is a discussion on the pros and cons of the existingsystems.

A. DeadboltSystem

Security protocol followed in this system was "Single key for a single lock". For a few days,it was satisfactory but at one time it was proved wrong by the fact that multiple keys can be easily made for a single lock. Hence this system is considered vulnerable and outdated in current times.

B. Password-Authentication

Thissystemstoresthepasswordofauthenticated users for the purpose of validation which provides considerable security to the users. Power consumption is efficient and usage is user-friendly. However, unauthorized users can easily acquire passwords through different methods (hacking, guessing and soon.).

C. Face detectorlock

These systems have difficulty in recognizing a face from images captured from two drastically different views and under different illumination

.

C. LOCK SYSTEM PROPOSED

Humans have used fingerprints for personal identificationformanycenturiesandthematching accuracyusingfinger-printshasbeenshowntobe veryhigh.Afingerprintisthepatternofridgesand valleysonthesurfaceofafingertip,theformation of which is determined during the first seven months of fetaldevelopment.

Fingerprints of identical twins are different and so

are the prints on each finger of the same person.

A. Fingerprint based Door Lock our proposed fingerprint based lock system is a reliable and very secure lock that will not only ensure safer environment but also ease lifestyle. This system can prove very useful in housing buildings, large offices, universities and so on. Because it offers the flexibility to add more features to the system. Users do not need to implement many systems from scratch. They can simply use our fingerprint lock system because fingerprint scanning is more accurate and cost effective method. It is also secure because fingerprint duplication is virtually impossible. Additionally, we have also used password authentication system for security purposes to ensure accessto not enrolled people

.

B. Fingerprint Identification

Fingerprints are one of many forms of biometrics, used to identify individuals and verify their identity. The analysis of fingerprints for matching purposes generally requires the comparison of several features of the print pattern. These include patterns, which are aggregate characteristics of ridges, and minutia points, which are unique featuresfound within the patterns. It is also necessary to know the structure and properties of human skin in order to successfully employ some of the imaging technologies. Minutiae and patterns are very important in the analysis of fingerprints since no two fingers have been shown to be identical. The three basic patterns of fingerprint ridges are the arch, loop, and whorl.

- Arch: The ridges enter from one side of the finger, rise in the center forming an arc, and then exit the other side of the finger.
- Loop: The ridges enter from one side of a finger, form a curve, and then exit on that sameside.
- Whorl: Ridges form circularly around a central point on the finger. In the whorl pattern, ridges form circularly around a finger.

A fingerprint recognition system can be used for both verification and identification. In verification, the system compares an input fingerprint to the enrolled fingerprint of a specific user to determine if they are from the same finger (1:1 match). In identification, the system compares an input fingerprint with the prints of all enrolled users in the database to determine if the person is already knownunder a duplicate or false identity (1:Nmatch).
Detecting multiple enrollments, in which the same person obtains multiple credentials such as a passport under different names, requires the negative identification functionality of fingerprints. When it came to designing the lock, we wanted to achieve simplicity in terms of the entire lock itself as well as in the internal components. The lock will be hanging on the wall beside the doorway that will include a fingerprint sensor. We have added a buzzer system to notify the usage of thedevice and a keypad that can be used to enter a password to allow access in case of the fingerprint bearer is not present. As shown in Fig. 1, an additional switch is added to the system so that people from the inside can unlock the door. We are using an optical fingerprint sensor. Optical fingerprint sensors use reflective light to scan the surface of the finger with almost 100% accuracy. The sensor we are using is called FPM10A Fingerprint Sensor.

For this project the main components are:

- Arduino Uno, fingerprint sensor
- Electronic lock, push button,Buzzer
- Channel relaymodule

Additionally, we used a breadboard, male-to male connecting wires, plastic glue, a 12V power adaptor, hard plastic for casing and a door.

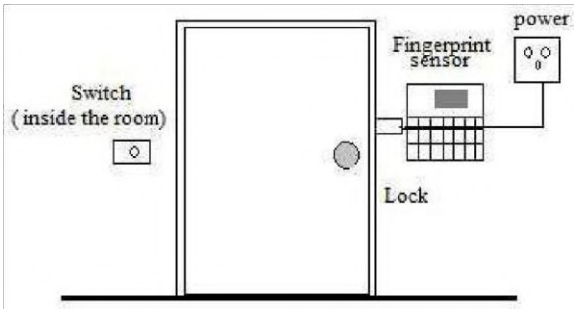

Fig. 1. Schematic diagram of the fingerprint based door lock.

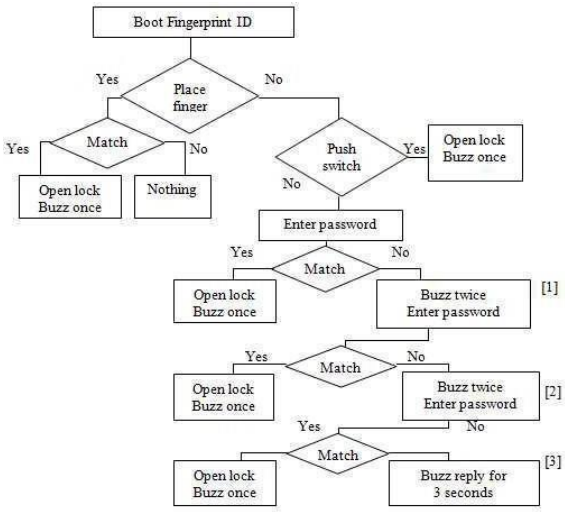

Fig. 2.Flowchart of entire system.

As shown in Fig. 2, when a finger is placed on the sensor, it will read the print and match it with the fingerprints saved inside it. If no match is found, the devicewillnotdoanything.Ifamatchisfound,itwill playonebuzzandtriggertheelectroniclocktounlock thedoorway.

- In addition to the fingerprints saved in the device, a 4- digit password will besaved.
- The keypad can be used to enter the password for access. Each key pressedwill

Make a low beeping sound, upon entering the code; if right code is entered the door will open with a single buzz. If wrong code is entered, the door will remain lockedandbeeptwice.Upon3failedattemptsthedoor willbuzzcontinuouslyfor3seconds.Aswitchwillbe installedinsidethedoorway.Uponpressingitthedoor will unlock with a single buzz. The total cost for this project is 7,790 BDT only. Mass manufacture of this project will yield in lowercost.

D. Hardware implementation

Devices can connect according to the block diagram. TX-out and Rx- in of the sensor are connected to the pin 2 and pin 3 of the Arduino Uno respectively. The electronic lock is connected with one of the output ports of the Uno. Making a network with the relay allows switching between the 5V and the 12V electrical components. Now we have attached the Arduino Uno to the laptop for registering

- Each key pressed results in a beeping sound. A successful code opens the door with asinglebuzz.
- An incorrect input will not open the door; the system will buzz shortlytwice.

3failedattemptsonthekeypadwillmakethesystem buzz continuously for 3 seconds notifying an intrusion attempt. Computer for assigning the ID to the prints. This can be done through Smartphone with Arduino application as well. We save the ID into the sensor and upload the code to the Uno. We disconnecttheUnowiththecomputerandturnonthe poweradaptor.Onceitgainspower,thesystemboots up the fingerprint IDs saved inside and waits for a printtobematched.Ifnomatchisfound,thekeypad andtheswitchremainactive.Onceamatchisfound, the buzzer will buzz once and the lock will open.If

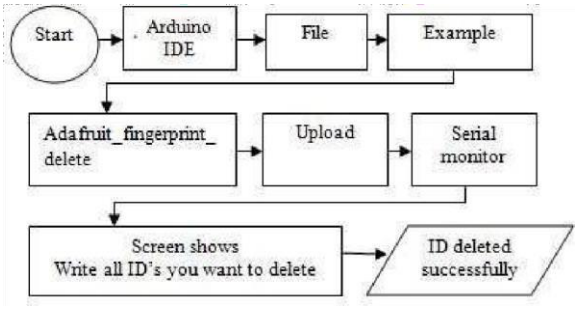

Fig. 3. Finger print enrollment steps.

No match is found, the system will not take any action at all. The scanner can perform over 100 scans per second, so when someone places a finger, it will respond instantly if the prints match. This system can store up to 126 fingerprint IDs. So, it can control the access of 126 different people. Review of the whole system

- 126 different fingerprints can be enrolled into the system to open door/doors.
- On placing a registered finger,the lockunlocksfor5secondswithno noise orbuzz.
- A 4-digit password can be entered through thekeypad.

- Software implementation

First of all, we download the Adafruit Fingerprint sensor library from net. For enrolling a new finger, we put together a simple sketch and upload it to the Arduino. Then follow this process which is shown below in Fig. 4.

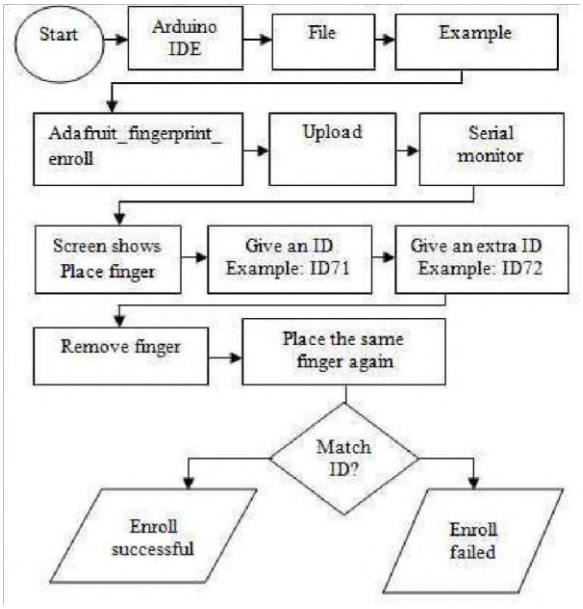

Fig. 4. Finger print deletion steps.

Fingerprint verification process: For verifying an enrolledfinger,weplacedfingeragainstthatwasalready enrolled. If Arduino recognize that fingerprint, the door will unlock, otherwise the door remainslocked.

1) Fingerprint deletion process: To delete any fingerprint, type the IDs in the serial monitor and it will delete that fingerprint. The steps is shown in Fig. 5. A picture of developed prototype of the fingerprint sensor based lock system is given in

E. RESULTS ANDDISCUSSION

In this section, we discuss how the system behaved up on completion. We devised various tests to see if the individual functions are performing accordingly. After implementation of the tests, we have collected the results to verify the functionalities of the individual components. Then the system was tested as a whole for any error. After carrying out the tests, the system was given to engineers so that they can try to break the system and use their own fingerprints in the system. They

F. FUTUREWORK

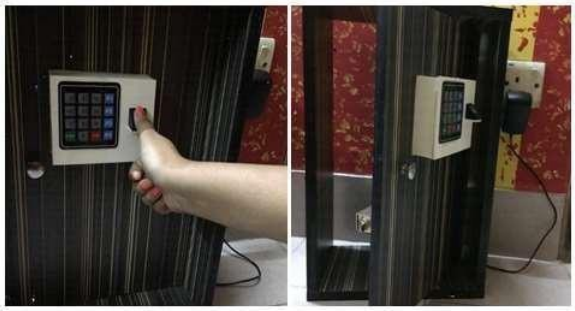

Fig 5- fingerprint door unlock system

The developed system is very muchflexible. Thesystemwehavecreatedoperatesononly one lock, but in our current state, we canadd more electronic locks, where each lock can be unlocked with specified print IDs. All it will need is more electronic locks and code modifications. There can be some other implementationstothissystemaswell,some of them are givenbelow.

G. Multi-lock/ Decoder networksystem

As mentioned earlier, this system currently hasonelockconnectedto,andwecanaddup to 5 more. In fact, by using a network of decoders, we can connect as many locks as we want and provide access to up to 126 different individuals. As shown in Fig. 7 a decoder network can be used with this system.Additionally,6 different locks can be added. Instead of using those output pins from then of or locks, we can create a system using 7: 128 decoders. In that way, all the memory space of the fingerprint sensor (126 capacity), connect them to individual doorway or doorways with just onesystem.

A. Computerized Fingerprint lock system

This system can be installed on a PC, which will act as the brain behind the system. It can add new IDs and delete old ones and can even unlock doors throughthecomputer.Thiswillrequirethecomputer to be in the security control room or somewhere secure. In particular a log system can be easily implementedwiththeuseofacomputerwiththis

system.Smartphone based fingerprint security

B. System:-

Smartphones with latest features use fingerprint ID system to allow access to the phone. This systemcanbemadetoconnectwiththosephones and use their print ID and their sensor on the phone to open doors.

Fig. 6. Smartphone connectivity with the fingerprint lock

The system can be connected to the phone via Bluetooth or Wi-Fi, and an application canbemadeforthephone(Fig.8,allowing them to interact. Fingerprint ID is being used in most new phones now-a-days and soon the fingerprint ID based phone willbe everywhere, almost everyone will have them and then this security system will be veryhelpful.

H. Improvements

More locks can beadded to the system, *i.e.*, we do not need to spend so much for just one lock. A system to save prints without the use of a computer could have been made,butitwillrequiremorepartsthanthe ones weused.

I. Limitations

It may not be able to detect fingers if they are exposed to certain chemicals and it can make errors with the dryness or dirty fingers or cuts and bruises on the finger. It is not appropriate for children, because of thesizeoftheirfingerprintchangesquickly. Sincethislockneedselectricitytorun,apowerfailure can make it totally useless. Thus an UPS or battery is needed. We used relay module, which is sensitive to power it gets. If it does not get sufficient power then relayswitchingsometimesmalfunctions.Sowehadto give constant power to the relay module. The optical sensor we used is prone to scratches, dirt. As a result it may sometimes give inaccurateresult.

J. CONCLUSION

The design and implementation of fingerprint based lock system is customizable and flexible. This door locking mechanism is comparatively cost- effective than the available lock systems in the traditional market. Our fingerprint based lock systemhashighaccuracyrateandisalsoquickto recognize fingerprints which enable seamless integration with the users and provides tighter security. In our country, private and government organizations are very much concerned about security. Many companies are interested in using this type of locking mechanism but the system whichisavailablehaveveryhighinstallationcost. Due to this excessive cost, many small firms cannot afford such systems. Keeping the installation cost in mind we planned to develop a systemthatshouldbeaffordabletobothlargeand smallfirms.Thisdesigncanbeimprovedbymore intensive development and additional features such as more locks can be added to the system. Thuswedonotneedtospendsomuchforjustone lock if this can be used to control several doorways.Asystemtosaveprintswithouttheuse of a computer could have been made, but it will requiremorepartsthantheonesweused.Inorder to maintain security properly, the keypad should be placed inside the security room. A system for batteries could also be made or even solar powered. One of the main advantages of this systemisitsflexibility.Severalothersystemscan be implemented with this system. The system is very secure. Fingerprints are unique and the sensorisabletoidentifymostoftheprintsduring testing. It provides greater control for access to restricted places. There are some drawbacks of this system

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Denoising of Wavelet Based MIMO OFDM Systems for Internet Telephony Applications

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Abstract:
Internet Telephony is engaged in communication services such as Voice-mailing, Video Conferencing, etc., as a salient role. Internet Telephony incorporates a prevalent scope of resemblance including different advanced telephone frameworks dependent on various IP addresses. Compression has become inevitable in the transmission of signals since, bandwidth resources have to be used efficiently. Compression provides a means to increase the allocation of number of users in channel and also to increase the transmission speed. Streaming of real-time data is entailed to deliver the information in time, with the trade off of information diminution. The Proposed system proffers lossy compression for transmission of signals in Orthogonal Frequency Division Multiplexing. Wavelet Filtering technique is employed as a compression technique by emphasizing only on the approximated coefficients. Steins Unbiased Risk Estimate (SURE) is employed to improve the performance in terms of Bit to Error rate (BER).

Keywords: Orthogonal Frequency Division Multiplexing (OFDM), Discrete Wavelet Transform (DWT), Internet Telephony, Stein's Unbiased Risk Estimate (SURE), Bit to Error Rate (BER).

I. Introduction

Internet telephony is a sort of interchanging technology that permits voice calls and other communication administrations like fax, SMS and other voice-communication applications to be transmitted utilizing the Internet as an association medium. Programming under this innovation is financially savvy and advantageous on the grounds that it permits the client to convey the information as long as there is an Internet association.

Internet Telephony can sidestep the charges that are normal in customary telephone utilities. In any case, the nature of this administration isn't on a par with that of customary circuit-exchanged systems utilized in conventional telephone utilities since it is exceptionally subject to the quality and speed of the Internet association. Internet Telephony is likewise called IP communication or broadband communication. Internet Telephony is characterized as the umbrella innovation, the one that includes all the utilization of Internet Protocols (IP) for voice and phone like interchanges transmitted over the open Internet. Voice Over Internet Protocol (VoIP), then again, is an essential innovation under Internet communication. It was created so as to build efficiency by exploiting the Internet and different applications appended to it. Conversely, VoIP is only an advanced mechanism for voice calls offering modest or free voice calls while including more voice communication highlights. A softphone is a product program for making calls over the Internet utilizing a universally useful PC as opposed to devoted equipment. The softphone can be introduced on a bit of gear, for example, a work area, cell phone, or other PC and permits the client to put and get calls without requiring a traditional phone set. This work contributes on the features of voice communication which could be carried out on the VOIP. Orthogonal Frequency Division Multiplexing system is used to transmit the signals over the channel where the noise disrupts the sent information signal which was discussed in [1]. Rajesh patil, et.al., discussed that Wavelet Filtering plays

a salient role in reducing the noise affected signals with the compromise of some information in the fundamental signal in [2]. Thresholding is carried out to obtain the lossy information signal with the estimation through the compression technique.

II. State of Art Literature

Harmanpreet Kaur, et.al., discussed about the speech compression techniques using Discrete Cosine Transform and Discrete Wavelet Transform in [3]. In [4] speech and Image compression are discussed using wavelets. In [5] J. I. Agbinya discussed about the speech compression techniques applications in the signal processing. Mike Meade, et.al., described about the usage of Discrete wavelet transform in the face recognition applications in [6]. In [7] Gautam Kumar, et.al., discussed about the discrete wavelet and discrete wavelet packet transform in speech compression. D.L. Donoho discussed about the soft thresholding technique for denoising the received signal in [8]. Yung Lung, et.al., discussed about the feature extraction using kernel analysis for text recognition in [9]. From the literature survey, the role of Discrete Cosine Transform, Wavelet Transform and Wavelet Packet Transform for the text compression, speech compression and audio compression are observed and the choose of different transforms would produce different results that depends on the applications.

III. Compression

To diminish transmission data transfer capacity or extra room. a codec may likewise pack the information which is termed as Encoding of a signal. Compression codecs are characterized essentially into lossy codecs and lossless codecs. Lossless codecs are while preserving all the data in the first stream, filing of information from the subsequent stream in a compacted structure. By preserving the important information of the fundamental signal, the remaining unwanted information in the subsequent streams are discarded with the reference of the first stream, this is likely to be called as lossy codecs. In case of lossy codecs the information in the first stream needed to be preserved for the further handling of the entire stream, since the deciphering will be carried out with the reference of the first stream rather than the previous stream used in lossless codec's. If we take reference of the previous stream the entire information cannot be decoded properly that would corrupt the nature of the subsequent information. Utilizing more than one codec or encoding plan progressively can likewise corrupt quality essentially. Numerous well known codecs are lossy. They lessen quality so as to expand compression. For applications like video streaming, video conferencing and in other video altering an information stream or a signal for transmission or capacity to be encoded by an encoder conceivably in scrambled structure, and then the reversal process of the altering or encoding has to be carried out by the decoder.

A codec was a device that uses Pulse Code Modulation (PCM) technique to encode the fundamental signals into binary formats called globally as digital format. For converting into further advanced signal configurations, including compander capacities, the addressed device named codec is applied to some specific programming.

This work mainly focuses on the lossy compression on the fundamental signal by wavelet compression. Entailing the approximation coefficients of the filtering signals to decode at the reception side would produce the signal that could be perceived by an Individual. Through this, the Increased bit rate and transmission speed is achieved with the trade off of the information loss that depends on the applications.

A. Wavelet Compression

Wavelet filtering technique can be either lossless or lossy. The essential thought of compression is to utilize less bits to communicate or to transmit to a similar data as some given portrayal (lossless compression) or to utilize less bits to communicate or to transmit with the given information roughly. The limitation of the wavelet filtering permits the greater part of the vitality of a signal to be amalgamated among a little subset of the wavelet filtered coefficients for organized signals, by transmitting signals which can be perceived by an individual. The utilization of either sort of compression can turn into a monetary factor for either

documenting or transmitting information, and the greater development of the Internet and graphical portrayals of data is making these issues become increasingly significant. It is advancing into a significant innovation for Bandwidth efficiency and for user's allocation. Devi priya, et.al., discussed that in [10], the wavelets are applied to compress the information signal as a lossy signal, by splitting the information signal into approximation coefficients and detailed coefficients.

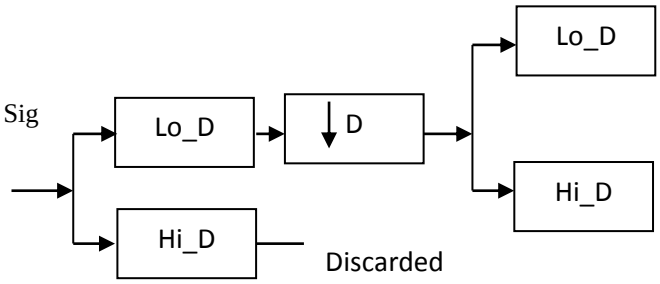

Fig:1 Wavelet Decomposition

Our work is to mainly give insight into the approximation coefficients which contains the more information signal rather than the detailed coefficients. This kind of lossy compression goes under the risk Denoising. This sort of specific Compression takes a parted with signal with noise in it and tosses a portion of the bits however the perfect sum and so that the reproduced signal is basically free from the noise present in the first signal which is the reference signal of all the transmitted informations.

III. MIMO OFDM

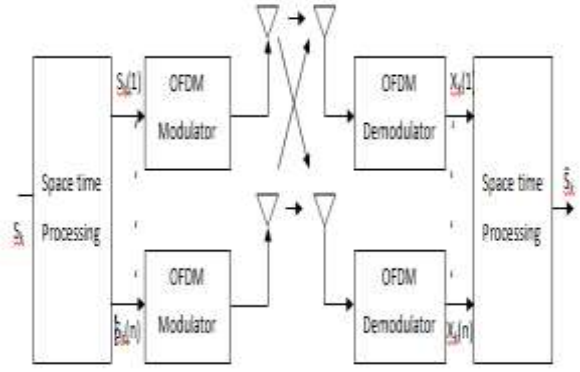

Fig.2 OFDM System Model

Orthogonal Frequency Division Multiplexing (OFDM), an advanced modulation technique for signal adjustment by avoiding more obstruction, cross talks in the transmitted signal through splitting the information into various stream by allocating various narrowband frequencies for each stream which were discussed in [11], [12]. Single channel modulation is carried out for the first information stream bits would be sent sequentially i.e., in a steady progression are transmitted in equal i.e., a few without a moment's delay each sub stream is carried out at lower speed on discrete channels comparative with the first signal. The signals transmitted in the sub streams are divided into various streams and are separated from distant. This diminishes obstruction among signals and makes it simpler to get every signal precisely while keeping up a similar throughput were discussed in [13]. Then Wavelet Decomposing proffers its role in decomposing the signal into Approximated and Detailed coefficients. The Detailed coefficients are discarded, since the for the telephony applications, it is sufficient to concentrate only on the approximated coefficients. Then those coefficients are decimated for further splitting or for further transmission of signals. Then those signals are transmitted into awgn channel and at the reception reverse process are carried out to reconstruct the original signal with some loss for the Internet Telephony Applications.

IV. SURE

Stein's Unbiased Risk Estimate (SURE) is a rationale estimator of the mean-squared error of an about discretionary, nonlinear one-sided estimator, it gives a signal of the precision of a given estimator. This is salient, since the true mean-squared error of an estimator is an element of the obscure parameter to be evaluated, and can't be resolved precisely. Vikas Gupta, et.al., discussed in [14] that a standard utilization of SURE is to pick a parametric structure for an estimator, and afterward enhance the estimations of the original signal. Thresholding may be carried out in two forms. Soft thresholding and Hard thresholding. Soft thresholding concentrates on the approximated coefficients values and discarding the detailed values whereas in hard thresholding entailing all the approximated and detailed values would result

in processing more bits thereby increasing the processing time which is discussed in [15]. Soft thresholding would result in the necessary information needed for the internet telephony applications.

V. TABULATION

For the various wavelet the compression has been executed to obtain the differences in the estimation process. Since the reception of signal should be appropriate inorder to process the information. Out of which symlet 4 wavelet has shown better results by the Mean Square Estimation.

S.No	Wavelet Name	Mean Square Estimation
1.	Haar	59.20
2.	Bior 1.1	59.20
3.	Sym 3	32.91
4.	Sym 4	31.75
5.	db1	32.64
6.	db2	32.37

VI. RESULT

The result is shown at some specific instants of time for the better perception. Entire result plot would not be perceived properly due to too much of information. From the results it is clearly shown that the reconstructed signal through the process which are mentioned in this work produces the similar

Fig.3 Approximated signal with the fundamental signal

Signal of the fundamental signal with some loss, since the proposed work emphasized only on the approximated values

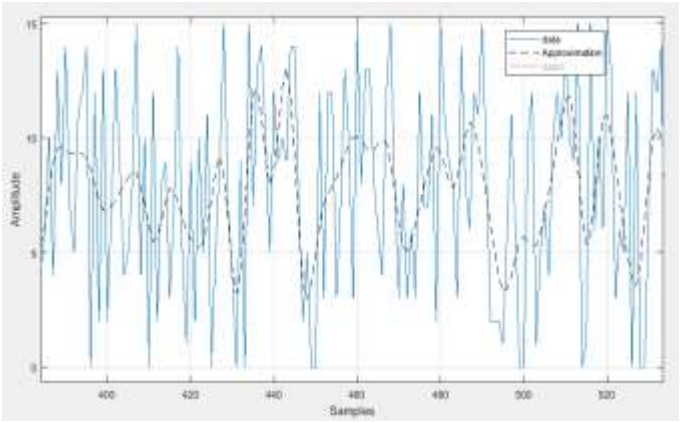

Fig.4 Wavelet compressed coefficients of the fundamental signal

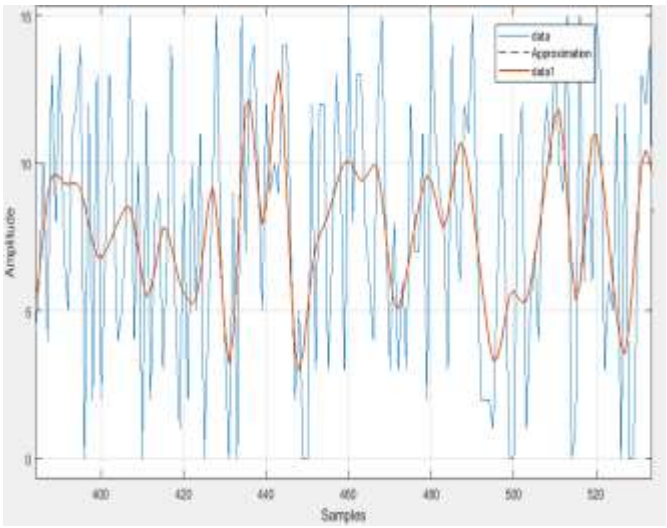

Fig.5 Wavelet denoised signal of the fundamental signal

of the original signal. Through the help of this proposed work voice communication in the internet telephony could be enhanced efficiently also could use for other applications which depends on the compromise of some information.

VII. Conclusion

Denoising by stein's unbiased risk estimate provides the better perception of received signal with the trade off some loss of information. Wavelet compression enhances the quality of the analog signal with better bit to error rate. For the voice communication this would be the better way to compress the unwanted information with enhanced bandwidth efficiency. Since, the Bayes method of denoising requires Minimum probability of threshold selection should be carried out that would lead to more selection of coefficients which increases much complexity. Mean filtering and Median filtering would

leave the valuable information depends on the noise present in the signal. If the noise is low, it would be better but in severe noise environment this method fails to reconstruct the information. Universal thresholding may leave the information since it estimate the threshold value for the entire transmitted signal. It could lose the information by estimating for the entire signal which is mostly added noise after passed through the channel. Hence, SURE gives better approximated coefficients for the transmitted signal with the noise, in which we executed the results for the soft thresholding.

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GSM based Automatic Irrigation System using Arduino

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***Abstract*-- The manuscript describes the research on GSM based Automatic Irrigation Control system using Arduino. An embedded system is a special-purpose computer system designed to perform a dedicated function. Since the system is dedicated to specific tasks, design engineers can optimize it, reducing the size and cost of the product. Embedded system comprises of both hardware and software. Embedded system is fast growing technology in various fields like industrial automation, home appliances, automobiles, aeronautics etc. Embedded technology uses PC or a controller to do the specified task and the programming is done using assembly language programming or embedded. Many devices are used for monitoring the humidity conditions. In early days, all the systems are analog devices and the measured value can be displayed by using recorders, and CROs. In this manuscript the drawbacks in the existing systems have been overcome. Here the humidity is monitored by sensor that can be converted in to corresponding signal to the arduino. According to the humidity levels, the control unit activates the relay driver unit and pumps the motor by using relay switches. The unit also generates signal corresponding to the humidity level, and then the signal can be transmitted through the GSM modem to mobile, when the pump is ON the corresponding message will be forwarded to our mobile number which was already programmed in controller unit.[1]**

***Keywords:* GSM Module, Automatic Irrigation, Soil Moisture Sensor, Arduino, Water**

I. INTRODUCTION

Irrigation is a scientific process of artificially supplying water to the land or soil that is being cultivated. Traditionally in dry regions having no or little rainfall water had to be supplied to the fields either through canals or hand pumps, tube wells. In late decades, there is a quick advancement in Smart Agricultural Systems. Show that agriculture has great importance worldwide. Indeed, in India for example, about 70 % of the people rely upon the vital sector of agriculture. In the past, irrigation systems used to be dependent on the mills to irrigate the farm by conventional methods without knowing the appropriate quantities of these crops. These old systems are a major cause of the waste of large quantities of water and thus destroy some crops because of the lack of adequate quantities of water. Conventional irrigation methods had severe problems such as increase in workload of farm labor and often it lead to problem such as over-irrigation or under-irrigation, and leaching of soil. A system capable of controlling many electrical appliances in an irrigation or field using android platform with a mobile handset, where data transmission is carried wirelessly is very useful for farmers. Design a Wireless transmission media using Wi-Fi transceivers and its interfacing peripherals for wireless data communication between Mobile Handset and appliances is our need. Another important point is not only monitor the

moisture level in the field for proper growth of plants but also saves water, Energy and man power in the agriculture sector. So we design such a system that will be efficient and effort reducing of the farmer. Hence we design the System which is operated manually as well as automatically from remote locations by using Android. Automation can be used in a number of ways: to start and stop irrigation through supply channel outlets, to start and stop pumps, to cut off the flow of water from one irrigation area – either a bay or a section of channel and directing the water to another area. [2]. The components required to design the project are -

- Arduino UNO
- GSM Module
- Transistor BC547 (2)
- Connecting wires
- 16x2 LCD
- Power supply 12v 1A
- Relay 12v
- Water cooler pump
- Soil Moisture Sensor
- Resistors (1k, 10k)
- Variable Resister (10k, 100k)
- Terminal connector
- Voltage Regulator IC LM317

Details of some components given below-

GSM Module:

Here we have used **TTL SIM800 GSM module.** The SIM800 is a complete Quad-band GSM/GPRS Module which can be embedded easily by customer or hobbyist. SIM900 GSM Module provides an industry-standard interface; the SIM800 delivers GSM/GPRS 850/900/1800/1900MHz performance for voice, SMS, Data with low power consumption. The design of this SIM800 GSM Module is slim and compact. The Global System for mobile (GSM) communication is the second generation of mobile technology. World is moving towards third and fourth generation but GSM has been the most successful and widespread technology in the communication. Here in our project we are interfacing GSM module with MC micro controller. The message will be send to a particular GSM mobile number using AT commands with the help of MC various operations are performed using GSM. They are - Test the simple AT command, find out the International mobile station equipment identify (IMEI) number of the GSM modem, connect a call to a GSM mobile number (i.e.) dials a number, send a text to that mobile number. These operations are done using AT commands. The provision of these four operations has been provided by means of four tactile switches. Each switch corresponds to each of the above functions. AT+CMGF message format command is used to select SMS protocol data unit (PDU) mode or SMS text mode. At+CMGS send message: sends a message from GSM to the network (SMS+CMGS).The message reference value <mr> is returned to the GSM on successful message delivery. Sending can be cancelled with the <ESC> character <ctrl-z> must be used to indicate the ending of the message body. [18]

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Fig. 1 GSM Module

TTL SIM800L GSM module:

It gives and takes TTL logic directly (can be use any GSM module). A **LM317 Voltage regulator** is used to power the SIM800 GSM module. LM317 is very sensitive to voltage rating and it is recommended to read its datasheet before use. Its operating voltage rating is 3.8v to 4.2v (prefer 3.8v to operate it).

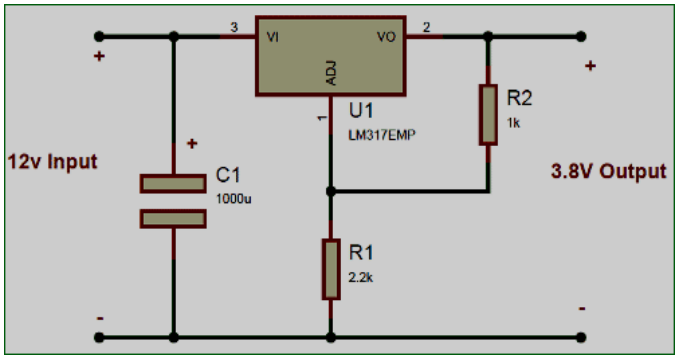

Fig: 2 Circuit diagram of Power Supply given to the TTLsim800L GSM Module

If user wants to use SIM900 TTL Module then he should use 5V and if the user wants to use SIM900 Module then apply 12v in the DC Jack slot of the board. [19]

Soil Moisture Sensor:

The Soil Moisture Sensor is used to measure the volumetric water content of soil. This makes it ideal for performing experiments in courses such as soil science, agricultural science, environmental science, horticulture, botany, and biology. The Soil Moisture Sensor uses capacitance to measure the water content of soil (by measuring the dielectric permittivity of the soil, which is a function of the water content). Simply insert this rugged sensor into the soil to be tested, and the volumetric water content of the soil is reported in percent. One side of the probe is directly connected to Vcc and other probe terminal goes to the base of BC547 transistor. A potentiometer is connected to the base of the transistor to adjust the sensitivity of the sensor. [20]

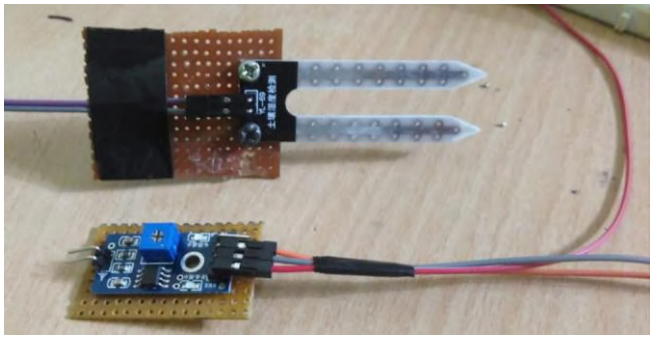

Fig. 3 Soil Moisture Sensor

Arduino :

It is used for controlling whole the process of this Automatic Plant Watering System. The output of soil sensor circuit is directly connected to digital pin D7 of Arduino.

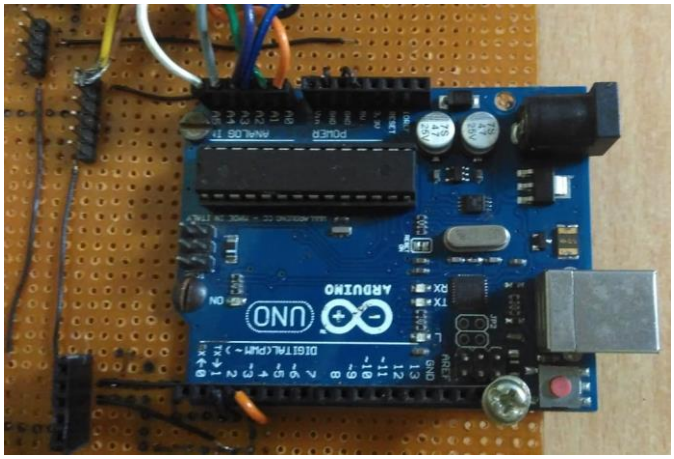

Fig. 4 Arduino UNO

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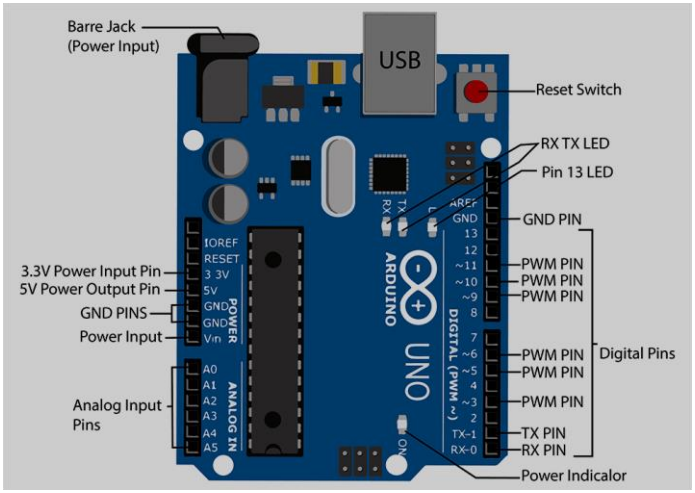

Fig. 5 Arduino UNO with its pin description [20]

Relay:

A 12 V relay is used to control the 220VAC small water pump. The relay is driven by a BC547 Transistor which is further connected to digital pin 11 of Arduino. [21]

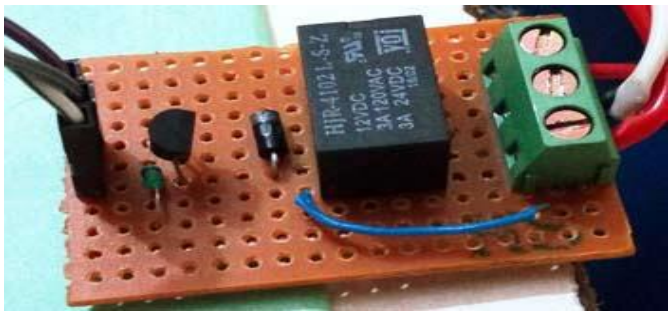

Fig. 6 12V Relay

LCD

It is also used for displaying status and messages. Control pins of LCD, RS and EN are connected to pin 14 and 15 of Arduino and data pins of LCD D4-D7 are directly connected at pin 16, 17, 18 and 19 of Arduino. LCD is and driven by Arduino's inbuilt LCD library.[23]

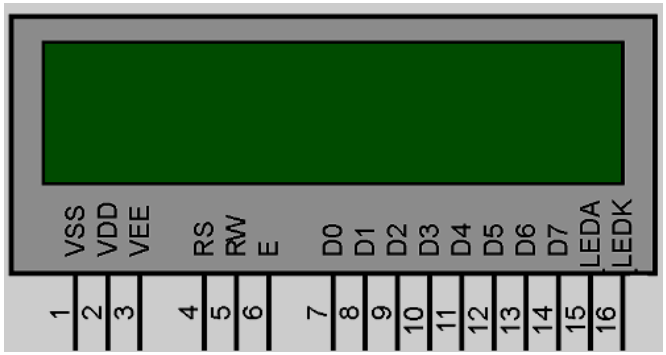

Fig. 7 LCD display 16×2

II. LITERATURE SURVEY

Shen etc. al (2007): Author introduced a GSM-SMS remote measurement and control system for greenhouse based on PC-based database system connected with base station. Base station is developed by using a microcontroller, GSM module, sensors and actuators. In practical operation, the central station receives and sends messages through GSM module. Criterion value of parameters to be measured in every base station is set by central station, and then in base stations parameters including the air temperature, the air humidity. [3]

Indu et al (2013): The author mainly focuses on reviews in the field of remote monitoring and control, the technology used and their potential advantages. The paper proposes an innovative GSM/Bluetooth based remote controlled embedded system for irrigation. The system sets the irrigation time depending on the temperature and humidity reading from sensors and type of crop and can automatically irrigate the field when unattended. Information is exchanged between far end and designed system via SMS on GSM network. A Bluetooth module is also interfaced with the main microcontroller chip which eliminates the SMS charges when the user is within the limited range of few meters to the designated system. The system informs users about many conditions like status of electricity, dry running motor,

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increased temperature, water content in soil and smoke via SMS on GSM network or by Bluetooth. [4]

Kalyan et al (2011): The author states that the need for systems that make agriculture easier and more sustainable has increased within the past few years. The ability to conserve two of the most important resources of a farmer, water and time, has been the latest challenge. A system that provides this ability - through the use of efficient and reliable methods such as wireless sensor networking, sprinkler irrigation, GSM, SMS technologies and readily available mobile phone devices – is certain to help the farmers get a better yield and on alarger scale, help the agricultural and economic growth of the country. [5]

Prisilla et al (2012): The author staes that water is one of nature's most important gifts to mankind, because of the increase in population food requirement for human being is also increasing. Over the past few decade usage of water for irrigation has increased hysterically. Water is polluted due to wastage and contaminants in the industries. Saving water is more important. This ultimate aim can be achieved by using the exiting ANN control system. It will provide a way to save flood water in the fields for future irrigation purpose. [6]

Chetana et al (2012): The paper focuses on automated Wireless Watering System which is a user friendly system, which notifies the user about its status. The 2 modes of operations provide the user with the option of automatic and manual process. The system also provides the log file of the events carried out. [7]

Muhammad (2010): The author proposed a simple approach to "Automatic Irrigation control problem using Artificial Neural Network Controller". The proposed system is compared with ON/OFF controller and it is shown that ON/OFF Controller based System fails miserably because of its limitations. On the other hand ANN based approach has resulted in possible implementation of better and more efficient control. These controllers do not require a prior knowledge of system and have inherent ability to ANN based systems can save lot of resources (energy and water) and can provide optimized results to all type of agriculture areas. [8]

Sanjukumar (2013): The author proposed "Advance Technique for Soil Moisture Content Based Automatic Motor Pumping for Agriculture Land Purpose" was developed and successfully implemented along with flow sensor. Salient features of the system are: Closed loop automatic irrigation system, temperature and water usage monitoring. User can easily preset the levels of the Moisture and is regularly updated. [9]

Prathyusha et al (2012): According to the author Microcontroller based drip irrigation system proves to be a real time feedback control system which monitors and controls all the activities of drip irrigation system efficiently. The present system is a model to modernize the agriculture industries at a mass scale with optimum expenditure. They can provide irrigation to larger areas of plants with less water consumption and lower pressure. Using this system, one can save manpower, water to improve production and ultimately profit. [10]

Shaik et al (2014) [11]: The water level monitoring in agricultural field and motor controlling system based on GSM technology using PIC16F877A micro-controller. An advantage of this system is very simple, more competent and low cost. Future work can be done by designing a sys-tem based on 3G camera for visual identification of water level from remote level. [11]

Joaquin Gutierrez et al (2014): The researcher developed an automated irrigation system to optimize water usage in agriculture. In the system, soil-moistures and temperature sensors are placed in the root zone of the plants. Algorithm

with temperature and soil moisture threshold values was programmed in microcontroller to control water flow. The algorithm first, identifies least significant byte in received packet. Second, soil moisture and temperature values are compared with programmed threshold values to activate irrigation pump. Third, algorithm records log data in memory and transfers it to a web server through GPRS module. Proposed system was tested in sage crop field and remarkable water savings is achieved compared to traditional irrigation practices. Results show that the proposed system has potential to be useful in water limited geographical areas. Limitation of the proposed system is that the availability of water is not taken into consideration in the irrigation process. [12]

Suraj et al (2015): Automated irrigation system provides irrigation as per the requirement of the crop. This system is automated irrigation system so it reduces the human resources. This irrigation system was found to be feasible and cost effective for optimizing water resources for agricultural production. It can be adjusted to a variety of specific crop needs and requires minimum maintenance. Using this system we can monitor the status of all the sensors (Soil , moisture, Temperature, Water level) and also the ON/OFF status of the motor and Fan. [13]

Jaichandran R et al (2013): They also proposed automated irrigation system for switching on and off of irrigation motor based on field soil moisture condition, but the limitations of this system is that the water availability in an important parameter which is not taken into consideration. [14]

Sukrithi et al. (2016): The author proposed a system for remote monitoring of water level in the tank using mobile phone and internet. Ultra sonic sensors are used to measure water level inside tank. Floating pad is mounted on the water in the tank and the ultra sonic sensor detects the distance of floating pad from the top of the tank and this is used to identify the availability of water in tank. Soil moisture sensor measures moisture in soil using two probes that acts as a resistor. The mobile phone is used to shut the water supply to irrigation field remotely. Switching on/off of motor has been automated. Proposed system can be installed to monitor moisture content of the soil continuously. Sprinklers are turned on automatically, when moisture of the soil goes below threshold level. The user can monitor irrigated process remotely using mobile application, without visiting the field. Proposed systems would make the farmers work extensively simple. Limitation of the proposed system is that the multiple fields are not taken into consideration. [15]

Reshma S et al (2016): The author proposed automation in irrigation system using WSN and IOT. Major prototype used in the prototype includes: soil moisture sensor, temperature sensor, water level sensor, and relay, GSM, and GPRS module. Soil moisture sensors and temperature sensors are used in monitoring field condition and the data are sent to microcontroller. Water availability details are sensed by water level sensor and the details are sent to microcontroller. Sensed data send to user mobile phone and web site using GSM and GPRS module. Based on analysis, microcontroller sends signal to relay for switching on/off of motor. Limitation of this system is that the proposed system is experimented by considering only one field. But in real time, there may one than one field need to be irrigated using a single water source. [16]

Shika et al (2016): The author proposed automated irrigation system using three sensor nodes. Irrigation process is automated using the soil moisture values send from senor nodes. Mobile phones are used as remote control. Graphical user interfaces and databases for the prototype is developed using matlab and mysql. [17]

It can be stated from the aforementioned literature survey, it can be stated that customarily hand pumps, waterway water and precipitation were a real source of water supply for irrigation system. This strategy has prompted extreme downsides like under watering and over watering system which thus causes filtering and loss of supplement and lack of water have prompted the requirement for a framework which effectively oversees watering system of fields.

The above mentioned drawbacks have been overcome by using a automated irrigation system which is based on arduino and operated by GSM. The system informs the user about the moisture content via SMS on GSM network. So this system reduces the human interference and

ON/OFF the supply of water automatically.

The manuscript comprises of

Introduction

Literature survey related to proposed control system

Methodology

Proposed design with working

Result

Conclusion

III. METHODOLOGY

Working of this **Automatic Irrigation system** is quite simple. First of all, it is a completely automated system and there is no need of manpower to control the system. Arduino is used for controlling the whole process and GSM module is used for sending alert messages to user on his Cell phone. If moisture is present in soil then there is conduction between the two probes of Soil Moisture sensor and due to this conduction, transistor Q2 remains in triggered/on state and Arduino Pin D7 remains Low. When Arduino reads LOW signal at D7, then it sends SMS to user about “Soil Moisture is Normal. Motor turned OFF” and water pump remains in off state.Now if there is no Moisture in soil then Transistor Q2 becomes off and Pin D7 becomes high. Then Arduino reads the Pin D7 and turns on the water motor and also sends message to user about “Low Soil Moisture detected. Motor turned ON”. Motor will automatically turn off when there is sufficient moisture in the soil. [24]

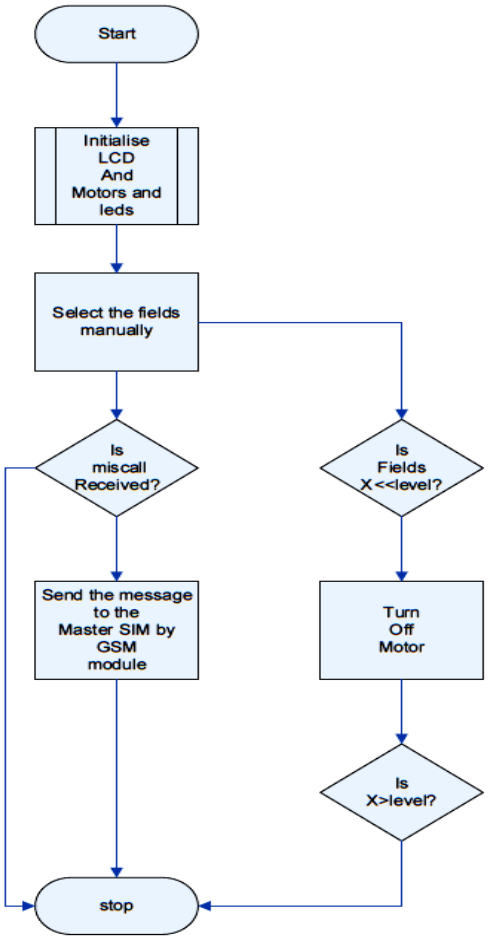

Fig. 8 Flow chart of proposed system [7]

IV. PROPOSED DESIGN WITH WORKING

The user communicates with the centralized unit through SMS. The centralized unit communicates with the system through SMS which will be received by the GSM with the help of the SIM card. The GSM sends this data to arduino which is also continuously receives the data from sensors in some form of codes. After processing, this data is displayed on the LCD. Thus in short whenever the system receives the activation command from the subscriber it checks all the field conditions and gives a detailed feedback to the user and waits for another activation command to start the motor. The motor is controlled by a simple manipulation in the internal structure of the starter. The starter coil is indirectly activated by means of a transistorized relay circuit. When the motor is started, a constant monitoring on soil moisture and water level is done & once the soil moisture is reached to sufficient level the motor is automatically turned off & a message is send to subscriber that the motor is turned off. The water level indicator indicates three levels low, medium, high and also empty tank. The system sets the irrigation time depending on the temperature and humidity reading from sensors and type of crop and can automatically irrigate the field when unattended. Information is exchanged between far end and designed system via SMS on GSM network. A Bluetooth module is also interfaced with the main microcontroller chip which eliminates the SMS charges when the user is within the limited range of few meters to the designated system. The system informs users about many conditions like status of electricity, dry running motor, increased temperature, water content in soil and smoke via SMS on GSM network or by Bluetooth. The GSM based irrigation system may offer users the flexibility to regulate and control the operations of their irrigation systems with little intervention to reduce runoff from over watering for improvement in crop yield. This enables users to take advantage of the globally deployed GSM networks with its low SMS service cost to use mobile phones and simple SMS commands to manage their irrigation system. It will be possible for users to use SMS to monitor directly the conditions of their farmland, schedule the water needs of crops, automatically control watering, and set control operational conditions in accordance with the water needs of crops. This will help minimize overwatering and crop production cost. Further, it will help users to take advantage of

the prevailing GSM networks to provide value added services. The pump switching system was tested for functionality using a simple code to perform on-and-off operation of the LED. The functionality of the GSM was tested by connecting it to the arduino board which was programmed to turn on-and-off an LED using SMS from a mobile phone. [27]

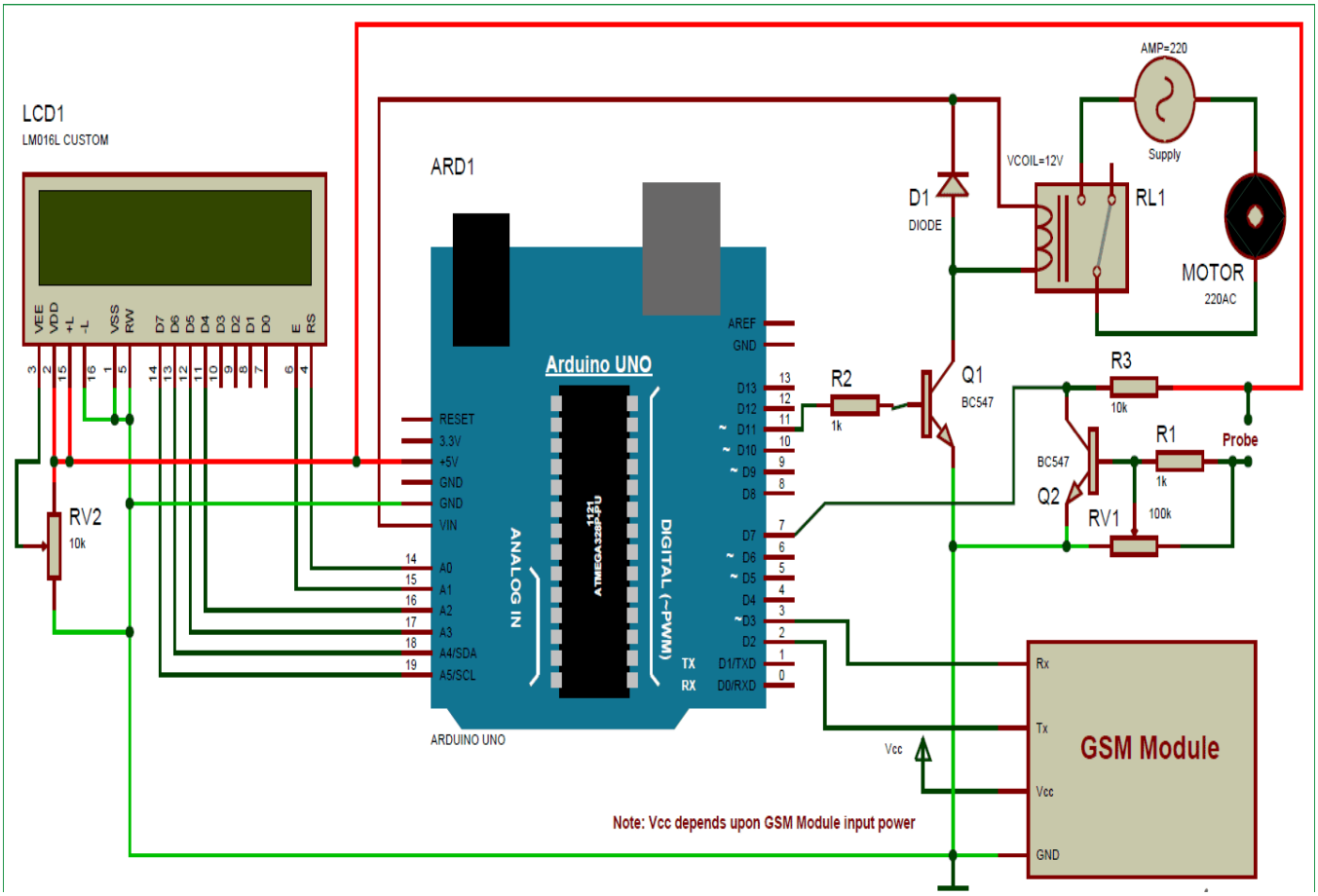

Fig. 8 Circuit diagram of Automatic Irrigation system

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TABLE I

Comparison with existing irrigation technologies

Parameter	WiFi	Bluetooth	Zigbee	Arduino
Application	Wireless LAN	Cable replacement	Control and monitor	Development of automation system
Frequency Band	2.4GHz	2.4GHz	2.4GHz 868MHz 915MHz	38.46KHz
Battery life (days)	0.1 – 5	1 – 7	100 – 7,000	38 - 183
Bandwidth	2 -100Mbps	1Mbps	20-250Kbps	16MHz
Range(meters)	1-100	1-10	1-75 and more	2-4
Memory	100KB	100KB	32-60KB	Flash memory-32KB SRAM - 2KB EEPROM-1KB

V. RESULT

The system supports water management decision, which determines the controlling time for the process and monitoring the whole system through GSM module. It also continuously monitors the water level in the tank and provide accurate amount of water required to the plant or tree (crop). This system is enable to measure the temperature, humidity and dew point so as to forecast the weather condition. This model is of low cost and effective with less power consumption using sensors for remote monitoring and controlling devices which are controlled via SMS using a GSM using android mobile

VI. FUTURE SCOPE

As the system is dependent on GSM, network failure is a major issue we have faced during its operation. The range of the model is also not so sufficient to cover any distance. So there is a scope to replace the GSM module with any other more sufficient network device Also the soil moisture sensor gets rusted after a period because of frequent contact with air, water and soil. So there is a scope of replacing copper made soil moisture sensor's probe with other rusting proof material.

VII. CONCLUSION

By using Hardware and software knowledge we built the "GSM Based Automatic Irrigation System". We became successful to receive the message about the state of the field that is whether the land is dry or wet through the GSM interfacing. The result of our design has met our expectation, in which every component is working well. Our irrigation system is easy to use, comparatively cheap in that case that by just giving a miscall we can received the state of the field, Moisture sensor interfacing helps to detect the moisture

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content of the fields and comparing the value predefine in the buffer helps to automatically to turn on/off the motor easily, low power consumption and highly reliable. The LCD also offer great interface and user can be familiar with the system and know the state of the field by just reading the message displayed on the LCD. The three push to on switch are corresponding used for three different crops so that this somewhat meet the requirement of farmer and farmer are free from the fact of irrigation overflow or underflow problems for growing the crop.

The system we had design is also secure because the master SIM only can only receive the message of the state of the field. This system saves the valuable time of the farmers and free from worrying about the field and helps to increase the production of the crops because this system provides the defined amount of water to the particular fields.

If we are given the chance to build it again the number of moisture sensor that should cover the large field will be under the considerations

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Proceedings of International Conference on Data Sciences & Machine Learning (ICDSML2020)

Quiz System Based on : OpenCV, MicroSoft Speech API and Fisher Face Recognition (Delight for Persons who Neither Speak

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Abstract— Now days, Technology is increasing day by day due to which world is Globalizing, and all the domains of world are coming closer, but this pace is also harmful for the disable persons as the technology is increasing such sections of society become more and more deprived. We come out with such quiz application which will work on the concept of image recognition, and let the user to enter her responses with help of her eyes, so user will hear the question and give his response, in this application he will only need to use his brain and just hear the things. So such an application is an attempt to make the condition of such section improved. Various concepts and algorithms have been combined to come out with such application: Haar Cascade Algorithm, Fisher Face Algorithm, Microsoft Speech API, OpenCV to combine them all.

Keywords--- OpenCV, Face Recognition, Quiz Application, Haar Cascade, Fisher Face

I. INTRODUCTION

Firstly, we talk about the various technologies and algorithms being used in our application.

In section I(a) we talk about how to prepare a haarcascade for the application to detect images.

In section I(b) we discuss the algorithm used to recognise the detected image using Fisher Face Algorithm.

In section I(c) we will talk about Microsoft Speech API used to provide voice to applications. and various algorithms to implement it.

In section II we will combine all the above techniques to come out with the quiz application that will use all the above techniques to give pleasure experience to the persons who can neither see or speak.

In the last section we will discuss results and future scopes of this application.

A. Face Detection and Recognition Algorithm

Haar Cascade [2][6] is a machine learning object detection algorithm used to identify objects in an image or video and based on the concept of features proposed by Paul Viola and Michael Jones in their paper "Rapid Object Detection using a Boosted Cascade of Simple Features" in 2001

It is a machine learning based approach where a cascade function is trained from a lot of positive and negative images. It is then used to detect objects in other images.

The algorithm has four stages:

1. Haar Feature Selection
2. Creating Integral Images
3. Adaboost Training
4. Cascading Classifiers

It is well known for being able to detect faces and body parts in an image, but can be trained to identify almost any object.

Let's take face detection as an example. Initially, the **algorithm needs a lot of positive images of faces and negative images** without faces to train the classifier. Then we need to extract features from it.

First step is to collect the Haar Features. A Haar feature considers adjacent rectangular regions at a specific location in a detection window, sums up the pixel intensities in each region and calculates the difference between these sums.

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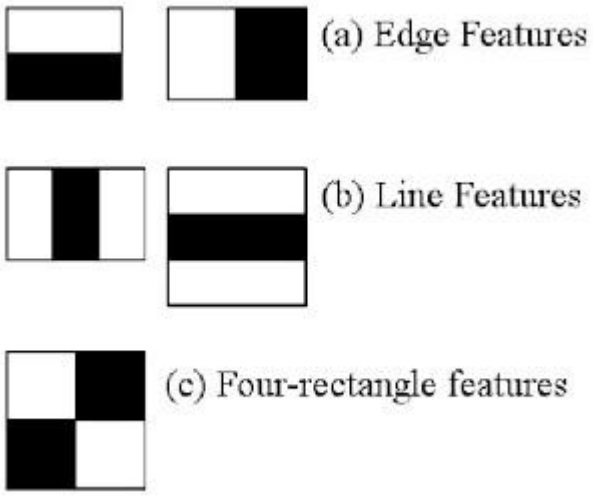

Fig 1 Feature Detection in Haar Cascade algorithm

Integral Images are used to make this super-fast.

But among all these features we calculated, most of them are irrelevant. For example, consider the image below. Top row shows two good features. The first feature selected seems to focus on the property that the region of the eyes is often darker than the region of the nose and cheeks. The second feature selected relies on the property that the eyes are darker than the bridge of the nose. But the same windows applying on cheeks or any other place is irrelevant

So how do we select the best features out of 160000+ features? This is accomplished using a concept called **Adaboost** which both selects the best features and trains the classifiers that use them. This algorithm constructs a "strong" classifier as a linear combination of weighted simple "weak" classifiers. The process is as follows.

During the detection phase, a window of the target size is moved over the input image, and for each subsection of the image and Haar features are calculated. You can see this in action in the video below. This difference is then compared to a learned threshold that separates non-objects from objects. Because each Haar feature is only a "weak classifier" (its detection quality is slightly better than random guessing) a large number of Haar features are necessary to describe an object with sufficient accuracy and are therefore organized into *cascade* ***classifiers*** to form a strong classifier.

1) Cascade Classifier: The cascade classifier [6] consists of a collection of stages, where each stage is an ensemble of weak learners. The weak learners are simple classifiers called *decision stumps*. Each stage is trained using a technique called boosting. *Boosting* provides the ability to train a highly accurate classifier by taking a weighted average of the decisions made by the weak learners.

Each stage of the classifier labels the region defined by the current location of the sliding window as either positive or negative. *Positive* indicates that an object was found and *negative* indicates no objects were found. If the label is negative, the classification of this region is complete, and the detector slides the window to the next location. If the label is positive, the classifier passes the region to the next stage. The detector reports an object found at the current window location when the final stage classifies the region as positive.

The stages are designed to reject negative samples as fast as possible. The assumption is that the vast majority of windows do not contain the object of interest. Conversely, true positives are rare and worth taking the time to verify.

- A *true positive* occurs when a positive sample is correctly classified.
- A *false positive* occurs when a negative sample is mistakenly classified as positive.
- A *false negative* occurs when a positive sample is mistakenly classified as negative.

To work well, each stage in the cascade must have a low false negative rate. If a stage incorrectly labels an object as negative, the classification stops, and you cannot correct the mistake. However, each stage can have a high false positive rate. Even if the detector incorrectly labels a non-object as positive, you can correct the mistake in subsequent stages. Adding more stages reduces the overall false positive rate, but it also reduces the overall true positive rate.

Cascade classifier training requires a set of positive samples and a set of negative images. You must provide a set of positive images with regions of interest specified to be used as positive samples. You can use the Image Labeller to label objects of interest with bounding boxes. The Image Labeller outputs a table to use for positive samples. You also must provide a set of negative images from which the function generates [9] negative samples automatically. To achieve acceptable detector accuracy, set the number of stages, feature type, and other function parameters

B. Fisher Face Algorithm

Fisher face is one of the popular algorithms [1] used in face recognition, and is widely believed to be superior to other techniques, such as Eigen face because of the effort to maximize the separation between classes in the training process. The purpose of this research is to establish a program of face recognition application using ***fisher face***

method by utilizing GUI applications and databases that are used in the form of a Papuan facial image. Image recognizing ***fisher face*** method is based on the reduction of face space dimension using **Principal Component Analysis (PCA)[2]** method, then apply Fisher's Linear Discriminant (FDL) method or also known as **Linear Discriminant Analysis (LDA)[3]** method to obtain feature of image characteristic. The algorithm used in the process for image recognition is **fisher faces** algorithm while for identification or matching face image using minimum Euclidean. The method used in this study is literature study that is studying and reviewing various books or literature related to mathematical concepts that underlies the formation of **fisher face** algorithm to recognize the image of a person's face which is then applied in programming language, especially programming language Matlab7.10. While in the process of preprocessing used Adobe Photoshop CS4 application program, its goal is to make the face image to be uniform in terms of size and format so that the image is ready to be used by the system. The results show that for image recognition where the image of testing is the same as the training image, the percentage of program success is 100%, while for 73 facial test images with various expressions and various positions, 70 faces are recognized correctly and 3 faces are recognized incorrectly, so the percentage of success is 93%.

The face image to be used must go through the preprocessing stage first. This stage includes image acquisition, and RBG image conversion to grayscale. Acquisition of face images using camera. The image of this acquisition is a 24-bit RGB image of JPG format with size 92 x 112 pixels. Conversion of face image of acquisition from RGB to 8-bit grayscale, BMP format with size 40 x 40 pixels. Furthermore, the face data is divided into 2 (two) parts i.e. one part of the image will be used as training image (training dataset) and one part of the image will be used as test image (testing dataset).
At this image processing stage, ***Fisher face*** method will be applied to generate feature vector of facial image data used by system and then to match vector off traits of training image with vector characteristic of test image using Euclidean distance formula.

$$d = \sqrt{\sum} \quad (p-d)(p-d)$$

equation 1

1) PCA Algorithm:

• Conversion training [8][9][10] image Γ1, 2, . . . m with size N * N into vector form with length size N ^2

• Calculate the average of all face images

$$\vec{m} = \frac{1}{M}\begin{pmatrix} a_1 & +b_1 & +\cdots+h_1 \\ a_2 & +b_2 & +\cdots+h_2 \\ \vdots & \vdots & \vdots \\ a_{M^2} & +b_{M^2} & +\cdots+h_{M^2} \end{pmatrix},$$

equation 2

• Calculate Matrix A with the formula

$$\vec{a}_m = \begin{pmatrix} a_1 & - & m_1 \\ a_2 & - & m_2 \\ \vdots & & \vdots \\ a_{N^2} & - & m_{N^2} \end{pmatrix}, \quad \vec{b}_m = \begin{pmatrix} b_1 & - & m_1 \\ b_2 & - & m_2 \\ \vdots & & \vdots \\ b_{N^2} & - & m_{N^2} \end{pmatrix},$$

equation 3

$$\vec{e}_m = \begin{pmatrix} e_1 & - & m_1 \\ e_2 & - & m_2 \\ \vdots & & \vdots \\ e_{N^2} & - & m_{N^2} \end{pmatrix}, \quad \vec{f}_m = \begin{pmatrix} f_1 & - & m_1 \\ f_2 & - & m_2 \\ \vdots & & \vdots \\ f_{N^2} & - & m_{N^2} \end{pmatrix},$$

equation 4

$$\vec{e}_m = \begin{pmatrix} e_1 & - & m_1 \\ e_2 & - & m_2 \\ \vdots & & \vdots \\ e_{N^2} & - & m_{N^2} \end{pmatrix}, \quad \vec{f}_m = \begin{pmatrix} f_1 & - & m_1 \\ f_2 & - & m_2 \\ \vdots & & \vdots \\ f_{N^2} & - & m_{N^2} \end{pmatrix},$$

equation 5

$$\vec{g}_m = \begin{pmatrix} g_1 & - & m_1 \\ g_2 & - & m_2 \\ \vdots & & \vdots \\ g_{N^2} & - & m_{N^2} \end{pmatrix}, \quad \vec{h}_m = \begin{pmatrix} h_1 & - & m_1 \\ h_2 & - & m_2 \\ \vdots & & \vdots \\ h_{N^2} & - & m_{N^2} \end{pmatrix}$$

equation 6

• Compute vector eigen (***eigVecs***) and value eigen (**eigenVals**) by using the method svd of the
matrix **A**. Sort eigvecs then reduction with the pca method, pe . pe is ***eigen faces***

2) LDA Algorithm

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• Calculate the average [7] of each person / class

$$\vec{x} = \frac{1}{2}\begin{pmatrix} a_1 + b_1 \\ a_2 + b_2 \\ \vdots \quad \vdots \\ a_{N^2} + b_{N^2} \end{pmatrix}, \quad \vec{y} = \frac{1}{2}\begin{pmatrix} c_1 + d_1 \\ c_2 + d_2 \\ \vdots \quad \vdots \\ c_{N^2} + d_{N^2} \end{pmatrix},$$

equation 7

$$\vec{z} = \frac{1}{2}\begin{pmatrix} e_1 + f_1 \\ e_2 + f_2 \\ \vdots \quad \vdots \\ e_{N^2} + f_{N^2} \end{pmatrix}, \quad \vec{w} = \frac{1}{2}\begin{pmatrix} g_1 + h_1 \\ g_2 + h_2 \\ \vdots \quad \vdots \\ g_{N^2} + h_{N^2} \end{pmatrix}$$

equation 8

• Construct the scatter matrix S1, S2, S3, S4

$S1 = a\ m\ a\ T + b\ m\ b\ mT$ equation 9

$S2 = (c\ m\ c\ mT + d\ m\ dm\ T)$ equation 10

$S3 = e\ m\ e\ mT + f\ m\ f\ mT$ equation 11

$S4 = (g\ m\ g\ mT + \mathrm{h}\ m\ \mathrm{h}mT)$ equation 12

and matrix within class scatter ($ScatW = S1 + S2 + S3 + S4$) equation 13

• The construct of also matrix between class scatter, (*ScatB)*

$(ScatB = 2(x -)(x - m\ )T + 2(y - m\ )(y - m\ )T + 2(z - m\ )(z - m\ )T + 2(w - m\ )(w - m\ )T\ )$

• Compute the multiplication of matrices transpose of pe , (**PeT**), with **ScatW** and **ScatB** until obtained

• Find eigenvector (***VeSbb***) and generalized eigenvalues (***NeSww***) of (***Sbb***, ***Sww***) and then sort in ascending order.

• Projection back *VeSbb with Pe* eigenfaces then formed (***Pe * VeSbb***) → Output as **Fisherfase**.

• Normalization Fisherface ***Pe*VeSbb*N***

• Find the transpose of the normalized **Fisherfaces**, ***Pe*VeSbb*Nt***

• Calculate Weights for each training image into a normalized fisherface, U = Pe * VeSbb * Nt * A.

The result of the above process is the weight of each training image in the form of eigen vector which will be used to find similarity with face image which will be recognized by using Euclidean distance formula.

3) Identification or recognition algorithm: The identity classification steps are as follows:

• Conversion of the face image tested by the size of *N* ***** *N* into the column vector form *i N*^2

• Calculate the distance of the difference between the image testing with training face image using euclidean distance. Stated above.

The result of the identification is the image that has the smallest distance with the test image displayed by the system.

C. Microsoft SAPI (For Voice Modulation)

1) Used for speech Production in system: An application creates the SpVoice [4] object and uses the ISpVoice interface to submit and control speech synthesis. Applications can speak text strings, text files, and audio files. Although this object is named the "SpVoice," it is actually a much higher-level object than a single voice. Conceptually, it is an object which accepts input data streams that are then rendered to the specified output, potentially using multiple speech synthesis voices in the process. Each SpVoice instance contains its own queue of input streams (usually just text) and its own output stream (usually an audio device). When an application calls ISpVoice::Speak, another item is added to the end of the SpVoice queue.

2) Basic Synthesis: The main speech synthesis method is ISpVoice::Speak. Almost everything having to do with controlling synthesis (for example, rate, pitch, and volume) is performed by this single function. This function can speak plain text, or the application can mark up the text using synthesis markup tags. The speak method enables the application to specify whether the call should be synchronous or asynchronous. If the call is synchronous, the Speak method will not return until all of the text has been rendered. Speak returns immediately for asynchronous Speak calls, and the text is rendered on a background thread.

ISpVoice::SpeakStream is similar to the Speak method, but by using SpeakStream, streams of text or audio data can be added to the rendering queue.

3) Overriding Defaults: SAPI will automatically use the default voice and default audio output device if the application does not specify otherwise. The output can be controlled by the application through ISpVoice::SetOutput. The default voice can be overridden in one of two ways: The application can call ISpVoice::SetVoice or it could speak a <VOICE> synthesis markup tag.

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4) Audio Device Sharing: When an SpVoice object is rendering to an audio device (as opposed to a stream), it will attempt to cooperate with other SpVoice objects that are sharing the same device based on the priority of the SpVoice. By default, a voice is set to SPVPRI_NORMAL which means that it will wait until other voices in the system have completed before it will begin rendering its input queue. A voice set to SPVPRI_ALERT will interrupt a normal priority voice by stopping the normal voice, rendering its own queue, and then restarting the normal priority voice. An SpVoice with a priority of SPVPRI_OVER will simply render its data immediately even if another voice is currently speaking (they would both speak at the same time).

Applications can control the priority of a voice by calling ISpVoice::SetPriority.

5) Rendering to Streams: The SpVoice can render data to any object that implements ISpStreamFormat, which is a simple derivative of the COM standard IStream. The SpStream object is provided to allow easy conversion of existing IStreams to support ISpStreamFormat or to read or write wav or other files. Applications can ISpVoice::SetOutput to force the SpVoice to render to a stream. When rendering to a stream, the voice will render the data as quickly as possible.

6) Synthesis Events: The SpVoice implements the ISpEventSource interface. It forwards events back to the application when the corresponding audio data has been rendered to the output device. Examples of events are reaching a word boundary, speaking a phoneme, reaching a bookmark, etc. Some applications can simply be notified when events occur and then call ISpVoice::GetStatus to determine the current stat of the SpVoice object. More complex applications may need to queue events. See the documentation for ISpEventSource for information on setting interest in events.

II. ALGORITHMS & PSEUDO CODES (APPLICATION)

Here we will be going to discuss with you the basic techniques and algorithms used to combine above discussed algorithms and come out with a such a well designed application.

A. Pseudo Codes for Training the Application to recognize the person registered.

1. Getting the total number of users registered.

2. And Train the model to recognize which person comes in front.

While (n < Total number of students)

Converting image of each student to OpenCv :: Mat object

Collect each image of student in vector

Collect roll no of student in a different vector in order of images

Change the image from rgb to gray scale

Then pass both vectors fisher-face object to train the model.

B. Pseudo Code for detecting and recognizing the person standing in front of machine.

While (app is running)

Using picture capturing device, we get live frames

Then as required for **fisher face** recognizer make size and color changes. (rgb to gray_scale).

Using trained model of **Fisher face** recognizer we generate the output label for required person. Since each label is unique for each person we can obtain whole information of that person.

C. Pseudo code for question asking mechanism with the help of Microsoft SAPI.

Question statements are read from file and are spoken out with the help of SAPI object.

The response of person is read with the help of eye cascade if the person shows his right eye his response to the given question is considered as true and for left eye it is considered as false.

Finally, the score is saved.

III. RESULTS & DISCUSSIONS

The application is tested among 60 persons and result obtained are of about 91.23% accurate.

TABLE 1
OBSERVATIONS

Tests	**Results**
1000 responses	980 interpreted correctly
60 users recorded	54 recognized correctly
Exceptions	99.02% exceptions are successfully overcome
Data Bases	Can be easily used with big data technologies like

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	MySQL , Oracle
Speed	Can handle 3 responses in one second

In future application will be modulated to accept numerical responses via finger detection algorithm

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A New Design Approach to Smart Wheelchair Using Arduino, Accelerometer and GSM Module

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ABSTRACT

Smart Wheel Chair is a mechanically controlled device designed to have self-mobility with the help of the user command. After several studies and survey it have shown that both children and adults benefit substantially from access to a means of independent mobility. Though many disabled people have satisfied with traditional manual or powered wheelchairs, there is a segment of disabled community find it difficult or impossible to use wheelchairs independently. This reduces the user's human effort and force to drive the wheels for wheelchair. Many researchers have used several technologies to make a wheelchair accessible to use for this population. Several wheelchairs have been developed with several control devices. The brain signal interfaces, vision based, head gesture based and many more controlled wheelchairs have been developed. Our proposed work is provided with obstacle detection system which reduces the chance of collision while on the journey. Smart wheelchair has gained a lot of interests in the recent times. These devices are useful especially in transportation from one place to another. The machines can also be used in old age homes where the old age persons have difficulty in their movements. The devices serve as a boon for those who have lost their mobility. This project also aims to build a similar wheelchair which would have a sort of intelligence and helps the user on his/her movement.The results achieved showed that it is possible to extract simple user profiles, using the proposed method. Thus, the approach may be further used to extract more complete user profiles, just by extending the set of tasks used, enabling the adaptation of the smart wheelchair interface to each user's characteristics.

Keywords: Gesture, Arduino, Smart wheelchair, GSM, Accelerometer

I. INTRODUCTION

Nowadays more than 700 million persons around the world have some kind of disability or handicap [1]. During the last decades the elderly population in most of the European countries and across all the most civilized countries is also growing at an increasing pace [2][3][4][5]. This phenomenon is receiving increasing attention from the scientific

community, during the last years, and several solutions are being proposed in order to allow a more independent life to the people belonging to those groups. A wheelchair may be seen as a wheeled device that may be propelled eithermanually or using motors. Wheelchairs are instruments that were initially developedin order to give mobility to handicapped human beings. Currently the wheelchairs areseen as powerful resources to overcome severe limitations and disabilities resultingfrom several types of handicaps and illnesses.Smart Wheel Chair is a mechanically controlled device designed to have self-mobility with the help of the user command. This reduces the user's human effort and force to drive the wheels for wheelchair. Furthermore, it also provides an opportunity for visually or physically impaired persons to move from one place to another. The wheelchair is also provided with obstacle detection system which reduces the chance of collision while on the journey. Smart wheelchair has gained a lot of interests in the recent times. These devices are useful especially in transportation from one place to another. The machines can also be used in old age homes where the old age persons have difficulty in their movements. The devices serve as a boon for those who have lost their mobility.

This paper presents a brief description of the history of wheelchairs, theirevolution, the start of art concerning smart wheelchair and the new design approach to smart wheelchair. An overview of simulators used fortesting and training in the context of wheelchairs and intelligent user interfaces andespecially several adaptive interfaces applications is also presented.

Fig1: Smart Wheelchair designed at VADER Labs [6]

Although there are illustrations of wheelchairs in ancient Greek culture, it is considered that the first wheelchair is the one made for Phillip II of Spain in 1595. Then, in 1655, Stephen Farfler, a paraplegic watchmaker, built a self-propelling chair on a three-wheel chassis [7]. The concept evolved from simple manually powered wheelchairs to electric wheelchairs and today new developments are presented in so called intelligent wheelchairs or "smart chairs" or even "robotic chairs".

G Azam and M T Islam, an anticipated system that helps to the self-need of physically challenged and older people. It minimizes the

manual attempt for acquiring and individuals to control the motion of a wheelchair. The author suggested this devise could be enhanced by providing the wireless communication facility, using sensors to sense an obstacle in the wheel chair. By humanizing this system, we directly enhance the lifestyle of the disabled people in the community [8].

Andrej Škraba, proposed the system which controlled by using the voice command, the GUI is developed which is used in the web browser as well as on the mobile devices providing live video stream. The drawback of the planned approach is hidden in the user's inflexibility for practical innovations, particularly adopting the design of rising control software that the cloud provides new possibilities [9].

Imen Klabi, designed Fuzzy Logic Control of the wheelchair in such a way that it can be controlled easily with very less attempt from the patient. Author focused on non-conventional organize algorithm developed using a PC interfaced with an embedded microcontroller platform. Experimental results are approved out on a wheelchair platform [10].

Alexandre A.G. Martinazzo, this work deals with an Arduino-based open hardware project can be enhanced to turn out to be an industrial product with the identical excellence level of existing available devices. The ensuing product is programmed to be released to the public in the year 2016 and will enlarge the use of power wheelchairs in Brazil so that citizens with disabilities have access to such electronic equipment [11].

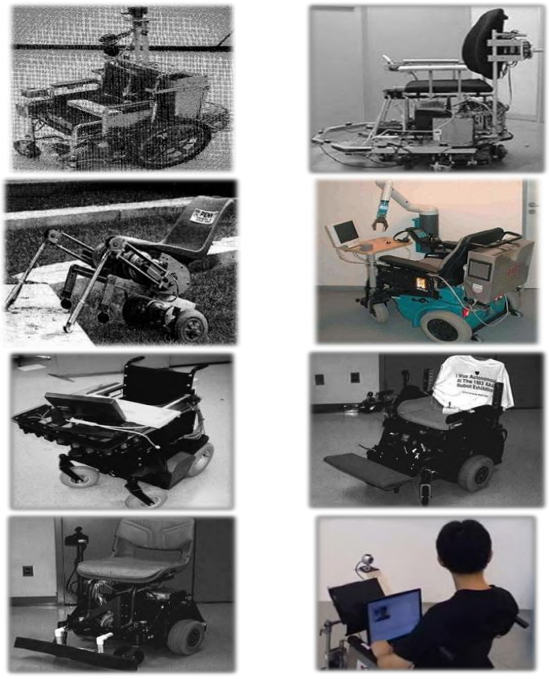

Fig 2: Several prototypes of Intelligent Wheelchairs [12]

Neal Seemiller, presented a novel dynamic model using WMR planning, control, and estimation systems. Author applied 3-D kinematics method. Derivation Simulation tests proved that dynamic models to be more functional, stable, and efficient than common alternatives [13].

Neal Seegmiller and Alonzo Kelly, designed a system exceptionally mobile and named as wheeled mobile Robots (WMRs). In this experiment, simulation result shows that system run over 1K × faster than real time on

an everyday PC. Experimental results show that, once registered, this modelpredict movement accurately [14].

In 2010, a Power Wheelchair Open Platform (PWOP) [15] was developed. It is an open hardware and free software project for power wheelchair electronics with an advanced module structure when compared to sit and drive devices. It provides Bluetooth connection, two controller ports (one for the main user, another for the caregiver) and infrared emission, all compatible with the most expensive modules available on the market. The PWOP project was designed to contribute to the Open Hardware community and to provide an inexpensive platform for research purposes, such as human interface development and prototype tests. It has been engineered around the Arduino platform to drive modern power wheelchair DC motors. Nevertheless, electric wheelchair industry needs simple, robust, low cost control modules. Including all the PWOP features in a commercial module [15] would make the final product too expensive to replace common sit-and-drive devices. Therefore, a Bluetooth-enabled power wheelchair control module was developed based on the PWOP project and industry demands.

In the last years several prototypes of Intelligent Wheelchairs have been developed and many scientific work has been published (Braga et al., 2009) (Reis et al., 2010) in this area. Simpson (Simpson, 2005) provides a comprehensive review of IW projects with several descriptions of intelligent wheelchairs. The main characteristics of intelligent wheelchair are (Braga et al., 2009) (Jia, 2007): interaction with the user using distinct types of devices such as joysticks, voice interaction, vision and other sensor based controls like pressure sensors; autonomous navigation with safety, flexibility and obstacle avoidance capabilities and communication with others devices such automatic doors and other wheelchairs[16].

The first intelligent wheelchairs were basically typical mobile robots to which seats, capable of accommodating user, were added. Nowadays, science allows having intelligent wheelchairs, very similar in shape to traditional wheelchairs, with high manoeuvrability and navigational intelligence, with units that can be attachedand/or removed and with high power independence.

Different types of smart wheelchair have been developed in the past but the new generations of wheelchairs are being developed and used which features the use of artificial intelligence and hence leaves a little to tinker about to the user who uses the wheel chair.

To perform functions a handicapped person with locomotive disabilities needs a wheelchair that require him or her to move around. He/she can do so manually by pushing the wheelchair with his/her hands. However,

many of us have weak upper limbs or find the manual mode of operating too tiring. Therefore, it is desirable to provide them with a motorized wheelchair which is controlled by moving a voice commands. Since motorized wheelchair is important that it be able to avoid obstacles automatically in real time, it can move at a fair speed. Cost of this motorized wheelchair is affordable for many handicapped people as possible, as well as for organizations that support it. With these requirements in mind we propose an automated wheelchair with real-time Herald avoidance capability. The power wheelchair control interfaces currently still not enough to provide mobility for substantial number of person with disabilities. Through research and design wise, the wheelchair to control development along safe and effective use of the provision independence and self-use mobility. This project will provide disability weight innovative solutions to handle the wheel chairs to use voice interface.

This project describes a wheelchair which can be controlled only by using the android application, joystick and hand gestures. The main aim of this project is to facilitate the movement of the disabled people and elderly people who cannot move properly so with this we can enable them to lead better lives without any problem. The project also aims to build a similar wheelchair which would have a sort of intelligence and hence helps the user on his/her movement. This project could be a part of an assistive technology. The project also incorporates use of ultrasonic sensors to detect obstacles within range of 4 meters and notifies the system and stop the wheelchair till further command. In this work, Smart Wheelchair control using Arduino Uno microcontroller and Bluetooth Module via android application is presented. It is for more independent, productive and lead to enjoyable living.

II. METHODOLOGY

To build this Intractable, you will need a wheelchair**,** a Laptop Computer**,** an Arduino, and an interface circuit made from basic electronics. The wheelchair was acquired as an unwanted extra from a local repair shop. It was not considered serviceable for disabled persons because its condition was below standards. The system has two parts, namely; hardware and software. The hardware architecture consists of an embedded system that is based on Arduino Uno board, a Bluetooth Module, Motor Driver and an Android phone.

An Arduino is a small microcontroller platform with a USB serial interface. Originally, the Arduino was not used, and the interface circuit was connected directly to the parallel port of the computer. The computer we eventually used does not have a parallel port, so the Arduino performs the function of providing eight on/off signals based on a packet of serial data sent through its USB interface.

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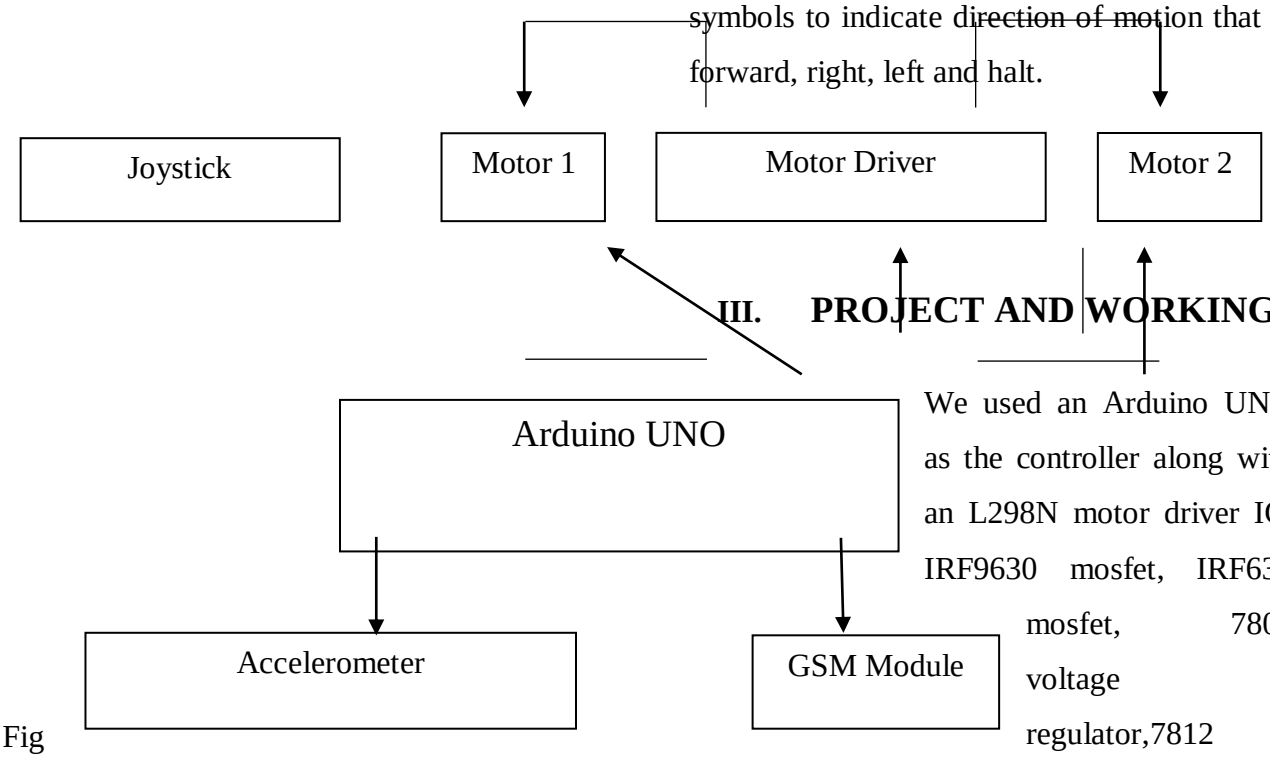

Fig 3: Block Diagram of Smart Wheelchair

Fig 3 shows block diagram of gesture controlled smart wheelchair with hand gesture sensor and the receiver for wireless head gesture sensor. Arduino UNO process the data from the hand and accelerometer sensor. Based on the result/data generated by the accelerometer sensor, the Arduino is programmed to rotate the DC Motor in a particular direction.Wheelchair has to be built before it is to be controlled project. The parts of smart wheelchair include base, the controller, hand gesture sensor that is 3-axis accelerometer(ADXL330), GSM Module, high torque DC motors and other parts like batteries, power cables, wheels etc.In this proposed system the wheelchair can be operated with the joystick or accelerometer sensor. Touch pad is calibrated and place the symbols to indicate direction of motion that is forward, right, left and halt.

III. PROJECT AND WORKING

We used an Arduino UNO as the controller along with an L298N motor driver IC, IRF9630 mosfet, IRF630 mosfet, 7805 voltage regulator,7812 voltage regulator. The wheelchair will most likely a battery of the same size of car batteries, and the same voltage. These batteries are the most likely part of the wheelchair to present a problem. A wheelchair has a charger connector, and should come with a charger with the same connector. Keep in mind that the battery must have the specification of 12V 7.2Ah in order to drive the motors. The charger must be a 12-volt charger, or a 14-volt regulated power supply

The device is powered by the wheelchair battery, which is a 12V, 7Ah lead acid battery. The Arduino controls the motor based on inputs from a button, a limit switch, and inbuilt timing constraints. The MOSFETs are used in motor driver circuit due to its ability to handle high currents and high voltages. This makes the control of the devices much easier. The

LM7805 voltage regulator IC steps down the 12V supply from the Vin pin of the Arduino to 5V, which is then used to bias the L298N motor driver IC. We have used L298N motor driver IC because it can withstand current to a higher range up to 2A which provides more power to the DC motors to pull the load. Pins 12 and 13 of the motor driver are connected to a common ground with the Arduino to ensure that our system has a stable reference voltage level. Pins 2 and 3 provide the output signal to the DC motor 1, Pins 13 and 14 provide the output signal to the DC Motor 2 whereas the pins 5 and 7 provide the motor driver with the data signals from the Arduino, which are used to select whether the motor is rotated clockwise or anti-clockwise.

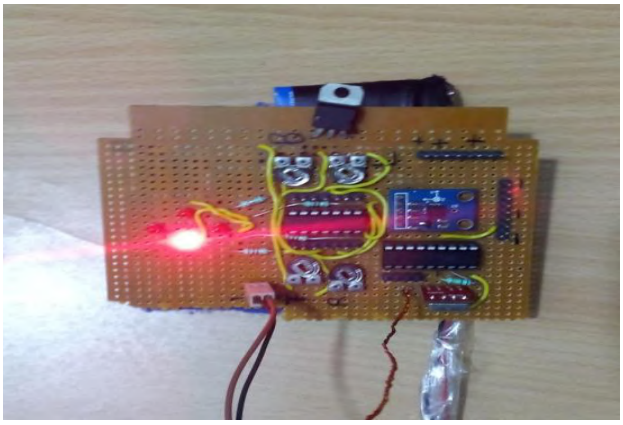

Fig 4: Hand gesture circuit with accelerometer and transmitter

The limit switch sends a signal to the Arduino when pressed against the body of the device. This signifies the swung-out position of the wheelchair arm. To bring the wheelchair arm back to its initial position, we use a timed approach. The motor is turned on for a set amount of time, which was measured, to move the arm forward.

To control the wheelchair electronically, we need to make a connection to its joystick. The joystick is a pair of variable resistors, one for forward/backward and another for left/right. Each variable resistor is connected between two voltages; one approximately zero and the other around 12 volts. This means that the centre wire of each variable resistor is somewhere in the middle at rest, when the joystick is not being moved.

The accelerometer can measure static acceleration forces such as gravity, allowing it to be used as a tilt sensor. The sensor is a surface micro machined polysilicon structure built on top of the silicon wafer. Polysilicon springs suspendthe structure over the surface of the wafer and provide a resistanceagainst acceleration forces. Deflection of the structure is measured using a differential capacitor that consists of independent fixedplates and central plates attached to the moving mass. The fixed plates are driven by 180° out of phase square waves. An accelerationwill deflect the beam and unbalance the differential capacitor resulting in an output square wave whose amplitude is proportional to acceleration. Phase sensitive demodulation techniques are then used to rectify the signal and determine the direction of the acceleration. The output of the demodulator drives a duty cycle modulator

(DCM) stage through a 32kΩ resistor. At this point a pin is available on each channel to allow the user to set the signal bandwidth of the device by adding a capacitor. This filtering improves measurement resolution and helps prevent aliasing. After being low-pass filtered, the analog signal is converted to a duty cycle modulated signal by the DCM stage. A single resistor sets the period for a complete cycle (T2), which can be set between 0.5ms and 10ms (see Figure 12). A 0g acceleration produces 50% duty cycle. The acceleration signal can be determined by measuring the length of the T1 and T2 pulses with a counter/timer or with a polling loop using a low cost microcontroller

This graph shows the X axis. The accelerometer starts level, and then is tilted to the left, then to the right, then level again.

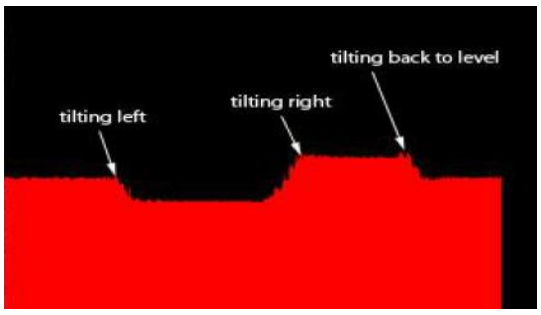

Fig 5: X- axis of accelerometer

This graph shows the Y axis. The accelerometer starts level, and then is tilted forward, then back then level again.

Fig 6: Y-axis of accelerometer

Fig 7: Final Prototype

IV. COMPARISON WITH EXISTING WORK

G Azam and M T Islam, an anticipated system that helps to the self-need of physically challenged and older people. It minimizes the manual attempt for acquiring and individuals to control the motion of a wheelchair. The author suggested this devise could be enhanced by providing the wireless communication facility, using sensors to sense an obstacle in the wheel chair.Andrej Škraba,

proposed the system which controlled by using the voice command, the GUI is developed which is used in the web browser as well as on the mobile devices providing live video stream. The drawback of the planned approach is hidden in the user's inflexibility for practical innovations, particularly adopting the design of rising control software that the cloud provides new possibilities.Imen Klabi, designed Fuzzy Logic Control of the wheelchair in such a way that it can be controlled easily with very less attempt from the patient.

This project describes a wheelchair which can be controlled only by using the android application, joystick and hand gestures. The main aim of this project is to facilitate the movement of the disabled people and elderly people who cannot move properly so with this we can enable them to lead better lives without any problem

Table1: Comparison of existing models with proposed model

Ref	Wireless	GSM & GPS	Gesture Control	Efficient	Safety	Reliable
[8]	✓	×	×	×	×
[9]	✓	×	×	✓	×
[10]	✓	×	×	✓	×
[12]	✓	×	×	✓	✓
Proposed Work	✓	✓	✓	✓	✓

V. CONCLUSION

This project elaborates the design and construction of Smart Wheel Chair with the help of Bluetooth Module. The circuit works properly to move as the command given by the user. After designing the circuit that enables physically disabled to control their wheel using an android application in their smart phones and it has also been tested and validated. The detection of any obstacle is successfully controlled by the microcontroller. As the person switches on the circuit and starts moving, any obstacle which is expected to lie within a range of 40cm will be detected by the GP2 sensor. This proposed system contributes to the self-dependency of differently abled and older people. All the common man can reach out for this smart wheelchair to become independent for mobility if they hold a smart phone. Wheelchair is simple to operate and does not need any external help.

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BLUETOOTH BASED HOME AUTOMATION SYSTEM USING ARDUINO

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Abstract-- With the advancement of technology, things are becoming simpler and easier for us. Automation is the use of control systems and information technologies to reduce the need for human work in the production of goods and services. In the scope of industrialization, automation is a step beyond mechanization. Whereas mechanization provides human operators with machinery to assist them with the muscular requirements of work, automation greatly decreases the need for human sensory and mental requirements as well. Automation plays an increasingly important role in the world economy and in daily experience. Through this project I have tried to show automatic control of a house as a result of which power is saved to some extent. The past decade has seen significant advancement in the field of consumer electronics. Various "intelligent" appliances such as cellular phone, air conditioners, home security devices, home theatres etc. are set to realize the concept of a smart home. They have given rise to a Personal Area Network in home environment, where all these appliances can be interconnected and monitored using a single controller. Home automation involves introducing a degree of computerized or automatic control to certain electrical and electronic systems in a building. These include lighting, temperature control etc. This project demonstrates a simple home automation system which contains a remote mobile host controller and several client modules (home appliances). The client modules communicate with the host controller through a wireless device such as a bluetooth enabled mobile phone.

I. INTRODUCTION

Home automation systems have gained popularity in recent years, paralleling the advances in the concept of the Internet of Things. Although automation for the commercial buildings is a mature technology, automation applications for residences are a relatively new development, which is gradually being adopted by consumers. Home automation involves the monitoring and control of activities such as lighting, heating, ventilation, air conditioning (HVAC), electrical appliances, sound systems, security cameras, door locks, and alarms. Home automation has various advantages, such as comfort, increased security, and energy efficiency. Figure 1 shows the general home automation system. The figure shows the various home appliances such as security sensors, thermostat etc. which is controlled through the central control panel via the Internet.

Automation is the transfer of tasks normally performed by humans to a set of technological elements [1]. An automated system consists of two parts: ✓ Operation: Part formed by elements that act directly on the machine and make it perform desired operations. These elements are called actuators and some examples are engines, cylinders or photodiodes.

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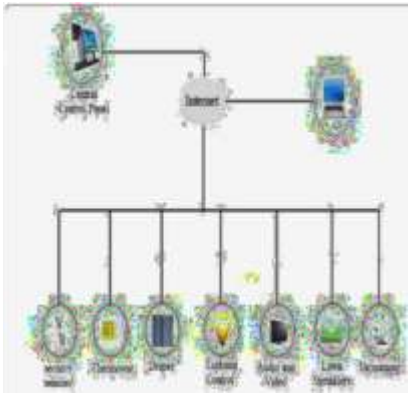

FIGURE 1. A General Home Automation System

✓ Control: Brain of system, normally constituted by a programmable automaton, able to communicate with all constituents of the operation part. The inclusion of control in the automation system, allows to decide on the development of a process, manipulating certain variables to get these or other variables to act in the desired way. Although it seems a recent technology and currently is in full development, automation dates back to ancient times. Nowadays nobody thinks of divine forces seeing an automatic door, it is something of the day to day that we have very internalized. It was not the same with people of Alexandria when Herón, the great genius of mechanical engineering of classical Greece, invented an automatic door opening system for a temple in Alexandria.

II. LITERATURE SURVEY

Although not same but many related work have been done by many researchers. Some of the papers have been studied and described below.

KartikRathod, Nilay Parikh, Aesha Parikh, Prof.Vrushank Shah, *et al* in [2] proposed the designing of fully functional wireless home automation network using IEEE 802.15.4 protocols and ZigBee and evaluating its applications in a sensor network has been discussed. The sensors and two functional ZigBee modules were reticuled wirelessly. Each and every sensor in the network is a node and their collection is known as a mesh. A wireless network was used to control the mesh. Once established, the mesh was easy to maintain and alter. Addition and deletion of nodes to reconfigure mesh in order to meet future demands can be done easily.

Shiu Kumar *et al* [3], proposed a low-cost and flexible smart home system. This system has Bluetooth and web services (REST full based). Smart home app was designed by using MIT app inventor tool. Ardunio Ethernet shield is used to run web server. Home system can be controlled through android app in the following ways: 1. Voice activation 2. Bluetooth based control 3. Internet based control. Authentication is required to use the app. If the entered password is correct, then only user can control the appliances. Google speech recognizer is used for voice controlled activation. Interrupts are used to get the value from sensors. RFCOMM is used to get back the values from sensors to master control. At a time, user can use any one method to control the appliances. Gate control, door lock and fire detection can be controlled in this method. This system also sends email to user in case of emergency is detected.

Kwang Yeol Lee *et al* [4] discussed the control of different home appliances over a Bluetooth. Pulse width modulation (PWM) technique is used to control the amount of power delivered to the motor. Motor speed can be controlled, by varying the duty cycle of PWM pulse. Two PC's are used in this design. Server PC sends signals to Bluetooth device and the signal can be transferred to client PC which has connected with interfacing circuit and various appliances. The device attached Bluetooth can be controlled both manually and remotely. Server PC can be controlled

over internet connection. Any change in UI, will send relevant signals to Bluetooth over air. Device values will get update once in every 3 seconds. Counter function is used to vary the PWM signals. Whenever signal changes, counter value will get increment by one.

Sougata Das et al [5], describes the design and development Home Automation System in which a system for household appliance control using cell phone through global system for mobile communication (GSM) technology. This system allows the user or home owner to monitor and control the home appliances via mobile phone set by sending commands in the form of SMS (short message service) messages and the system also provides current status of the home appliances. The proposed system makes use of wireless control hence can be effectively used in systems were unwired connections are desired.

Sweatha K N, Poornima M, and Vinutha M H et al [6], presents a novel technology where the user controls the home devices through mobiles phones. System contains the Field Programmable Gate Array (FPGA) as a controller to which the devices are directly interfaced and control to the devices is communicated to the FPGA from the mobile phone using speech recognition technique.

Vijay P. Jadhao et al [7], present the ARM based automation system that can monitor and control home appliances and able to establish successful communication with unknown outdoor person or visitor. This system not only provides Smart Home automation as well as it provides smart communication system which provides communication with unknown visitors visiting home.

Bulbul Bhaskar and R. Swarnalatha et al [8], presents smart home automation system using AVR microcontroller. This system incorporates with sensors, microcontroller and Bluetooth module to provide automation capability to various household activities. An AVR microcontroller offers high performance and flexibility for controlling various appliances. This system can monitor the changes in temperature, lighting, detect fire and keep a check on the safety of the house.

Manish Kumar and Ramandeep Singh et al [9] presents home appliance controlling using ZIGBEE, where control of home appliances, like refrigerator, fan, and air conditioner etc, was done wirelessly using computer and ZIGBEE wireless communication protocol. Home appliance control by sending command through the computer. System is used for controlling home appliance like refrigerator, fan, and air conditioner etc using your pc and Zigbee. In the proposed system all appliance are connected with microcontroller through relay and the command is send through hyper terminal or X-CTU software. In this embedded system the transmitter contains Zigbee transmitter and RS232 circuit and receiver contains Zigbee receiver and ATMEGA128 which is connected with relay and appliance.

N. Sriskanthan, F. Tan, A. Karande et al [10] presented model for home automation using Bluetooth via PC.This application of Bluetooth technology in home automation and networking environment. They proposes a network, which contains a remote, mobile host controller and several client modules (home appliances). The client modules communicate with the host controller through Bluetooth devices. The researchers even built a new protocol on top of the Bluetooth software stack, called Home Automation

Protocol (HAP), to make the communication between devices possible. The device controller is connected to electronic devices through the I2C Bus. The system allows more than one device controller to be connected to the host controller. But unfortunately the system lacks to support mobile technology.

R. Piyare et al [11] introduced design of wireless and low cost solution to home automation.This automation is supports for cell phones works on SymbianOS. This design has several issue like range limitation and limited platform. He designed and implemented low cost Javabased automation system through World Wide Web. However, they are not too feasible to be carried out as a low cost solution. And it had a standalone embedded system board integrated into a PC based server. The primary motive of this project is to build up a system that helps elderly and handicapped people live a more independent life. The objective of this project is to take into consideration all the domestic systems that are difficult to control by elderly people and the handicapped. The project will allow any person who has a Bluetooth enabled Android mobile phone to download an application from the Google Play Store. With the help of this application, a user can control all the appliances in the house via Bluetooth receivers. The proposed system allows the clients to have access to all the appliances in the house including air conditioners, and lights, with a single click on a mobile phone to turn it either ON or OFF.

The following list of objectives must be fulfilled to successfully help elderly and disabled individuals.

1. Develop Bluetooth appliance controller: The Bluetooth will interface with the microcontroller to perform the desired automation. The microcontroller will get the signals from the Bluetooth enabled mobile phone and it will be processed.
2. Develop an application for a mobile phone: An application needs to be developed for the mobile phone, which needs to communicate with the Bluetooth receiver HC 06.
3. Integrate the device to the controller: The foremost priority that has to be kept in mind when developing a Smart Home is that it has to be cost-efficient. The appliance controller has to be inexpensively integrated with the appliances in the house with an easy installation.
4. Test the set up and analyze the data: After the system is set-up, with the help of a mobile device and a controller, tests are conducted while data is recorded and analyzed.

The hardware part mainly consists of the components described below, which are being discussed along with their specific functions.

A. ARDUINO UNO: Arduino [12] is an open source computer hardware and software company, this project, and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical and digital world. The project's products are distributed as open-source hardware and software, which are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form, or as do-ityourself (DIY) kits.

B. RELAY: A relay [13] is an electrically operated switch. Many relays use an electromagnet to

mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and retransmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

C. BLUETOOTH MODULE (HC-05): For the communication between mobile phone and microcontroller, Bluetooth module (HC-05) [14] is used. HC-05 is easy to use with Bluetooth SPP (serial port protocol) and perform operation at 1.8 V. Serial port Bluetooth module have a Bluetooth 2.0+EDR(enhanced data rate),3Mbps modulation with complete 2.4GHZ radio transceiver and base band. Using Bluetooth profile and android platform architecture different type of Bluetooth applications can be developed if the module is set to be in slave mode, it cannot initiate a connection to another Bluetooth devices rather than the intended smart phone, but can accept connections when it is in master mode, the module can initiate a connection to other devices. The module contains 2 parts, the back plane and the main Bluetooth board.

D. POWER SUPPLY: The transformer is the static machine because there is no path for flowing of current from one arm to another. The current flows through arms by the electromagnetic force. The transformer having the two windings which are wound on the iron core. In step down transformer the primary winding have more number of turns than secondary winding. The power supply (AC) which is given to the primary winding and at the secondary winding we have to connect the load.

III. METHODOLOGY

Figure 2 shows the steps needed to accomplish the goals of this project in a sequential manner. First, all the parts needed to design the project are collected and a primary concept is designed based on it. Next is the connection between the Arduino Uno and the Bluetooth via the Bluetooth module which is the most important part of the project. After all the connection is being done, the Arduino board needs to be programmed and the Arduino software has to be installed. At the end, the Android based mobile phone is used to control the Arduino Uno via

Bluetooth.

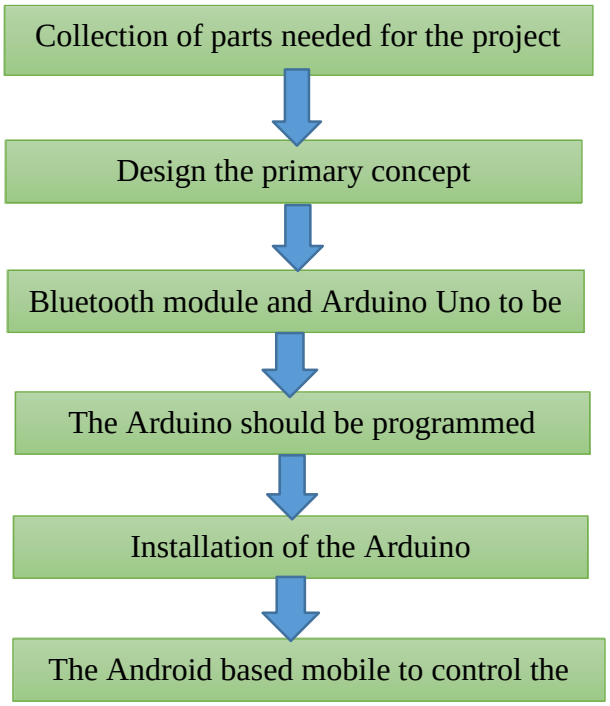

FIGURE 2. Flow Chart

IV. PROJECT AND WORKING

The home automation circuit is built around an Arduino Uno board, Bluetooth module HC-05 and a 3-channel relay board. The number of channels depends on the number of appliances you wish to control. Arduino Uno is powered with a 12V DC adaptor/power source. The relay module and Bluetooth module can be, in turn, powered using a board power supply of Arduino Uno.Connection details for each appliance [15] are shown in Figure 3.

With the procedures mentioned, the implementation of the project "Home Automation via Bluetooth using the Arduino Uno Microcontroller" is successfully completed and implemented.

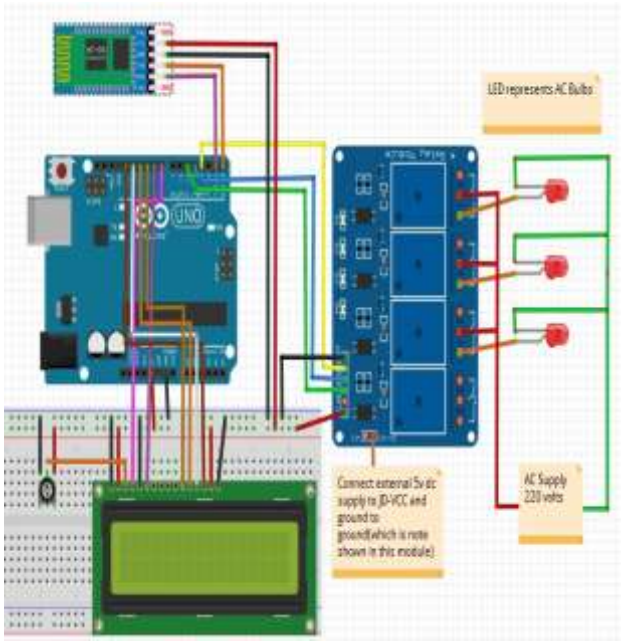

FIGURE 3. Connections Diagram

The project is cost efficient and user friendly because it can be used by anyone with a simple click on an Android based mobile device. All the appliances of the house are controlled successfully via Bluetooth using an Android mobile phone.

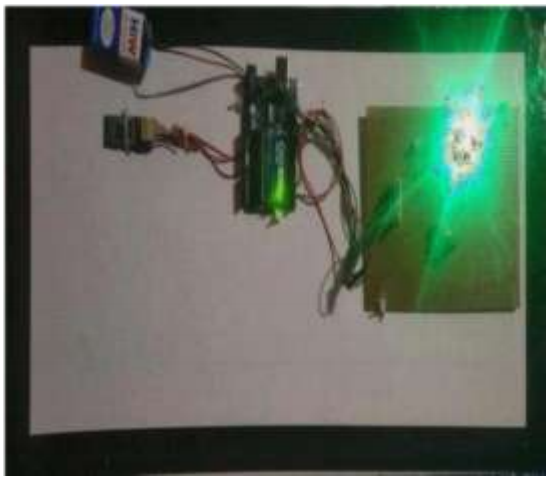

FIGURE 4. A Complete Circuit

V. CONCLUSION

There are a number of do-it-yourself (DIY) platforms available that allow to create Home Automation system quickly and easily with low cost and high performance e.g. Raspberry pi, Arduino, other microcontrollers, etc.The current project presents the implementation of an inexpensive home automation system, within the framework of assistive technology. The system implementation is based on the Arduino microcontroller, which has been programmed to control a range of home automation devices based on sensor signals and on direct commands by the user. The system has been programmed to have Bluetooth communication capability.

Demonstrations of the system show that it facilitates the control of home-based devices such as electrical appliances, lights, heating, cooling systems and security devices by the intended users, i.e., the elderly

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and the disabled. The implementation of this project overall is successful. The motive of making the project cost efficient and user friendly is taken into account and

achieved. Taking into consideration the target audience of elderly and handicapped people, the project developed is user friendly. Using an Android mobile phone, a Smart Home is created and controlled with a smart phone.

VI. FUTURE SCOPE

Home automation can be extended to controlling the devices like fans, lights, bulbs, T.V, etc. by monitoring the heartbeat of an individual. The heartbeat is being monitored continuously via heartbeat sensor circuit. If suppose person forgets to switch of a device such as T.V, A.C etc. and falls asleep, then the proposed system is useful. Though there are various systems for home automation already available but none of them gives a provision like this. It will be helpful in saving energy and bringing down the annual cost of an individual's electricity bill thus helping both ways. The Heartbeat sensor circuit senses the heartbeat pulses tapped from the finger of the individual then it is wirelessly transmitted from one xbee module to another interfaced with the Arduino board for comparing the received value with the preset values of heartbeat. If it falls below the threshold (i.e. 60 bpm) then the relay which is continuously monitoring the state of the device will be triggered by a pulse from Arduino board to change the state of the devices.

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Wireless charger based on inductive coupling using QI technology

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***Abstract*—Wireless charging is a technology of transmitting power through an air gap to electrical devices for the purpose of energy replenishment. The recent progress in wireless charging techniques and development of commercial products have provided a promising alternative way to address the energy bottleneck of conventionally portable battery-powered devices. However, the incorporation of wireless charging into the existing wireless communication systems also brings along a series of challenging issues with regard to implementation, scheduling, and power management. In this manuscript, we present a comprehensive overview of wireless charging techniques, the developments in technical standards, and their recent advances in network applications. In particular, with regard to network applications, we review the static charger scheduling strategies, mobile charger dispatch strategies and wireless charger deployment strategies. Additionally, we discuss open issues and challenges in implementing wireless charging technologies. Finally, we envision some practical future network applications of wireless charging**

I. Introduction

Wireless charging also known as wireless power transfer, is the technology that enables a power source to transmit electromagnetic energy to an electrical load across an air gap, without interconnecting cords[1] [2]. This technology is attracting a wide range of applications, from lowpower toothbrush to high-power electric vehicles because of its convenience and better user experience. Nowadays, wireless charging is rapidly evolving from theories toward standard features on commercial products, especially mobile phones and portable smart devices. In 2014, many leading smartphone manufacturers, such as Samsung, Apple and Huawei, began to release new-generation devices featured with built-in wireless charging capability. IMS Research [3] envisioned that wireless charging would be a 4.5 billion market by 2016. Pike Research estimated that wireless powered products will triple by 2020 to a 15 billion market.

Compared to traditional charging with cord, wireless charging introduces many benefits as follows.

- Firstly, it improves user-friendliness as the hassle from connecting cables is removed. Different brands and different models of devices can also use the same charger.
- Secondly, it renders the design and fabrication of much smaller devices without the attachment of batteries.
- Thirdly, it provides better product durability (e.g., waterproof and dustproof) for contact-free devices.
- Fourthly, it enhances flexibility, especially for the devices for which replacing their batteries or connecting cables for charging is costly, hazardous, or infeasible (e.g., body implanted sensors).
- Fifthly, wireless charging can provide power requested by charging devices in an on-demand fashion and thus are more flexible and energy-efficient.

Nevertheless, normally wireless charging incurs higher implementation cost compared to wired charging. First, a wireless charger needs to be installed as a replacement of traditional charging cord. Second, a mobile device requires implantation of a wireless power receiver. Moreover, as wireless chargers often produce more heat than that of wired chargers, additional cost on crafting material may be incurred.

The development of wireless charging technologies is advancing toward two major directions, i.e., radiative wireless charging (or radio frequency (RF) based wireless charging) and non-radiative wireless charging (or coupling-based wireless charging). Radiative wireless charging adopts electromagnetic waves, typically RF waves or microwaves, as a medium to deliver energy in a form of radiation. The energy is transferred based on the electric field of an electromagnetic wave, which is radiative. Due to the safety issues raised by RF exposure, radiative wireless charging usually operates in a low power region. For example, omni-directional RF radiation is only suitable for sensor node applications with up to 10mW power consumption [4] [5]. Alternatively, nonradiative wireless charging is based on the coupling of the magnetic-field between two coils within the distance of the coils' dimension for energy transmission. As the magnetic field of an electromagnetic wave attenuates much faster than the electric field, the power transfer distance is largely limited.

Due to safety implementation, non-radiative wireless charging has been widely used in our daily appliances (e.g., from toothbrush to electric vehicle charger [5]) by far.

In this manuscript, we aim to cover wireless method has been used to design the wireless charger and also tested in real life (inductive coupling and capacitive coupling) by testing them in real life

II. HISTORY AND COMMERCIALIZATION

The study of electromagnetism originates from 1819 when H. C. Oersted discovered that electric current generates a magnetic field around it. Then, Ampere's Law, Biot-Savart's Law and Faraday's Law were derived to model some basic property of magnetic field. They are followed by the Maxwell's equations introduced in 1864 to characterize how electric and magnetic fields are generated and altered by each other. Later, in 1873, the publication of J. C. Maxwell's book A Treatise on Electricity and Magnetism [6] unified the study of electricity and magnetism. Since then, electricity and magnetism are known to be regulated by the same force. These historic progress established the modern theoretic foundation of electromagnetism.

2.1. Technical breakthroughs and Research Projects

The history has witnessed a series of important technical breakthroughs, going along with two major research lines on electric field and magnetic field. In 1888, H. R. Herts used oscillator connected with induction coils to transmit electricity over a tiny gap. This first confirmed the existence of electromagnetic radiation experimentally. Nikola Tesla, the founder of alternating current electricity, was the first to conduct experiments of wireless power transfer based on microwave technology. He focused on long-distance wireless power transfer [7] and realized the transfer of microwave signals over a distance about 48 kilometres in 1896. Another major breakthrough was achieved in 1899 to transmit 10^8 volts of high-frequency electric power over a distance of 25 miles to light 200 bulbs and run an electric motor [7]. However, the technology that Tesla applied had to be shelved because emitting such high voltages in electric arcs would cause disastrous effect to humans and electrical equipment in the vicinity [8].

Around the same period, Tesla also made a great contribution to promote the magnetic-field advance by introducing the famous "Tesla coil", In 1901, Tesla constructed the Wardenclyffe Tower, shown in Figure a to transfer electrical energy without cords through the Ionosphere. However, due to technology limitation (e.g., low system efficiency due to large-scale electric field), the idea has not been widely further developed and commercialized. Nowadays, these standards have been adopted in many electronic products available in the market, such as smart phones and wireless chargers. At the end of 2014, a breakthrough technology, named magnetic MIMO (MagMIMO), has been designed to perform multiantenna beamforming based on magnetic waves. This technology has opened an area for the magnetic-field beamforming research. The history of wireless charging then continues. The reader can refer to [9], [10] for a more detailed history of progress

Fig 1: Wardenclyffe Tower [28]

III.FUNDAMENTALS OF WIRELESS CHARGING:

In this section, we provide some basic knowledge of wireless charging which covers the principles of charging techniques, existing applications of wireless charging as well as charging system designs in terms of architectures, hardware designs and implementations. In addition, we introduce the wireless power propagation models for non-radiative charging systems.

3.1Wireless Charging Technologies

Wireless charging technologies can be broadly classified into non-radiative coupling-based charging and radiative RFbased charging. The former consists of three techniques: inductive coupling [11], magnetic resonance coupling [12] and capacitive coupling [13], while the latter can be further sorted into directive RF power beamforming and nondirective RF power transfer [14]. In capacitive coupling, the achievable amount of coupling capacitance is dependent on the available area of the device. However, for a typical-size portable electronic device, it is hard to generate sufficient power density for charging, which imposes a challenging design limitation. As for directive RF power beamforming, the limitation lies in that the charger needs to know an exact location of the energy receiver. Due to the obvious limitation of above two techniques, wireless charging is usually realized through other three techniques, i.e., magnetic inductive coupling, magnetic resonance coupling, and non-directive RF radiation.

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The magnetic inductive and magnetic resonance coupling work on near field, where the generated electromagnetic field dominates the region close to the transmitter or scattering object. The nearfield power is attenuated according to the cube of the reciprocal of the charging distance [15]. Alternatively, the microwave radiation works on far field at a greater distance. The far-field power decreases according to the square of the reciprocal of the charging distance [15]. Moreover, for the farfield technique, the absorption of radiation does not affect the transmitter. By contrast, for the near-field techniques, the absorption of radiation influences the load on the transmitter [16]. This is because, a transmitting antenna and a receiving antenna are not coupled for the farfield technique. While a transmitting coil and a receiving coil are coupled for the nearfield techniques [17].

i) Inductive Coupling:

Inductive coupling is based on magnetic field induction that delivers electrical energy between two coils. Fig 2 shows the reference model. Inductive power transfer (IPT) happens when a primary coil of an energy transmitter generates predominantly varying magnetic field across the secondary coil of the energy receiver within the field, generally less than a wavelength. The near-field magnetic power then induces voltage/current across the secondary coil of the energy receiver within the field. This voltage can be used for charging a wireless device or storage system. The operating frequency of inductive coupling is typically in the kilo Hertz range. The secondary coil should be tuned at the operating frequency to enhance charging efficiency [18].

The quality factor is usually designed in small values (e.g., below 10 [19]), because the transferred power attenuates quickly for larger quality values [20]. Due to lack of the compensation of high quality factors, the effective charging distance is generally within 20cm [21].

Inductively coupled radio frequency identification (RFID) [22] [23] is an example that pushes the limit to extend the charging distance to tens of centimetres, at the cost of diminished efficiency (e.g., 1-2%) with received power in micro watt range. Despite the limited transmission range, the effective charging power can be very high (e.g., kilowatt level [24] for electric vehicle re-charging).

The advantages of magnetic inductive coupling include ease of implementation, convenient operation, high efficiency in close distance (typically less than a coil diameter) and .ensured safety. Therefore, it is applicable and popular for mobile devices. Very recently, MIT scientists have announced the invention of a novel wireless charging technology, called MagMIMO, which can charge a wireless device from up to 30cm away. It is claimed that MagMIMO can detect and cast a cone of

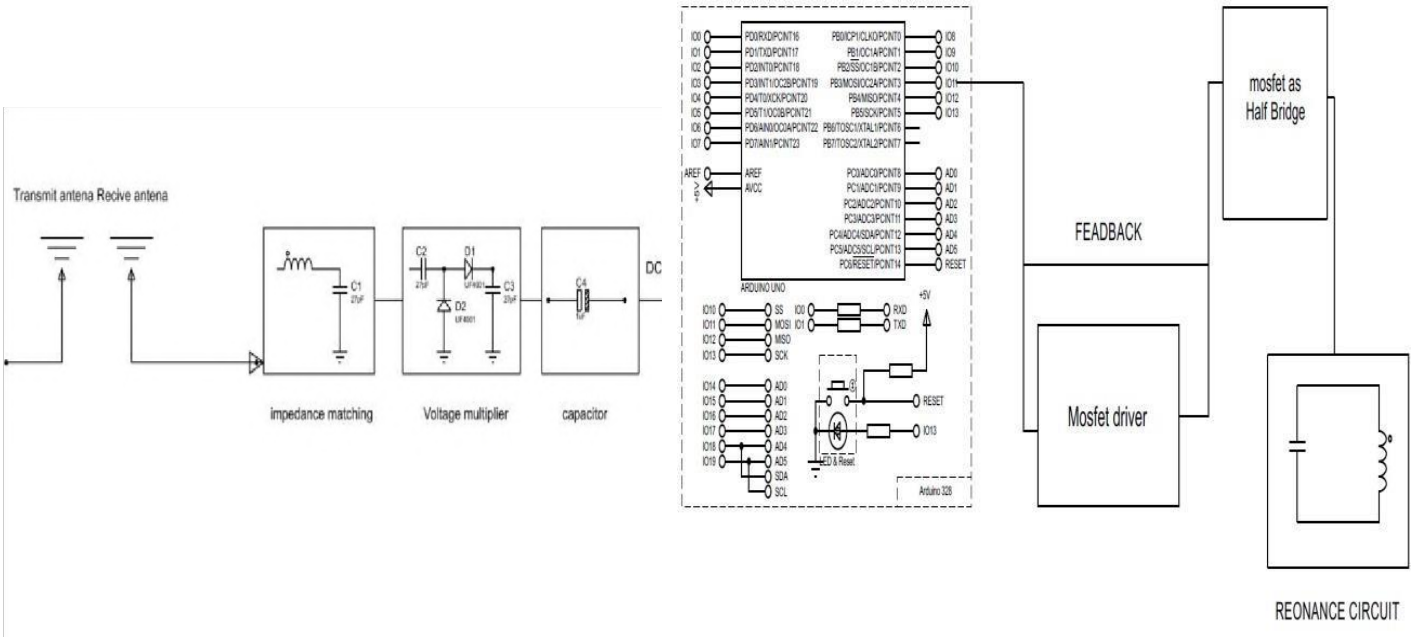

Fig 2: Wireless receiver circuit

energy toward a phone, even when the phone is put inside the.

ii) Capacitive coupling principle Capacitive coupling is known as electric field coupling or electrostatic coupling. It is a coupling method generated due to the existence of distributed capacitance. Capacitive coupling makes the signal transmit from the first stage to the second level through the electric field. It is also referred to the exchange coupling, which is between the front and rear circuits (or two unit circuits). If it is between two stage amplifiers, then it can be called inter-class coupling capacitance. It is worth mentioning that only Alternating Current (AC) signals can be added to the input terminal of the back-end circuit. The purpose of the coupling capacitance between the two circuits is to transmit the useful AC signals to the input terminals of the back-end circuit. As is shown in Figure 1, Direct Current (DC) cannot be added to the back-end circuit, which is convenient for circuit design and maintenance. The principle of this phenomenon is that if the voltage of the circuit at one side is increasing gradually, the charge gathers gradually in this side. When the voltage of the circuit in this side reduced, the charge that accumulates in the high voltage will be returned to the circuit and vice versa. Capacitors are insulated and the current does not pass through in capacitance. The capacitor gathers and releases electric charge as the potential increases and decreases. It was mistaken for an electric current. Therefore, I can isolate the DC, and the AC signal is coupled to the following circuit elements by means of both elevating and reducing potential

IV. METHODOLOGY

So we know that simple wireless is cheap but it waste lots of power so in this manuscript we are going to study about qi technology used now days in mobile phones so the idea is that we know that the resonance is very important in wireless transformation so that's why we are going to use that method to control the output now we know that the output varies with respect to load so if load is high like we place metal front of the receiver it produces a lots of heat So to not heat the system we are going to use Arduino as feedback or load controller

V. PROJECT AND WORKING

Wireless charging works by transferring energy from the charger to a receiver in the back of the phone via electromagnetic induction. The charger uses an induction coil to create an alternating electromagnetic field, which the receiver coil in the phone converts back into electricity to be fed into the battery. QI technology is mostly used technology now days

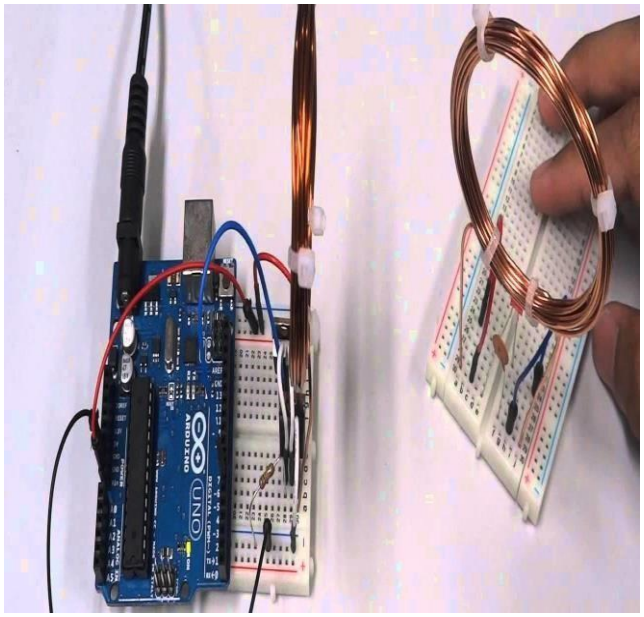

Fig 3: Final prototype

This fig shows the main prototype of QI technology by using the Arduino. When the load is high Arduino detects the power dissipated from the transmitter and then drops the resonance I have connected two capacitor when load is normal it gives full power and work in resonance but when I put bigger load like

metal road on receiver transmitter get loaded and then Arduino detects that and drop resonance by switching another capacitance.

VI. COMPARISON WITH EXISTING WORK

This project describes QI technology by using Arduino which improve the safety and power saving Other project like [27] and [28] Using high voltages and hgh frequency which is not good for birds But this project uses qi standards and uses only less then 100KHZ frequency which is safer then Other projects

Ref	QI Technology	Efficiency	Safety	Cost	Power Saving
[24]	×	×	✓	×	×
[25]	×	✓	×	×	✓
[26]	×	✓	×	✓	✓
[27]	×	✓	✓	✓	✓
Proposed Work	✓	✓	✓	✓	✓

Table 1: Comparison of existing work with proposed model

VII. CONCLUSION

This paper elaborates the design and construction of inductive wireless charging with QI Technology using Arduino and MOSFET drivers after designing the circuit helps to save the output power which makes the mosfet heat and output unstable result of this manuscript helps to make the output stable and saving energy. It can also detects the loads and transfer to only the required load which is programmed in the Arduino. Nowdays many brand devices like Samsung ,MI, APPLE adopted QI technology.

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Review: A Paper on Light Fidelity (LiFi)

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Abstract:

Now-a-days, internet has become a major demand people are in search of Wi-Fi hot spots. Li-fi or Light Fidelity was invented by Professor Harald Hass of university of Edinburgh. This is the latest technology in present day communication system which makes the use of LEDs, Light Emitting Diodes that helps in the transmission of data much more faster and flexible than the data that can be transmitted through Wi-Fi. It is basically a 5G technology of visible light communication system which utilizes light emitting diodes as a medium of high speed communication in similar manner as Wi-Fi

Keywords— LiFi, Light, LOS.

1. Introduction

Harald Haas was developed LI-FI and promoted LI-FI in his 2011 TED Global talk by giving Presentation of an LED light bulb to transmit a data with the speed 10 times more faster. As the speed of light is very high so the data transmission speed via the light is also high.

Transfer of data from one place to another is one of the most important day-to-day activities. When the multiple devices are connected to the current wireless networks that connect us to the internet are very slow. As the number of devices increasing the internet access, the fixed bandwidth which is available makes it more and more difficult to utilize high data transfer rates and connect to a network. But, radio waves are just a small part of the spectrum available for data transfer. A solution to this problem is by the use of the proposed system. Li-Fi stands for the Light-Fidelity. Li-Fi is transmission of data through light by sending data through an LED bulb that varies in intensity faster than the human eye can follow and the faster data transmission speed. Li-Fi is the new technology has used to label the fast and cheap wireless communication system, which is the next optical version of Wi-Fi.

II. ARCHITECTURE OF LI-FI

Li-Fi which can be the future of data communication appears to be a fast and cheap optical version of Wi-Fi. Being a Visible Light Communication (VLC), Li-Fi uses visible light of electromagnetic spectrum between 400 THz and 800 THz as optical carrier for data transmission and illumination.

The main components of a basic Li-Fi system may contain the following:

a) A high brightness white LED which acts as transmission source.

b) A silicon photodiode with good response to visible light as the receiving element.

Turning the LEDs on and off can make them generate digital strings with different combination of 1s and 0s. To generate a new data stream, data can be encoded in the light by varying the flickering rate of the LED. In this way, the LEDs work as a transmitter by modulating the light with the data signal. The LED output appears constant to the human because they are made to flicker at a phenomenal speed (millions of times per second) and it's impossible for human eye to detect this frequency. Communication rate more than 100 Mbps can be achieved by using high speed LEDs with the help of various multiplexing techniques. And this VLC data rate can be further increased to as high as 10 Gbps via

parallel data transmission using an array of LED lights with each LED transmitting a different data stream.

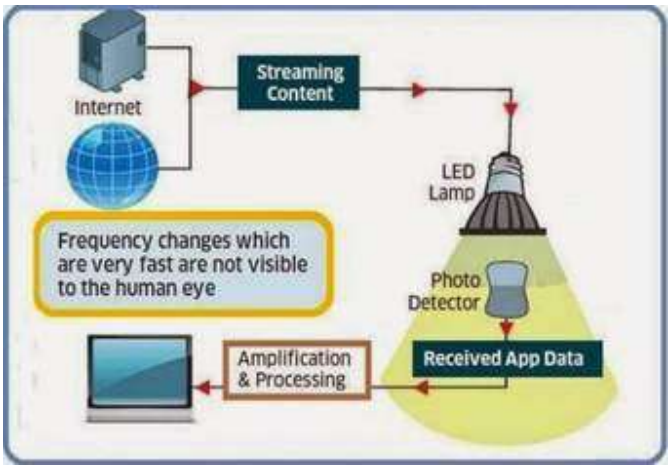

Fig1: Li-Fi Bulb

Li-Fi Bulb sub-assembly:
The bulb sub-assembly is the main part of the Li-Fi emitter.

It consists of a sealed bulb embedded in a dielectric material which serves two purposes: one, it acts as a waveguide for the RF energy transmitted by the PA (Power Amplifier) and two, it acts as an electric field concentrator that focuses the energy into the bulb. The collected energy from the electric field rapidly heats the material in the bulb to a plasma state that emits light of high intensity of Visible light spectrum.

There are various inherent advantages of this approach which includes high brightness, excellent color quality and high luminous efficacy of the emitter – in the range of 150 lumens
per watt or greater. The structure is mechanically robust without typical degradation and failure mechanisms associated with tungsten electrodes and glass to metal seals, resulting in useful
lamp life of 30,000+ hours.

In addition, the unique combination of high temperature plasma and digitally controlled solid state electronics results in an economically produced family of lamps scalable in packages from 3,000 to over 100,000 lumens.

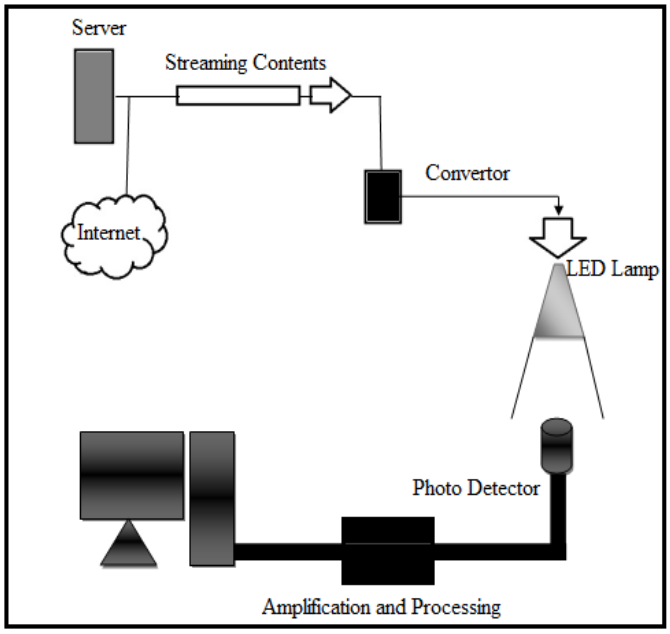

Fig 2: Block diagram of Li-Fi system

Important factors that should be considered while designing Li-Fi are as follows:

1) Presence of Light
2) Line of Sight (Los)
3) for better performance use fluorescent light & LED

III. WORKING

Transmission of knowledge is finished by single semiconductor diode or multi semiconductor diode through an understandable lightweight. On the receiver aspect there's a photograph detector that convert this lightweight signal that emits electrical signals to the connected device transformer and level shifter circuits square measure used on each the aspect to convert and maintain a voltage level between transmitter and receiver.

LiFi may be work underwater wherever Wi-Fi cannot use underwater, thus we are able to implement this method in military operations. As per existing result been reportable from the utilization of metric linear unit wave (mm Wave) communication within the twenty-eight Gc region in conjunction with visible radiation. Advancements promise a theoretical speed of LIFI 10Gbps that means one will transfer a full high-definition motion-picture show in just thirty seconds.

The construct of binding along the function of illumination and communication offer the potential for tremendous price savings as power-line communication (PLC) and power-over- LAN (PoE) for installations method, and new installations severally. and since lighting is predicated, on the in indoor environment s even in day time, the energy used for communication will much zero as a results of the piggy-backing of knowledge.

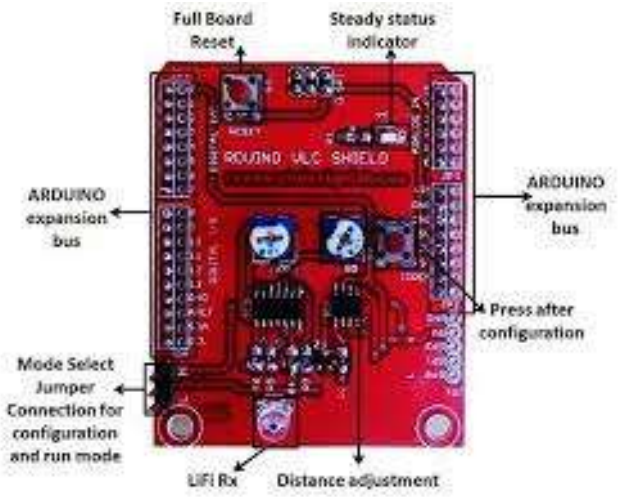

Fig 3: Architecture of Li-Fi System

IV. ADVANTAGE

Li-Fi overcomes the constraints that square measure placed on the user by the Wi-Fi system.

Capacity: lightweight has ten thousand times quicker information measure than radio waves. Also, lightweight sources square measure already obtainable. So, Li-Fi possesses additional capability and conjointly the equipments square measure already obtainable within the market.

There square measure range of sunshine bulbs worldwide; they only got to get replaced with LEDs for higher transmission of knowledge.

Security: lightweight isn't visible therefore it's safer.

Lightweight waves don't penetrate through walls. So, they can’t be intercepted and exploited.

V. APPLICATION of LIFI

High speed knowledge Transmission.

Li- Fi uses light-weight instead of oftenness signals.

Within the craft VLC is use for safety.

Within the medical devices and in hospitals Bluetooth, infrared. Prohibited as this technology doesn't wear down radio waves.

VI.FEATURES OF LI-FI

Li-Fi features include benefits to the capacity, energy efficiency, safety and security of a wireless system with a number of key benefits over Wi-Fi but are inherently a complementary technology.

a) Capacity:

Bandwidth: The visible light spectrum is plentiful (10,000 more than RF spectrum), unlicensed and free to use. Data density: Li-Fi can achieve about 1000 times the data density of Wi-Fi because visible light can be well contained in a tight illumination area whereas RF tends to spread out and cause interference.

High speed: Very high data rates can be achieved due to low

interference, high device bandwidths and high intensity optical output. Planning: Capacity planning is simple since there tends to be illumination infrastructure where people wish to communicate, and good signal strength can literally be seen.

b) Efficiency:

Low cost: Requires fewer components than radio technology.
Energy: LED illumination is already efficient and the data transmission requires negligible additional power.
Environment: RF transmission and propagation in water is extremely difficult but Li-Fi works well in this environment.

c) Safety:

Safe: Life on earth has evolved through exposure to visible light. There are no known safety or health concerns for this technology.

Non-hazardous: The transmission of light avoids the use of radio frequencies which can dangerously interfere with electronic circuitry in certain environments.

d) Security:

Containment: It is difficult to eavesdrop on Li-Fi signals since the signal is confined to a closely defined illumination area and will not travel through walls.

Control: Data may be directed from one device to another and the user can see where the data is going; there is no need for additional security such as pairing for RF interconnections such as Bluetooth.

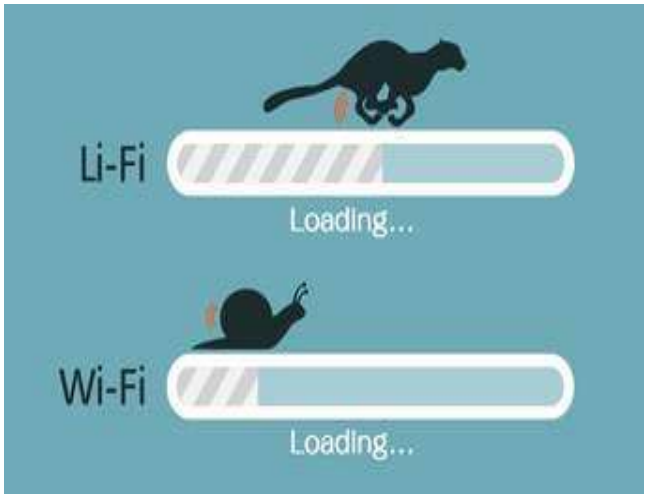

Fig 4: Li- Fi Technology

VII. APPLICATIONS OF LI-FI

The applications of visible light communication to location-based services and new graphical user interfaces that combine visual imagery with visible light communication have potential widespread use. For these applications, users are able to know the information associated with a transmitter. If a transmitter is attached to a building or a fixed place, location information will be obtained.

a) Indoor Navigation:

A typical application of visible light communication for location-based services is where a user uses a cellular phone with a photo diode, which detects signals from an LED light. This application is especially useful indoor because GPS receivers do not work well indoors even though they work well outdoors [2].

b) Indoor Navigation for visually impaired people:

Indoor navigation is convenient for everyone, and it is especially indispensable for the visually impaired. Such a navigation system can be proposed for the visually impaired as shown in Fig. LED lights emit visible light with location data and a smart phone with visible light receiver receives

the data. The smart phone calculates the optimal path to a designation and speaks to the visually impaired through a headphone.

c) Visible Light Communication using Image Sensors as Receivers:

An image sensor continuously takes images of a scene with an LED light whose light intensity is modulated and a receiver detects the optical intensity at a pixel where the LED light is focused on. Image sensors used for digital cameras or video cameras usually have frame rate of tens of frames per second. The data associated with a user is sent from the LED transmitter and an image sensor detects not only its direction of a transmitter in an image, but also its received data contents.

d) Survey Measurement using Image Sensors as Receivers:

A photogrammetric method is used to detect the locations of LEDs attached to a water tank and the ground. The accuracy of position using photogrammetric method and visible light communication was about several millimeters at a distance of about 50meters away from an image sensor. This accuracy of position is comparable to that of a typical surveying device called a total station. This system has another advantage over a total station, which is continuous monitoring of positions over time. The positions of LEDs attached to a water tank in Fig.5 were monitored for 24 hours.

VII. CONCLUSION

As increasing variety of individuals and their varied devices access wireless net, the airwaves are getting additional and additional clogged, creating it additional tough to induce a reliable, high-speed signal. The projected system might fix issues like the scarce radio-frequency information measure and conjointly allow net wherever ancient radio primarily based wireless isnt allowable as in craft or hospitals.

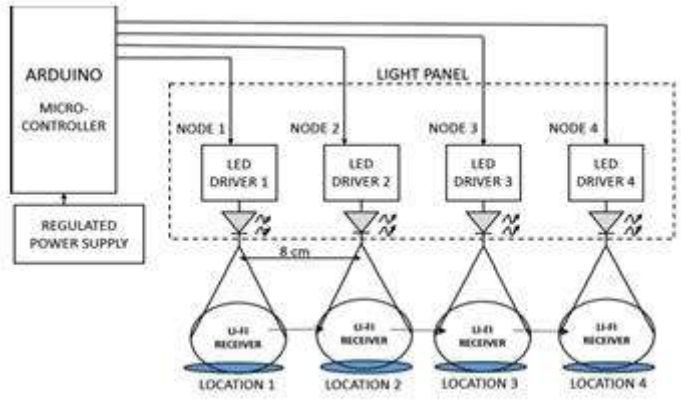

Fig 5: Li Fi Micro Controller

Li-Fi might emerge information measure of radio waves. And it'll actually be the primary alternative for accessing net during a confined area at cheaper price. In future the restrictions of artificial lightweight are going to be overcome for quicker transmission. Also, the direct line of sight is going to be overcome.

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Proceedings of International Conference on Data Sciences & Machine Learning (ICDSML2020)

Application Based on Internet of Things (IoT): A Review

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***Abstract*:**

This paper describes Internet of Things (IOT) and its various applications. Total almost all devices are equipped with sensors and are controlled by controllersfrom Biometric sensors to a smart city. By embedding intelligence in every day objects, they turned into smart devices and can be controlled from anywhere in the world. Moreover, these devices can also be integrated by exchanging data among themselves. Connecting such devices to mobile phones or computers through internet is a paradigm and can find lot of scope to researchers and for setups. In this paper it is discussed that the application IoT is in various fields such as home automation, transportation, energy management, manufacturing, medical, etc.

Keywords—**Biometric sensors, Internet of Things (IoT), Jarvis, Smart cities, Smart healthcare, Smart Industry, Smart irrigation**

I. INTRODUCTION

IoT system allows user to achieve deeper automation, analysis and integration within a system. They improve the reach of these areas and their accuracy. IoT utilizes existing and emerging technology for sensing, networking, and robotics [1].

The IoT is comprised of smart machines interacting and communicating with other machines, objects, environments and infrastructures. The essential idea of the Internet of Things (IoT) has beenround for nearly two decades, and has attracted many researchers and industries because of its great estimated impact in improving our daily lives and society. When things like household appliances are connected to a network, they can work together in cooperation to provide the ideal service as a whole, not as a collection of independently working devices.IoT is useful for many of the real-world applications and services, and one would for example apply it to build a smart residence, windows can be closed automatically when the air conditioner is turned on, or can be opened for oxygen when the gas oven is turned on. WSN's have numerous applications in weather monitoring, disaster management, inventory tracking, smart spaces, habitat monitoring, target tracking, surveillance and many more. The devices are accessed remotely by the human being [3]. This technology allows the machine to perform the actions of different human beings.

The devices which is referred as things has the ability to collect and transfer data over a network or internet without manual intervention [2]. IoT technically makes things smart, as it enhances different aspects of life through proper usage of that data, networks, and algorithms. IoT makes the concept of pervasive computing and ubiquitous computing a reality by allowing objects of our everyday life like cars, roadways, pacemakers, pill shaped cameras in our digestive tracks, billboards that adjust to passersby, refrigerators and even cattle equipped with sensors to communicate with humans and assisting them in every step[4].

II. APPLICATION OF IOT

IoT has many applications which are very useful for the people living in this world. Experts are increasingly taking advantage of the benefits these technologies to cater the need of the society [13].

i. Smart cities: - To make the city as a smart city to engage with the data exhaust produced from your city and neighborhood.

Fig. 1 Example of Smart city

- Controlling traffic according to conditions of different places.
- Monitoring of parking areas availability in the city.
- Monitoring of vibrations and material conditions in buildings, bridges and historical monuments.
- Detect Android devices, iPhone and in general any device which works with Bluetooth interfaces or Wi-Fi.
- Measurement of the energy radiated by cell stations and Wi-Fi routers.
- Monitoring of vehicles and pedestrian levels to optimize driving and walking routes.
- Intelligent Highways with warning messages and diversions according to climate conditions and unexpected events like accidents or traffic jams.

ii. Security &Emergencies:- IoT devices such as smart cameras. Which takes photograph of person who had arrived on the door and send it to database and there it compares the photo graph with the photos present in database and if the photo doesn't match it sends the photo to concern person and if that person allows then only the door will get open[5].

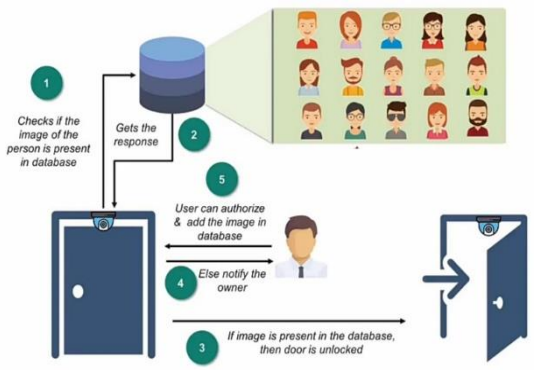

Fig. 2 Working of Smart Security Door

• Perimeter Access Control: Detection and control of people in non authorized and restricted.

• Liquid Presence: Liquid detection in data centers, sensitive building grounds and warehouses to prevent breakdowns and corrosion.

• Radiation Levels: In nuclear power stations surroundings distributed measurement of radiation levels to generate leakage alerts.

• Explosive and Hazardous Gases: Detection of gas leakages and levels in industrial environments, surroundings of chemical factories and inside mines.

iii. Domestic & Home Automation: - In home by using the IoT system remotely monitor and manage our home appliances and cut down on your monthly bills and resource usage.

Fig.3 A Smart Home

• Energy and Water Use: Energy and water supply consumption monitoring to obtain advice on how to save cost and resources.

• Remote Control Appliances: Switching on and off remotely appliances to avoid accidents and save energy.

• Intrusion Detection Systems: Detection of windows and doors openings and violations to prevent intruders [1].

iv. Smart Industry: - Smart industry is empowering industrial engineering with sensors, software and big data analytics to create brilliant machines.

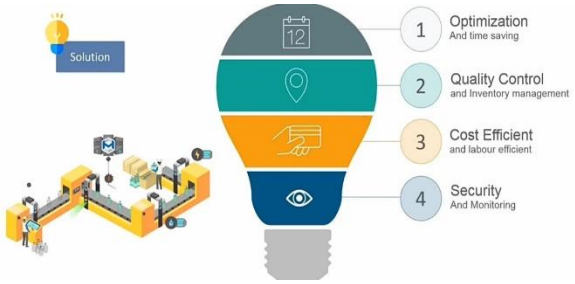

Fig. 4 IoT in Industrial automation

• Digitized machinery that is embedded with an IoT system can transfer information related to operations to the workers about the original equipment manufacturers and report to field engineers [12].

• Most of the machine tools are critical and are designed to function between a specific temperature and vibration ranges.

• Manufacturers in this way can conserve energy, reduce costs, eliminate machine downtime and increase operational efficiency, by ensuring the prescribed working environment for machinery.

• In Production Flow Monitoring, IoT is capable of monitoring an entire production line be it from the refining process completely down to the packaging of final products.

• Through Inventory Management, the IoT system monitors the events across a supply chain. These systems allow one to track the inventory and trace it globally on a line-item level. It helps managers in getting realistic estimates of the available material, the work in progress and the estimated arrival time of new materials.

v. Smart Healthcare: - The IoT is used in healthcare domain to improve the quality of human life by assisting basic tasks that humans must perform through application [6].

Fig. 5 Steps of smart healthcare

• Sensors can be placed on health monitoring equipment used by patients. The information collected by these sensors is made available on the Internet to doctors, family members and other interested parties in order to improve treatment and responsiveness.

•IoT opens ways to a sea of valuable data and information through analysis, real-time field data, and testing. IoT can deliver data that is far superior to standard analytics through making use of instruments that are capable of performing potential research [9].

• IoT devices can be used to monitor a patient's current medicines and evaluate the risk of new medications in terms of allergic reactions and adverse interactions.

•With the use of sensors and the technology stated above we can track the person's body temperature, heart beat rate, blood pressure, etc.

• In case of emergency, the individual and their personal doctor will be notified with all the data collected by the sensors. This system will be very useful to senior citizens and disabled people who live independently. Smart Hospitals will be equipped with smart flexible wearable embedded with RFID tags which will be given to the patients on arrivals.

• Other areas of use inside the healthcare enterprise encompass patient's surveillance, care of the elderly and the disabled, fall detection and so on.

vi. Smart Agriculture: - In this modern era, here the sensors sowed under the soil. These sensor senses the moisture present in the soil at different places.

And it uses two smart devices known as Adreno Board and the Raspberry Pi. All these devices are connected with same router [9].

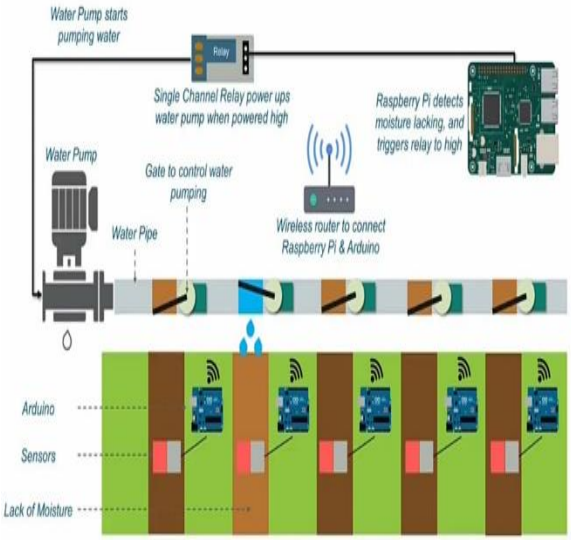

Fig.6 Smart irrigation system

• Adreno boards are placed at each of the water channel.

• These Adreno boards are connected to many sensors.

• When the sensors don't find enough water in soil that is required. It sends the signal to the Raspberry Pi.

• The Raspberry Pi will send signal to the relay the relay in turn would initiate water pump and water would be parked now [6].

• The time sensors recognize that enough water had been supplied they would signal to the Raspberry Pi to stop water and the Raspberry Pi will do the same.

vii. Biometric sensor: - A Biometric sensor is a transducer that changes a biometric treat of a person into an electrical signal. Biometric treats mainly include fingerprint reader, iris, face, voice, etc. Biometric sensors are an essential feature of identity technology

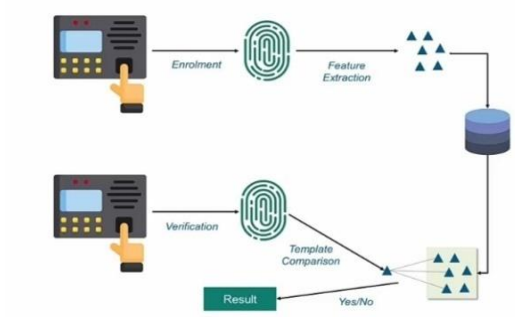

Fig. 7 working of biometric sensor

• When first time finger is placed on a biometric sensor it scans the fingerprint and considers this as part of an enrollment process.

• From this fingerprint template what it does is that it extracts certain key features which makes different from others and stores it into a database [5].

• From then forward every time that he/she placed his/her finger on top of this fingerprint scanner it creates a template and compares this with all the templates that are present in the database if it matches then correspondingly let's say gives me an attendance.

viii. Disaster Management: - IoT cannot stop disaster to happen but it surely can help in preparedness during disasters. Due to high population density, poor evacuation infrastructure and exposure to severe weather conditions developing countries are more expose to the risk of natural disasters and often have limited means to sustain the effects. IoT can compensate for it by prediction, preparedness, response and recovery to rescue developing and emerging countries from there vulnerable position. [13].

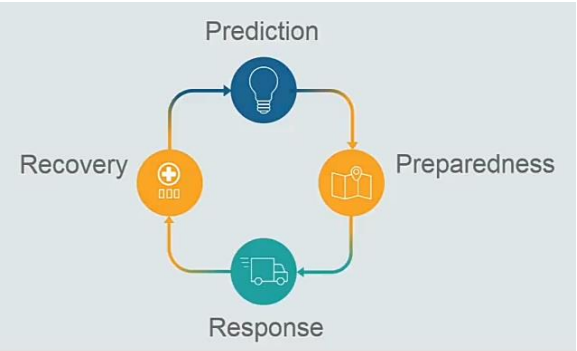

Fig. 8 working of IoT in disaster management

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• We can set sensors in forest and when there is any drastic change in natural components such as temperature.

• These sensors send signal to control center. And later the control center takes the required action.

• IoT can help in preventing many types of disasters like forest fire etc.

ix. Jarvis: - Mark Zuckerberg the creator of Facebook had created his AI assistant known as Jarvis. It is the latest and most advanced application of IoT.

Fig. 9 Mark Zuckerberg with Jarvis

• It is activated by voice.

• It is able to control household devices.

• It can do every housekeeping work from security to make food for his master.

• It is not based on sensors only but it has something more.

III. IoT-ADVANTAGES

The advantages of IoT span across every area of lifestyle and business. Here is a list of some advantages that IoT has to offer

•**Improved Customer Engagement** – Current analytics suffer from blind-spots and significant flaws in accuracy and as noted, engagement remain passive. IoT completely transforms this to achieve richer and more effective engagement with audiences [2].

•**Technology Optimization** – The same technologies and data which improve the customer experience also improves device use, and aid more potent improvements to technology. IoT unlocks a world of critical functional and field data.

•**Reduce waste** – IoT makes areas of improvement clear. Current analytics give us superficial insight, but IoT provide real-world information leading to more effective management of resources.

•**Enhancement Data Collection** – Modern data collection suffers from its limitations and its design for passive use. IoT breaks it out of those spaces and places it exactly where humans really want to go to analyze our world. It allows an accurate picture of everything.

IV. IoT-DISADVANTAGES

Though IoT delivers an impressive set of benefits, it also presents a significant set of challenges [15]. Here is a list of some of its major issues-

•**Security** – IoT creates an ecosystem of constantly connected devices communicating over networks. The system offers little control despite any security measures. This leaves users exposed to various kinds of attackers.

•**Flexibility** – Many are concerned about the flexibility of an IoT system to integrate easily with another. They worry about finding themselves with several conflicting or locked systems.

•**Compliance** – IoT, like any other technology in the realm of business, must comply with regulations. Its complexity makes the issue of compliance seem incredibly challenging when many consider standard software compliance a battle [16].

V. CONCLUSION

Internet of things is a new technology which provides many applications to connect the things to things and human to things through Internet. Each object in the world can be identified, connected to each other through internet taking decisions independently. All networks and technologies are mobile computing, RFID, wireless sensors networks, and embedded systems, in addition to many algorithm and methodologies to get management process, storing data, and security issues. It facilitates

many important aspects for human life such as smart healthcare, smart homes, smart energy, smart cities and smart environments.

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Analysis of Metrics on Open Source Software: A Study

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Abstract *- **Evolution is the process of upgrading open source software (OSS) components to minimize the complexity and increase the quality. Software metric is a quantitative measure that defines the property of the software. Strong cohesion and weak coupling results in better software quality. In this paper the object oriented open source software study is done by analyzing software metrics. Correlation value declares the relationship among metrics; low correlation value weak relation, high correlation strong relation among metrics.***

Keyword – ***Component, Software evolution, metric, Complexity, open source, cohesion.***

1. INTRODUCTION:

Component based software engineering (CBSE) is an important prototype for the construction of complex and heavy software systems. The main objective of the CBSE approach is to minimize the complexity of the system and improve the quality as per user requirements [1]. Complexity and cohesion are the major factors for the component reusability evaluation. By calculating metrics values, evaluating the relation among components, a new process will appear [4]. Software component is an independent operating package used to interact with other components to complete the task. A software component can be deployed independently and is subject to composition by third party [5].

System evolution is the process to add new features to the existing system architecture to design a new simple architecture and evolve a new system from old system. Lehman's law of software evolution is a force responsible for driving of new developments in the system and revising of developments in existing system. Lehman's theory defines the software evolution in seven laws: Continuing change, Increasing complexity, Self-regulation, Conservation of organizational stability, Conservation of familiarity, Continuing growth, and Declining quality [9]. The metrics used in component based system research analysis are:

Static Metrics	**Static Metrics**
1. Lines	6. Class_Size
2. Files	7. Methods/ Class
3. Statements	8. Avg Statements/ Method
4. %Branches	9. Avg. Depth
5. %Comments	10. Avg. Complexity

A measure used for evaluating the software process, product and services is termed as software metrics. Software metrics must be designed to provide the specific information necessary to manage and improve software [13]. Metrics are classified as Product metrics, Process metrics, Project metrics. The concepts of software metrics are coherent, understandable and well established. Metrics provides an effective rationale for selecting the best alternatives [14, 15].

2. TARGET OPEN SOURCE SOFTWARE

Open source software is a good example of component based system as it has a modular design which makes it easier to include modules for new format. The collection of modules

generates layer that are responsible to perform a task. The correct module for a given session will be chosen at runtime for each individual layer.

3. METHODOLOGY

The method used in the paper is to study the evolution of open source software components. Program statements, classes or modules are considered to be the components of the software. The dynamic dependency relationships between classes indicate the high cohesion among components. The cohesion metric takes into consideration the structural relationships along with the types of method called between classes of an object oriented component [2]. It is complicated to generate relationship and design a graph among two metrics having non-equivalent data values at parallel level. To configure the equivalency, one metric data is multiplied by a constant value to make it equivalent to other metric data.

4. ANALYSIS ON THE EVALUATION

During the evaluation of the OSS, correlation computes the complexity of the software. Correlation value declares the relationship among metrics; low correlation value weak relation, high correlation strong relation among metrics. Comparative analysis of open source Software metrics w.r.t. Average Complexity metric is describes below.

Files vs Avg. Complexity: Program longer than 400 program lines (with 10 to 40 functions) are usually too long to be understood as a whole. The files are partitioned into small simple files. For data equivalency among file metric and complexity metric, complexity metric data is multiplied by constant value as per the size of open source software. On analysis of metrics, software data collection represents that with small change in number of files in software, there is inverse affect in complexity. Whereas with huge change in number of files in open source software there is direct affect on complexity. The final conclusion is that with change in number of files in software, there is nominal change in software complexity. To reduce the complexity the bulky files are broken into smaller files which increase the number of files and reduce the complexity level. To measure the complexity of the software, the number of files in software is not a strong metric.

Lines vs Average Complexity: Lines metric counts only number of lines and ignores the structure of the software like branches, loops [20]. There is linear relationship between lines and average complexity metric of a program [5,21]. With increase in size of program, number of lines and complexity also increases. To analyse the relationship among line and complexity metric data in software, the open source is divided in two dimensions: strong relationship among LOC and weak relationship among LOC. In strong relationship, complexity metric data is multiplied by constant value (size of program) and weak relationship complexity metric is multiplied by size of program. It is analysed that with strong direct relationship among number of lines and complexity metrics, the level of complexity is least affected. The correlation among the two metrics results in weak direct relationship is highly affected

Statements vs Avg. Complexity: Calculating the complexity with measuring the length is not a correct way to evaluate the quality and complexity of software. Even though the length is large, it is possible that the program is easily understandable and maintained because it consists of few complex and nested structures and many simple statements [5]. There is linear relationship between statements and average complexity. To calculate the correlation among statement and complexity, the complexity metric data is multiplied by a constant value size of program. With the continuous variable change in number of statements during evolution of software there is minor change in complexity of software. With change in statements there is minor change in complexity as per the type and number of statements used. With the huge rise in number of statements during evolution, there is again very small change in level of complexity. There is a weak direct relationship among number of statements and complexity metrics.

%Branch vs Avg. Complexity: %Branch calculates how many control statements of the program has been executed [6]. The control statements are defined with while, for loop, if, case, etc statements. Each statement either generates condition or loop with a condition. With increase in number of conditions in the program the complexity of the program increases. It is studied that with the minor change in number of branches used there is equivalent direct change in complexity of the software. With the increase in number of branches there is strong increase in complexity and vice versa. The relationship among branches in software and complexity of software is direct but weak. With minor change in number of branches there is non-equivalent direct change in complexity. The weak relation represents that with minor change in number of branches there is major change in complexity. This represents the weak relationship. But one important factor is that the complexity has a random measurable change to find the change in evolution. With increase in %branch there is increase in complexity of the program. The complexity increases with the type of control statement used. The complexity of the software can be maintained by the cohesiveness of the branches used.

%Comment vs Avg. Complexity: Less than minimum required comments limit signify that the program is not properly explained. And more than the maximum limit signifies that it is not a program perhaps it is a text file. %Comments metrics measures the existence of non-executable lines in the program. With increase in number of comments in a program complexity either decrease or remain stable. The complexity decreases if the program is easily understandable. In heavy design software the Average Complexity reduces with rise in %comment in the program. Where as in least design software the complexity level remain same. The relationship among comment and complexity is defined by the contents used in comment to describe the execution of program. In narrow change in software, there is inverse change in complexity. In software with huge change in number of comments in software evolution bring negligible effect on software complexity. The variation in the complexity is not varying as per increase in number of comments. This variability generates the weak relation.

Method per Class vs Avg. Complexity: Classes with large numbers of methods are likely to be more application specific, limiting the possibility of reuse [7]. The increase in number of methods in the class reduces the redundancy of the statements. Method per Class and Avg. Complexity has the non-linear relationship. With increase in number of methods in a class, the complexity of the program decreases. With fall in method per class in software the complexity of the software increases. This implies that with change in method per class brings inverse change in the complexity. With rise in methods per class in software, there is inverse change in complexity. Method per class is an important factor for the class size, therefore complexity variance can also be calculated with method per class per evolution cycle. Maximum number of methods in a class should not be greater than seven. If number of methods increases it would be difficult to handle and increase the complexity. The class must be decomposed into sub-classes if the number of methods exceeds.

Average Statements per Method: Sum of total number of statements existing in various methods in a file divided by the sum of number of methods used in the file [9].The metric calculates the average size of the methods or classes used in the program in terms of executable lines or statements [8]. If large size of methods is invoked in response to input, it becomes difficult to understand the method and complexity increases. There is linear relationship between statements and complexity. In open source software, with increase in average statements per method, there is increase in complexity. In software the variability among the two metrics is less and direct. As data collection there is continuous change in complexity as per change in average statements per method. With change in average statements/method, there is equivalent change in complexity. This represents the strong

relation among average statements in method metric and average complexity metric. With minor rise in number of statements per method there is equivalent change in average complexity. With sharp change in average statements per methods there is small change in average complexity. As per data with change in avgstemnts/method, there is change in complexity. This brings the very weak change direct relation among two metrics in software.

Class Size vs Average Complexity: Class size is the proportion of the number of lines of code divided by the total number of classes. Class size is strongly and linearly related to complexity metric calculated as multiplication of average statements per method and method per class [8]. In software with increase in class size there is increase in complexity. The change in complexity depends upon type of statements, variables, and size of methods used in class. With change in class size there is direct and proportionate change in complexity of the software. With change in class size from 70 -76.73, there is very less change in complexity by 3.12 – 3.21. The proportionate change in software brings the strong cohesiveness of methods. The change among the metrics represents the strong relation among the metrics. With change in class size from 59.09 – 85.10, there is dramatic change in complexity from 27.00 – 22.20, this represents the weak cohesiveness. There is weak relation representation among class size and average complexity metrics. With the immediate increase in class size, the complexity of the software is negligibly indirectly affected.

Average Depth vs Average complexity: Average depth represents the distance of the greatest path from the root node to the end node of the tree. A deeper a class hierarchy means more methods were used or inherited making it more complex [8]. A class situated too deeply in the inheritance tree will be relatively complex to develop, and understand the relation among parent and child class. It is useful to know the depth of the software. Greater the number of methods inherited, it is harder to predict the behavior of the program. The coupling and cohesion of the software increase with increase in level of average depth. Higher average depth greater the complexity. With increase in average depth there is proportionate change in average complexity of the software. With change in average depth there is direct change in complexity. With small change in depth of the software, complexity also gets minor change in direct order. There is a strong direct relationship among depth and complexity of the software [22].

5. CONCLUSION

In the paper we study and analyses the dynamic variability of the complexity on evolution of open source software written in object oriented language with the set of selected metrics. The interrelation among the methods (components) is calculated by the cohesion value. Component based system is based on two properties; coupling and cohesion. Maximize the cohesion and minimize the coupling results in better software quality. The complexity is an important metric to calculate the quality of the software from reusability, understandability, and cost of maintenance. The analysis is done among the complexity metrics and other metrics used in analysis. The complexity metric is used to find the quality of the software during the evolution period. The relation among metrics is calculated by finding the correlation value among the metrics. Low correlation value defines the low relation and high value represents the strong relationship among the metrics. Software complexity metric have a tendency to judge the quality of the software development. The metric analysis could lead to reduce software development cost and improving efficiency and software quality by evaluating software metrics LOC, Number of statements, %Branches, Class Size, Method/Class, Average Statements per method, Average Depth with Average Complexity. In the component based system, the component of the system can be defined in statements, branches, and classes. The relationship among the components is measured by average statements per method and average depth. It is

concluded that the complexity of the software is not dependent one metric, but the combination of various components used in the system.

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A Review on Ethical Hacking and Hacking Attacks

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Abstract:

Nowadays ethical hacking is the most emerging field in computer science. Everyone knows that the state of security on the internet is very poor. Hacking is an activity in which, a person exploits the weakness in a system for self-profit. Ethical hacking describes the process of hacking a network in an ethical way, therefore with good intentions. This paper describes what is ethical hacking, what are the types of ethical hacking, phases of ethical hacking, attacks and preventions.

Keywords **-Ethical hacking, vulnerabilities, Data, Attacks and hackers.**

I. INTRODUCTION

The term “Hacker” has a binary usage in the computer industry today. Initially, the term was defined as a person who enjoys learning the details of computer systems and how-to extent their capabilities-as opposed to most users of computers, who prefer to learn only the minimum amount necessary.

But due the increasing popularity of computers and their continued high cost, access to them was usually restricted. When the access to the computers was refused, some users would challenge the access controls that had been put in place. They steal passwords or account numbers by looking over someone's shoulder, explore the system for bugs that might get them past the rules, or even take control of the whole system. In order to overcome this issue, Ethical Hacking is introduced in which the ethical hacker uses the hacking skills to protect the secrets, crucial data, and image of a company, organization or anything.

Ethical hacking is actually a hacking which used for good purpose and for better security. The further things about ethical hacking are explained in upcoming paragraphs.

WHAT IS ETHICAL HACKING?

Ethical Hacking sometimes called as Penetration Testing is an act of penetrating into system or networks to find out threats, Weakness in those systems which a malicious attacker may find and exploit causing loss of data, financial loss or other major damages. The purpose of ethical hacking is to improve the security of the network or systems by fixing the vulnerabilities found during testing. Ethical hackers may use the same methods and tools used by the malicious hackers but with the permission of the authorized person for the purpose of improving the security and defending the systems from attacks by malicious users.

Ethical hackers are expected to report all the vulnerabilities and weakness found during the process to the management.

Fig.1 Example of ethical hacking

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II. TYPES OF HACKERS

There are three types of hackers

- ✓ Black Hat Hackers
- ✓ Grey Hat Hackers
- ✓ White Hat Hackers

Fig.2 Types of hackers

1. **Black hat hackers** are those who do hacking for their own purpose. They can also be called as Crackers. They are considered to be as criminals and can be easily identified because of their malicious actions.
2. **Grey hat hackers** are the binary hackers which mean they are black hat and also White hat hackers. They are not legally authorized hackers. They work with both good and bad intentions and they can use their skills for personal gain.
3. **White hat hackers** are that who do ethical hacking (good purpose) and writes the report for what they have done. White hat hackers had the authorization or the certification who work for the government and organizations by performing penetration testing and identifying gap in their cyber security.

III. PHASES OF ETHICAL HACKING

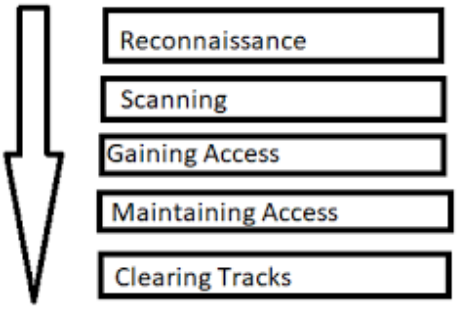

Fig.3 Phases of Ethical hacking

a) Reconnaissance

RECONNAISSANCE is gathering information about the target as much as possible. We can gather information in many ways. Here are the methodologies for the foot printing.

b) Scanning

Scanning refers to collecting more information using complex and aggressive scanning techniques. It is a set of procedures for identifying live hosts, ports, and services, discovering Operating system and architecture of target system, Identifying vulnerabilities and threats in the network [8].

c) Gain Downloading access

The attacker would exploit a vulnerability to gain access to the target. This typically involves taking control of one or more network devices to extract data from the target or use that device to perform attacks on other targets.

- ❖ Abusing a username/password that was found Exploiting a known vulnerability
- ❖ Breaking into a weakly secured network
- ❖ Sending malware to an employee via E-mail or a USB stick on the parking lot

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d) Maintaining access

The attacker will now need to maintain access long enough to gather as much data as possible or to enable himself to return at a later time.

In order to maintain access for a longer time, the attacker must remain stealthy to not get caught using the host environment.

Some examples of techniques used in this phase:

- Privilege escalation
- Installation of a backdoor or remote access Trojan Creating own credentials

e) Clearing tracks

The attacker will take steps necessary to hide the intrusion and any controls he may have left behind for future visits.
Any changes that were made, installed Trojans, backdoors, escalated authorizations, etc. must return to a state in which the attacker's presence cannot be recognized by the network's administrators.

IV. Operating System used for Ethical Hacking

- **Kali Linux**

Fig.4 Kali Linux

Kali Linux is nothing but just a specialized Linux Operating System. This operating offers the best hacking inbuilt tools and software's. Kali Linux mainly works on commands and also on special codes which helps the user to hack or track any type of data.

- **Parrot operating system**

Fig.5 Perrot security OS

This is also Linux based operating system which is also used for hacking. Its best feature is that the cryptography on this operating is very easy to handle and this operating system had best user interface that's why it is very popular in ethical hacking.

V. ATTACKS

- **Phishing**

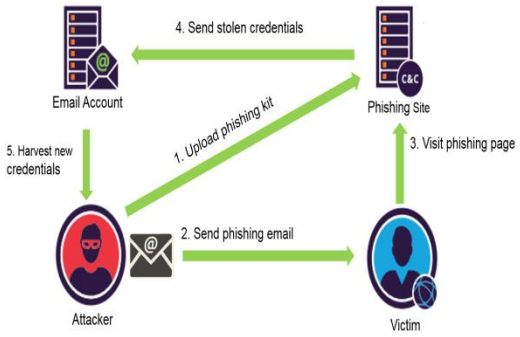

Fig.6 Attacks

In a phishing attack, an attacker may send you an email that appears to be from someone you trust, like your boss or a company you do business with. The email will seem

legal, and it will have some urgency to it like (fraudulent activity has been detected on your account). In the email, there will be an attachment to open or a link to click. When you will click on the link, you will thereby install malware in your computer. If you click the link, it may send you to a real looking website that asks for you to log in to access an important file, except the website is actually a trap used to capture your authorization when you try to log in.

- **Brute force**

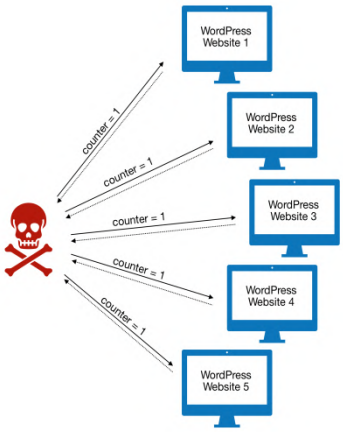

Fig.6 Brute force

A brute force attack, also known as a dictionary attack, is a cryptographic hack that depends on guessing possible combinations of a targeted password until the correct password is discovered. The longer the password, the more combinations that will need to be tested. A brute force attack can be time consuming, difficult to perform if methods such as data obfuscation are used, and at times downright impossible.

- **Ransomware**

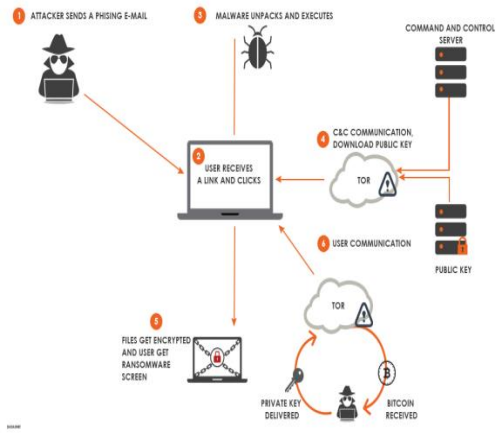

Fig.7 Ransomware

Ransomware is a type of malware. It restricts access to the computer system that it infects or the data that it stores (often using encryption techniques), and demands money to be paid to the developers (hackers) of the malware. This is in order for the restriction to be removed. Some forms of ransomware encrypt user's data on the system hard drive. Others may simply lock the system and display messages intended to force the user to pay.

VI. PREVENTION

- **Download Software from Authorized Websites**

If you are planning to download a music file, video or utility software does so from a trusted website. Many websites offer a free download of certain high-value software, but those may carry the virus or a spyware released by a hacker to obtain your PC information.

- **Do not click on Random Email Attachments**

Email is one of the biggest tools through which hackers spread malware. The spyware or virus is hidden in attachments and links clicking on which the infection begins. Hence, never click on random attachments if those are not from any trusted source.

- **Scan all Types of Hard Drives before Running**

Hard drives such as pen drives, external hard disk or mobile devices should be scanned by a USB scanner to remove any kind of malware.

VI. CONCLUSION

This paper gives complete view about what is ethical hacking, difference between hacker and ethical hacker types and kinds of hackers, phases, attacks & prevention. Discusses phases of hacking, methodologies of foot printing and scanning, finding vulnerabilities in a website using scanning, maintaining access and gaining access.

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Review: Internet of Things (IoT) And Future Technologies

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Abstract

The Internet of Things (IoT) is the internetworking of physical devices, vehicles and other objects which consists of an embedded system with sensors, actuators and network connectivity that enable to collect and exchange data. Internet of Things (IoT) is fast becoming a disruptive technology business opportunity, with standards emerging primarily for wireless communication between sensors, actuators and gadgets in day-to-day human life, all in general being referred to as "Things". The IoT is comprised of smart machines interacting and communicating with other machines, objects, environments and infrastructures. The IoT is a rapidly increasing and promising technology which becomes more and more present in our everyday lives. Radio Frequency identification assigns a unique identification to the objects. RFID technology is used as more secure identification and for tracking/locating objects, things, vehicle. In this paper, we survey about components, application ain the new emerging area. This survey paper proposes for IoT technologies, highlights for some important technologies and applications.

Keywords-IOT (Internet of Things), IOT definitions, IoT components, applications, future technologies.

I. Introduction

Today, Internet application development demand is very high**. So** IoT is a major technology by which we can produce various useful internet applications. Basically, IoT is a network in which all physical objects are connected to the internet through network devices or routers and exchange data. IoT allows objects to be controlled remotely across existing network infrastructure. The Internet of Things (IoT) can be defined as a network of physical objects or people called "things" that are embedded with software, electronics, network, and sensors which allows these objects to collect and exchange data. The concept of a network of smart devices was discussed as early as 1982, with a modified Coke machine at Carnegie Mellon University becoming the first internet-connected appliance , able to report its inventory and whether newly loaded drinks were cold. Kevin Ashton (born 1968) is a British technology pioneer who is known for inventing the term "the Internet of Things" to describe a system where the Internet is connected to the physical world via ubiquitous sensors.

So ,"The Internet of Things refers to the ever-growing network of physical objects that feature an IP address for internet connectivity, and the communication that occurs

between these objects and other Internet-enabled devices and systems".

Fig 1: Internet of things

This includes everything from cell phones, coffee makers, washing machines, headphones, lamps, wearable devices and almost anything else you can think of.

Over 9 billion 'Things' (physical objects) are currently connected to the Internet, as of now. In the near future, this number is expected to rise to a whopping 20 billion.

II. HOW IOT WORKS?

As we know that,"The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction."

A complete IoT system integrates four distinct components: sensors/devices, connectivity, data processing, and a user interface.

Below I will briefly explain each component and what it does:-

(A)Sensors/Devices:-

First, sensors or devices help in collecting very minute data from the surrounding environment. All of this collected data can have various degrees of complexities ranging from a feed. These sensors are built in the devices which collects all the data to be used later. For instance, our phone is a device with built-in sensors like GPS, camera, etc.

Fig.2:COMPONENTS OF IOT

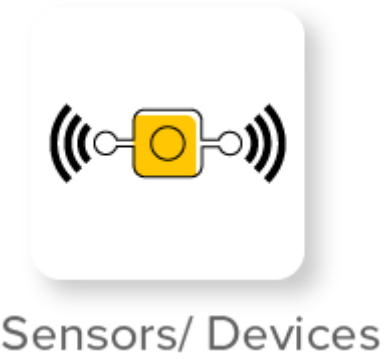

Fig.3: Sensors

(B). Connectivity:-

Second, after you have chosen the sensor or actuator, you will need to connect it reliably to the Internet. Since wireless connectivity is central to the success of the IoT. We will establish that connecting all objects in the long-term future with cellular mobile phone technology is probably the best business proposition since it is a technology which ensures availability, reliability and viability all ingredients which we need for a successful IoT uptake. Low Power Wifi, a new system, is also a great contender since Wifi already enjoys

global coverage today. Furthermore, an exciting class of Low Power Wide Area networking technologies is also emerging, diversifying the connectivity portfolio. On the other hand, whilst the initial technology of choice, known as Zigbee, is suitable for sporadic short-range connections, it is surprisingly unfit to meet the demands for a viable Internet of Things at global scale. So watch out when building a future-proof IoT business.

Fig.4: Connectivity

(C).Data Processing:-

Once the data is collected and it gets to the cloud, the software performs processing on the acquired data.

The analysis can be as simple as checking the temperature of the AC or a complex one such as a situation where an intruder comes in and the device has to identify it through cameras.

Fig.5: Data Processing

(D).User Interface:-

Next, the information made available to the end-user in some way. This can achieve by triggering alarms on their phones or notifying through texts or emails. However, this isn't as easy as it seems. It all depends on what is IoT platform and how the technology has been developed.

Finally, an important component is how the data is presented to the final users. Make sure your IoT product has a very appealing user interface, both web based as well as smart phone or tablet based..

Fortunately, there are many open-source as well as paying front-end products available today. For Example, sometimes the system doesn't need the interference of humans to work; like in home automation system if no one is in the home and the system detects any intruders then they are sensed, then the system generate an alert to the owner of the house and also to the concerned authorities.

This is how iot works.

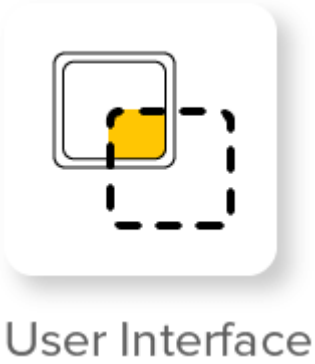

Fig.6: User Interface

III. INTERNET OF THINGS APPLICATIONS

A .Smart Cities

Smart cities use a combination of the internet of things (IoT) devices, software solutions, user interfaces (UI) and communication networks. However, they rely first and foremost on the IoT. The IoT is a network of connected devices -- such as vehicles, sensors or home appliances -- that can communicate and exchange data. Data collected and delivered by the IoT sensors and devices is stored in the cloud or on servers.

Fig.7: Smart City

For example, New York Smart City, Amsterdam Smart City, Copenhagen Smart City etc….

Application of IoT to achieve smart cities would require using radio frequency identification and sensors.

B .Smart Home and Buildings

Now a days, smart home is becoming a need of fast life. Smart home allows many household devices to be connected with internet for the communication. In smart home, the various home equipment's like air conditioning, doors, windows, lighting, washing machine, and refrigerator can be controlled manually as shown in Fig-8. IoT in integration with wireless sensor network can give intelligent solution for energy management of buildings. With the help of laptop or smart phones, we can access energy information and control system of buildings. Wi-Fi's technologies in home automation has been used primarily due to the networked nature of deployed electronics where electronic devices such as TVs, mobile devices, etc are usually supported by Wi-Fi .

Fig.8: Smart Home

Wi-Fi have started becoming part of the home IP network and due the increasing rate of adoption of mobile computing devices like smart phones, tablets, etc

C. Smart Energy and the Smart Grid

A smart grid is related to the information and control and developed to have a smart energy management . A smart grid that integrate the information and communications technologies (ICTs) to the electricity network will enable a real time, two way communication between suppliers and consumers, creating more
dynamic interaction on energy flow, which will help deliver electricity more efficiently and sustainably .

Fig.9: Smart Energy and Smart Grid

Project related to smart energy and the smart grid are Salt River Project , Entergy AMI , AEP Ohio gridSMART PHASE 2 project etc …. Application of internet of things such as industrial, solar power, nuclear power , power control etc..

D. Smart HealthCare

Most healthcare systems in many countries are inefficient, slow and inevitably prone to error. This can easily be changed since the healthcare sector relies on numerous activities and devices that can be automated and enhanced through technology. Additional technology that can facilitate various operations like report sharing to multiple individuals and locations, record keeping and dispensing medications would go a long way in changing the healthcare sector.

Fig.10: Smart HealthCare

Remote health monitoring could be used to monitor non-critical patients at home rather than in hospital, reducing strain on hospital resources such as doctors and beds. It could be used to provide better access to healthcare for those living in rural areas, or to enable elderly people to live independently at home for longer. Essentially, it can improve access to healthcare resources whilst reducing strain on healthcare systems, and can give people better control over their own health at all times. Thus far, most IoT initiatives in healthcare revolved around the improvement of care as such with remote monitoring and telemonitoring as main applications in the broader scope of telemedicine. A second area where many initiatives exist is tracking, monitoring and maintenance of assets, using IoT and RFID. This is done on the level of medical devices and healthcare assets, the people level and the non-medical asset level (e.g. hospital building assets).

E. Smart Transportation and Mobility

Smart transportation, a key internet of things vertical application, refers to the integrated application of modern technologies and management strategies in transportation systems. These technologies aim to provide innovative

services relating to different modes of transport and traffic management and enable users to be better informed and make safer and 'smarter' use of transport networks.

Smart Transportation. Intelligent Transportation Systems are advanced applications that aim to provide innovative services relating to different modes of transport and traffic management and enable various users to be better informed and make safer, more coordinated, and smarter use of transport networks.

Application of internet of things a that can handle smart transportation like road safety, traffic management, autonomous driving etc…

The intelligent transportation technology can be wireless communication , sensors , bluetooth , video vehicle , audio detection , floating car data etc...

Fig.11: Smart Transportation and Mobility

Congestion, accidents, and pollution issues due to transportation are becoming more severe as a result of the tremendous increase in various travel demands, including vehicular traffic, public transportation, freight, and even pedestrian traffic. To resolve such issues, ITSs have been developed that are able to integrate a broad range of systems, including sensing, communication, information dissemination, and traffic control.

Three essential components are necessary for any ITS to perform its function(s): data collection, data analysis, and data/information transmission.

Intelligence transportation system is an future transportation system comprised of an advanced information and telecommunication for roadstead and vehicles Intelligence Transportation system is a application of advance technologies using electronics divide, communication and advance sensors. These application provides passenger with important information while improving the status and efficiency of the transportation system.

Application of internet of things a that can handle smart transportation like road safety, traffic management, autonomous driving etc…

The intelligent transportation technology can be wireless communication , sensors , bluetooth , video vehicle , audio detection , floating car data etc….

F. Smart Factory and Smart Manufacturing

Smart manufacturing allows factory managers to automatically collect and analyze data to make better-informed decisions and optimize production. The data from sensors and machines is communicated to the Cloud by Iot connectivity solutions developed in the factory. That data is analyzed and combined with contextual information and then shared with authorized stakeholders.

Iot technology, leveraging both wired and wireless connectivity, enables this flow of data, providing the ability to remotely monitor and manage processes and change production plans quickly, in real time when needed. It greatly improves outcomes of manufacturing reducing

waste, speeding production and improving yield and the quality of goods produced.

Effect of smart manufacturing are:--

(i)Greater operating efficiency:

The ability to understand what is happening at each stage of the manufacturing process allows plant managers to implement real-time solutions and minimize machine downtime. This leads to greater efficiency and reduced costs.

(ii)Minimal machine downtime:

Artificial intelligence algorithms can use operation and failure logs to turn real-time IoT sensor data into predictive maintenance insights. This allows human workers to be warned of potential component failures, or even enable these components to be "self-healing".

(iii)Increased worker safety:

Automated tracking and analysis of people's movements and activities inside a smart factory can help mitigate risks. Safety systems warn persons inside the factory about specific injury risks, surveying for lapses in focus or mistakes during new or routine tasks. These systems could also administer or send for medical assistance if needed.

(iv)Supply chain management:

Manufacturers can use IoT device geolocation to track shipments, parts, and products. This data can then be used to adjust scheduling on parts orders and provide insights that make products easily recycled or reused, lowering the cost of materials for manufacturers.

Smart factories are manufacturing plants that incorporate many of the previously mentioned smart manufacturing technologies with specialized processes and management. Smart factories are built to be responsive to environmental changes and can proactively address potential problems or events.

Fig.12: Smart Factory and Manufacturing

Smart factory added a new values in manufacturing revolution by integrates artificial intelligence, machine learning, and automation of knowledge work and M2M communication with the manufacturing process.

G. Smart Environment

Environment plays a major effect in human life. People, even animals, birds, fishes and plants may be affected in unhealthy environment. There were many researches efforts has been paid to solve the problems of environmental pollution and waste resources . Creating of a healthy environment is not easy because of industries and transportations wastes, with irresponsible human activities are daily factors that make the environment damaged .

Using IoT to create smart environments, smart office and smart buildings can yield benefits for enterprises beyond energy cost savings. Smart environments not only attract top talent but real-time data gathered from facilities can help organizations make informed decisions related to productivity, innovation, safety, and efficiency.

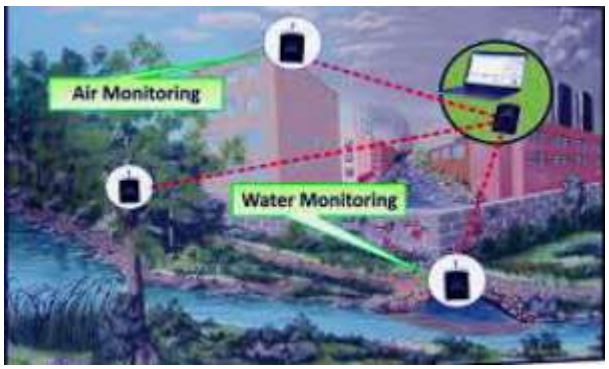

Fig.13: Smart Environment

Smart environment is an important technology in our everyday life which provides many facilities and solutions for many environmental applications such as water and air pollution, weather and radiation monitoring, waste management, natural disaster, and many other environment indicators.

The resources management relates to all natural resources include animals, planets and forests, birds and fishes, coal , petroleum , land, freshwater, air and heavy metals including gold, copper and iron. All these resources are likely to decrease significantly or affected by several factors, including pollution, waste and abuse. Smart environment strategies integration with IoT technology should be created for sensing, tracking and assessment of objects of the environment that offer potential benefits in achieving a sustainable life and a green world. Through IoT technology, weather systems can collect information such as barometric pressure, humidity, temperature, light, motion and other information, from vehicles in motion and transmit the information wirelessly to weather stations.

Therefore, some other applications of internet of things are smart lighting, smart parking , smart refrigerator, smart watches etc…. SO, these are the some applications of internet of things.

H. Smart Agriculture and Water Management

According to , the IoT has the capacity to strengthen and enhance the agriculture sector through examining soil moisture and in the case of vineyards, monitoring the trunk diameter. IoT would allow to control and preserve the quantity of vitamins found in agricultural products, and regulate microclimate conditions in order to make the most of the production of vegetables and fruits and their quality. Furthermore, studying weather conditions allows forecasting of ice information, drought, wind changes, rain or snow, thus controlling temperature and humidity levels to prevent fungus as well as other microbial contaminants.

Fig.14: Smart Agriculture

When it comes to cattle, IoT can assist in identifying animals that graze in open locations, detecting detrimental gases from animal excrements in farms, as well as controlling growth conditions in offspring to enhance chances of health and survival and so on. Moreover, through IoT application in agriculture, a lot of wastage and spoilage can be avoided through proper monitoring techniques and

management of the entire agriculture field. It also leads to better electricity and water control.

IV. Future Technologies in IOT

Many new technologies are related to IoT to prove the integration of wired as well as wireless control, communication and IT technologies together which are responsible for connecting several subsystems and things which operate under a unified platform controlled and managed smartly.

A.Cloud Computing

The two worlds of Cloud and IoT have seen a rapid and independent evolution. These worlds are very different from each other, but their characteristics are often complementary in general, in which IoT can benefit from the virtually unlimited capabilities and resources of cloud to compensate its technological constraints for example storage, processing, and communication. Cloud computing is the delivery of on-demand computing services -- from applications to storage and processing power -- typically over the internet and on a pay-as-you-go basis. Cloud computing services cover a vast range of options now, from the basics of storage, networking, and processing power through to natural language processing and artificial intelligence as well as standard office applications. Pretty much any service that doesn't require you to be physically close to the computer hardware that you are using can now be delivered via the cloud. All we need to have a web browser like

chrome to use cloud computing. Following are the key features of cloud computing:

I.I Resource Pooling and Elasticity

I.II Self-Service and On-Demand Services

I.III Pricing

I.IV Quality of Service

Fig,15: Network Of Cloud

The basic examples of cloud computing which are used by general people in daily life are Facebook, YouTube, Dropbox, and Gmail etc. It offers scalability, flexibility, agility, and simplicity that's why its use is rapidly increasing in the enterprises.

Characteristics of cloud computing are multi sharing , high scalability, performance, maintenance.

Advantages of cloud computing are cost efficiency, unlimited storage, backup and recovery.

There are various challenges while working on cloud computing like privacy, trust, availability, audit, confidentiality, integrity.

B. Big Data

Due to the rapid expansion in the networks nowadays, the number of devices and sensors in networks are increased more and more in the physical environments which will change the information communication networks, services and applications in various domains. The term “big data” refers to data that is so large, fast or complex that it’s difficult or impossible to process using traditional methods.

The act of accessing and storing large amounts of information for analytics has been around a long time. But the concept of big data gained momentum in the early 2000s when industry analyst Doug Laney articulated the now-mainstream definition of big data as the three V's: volume, velocity, variety.

Fig.16: Big Data

Examples of big data are New York Stock Exchange , Facebook, Jet Engine.

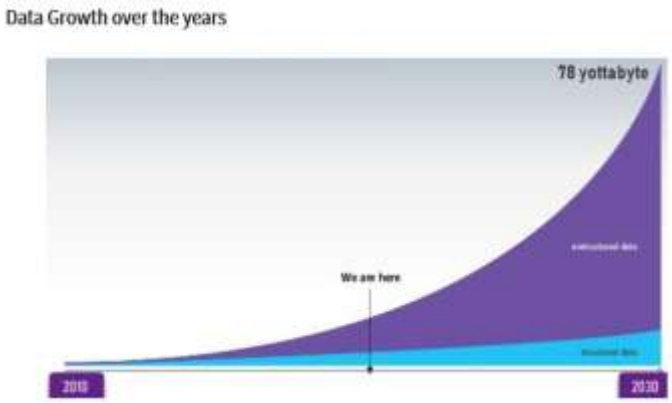

Fig.17: Graph of Big Data

Characteristics of big data includes volume, variety, variability**,** velocity. Improved customer services, better operational efficiency, better decision making are few advantages of big data. With large volumes of distributed and heterogeneous IoT data, issues related to interoperability, automation, and data analytics will require common description and data representation frameworks in addition to machine readable and interpretable data descriptions.

A. Security and Privacy

Due the fact that IoT applications able to access the multiple administrative domains and involve to multiple ownership regimes , there is a need for a trust framework to enable the users of the system to have confidence that the information and services being exchanged can indeed be relied upon . The trust framework needs to be able to deal with humans and machines as users, for it needs to convey trust to humans and needs to be robust enough to be used by machines without denial of service. Recently, the IoT becomes a key element of the future internet, the need to provide adequate security for the IoT infrastructure becomes ever more important. A large scale applications and services based on the IoT are increasinglyvulnerable to disruption from attack or information theft. Many advanced security methods are required in several areas to make the IoT secure from attacks, thefts and many other security problems such as DoS/DDOS attacks, compromised nodes, and malicious code hacking attacks, that because the IoT is susceptible to such attacks and will require specific techniques and mechanisms to ensure that transport, energy, city infrastructures cannot be disabled or subverted. Owing to the fact that IoT has become a vital element as regards the future of the internet with its increased usage, it necessitates a need to adequately address security and trust functions. Researchers are aware of the weaknesses which presently exist in many IoT devices. Furthermore, the foundation of IoT is laid on the existing wireless sensor networks (WSN), IoT thus architecturally inherits the same privacy and security issues WSN possesses

There is a need for more research to be conducted on cryptographic security services that have the capability to operate on resource constrained IoT devices. This would enable different skilled users to securely use and deploy IoT systems regardless of the inadequate user interfaces that are available with almost all IoT devices. In addition to the protection and security aspects of the IoT, additional areas like confidentiality in communication, trustworthiness, and authenticity of communication parties, and message integrity, and supplementary safety requirements should also be incorporated. These may include features like being able to prevent communication of various parties. As an example, in business transactions, smart objects must be prevented from facilitating competitors' access to confidential information in the devices and thus using this information maliciously.

B. ZigBee

Zigbee is a wireless personal area network (WPAW's) and is specially built for control network sensors. This communication standard defines physical and Media Access Control (MAC) layers to handle many devices at low-data rates. These Zigbee's WPANs operate at 868 MHz, 902-928MHz and 2.4 GHz frequencies. The date rate of 250 kbps is best suited for periodic as well as intermediate two way transmission of data between sensors and controllers. This communication has less cost and less power mesh network for developing for controlling and monintoring . Zigbee is based on the IEEE's 802.15.4. Zigbee does not focus on point-to-point communication, such as Bluetooth, where one high-powered device sends data to another high-powered device over a short range, put it operates in a mesh network, which is why it's great for the smart home.The Zigbee 3.0 protocol is designed to communicate data through noisy RF environments that are common in commercial and industrial applications. Version 3.0 builds on the existing ZigBee standard but unifies the market-specific application profiles to allow all devices to be wirelessly connected in the same network, irrespective of their market designation and function. Furthermore, a ZigBee 3.0 certification scheme ensures the interoperability of products from different manufacturers. Connecting ZigBee 3.0 networks to the IP domain opens up monitoring and control from devices such as smartphones and tablets on a LAN or WAN, including the Internet, and brings the true Internet of Things to fruition.

Fig.18: Zigbee

Why zigbee is better than wifi?

WiFi and ZigBee both have their positive qualities, but they obviously come with negatives. What you gain in bandwidth with WiFi is lost in battery power and range, and what you gain with ZigBee's battery life you lose in range and bandwidth with ZigBee. So like any decision based around link budgets, tradeoffs are crucial to understand.ZigBee's best quality is its low power-consumption rate and battery life. Its protocol was designed as "assemble and forget", meaning once you set it up, it can last for months. Zigbee is mesh topology. Bandwidth is high—up to 2MHz—which is why it's perfect for streaming

music and checking email on your phone or tablet.maximun transfer speed of wifi is 11mbps. Wifi is a star topology.

D.Fog Computing

Fog computing is related to the edge computing in the cloud. In contrast to the cloud, fog platforms have been described as dense computational architectures at the network's edge. Characteristics of such platforms reportedly include low latency, location awareness and use of wireless access. While edge computing or edge analytics may exclusively refer to performing analytics at devices that are on, or close to, the network's edge, a fog computing architecture would perform analytics on anything from the network center to the edge. IoT may more likely be supported by fog computing in which computing, storage, control and networking power may exist anywhere along the architecture, either in data centers, the cloud, edge devices such as gateways or routers, edge equipment itself such as a machine, or in sensors.

C. SigFox

Sigfox is an ultra-narrowband technology. It uses a standard
radio transmission procedure called binary phase-shift keying,
and it takes very narrow chunks of the spectrum and
transformation the phase of the carrier radio wave to encode the
data . The Sigfox uses low data rate transmission and
sophisticated signal processing to effectively keep away from
network interference, and ensures the integrity of the transmitted
data show in figure 19. This IoT wireless technology solution permits bidirectional communication, but always commence by the device. The Sigfox is emphatic for communications from endpoints to base stations (uploads). However, it is not emphatic for communications from base stations to endpoints (downloads Sigfox consumes a fraction (1%) of the power used via cellular communication. This network solution would be perfect for one-way systems, including environmental sensors, basic alarm systems, and agricultural and simple metering as well as this technology is a good fit for any application that needs to send small, unusual bursts of data.

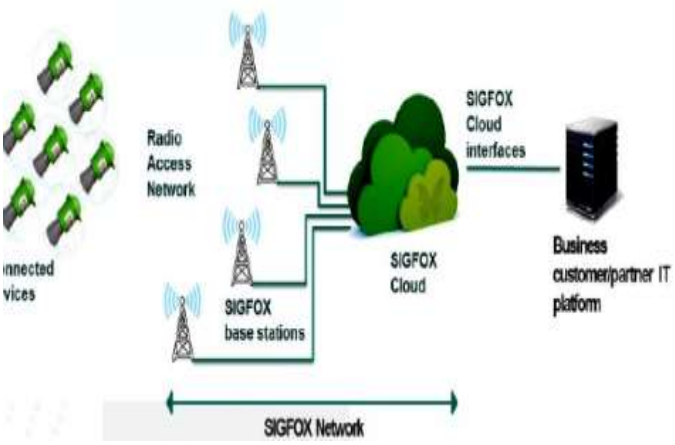

Fig.19: Sig Fox

F.Z-Wave

Z-Wave is a low-power, IoT wireless technology, mainly designed for home automation. It is a possessory solution, originally developed by Zen-Sys and later acquired by Sigma Designs. The Z-Wave proposed authentic and low-latency communication with data rates up to 100kbit/s [32]. A Z-Wave network consists of internet of things (IoT) devices and a mainly controller, also known as a smart home hub, which is the only device in a Z-Wave network that is normally connected to the internet. When a Z-Wave hub receives a command from a smart home application on

a user's tablet or computer, smartphone, it routes the command to its destination device across networks of upto 232 devices including hub.

G. RFID

Radio Frequency Identification (RFID) technology uses radio waves to recognize people or objects. There is a device that reads information contained in a wireless device or tag from a distance without making any physical contact or need a line of sight. The tags contain electronically stored information cross-source reader. The RIFD functions per second, despite the fact that, it is not a very high data rate system; it is enough for most data monitoring applications.

Fig.20: Z-Wave

Passive tags collect energy from a nearby RFID reader's cross-examines radio waves. The active tags have a local power source and may operate hundreds of meters from the RFID The RFID is able to endue several write and reads The RFID technology was first appeared in 1945, as an espionage tool for the Soviet Union, which retransmitted incident radio waves with audio information. Similarly, the IFF (Identification Friend or Foe) transponder developed in the United Kingdom was routinely used by the allies in World War II to identify aircraft as friend or foe.

Every RFID system consists of three components: a scanning antenna, a transceiver and a transponder. When the scanning antenna and transceiver are combined, they are referred to as an RFID reader or interrogator. The RFID reader is a network-connected device that can be portable or permanently attached. It uses radio frequency waves to transmit signals that activate the tag. Once activated, the tag sends a wave back to the antenna, where it is translated into data.

Fig.21: RFID

V. Future Challenges Of Internet Of Things (IOT)

The fact that Internet of things applications and scenarios outlined above are very interesting which provides technologies for smart every things. , but there are some challenges to the application of the Internet of Things concept in cost of implementation. The expectation that the technology must be available at low cost with a large number of objects. Even though the current IoT enabling technologies have greatly improved in the recent years,

there are still numerous problems that require attention, hence paving the way for new dimensions of research to be carried out. Since the IoT concept ensues from heterogeneous technologies that are used in sensing, collecting, action, processing, inferring, transmitting, notifying, managing, and storing of data, a lot of research challenges are bound to arise. These research challenges that require attention have consequently spanned different research areas. IoT are also faced with many other challenges such as:

A. Scalability

Internet of Things has a big concept than the conventional Internet of computers, because of things are cooperated within an open environment. Basic functionality such as communication and service discovery therefore need to function equally efficiently in both small scale and large scale environments. The IoT requires a new functions and methods in order to gain an efficient operation for scalability. To handle their distribution is not a convenient task. Besides, IoT applications should be tolerant of new services and devices continually joining the network and, consequently, must be designed to enable extensible services and operations.

B. Self-Organizing

Smart things should not be managed as computers that require their users to configure and adapt them to particular situations. Mobile things, which are often only sporadically used, need to establish connections spontaneously, and able to be organize and configure themselves to suit their particular environment.

C. Data Volume

Some application scenarios of the internet of things will involve to infrequent communication, and gathering information's form sensor networks, or form logistics and large scale networks, will collect a huge volumes of data on central network nodes or servers. The term represent this phenomena is big data which is requires many operational mechanism in addition to new technologies for storing, processing and management.

D. Data interpretation

To support the users of smart things, there is a need to interpret the local context determined by sensors as accurately as possible. For service providers to profit from the disparate data that will be generated, needs to be able to draw some generalizable conclusions from the interpreted sensor data.

E.Interoperability

Each type of smart objects in Internet of Things have different information, processing and communication capabilities. Different smart objects would also be subjected to different conditions such as the energy availability and the communications bandwidth requirements. To facilitate communication and cooperation of these objects, common standards are required. The interoperability means that miscellaneous devices and protocols need to be able to interwork with each other. This is challenging due to the huge number of various platforms used in IoT systems. Interoperability should manage by both the application developers and the device manufacturers.

F. Power supply

Things typically move around and are not connected to a power supply, so their smartness needs to be powered from a self-sufficient energy source. Although passive RFID transponders do not need their own energy source, their functionality and communications range are very limited. Hopes are pinned on future low power processors and communications units for embedded systems that can

function with significantly less energy. Energy saving is a factor not only in hardware and system architecture, but also in software, for example the implementation of protocol stacks, where every single transmission byte will have to justify its existence

.G. Wireless Communication

From an energy point of view, established wireless technologies such as GSM, UMTS, Wi-Fi and Bluetooth are far less suitable; more recent WPAN standards such as ZigBee and others still under development may have a narrower bandwidth, but they do use significantly less power.

H. Maneuverability

In this context, IoT devices need to move freely and transformation their IP address and networks based on their location. Thus, the routing protocol, like as RPL, has to reconstruct the DODAG each time a node goes off the network or joins the network which adds a large amount overhead . Besides, mobility might outcome in a transformation of service providers which can add another layer of complexity due to service interruption and alter gateway.

I. Trustworthiness

The system should be completely working and delivering all of its specifications properly. It is a very critical need in applications that requires emergency reaction. In IoT applications, the system should be highly trustworthy and fast in collecting data, communicating them, and making judgment and eventually the wrong judgment can lead to calamitous scenarios.

J. Handle

To handle all these devices and keeping track of the lack of success, configurations, and performance of such huge number of devices is definitely a trouble in IoT. Providers should handle imperfection, configuration, and performance of their interconnected devices.

K. Accessibility

The accessibility of IoT includes software and hardware levels being endowed at any time and anywhere for service subscribers. Software accessibility means that the service is endowing to anyone who is authorized to have it. Hardware accessibility means that the live devices are convenient to access and are favorable with IoT functionality and protocols.

VI. Conclusion

The Internet of Things (IoT) is still in its infancy as an incidence. IoT has components that range in complexity, from simple recognition tags to complex machine-to-machine communication. Internet of things is a new technology which provides many applications to connect the things to things and human to things through the internet. Each objects in the world can be identified, connected to each other through internet taking decisions independently. All networks and technologies of communication are used in building the concept of the internet of things such technologies are mobile computing, RFID, wireless sensors networks, and embedded systems, in addition to many algorithms and methodologies to get management processes, storing data, and security issues. IoT requires standardized approach for architectures, identification schemes, protocols and frequencies will happen parallels, each one targeted for a particular and specific use. by the internet of things many smart applications becomes real in our life , which enable us to reach and contact with every things in addition to facilities many important aspects for human life such as smart healthcare, smart homes, smart energy , smart cities

and smart environments. In the near future, old style factories will be disappeared and smart factories will take place of them. Smart factory has a conscious and intelligent structure so that enables information exchange. Smart products are able to connect the whole factory through intelligent actors such as sensors, robots, conveyors, actuators. Developing countries have to eliminate challenges and adopt new technologies in this new era. IoT practices are crucial to provide automation and competitive advantage. The internet of things promises future new technologies when related to cloud, fog and distributed computing, big data, and security issues. By integrating all these issues with the internet of things, smarter applications will be developed as soon. This paper surveyed some of the most important applications of IoT with particular focus on what is being actually done in addition to the challenges that facing the implementation the internet of things concept, and the other future technologies make the concept of IoT feasible.

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Review: A Study on Robotics Process and Automization (RPA)

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Abstract:

Dynamic Robotic procedure robotization (or RPA) is partner rising kind of business process computerization innovation bolstered the thought of programming framework robots or man-made reasoning (AI) labourers. In conventional work process computerization devices, a product engineer produces stock activities to automatism an undertaking and interface to the back-end framework abuse interior application programming interfaces (APIs) or devoted scripting language. In qualification, RPA frameworks build up the activity list by taking a gander at the client play out that undertaking inside the application's graphical UI (GUI), and afterward play out the mechanization by redundancy those errands straightforwardly with in the GUI. This may bring down the obstruction to utilization of computerization in items that may not in any case include arthropod family for this reason.

***Keywords*- Robots, Automation hypothesis, Robotic laws, Artificial insight, Sensors, Controllers, Programming.**

I. Presentation

When people at first hear the expression "Mechanical Process Automation" they could envision sparkly robots sailplaning around workspace structures. In all actuality, this can be just programming bundle that might be made to play out the sorts of authoritative assignments that in any case need to stop-hole human dealing with. most tasks groups embracing RPA have secure their representatives that mechanization would not bring about cutback. Rather, staff is redeployed to have a go at doing a great deal of entrancing work. One instructive investigation featured that information laborers didn't feel defenseless via computerization: they grasped it and saw the robots as partners. Among various mechanical patterns, is anticipated to drive another rush of profitability and effectiveness gains in the worldwide work.

The contrast between RPA and customary business strategy computerization might be compared to a driverless automated vehicle versus a vehicle utilizing control. control only balances vehicle speed, while the driverless vehicle is prepared to recall, learn, adjust, and answer to various driving things, as a persons would. This capacity and mindfulness are the thing that gives RPA the providing over customary business and data innovation process computerization innovation the facilitating of RPA benefits moreover lines up with the figure of speech of a product robot, with each mechanical occurrence having its own virtual workstation, fundamentally the same as someone's worker. The machine utilizes console and mouse controls to require activities also, execute mechanizations. Unremarkably those activities occur in exceedingly virtual environment and not on screen; the robot doesn't might want a physical screen to control, rather it deciphers the screen show electronically. The quantifiability of ongoing

arrangements bolstered structures like these owes a great deal of to the presence of virtualization innovation, while not unreasonably the quantifiability of tremendous organizations would be limited by reachable capacity to oversee physical equipment and by the related costs. To comprehend the possibility of Robotic procedure Automation (RPA) little Illustration like, a group of eleven bank labourers was assigned to physically survey on an everyday a couple of,500 high-hazard customer records to work out whether or not installments should be handled or came. It took as long as eight hours for these eleven specialists to end the undertaking. The work is at present performed by twenty PC code robots, though the labourers are liberated to attempt to do higher-esteem work.

II. Man-made intelligence *and* robotics

An assembling procedure is fundamentally a stochastic procedure. An administrator utilizes his arms, hands, sense, and mind to perform tasks like getting a handle on, holding situating, embeddings, adjusting, fitting, screwing and turning of work bits of different shapes and sizes. In little and medium group generation, programmable mechanization is embraced. Robots are significant guides in programmable mechanization.

For accuracy a robot needs to associate with nature around it in a way like man. Accordingly, a robot ought to be clever on the off chance that it needs to copy human abilities. A clever robot has endured arm and end-effectors, has sensors and versatile control capacities with the assistance of PC. Versatile control is important to address the blunders in position and directions of the work pieces and the end-effectors .an astute robot must decide circumstances and logical results marvels. So, it must identify the deficiencies and limit their belongings. The reasoning procedures, for example, cerebrum work is performed by a PC. Detecting and affecting are the body capacities that can be performed utilizing the essential laws and aphorisms of software engineering. So as to achieve an undertaking, both the mind and the body work are to be composed. So, a keen robot must have man-made brainpower that will separate the robot from another machine.

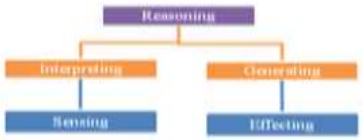

Figure 1: Simplified model of AI/Robotics

Sensing includes seeing, hearing, touching, smelling and measuring. The sensors gather and produce information. They have little ability to reason about it. Effecting can be done by actions. The action can be accomplished by manipulators using body, arm, wrist, hands, fingers, legs, wheeled vehicles (mobile robot) and with various means of communications. The components of interpreting, generating and reasoning are necessary to acquire knowledge about the environment. These components in fact, recognize, locate and assemble the objects and may direct the changes in the environments. Interpreting information is a means to understanding the environment. However, interpreting information in proper context in the proper context is necessary. Generating function is a means to influence the environment. Reasoning is cope with unforeseen, incomplete, and uncertain and perhaps, conflict ting information to act or react to the environment.

A. ROBOTIC LAWS

Sir Isaac Asimov dealing on the subject of robotics framed three basic laws which the roboticists still obey with respect. The laws are philosophical in nature, they are as follows

First Law: A robot must not harm a human begin or through inaction, allow one to come to harm.

Second Law: A robot must always obey human begins unless it is in conflict with the first law.

Third Law: A robot must protect itself from harm unless that is in conflict with the second laws.

B. TYPES OF ROBOT CONTROLS

There are different types of controller used in robotics. There are:

1. Drum controllers
2. Air rationale controller
3. Programmable controller
4. Chip based controller
5. Mini Computer – Bade Controller

Drum controllers:

In drum controllers, as the drum turns, it incites those switches which are wired to water driven or pneumatic valves. In this manner, the controller developments are constrained by the progression of the drum. It is presently out of date.

Air rationale controller:

Air logic controller employs a number of pneumatic valves which in turn control the opening and closing of the main valves of the robot manipulator in close synchronization with timers.

Programmable controllers:

In a programmable controller, the successive request in which the switches are to be worked in kept in the memory .it very well may be gone into the controller with the assistance of a console. The program can likewise be shown on the CRT screen. Programmable controllers might be wont to control and arrange various undertakings to be finished by the fringe gadgets just as robots.

Chip based controller:

The microchip-based control is the most well-known robot control framework. Microcomputer of different kinds might be utilized to program the successive errands or movements and store them in its memory. It contains extraordinary hardware to decipher the projects kept in its memory and simultaneously it can likewise tally the quantity of consecutive occasions or assignments achieved. It is adaptable, programmable and has great memory. point ceaseless way and controlled way movements can be effortlessly modified in chip – based automated framework.

Minicomputer-based controller:

Robots having higher payload are controlled through a minicomputer-based controller

C. PROGRAMMING METHODS

Programming of a robot should be possible by a few techniques

- Lead through programming
- Encourage pendant programming
- Textual programming utilizing work station

Lead through programming:

In this technique robot is changed to program mode when the operant holds the robot controller or its wrist and moves it through an ideal way. The robot controller retains all the focuses so produced. During playback, the robot manipulator depicts a similar way as instructed during learning. In addition, altering office can be given to remunerate to mistake. A portion of the robots with ceaseless way control framework use joystick. As the joystick is moves in various axes, the robot manipulator axes follow the movements precisely. speed directions are given to increments or declarations the speed of the controller.

Encourage pendant programming:

Teach pendant is the most well-known technique for programming modern robot.

Content programming:

Micro PC are utilized for programming mechanical robots and various dialects has been degenerated for both on line observing. Robot programming dialects incorporate offices,

for example, subroutines ,program stretching ,interferences and motioning to fringe gear, and so forth various dialects for robot programming framework incorporate VAL utilized in Animation robots, SIGLA utilized in sigma robots ,HELP utilized in pram get together robots , AUTOPASS in IBM robots, etc. .at present , there are a wide range of robot programming dialects with different significant highlights like adaptability in altering ,deciphering ,aggregating, reproducing and troubleshooting offices.

D. Robot sensors

In request to work successfully, a robot needs to get data from nature for vital controls, impart signs to different joints for fundamental minutes and communicate with the fringe gear. The article ought not be squeezed had or distorted or slip. Some of the time it's important to have earlier information with respect to the type of the item before it's held. In this manner, it's expected to detect and estimated all the significant geometrical parameters of the article lying in a situation. Tangible criticism is, of cause, increasingly significant for unstructured condition Usually there are two essential sorts of sensors for looking, perceiving, getting a handle on and place the items. they are material and non-material.

Tactile sensors are contact sensors that needs to carried associated with the article to get signs to quantify the important amounts,

while non-material sensors are contactless sensors that sense the signs remotely, however just inside the necessary scope of good ways from the article. At the point when the material sensors reach the item, an electrical simple or advanced sign is created and sends to the robot controller. Electrical signs might be gotten through the contacts of miniaturized scale switches. signs may likewise be acquired through mechanical weights which changes protections of electrical strain checks in piezoelectric precious stones.

Run of the mill contact type's automated sensors incorporate

- Force sensors
- Torque sensors
- Touch sensors
- Position sensors

Non material sensors distinguish and quantifies attractive fields, infrared and bright light, x-beams, electrical fields, ultrasonic sound waves or electromagnetic waves.

Ordinarily non-contact sensors incorporate

- Electro-optical imaging sensors
- Proximity sensors
- Range imaging sensors

Imaging sensors may utilize a laser scanner. PC vision client man-made reasoning (AI) to decide cause and influence marvels to identify the blame or limit their belongings. Vision – robots secure information about nature by the deciphering, creating and thinking segments.

E. Improved information Analytics

Each assignment the robot executes produces information that, when accumulated, grants for an investigation. This drives better basic leadership inside the regions of the procedures being machine-controlled. When information is speedily joined, looked at, and differentiated to information gathered in various regions, it licenses for better basic leadership on each a smaller scale and full-scale level. As each progression in a very procedure is followed, an association is prepared to spot holes any place procedures can be additionally upgraded to broaden strength.

F. EXPANDED PROFICIENCY

As programming bundle robots handle a lot of redundant, repetitive occupations during a business, workers can take an interest in further else exercises that include individual communication, issue assurance, and choosing. Mechanical procedure robotization grants representatives to complete undertakings that are a great deal of significant to the organization and its clients. when representatives feel their work is esteemed and commendable, their efficiency will expand, that will build work standards for dependability.

anyway, on the far side being able to take an interest in extra included exercises, representatives territory unit higher upheld for their additional assignments. this could encourage increment efficiency.

Once more, a comparative volume of work should be possible in less time, in this manner allowing downstream work to start sooner.

III. Points of interest

Mechanical procedure computerization programming framework and administrations are prepared to run applications the way an individual's administrator would. Bolstered rules, the work process work naturally muddled assignments. RPA brings a full type of favorable circumstances like:

1) Continuing help*:* when it includes running genuine all day, every day administration, programming bundle robots develop as clear what they are doing, no compelling reason to take breaks while doing undertakings.

2*) Scalability:* The procedures fixed for one programming robot are frequently develop to any number of different robots and on the other hand, robots are regularly decommissioned of a procedure to deal with another.

3)Truthfulness: Once dispensed undertakings, robots are intended to steadfastly finish the guidelines without fizzling.

4) Time*:* Whereas it takes a long time to actualize conventional undertakings with people, it just takes a long time with robots.

5) Improved Efficiency: The marvel of RPA is that it's intended to lighten human representatives of their monotonous every day errands. when innovation handles these undertakings and work processes, the technique runs bottomless quicker and a short time later works all the more viably.

6) Greater Productivity*:* When innovation does the hard work, just like the case with RPA, yield can be extensively increased. Moreover, information representatives will be opened up to utilize their abilities and information to advance important activities that drive development and development.

7*) Elimination of human blunder:* Even the premier cautious human labourer can commit an intermittent error. Tragically, ordinarily these mistakes can end up being unbelievably expensive. With mechanical procedure robotization innovation, this hazard is disposed of, bringing about bigger exactness.

8) Cost sparing*:* While implementing mechanical procedure computerization requires a forthright speculation, the general increment in effectiveness and profitability just as decrease in human blunders very legitimize the cost.

9) Lower turnover*:* once human representatives are never again eased back somewhere near exhausting, dull and commonplace undertakings, fulfilment levels can normally rise. Moreover, representatives can value the adaptability to take an interest in extra elevated level tasks, moreover removal to bigger labourer fulfilment and maintenance.

IV. Weaknesses

1) **Monetary Expense*:*** Budgetary limitations are among the most significant reasons why organizations are not like to execute RPA.
2) **Lack of specialized capacity*:*** Many of us accepts that so as to use mechanical procedure computerization, the end client ought to have noteworthy specialized capacity. This idea once in a while keeps them away from procuring the different points of interest that territory unit available to them.
3) **Major Change:** Doping a substitution innovation needs alteration, anyway with the best possible device, the effect of that change is considerably less perceptible and troublesome than many figures it out.
4) **Redundancy:** Another basic worry of these impervious to RPA is that the stress that robots will supplant human laborers, when its principle reason for existing is to really bolster people inside the work.

V. EXISTING RPA TASKS

a) RPA at work environment

While receiving RPA at organizations, it's really in light of the fact that they've known issues with their legacy frameworks that zone unit losing them time and cash. For instance, when a business has a wasteful manual strategy for business archive satisfaction any place human specialists must be constrained to physically scrutinize the framework for pristine requests and genuinely approve each, the technique isn't exclusively long and repetitive, anyway in danger of human mistakes. With RPA bundle, the technique may rather work simply like the accompanying:

1. The RPA framework consequently pulls information from the customer framework, checking for fresh out of the box new buy orders, diminishing satisfaction times and expanding efficiency.

2. When a buy request is downloaded it will be correct route driven into the heritage framework.

3. The operator goes about as a "human-insider savvy" and physically approves the request for precision dependent on the client contract.

4. RPA programming bundle at that point transfers the securing request into a database any place limits region unit naturally applied upheld customer understandings.

5. Specialists at that point check the fulfilled request, ensuring quality control and human piece. 6. With extra AI abilities, RPA programming bundle will start to discover and adjust to the present technique for much bigger gains in intensity that after some time, would require less human collaboration to ensure precision. By adding RPA to this heritage framework, the satisfaction procedure can be essentially improved and bottlenecks in efficiency, particularly during occupied seasons, can be dispensed with totally bringing about higher customer fulfillment.

b) RPA at banking industry

How about we look the more cautiously at the financial business. RPA frameworks will viably play out a few assignments identified with advance beginning and record the board. Be that as it may, RPA regularly can't decide whether the individual making the request is who they state they are. By examining unstructured information (for example state, auditing an examined visa picture and coordinating it against a client's record), AI is then ready to make an association among doing and thinking in a robotized domain.

c) In HR and Business Support

It's Coming The utilization of man-made consciousness and progressed investigation are obvious and full grown in modern settings, though in help capacities like unit of time, it's the possibility to be even as progressive anyway the take-up has been a piece slower yet the take up has been a little slower. For instance, in HR, on boarding the way toward producing new individuals from staff and giving them something to do chasing after enlistment for the most part takes one month, as indicated by ongoing exploration via CareerBuilder. The different procedures taking up references, checking personalities, completing wellbeing and security evaluations and guaranteeing enlists have a comprehension of organization practices, arrangements and culture requires a mind-boggling set of activities and toolsets which are difficult to mechanize. Be that as it may, there's a great deal to pick up just as driving productivity by chopping down time spent on commonplace yet fundamental procedures and consistence, robotizing assignments like this will free up gifted specialists to apply them all the more imaginatively. At long last it doesn't mean we will supplant HR divisions with robots yet that computerization will seriously expand the employments individuals will do in help capacities like HR. Portions of the remaining task at hand managing relational or disciplinary issues despite everything require a human touch.

d) Intelligent procedure automation (ISP)

The subsequent stage inside the robotization venture is IPA (Intelligent procedure Automation). RPA is proposed

basically to follow headings, though IPA that is made from RPA and AI (Artificial Intelligence) has the bent of gaining from mastery that it at that point applies to help on future errands. Nearly without individuals seeing, AI is quick turning out to be a piece of our day by day life. Models incorporate the cell phone 'individual collaborators' Sire and Cortana; Amazon's 'Alexa' voice administration, and a few sorts of extortion recognition programming utilized by banks. As of now AI remains genuinely juvenile, however proof proposes that this troublesome innovation will change numerous ventures, including protection. Various new companies are gaining by this forecast, for instance, the New York-based organization Lemonade, which sells protection utilizing a Chabot Smartphone application and endeavors computerized calculations to incredible accomplishment for accelerating its cases administration.

This is one case of AI however for back up plans, the potential outcomes appear to be huge. From spotting designs and suspicious action for misrepresentation discovery to utilizing remote helpers with the expansion of visit bots for a progressively normal collaboration experience lastly self-administration apply autonomy, which gives the abilities to sites and versatile applications to be powerfully made, and permit RPA/IPA to serve client demands legitimately. For an industry ordinarily saw as staid and antiquated, this may display an open door for some, insurance agencies to rebrand themselves as pioneers in advanced development. IPSoft, Inc., and Rage Frameworks Inc. in the US, and Blue Prism in the UK, are built up stages as of now being used – IPSoft portrays its item Amelia as follows: "[It] can process an oil-well radial siphon manual in 31 seconds – and give directions for fixes – and carry out the responsibility of a call-focus administrator, a home loan or protection specialist, even a therapeutic partner, with for all intents and purposes no human assistance. Conversant in 21 dialects, Amelia comprehends inferred, not simply expressed, implications, and improves Examples of Existing RPA and AI Products.

e) Atos SE has been utilizing RPA to computerize IT errands in client heritage framework assignments in capacities, for example, ticket the board, episode the board and server load adjusting, which were recently done by people.

f) Oracle Policy Automation Cloud Service is depicted as RPA programming that peruses business rules and strategies written in characteristic language and afterward, in light of those principles and approaches, chooses what inquiries to pose to the client, performs qualification checks and creates a choice report.

g) Ross, touted by its supplier as "the world's first misleadingly canny attorney" based on IBM's Watson. Intended to get language, hypothesize speculations when posed inquiries, research, and afterward produce reactions posed inquiries, research, and afterward create reactions (alongside references and references) to back up its decisions. Likewise, screens law nonstop to tell you of new court choices that could influence your case.

h) RPA at business cases

In many ventures, the normal worker spends up to 80% of their day on dreary errands that don't require innovativeness or profound thought. These unremarkable assignments are intended to be computerized. To represent this, coming up next are a couple of commonsense business cases:

- **Fraud recognition:** Robots can help human bank representatives performing historical verifications and time-consuming misrepresentation examinations while the worker can concentrate on consumer loyalty.

- **Form-checking:** Robots can deal with dull client request checking to set up the conveyance procedure. It diminishes the necessary time and simultaneously decreases the safety buffer.

• **Claim preparing:** Robots can survey client asserts and distinguish who will wind up with a discount without mentioning any guide from a human.

• **Fax arranging:** Robots can change over fax pictures to machine-coherent content and afterward separate information and order faxes.

Man-made consciousness enables RPA. Numerous different business cases for RPA are being acknowledged inside inventive organizations from various ventures. Use cases incorporate bookkeeping, charging the executives, and client on boarding, information approval, client care request steering, stock rundown refreshing, advance capability, chance appraisal, and authority archive approval. RPA vows to have the option to run day in and day out without any stops, no breaks, no dozing time, no excursions, and no wiped-out leave, without overlooking, excluding, misjudging, or thinking little of mistakes and without experiencing any issues.

VI. New capabilities with RPA and AI

1) **1) Increasing security:** A product robot could be utilized to execute a procedure as coordinated, without wrong information assortment, false intercession or deviation from recommended process. – E.g., could be especially helpful with the most delicate information, for example, individual annuities and regulatory issues of military faculty, or budgetary administrations where having an individual access numerous framework could expand the danger of extortion New Capabilities with RPA and AI.

2) **Promoting self-administration:** An essential boundary to the appropriation of self-administration is frequently mechanical Robotic procedure mechanization could be utilized to give a method for conveying new self-administration arrangements where robots just copy the conduct of people to perform backend translation or handling exercises.

3) **Promoting utilization of large information:** RPA programming could be utilized to gather and sort out conflicting information from among unique frameworks to make it usable by AI for enormous information examination. Helping heritage frameworks work with cloud-based frameworks. For instance, RPA programming could be utilized to empower computerized requesting and provisioning of administrations through a cloud interface that is meant work with progressively customary frameworks.
4) **Overcome Geographic Hurdles:** This could make new business open doors for customers that have political or administrative obstructions to off shoring their IT capacities or business forms. It could likewise decrease to need to migrate activities to exploit work exchange.

VII. Nutshell

Mechanical procedure mechanization (RPA) gives propelled programming framework robots having the spot people at whatever point confounded procedures or routine errands will be machine-controlled. That being stated, in what capacity will man-made brainpower and associated innovations engage it? As we tend to enter the advanced change time, our businesses are inclusion that their teams are operational in regards to eightieth of their IT forms physically, bringing down their presentation and inspiration. At a comparable time, they gauge that at least five hundredth of those errands might be automatic. PA utilizes programming bundle and strategies that are fit for exploiting the latest advancements together with computerized reasoning, AI, voice acknowledgment, and phonetic correspondence procedure to expect computerization to future level. That makes it a prerequisite for enterprises of all ventures that desire to pass on their business directly along the advanced change venture.

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A Review: Various Machine Learning Algorithms

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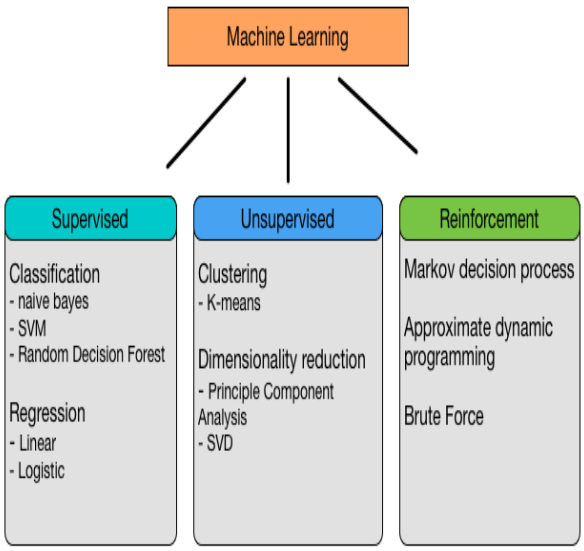
Abstract :

Nowadays, large amount of data is available everywhere. Therefore, it is very important to analyse this data in order to extract some useful information and to develop an algorithm based on this analysis. This can be achieved through machine learning. Machine learning is an integral part of artificial intelligence, which is used to design design algorithms based on the data trends and historical relationships between data. In this paper, various machine learning algorithms have been discussed. These algorithms are used for various purposes like data mining, image processing



Section 1

Machine learning is used to teach machines how to handle the data more efficiently and behave like human being. With the availability of large amount of data, the demand for machine learning is in rise. Many industries apply machine learning to extract relevant information. The purpose of machine learning is to learn from the data. Many studies have been done on how to make machines learn by themselves [2] [3]. There are various techniques available by which machine learn by itself. Supervised Learning, Unsupervised Learning and Reinforcement Learning mentioned in Fig 1..

Fig 1-Types of Learning

Section 2

TYPES OF LEARNING

A. Supervised Learning: The supervised machine learning algorithms are those algorithms which need supervision under which machine learn. [1]The input dataset is divided into train and test dataset. The train dataset has output variable which needs to be predicted or classified. All algorithms learn some kind of patterns from the training dataset and apply them to the test dataset for prediction or classification [4]. The workflow of supervised machine learning algorithms is given in Fig. 2.

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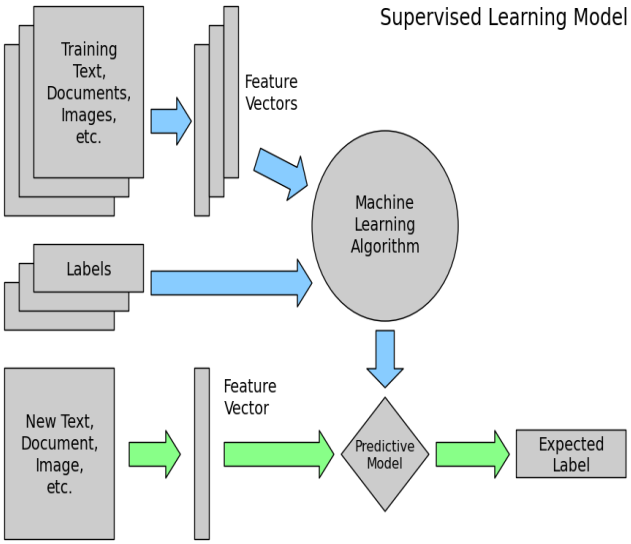


Fig 2: Supervised Learning Model

Three most popular supervised machine learning algorithms have been discussed following :

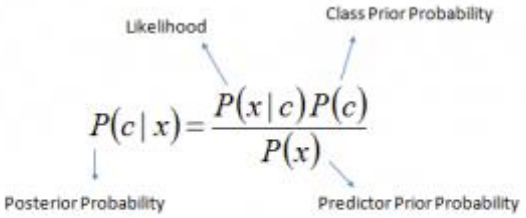
Classification includes :Naive Bayes' ,Support Vector Machine ,Random Forest

Naive Bayes:It is a classification technique based on Bayes' Theorem with an assumption of independence among predictors. In simple terms, a Naive Bayes classifier assumes that the presence of a particular feature in a class is unrelated to the presence of any other feature.

For example, a fruit may be considered to be an bannana if it is yellow, long , and about 3 inches in diameter. Even if these features depend on each other or upon the existence of the other features, all of these properties independently contribute to the probability that this fruit is an apple and that is why it is known as 'Naive'.

Naive Bayes model is easy to build and particularly useful for very large data sets. Along with simplicity, Naive Bayes is known to outperform even highly sophisticated classification methods.

Bayes theorem provides a way of calculating posterior probability P(c|x) from P(c), P(x) and P(x|c). Look at the equation below:



$$P(c \mid X) = P(x_1 \mid c) \times P(x_2 \mid c) \times \cdots \times P(x_n \mid c) \times P(c)$$

Above,

P(c|x) is the posterior probability of class (c, target)
given predictor (x, attributes).

P(c) is the prior probability of class.

P(x|c) is the likelihood which is the probability of predictor given class.

P(x) is the prior probability of predictor.

Pros and Cons of Naive Bayes:

Pros:

It is easy and fast to predict class of test data set. It also perform well in multi class prediction

When assumption of independence holds, a Naive Bayes classifier performs better compare to other models like logistic regression and you need less training data.

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It performs well in case of categorical input variables compared to numerical variable(s). For numerical variable, normal distribution is assumed (bell curve, which is a strong assumption).

Cons:

If categorical variable has a category (in test data set), which was not observed in training data set, then model will assign a 0 (zero) probability and will be unable to make a prediction. This is often known as "Zero Frequency". To solve this, we can use the smoothing technique. One of the simplest smoothing techniques is called Laplace estimation.

On the other side naive Bayes is also known as a bad estimator, so the probability outputs from predict_proba are not to be taken too seriously.

Another limitation of Naive Bayes is the assumption of independent predictors. In real life, it is almost impossible that we get a set of predictors which are completely independent.

Applications of Naive Bayes Algorithms

Real time Prediction: Naive Bayes is an eager learning classifier and it is sure fast. Thus, it could be used for making predictions in real time.

Multi class Prediction: This algorithm is also well known for multi class prediction feature. Here we can predict the probability of multiple classes of target variable.

Text classification/ Spam Filtering/ Sentiment Analysis: Naive Bayes classifiers mostly used in text classification (due to better result in multi class problems and independence rule) have higher success rate as compared to other algorithms. As a result, it is widely used in Spam filtering (identify spam e-mail) and Sentiment Analysis (in social media analysis, to identify positive and negative customer sentiments)

Support vector machines (SVMs)

Support vector machines (SVMs) are powerful yet flexible supervised machine learning algorithms which are used both for classification and regression. But generally, they are used in classification problems. In 1960s, SVMs were first introduced but later they got refined in 1990. SVMs have their unique way of implementation as compared to other machine learning algorithms. Lately, they are extremely popular because of their ability to handle multiple continuous and categorical variables.

Working of SVM

An SVM model is basically a representation of different classes in a hyperplane in multidimensional space. The hyperplane will be generated in an iterative manner by SVM so that the error can be minimized. The goal of SVM is to divide the datasets into classes to find a maximum marginal hyperplane (MMH).

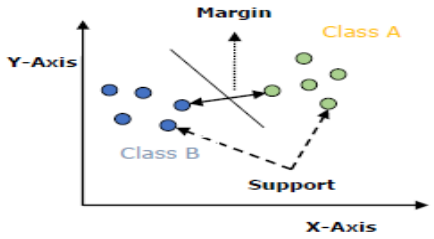

Fig:3

The followings are important concepts in SVM −

- **Support Vectors** − Datapoints that are closest to the hyperplane is called support vectors. Separating line will be defined with the help of these data points.
- **Hyperplane** − As we can see in the above diagram, it is a decision plane or space which is divided between a set of objects having different classes.
- **Margin** − It may be defined as the gap between two lines on the closet data points of different classes. It can be calculated as the perpendicular distance from the line to the support vectors. Large margin is considered as a good margin and small margin is considered as a bad margin.

The main goal of SVM is to divide the datasets into classes to find a maximum marginal hyperplane (MMH) and it can be done in the following two steps −

- First, SVM will generate hyperplanes iteratively that segregates the classes in best way.
- Then, it will choose the hyperplane that separates the classes correctly.

Implementing SVM in Python

- For implementing SVM in Python − We will start with the standard libraries import as follows −

SVM Kernels

In practice, SVM algorithm is implemented with kernel that transforms an input data space into the required form. SVM uses a technique called the kernel trick in which kernel takes a low dimensional input space and transforms it into a higher dimensional space. In simple words, kernel converts non-separable problems into separable problems by adding more dimensions to it. It makes SVM more powerful, flexible and accurate. The following are some of the types of kernels used by SVM.

Linear Kernel

It can be used as a dot product between any two observations. The formula of linear kernel is as below −

K(x,xi)=sum(x∗xi)K(x,xi)=sum(x∗xi)

From the above formula, we can see that the product between two vectors say x&xi is the sum of the multiplication of each pair of input values.

Polynomial Kernel

It is more generalized form of linear kernel and distinguish curved or nonlinear input space. Following is the formula for polynomial kernel −

k(X,Xi)=1+sum(X∗Xi)^dk(X,Xi)=1+sum(X∗Xi)^d

Here d is the degree of polynomial, which we need to specify manually in the learning algorithm.

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Radial Basis Function (RBF) Kernel

RBF kernel, mostly used in SVM classification, maps input space in indefinite dimensional space. Following formula explains it mathematically −

K(x,xi)=exp(−gamma∗sum(x−xi^2))K(x,xi)=exp(−gamma∗sum(x−xi^2))

Here, *gamma* ranges from 0 to 1. We need to manually specify it in the learning algorithm. A good default value of *gamma* is 0.1.

As we implemented SVM for linearly separable data, we can implement it in Python for the data that is not linearly separable. It can be done by using kernels.

Example

The following is an example for creating an SVM classifier by using kernels. We will be using *iris* dataset from *scikit-learn* −

We will start by importing following packages −

```
import pandas aspd
importnumpyasnp
fromsklearnimportsvm, datasets
importmatplotlib.pyplotasplt
```

Now, we need to load the input data −

```
iris = datasets.load_iris()
```

From this dataset, we are taking first two features as follows −

```
X = iris.data[:, :3]
y = iris.target
```

Next, we will plot the SVM boundaries with original data as follows −

```
x_min,x_max=X[:,0].min()-1, X[:,0].max()+1
y_min,y_max=X[:,1].min()-1, X[:,1].max()+1
h =(x_max/x_min)/100
xx,yy=np.meshgrid(np.arange(x_min,x_max,
h),np.arange(y_min,y_max, h))
X_plot=np.c_[xx.ravel(),yy.ravel()]
```

Now, we need to provide the value of regularization parameter as follows −

```
C = 1.0
```

Next, SVM classifier object can be created as follows −

```
Svc_classifier = svm.SVC(kernel='linear',
C=C).fit(X, y)
```

```
Z =svc_classifier.predict(X_plot)
Z =Z.reshape(xx.shape)
plt.figure(figsize=(15,5))
plt.subplot(121)
plt.contourf(xx,yy, Z,cmap=plt.cm.tab10,
alpha=0.3)
plt.scatter(X[:,0], X[:,1], c=y,cmap=plt.cm.Set1)
plt.xlabel('Sepal length')
plt.ylabel('Sepal width')
plt.xlim(xx.min(),xx.max())
plt.title('Support Vector Classifier with linear
kernel')
```

Output

```
Text(0.5, 1.0, 'Support Vector Classifier with linear
kernel')
```

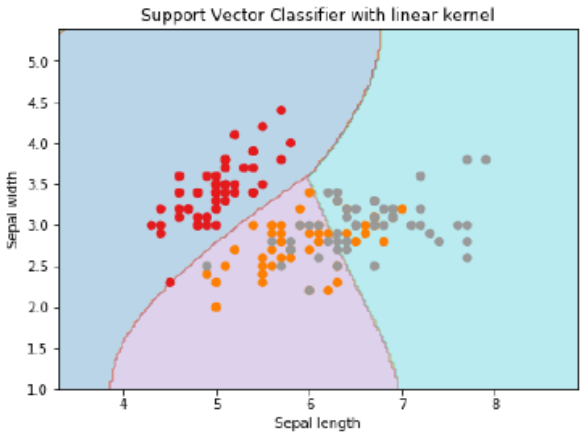

Fig: 4

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For creating SVM classifier with **rbf** kernel, we can change the kernel to **rbf** as follows −

```
Svc_classifier=svm.SVC(kernel ='rbf', gamma ='auto',C= C).fit(X, y)
Z =svc_classifier.predict(X_plot)
Z =Z.reshape(xx.shape)
plt.figure(figsize=(15,5))
plt.subplot(121)
plt.contourf(xx,yy, Z,cmap= plt.cm.tab10, alpha =0.3)
plt.scatter(X[:,0], X[:,1], c = y,cmap= plt.cm.Set1)
plt.xlabel('Sepal length')
plt.ylabel('Sepal width')
plt.xlim(xx.min(),xx.max())
plt.title('Support Vector Classifier with rbf kernel')
```

Output

Text(0.5, 1.0, 'Support Vector Classifier with rbf kernel')

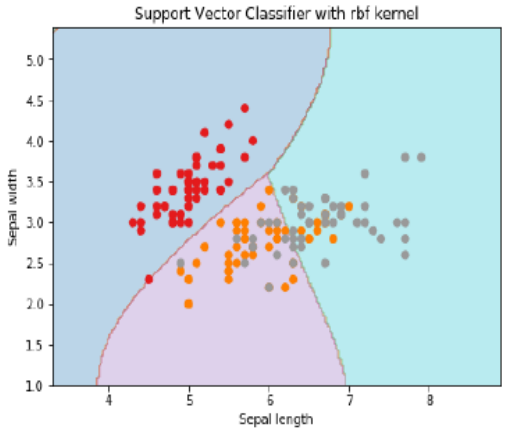

Fig: 5

We put the value of gamma to 'auto' but you can provide its value between 0 to 1 also.

Pros and Cons of SVM Classifiers

Pros of SVM classifiers

SVM classifiers offer great accuracy and work well with high dimensional space. SVM classifiers basically use a subset of training points hence in result uses very less memory.

Cons of SVM classifiers

They have high training time hence in practice not suitable for large datasets. Another disadvantage is that SVM classifiers do not work well with overlapping classes.

Random Forest Algorithm:

Random forest algorithm is a supervised classification and regression algorithm. As the name suggests, this algorithm randomly creates a forest with several trees.

Generally, the more trees in the forest the more robust the forest looks like. Similarly, in the random forest classifier, the higher the number of trees in the forest, greater is the accuracy of the results.

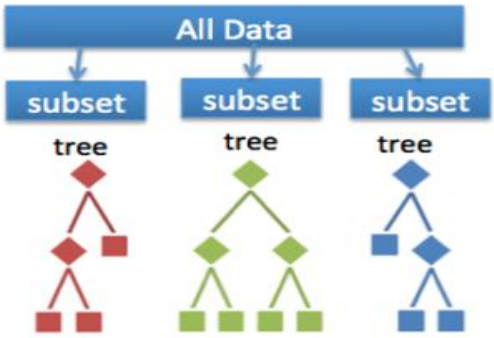

Fig 6

In simple words, Random forest builds multiple decision trees (called the forest) and glues them together to get a more accurate and stable prediction. The forest it builds is a collection of Decision Trees, trained with the bagging method.

Creating a Random Forest

Step 1: Create a Bootstrapped Data Set

Step 2: Creating Decision Trees

Step 3: Go back to Step 1 and Repeat

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Step 4: Predicting the outcome of a new data point

Step 5: Evaluate the Model

Unsupervised Learning: Unsupervised learning is a machine learning technique, where you do not need to supervise the model. Instead, you need to allow the model to work on its own to discover information. It mainly deals with the unlabelled data.

Unsupervised learning algorithms allow you to perform more complex processing tasks compared to supervised learning.

An example of workflow of unsupervised learning is given in Fig.

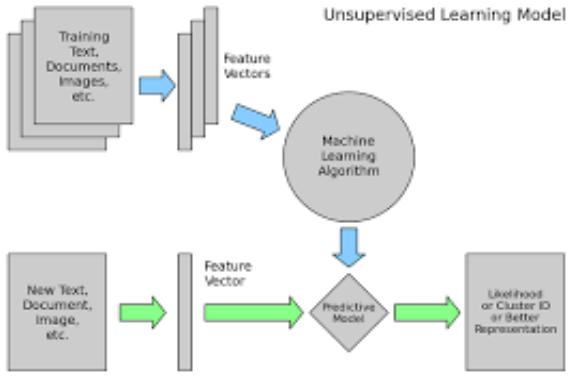

Fig. 7. Example of Unsupervised Learning [10]

The two main algorithms for clustering and dimensionality reduction techniques are discussed below.

Clustering is the task of dividing the population or data points into a number of groups such that data points in the same groups are more similar to other data points in the same group and dissimilar to the data points in other groups. It is basically a collection of objects on the basis of similarity and dissimilarity between them.

For ex– The data points in the graph below clustered together can be classified into one single group. We can distinguish the clusters, and we can identify that there are 3 clusters in the below picture.

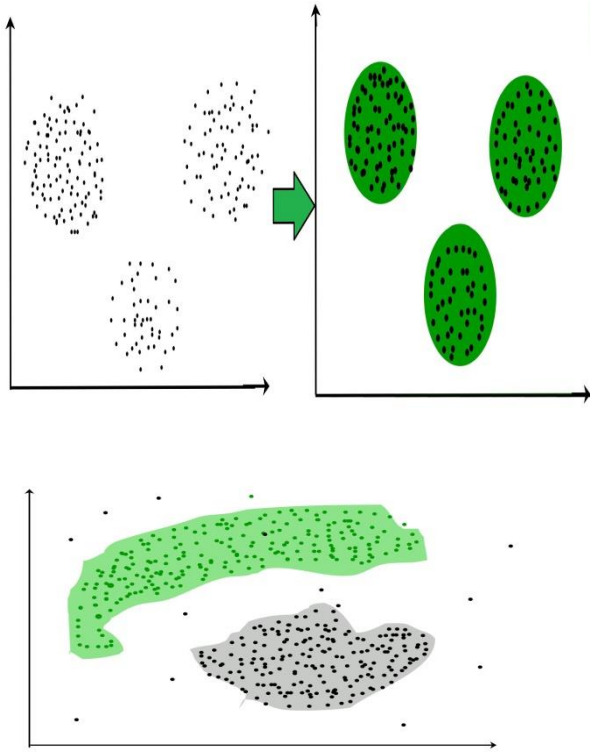

Fig 8

DBSCAN Density data

These data points are clustered by using the basic concept that the data point lies within the given constraint from the cluster center. Various distance methods and techniques are used for calculation of the outliers.

Why Clustering ?

Clustering is very much important as it determines the intrinsic grouping among the unlabeled data present. There are no criteria for a good clustering. It depends on the user, what is the criteria they may use which satisfy their need. For instance, we could be interested in finding representatives for homogeneous groups (data reduction), in finding "natural clusters" and describe their unknown properties ("natural" data types), in finding useful

and suitable groupings ("useful" data classes) or in finding unusual data objects (outlier detection). This algorithm must make some assumptions which constitute the similarity of points and each assumption make different and equally valid clusters.

Clustering Methods:

1. Density-Based Methods: These methods consider the clusters as the dense region having some similarity and different from the lower dense region of the space. These methods have good accuracy and ability to merge two clusters. Example *DBSCAN (Density-Based Spatial Clustering of Applications with Noise)* , *OPTICS (Ordering Points to Identify Clustering Structure)* etc.

2. Hierarchical Based Methods: The clusters formed in this method forms a tree type structure based on the hierarchy. New clusters are formed using the previously formed one. It is divided into two category

-> Agglomerative (*bottom up approach*)

-> Divisive (*top down approach*) .

examples *CURE (Clustering Using Representatives), BIRCH (Balanced Iterative Reducing Clustering and using Hierarchies)* etc.

3. Partitioning Methods: These methods partition the objects into k clusters and each partition forms one cluster. This method is used to optimize an objective criterion similarity function such as when the distance is a major parameter example *K-means, CLARANS (Clustering Large Applications based upon randomized Search)* etc.

4. Grid-based Methods : In this method the data space are formulated into a finite number of cells that form a grid-like structure. All the clustering operation done on these grids are fast and independent of the number of data objects example *STING (Statistical Information Grid), wave cluster, CLIQUE (CLustering In Quest)* etc.

Clustering Algorithms :

K-means clustering algorithm – It is the simplest unsupervised learning algorithm that solves

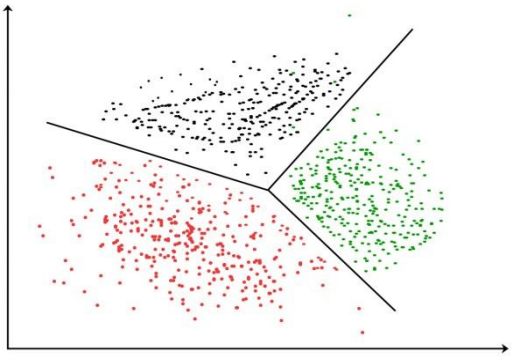

Fig 9

clustering problem.

Applications of Clustering in different fields

1. **Marketing:** It can be used to characterize & discover customer segments for marketing purposes.
2. **Biology:** It can be used for classification among different species of plants and animals.
3. **Libraries:** It is used in clustering different books on the basis of topics and information.
4. **Insurance:** It is used to acknowledge the customers, their policies and identifying the frauds.
5. **City Planning:** It is used to make groups of houses and to study their values based on their geographical locations and other factors present.
6. **Earthquake studies:** By learning the earthquake affected areas we can determine the dangerous zones.

Principal Component Analysis

The main idea of principal component analysis (PCA) is to reduce the dimensionality of a data set consisting of many variables correlated with each

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other, either heavily or lightly, while retaining the variation present in the dataset, up to the maximum extent. The same is done by transforming the variables to a new set of variables, which are known as the principal components (or simply, the PCs) and are orthogonal, ordered such that the retention of variation present in the original variables decreases as we move down in the order. So, in this way, the 1st principal component retains maximum variation that was present in the original components. The principal components are the eigenvectors of a covariance matrix, and hence they are orthogonal.

Importantly, the dataset on which PCA technique is to be used must be scaled. The results are also sensitive to the relative scaling. As a layman, it is a method of summarizing data. Imagine some wine bottles on a dining table. Each wine is described by its attributes like colour, strength, age, etc. But redundancy will arise because many of them will measure related properties. So what PCA will do in this case is summarize each wine in the stock with less characteristics.

Intuitively, Principal Component Analysis can supply the user with a lower-dimensional picture, a projection or "shadow" of this object when viewed from its most informative viewpoint.

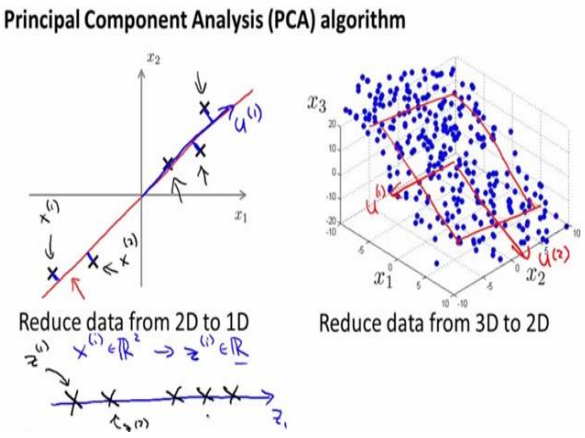

Image Source: Machine Learning Lectures by Prof. Andrew NG at Stanford University

- Dimensional:It is the number of random variables in a dataset or simply the number of features, or rather more simply, the number of columns present in your dataset.
- Correlation: It shows how strongly two variable are related to each other. The value of the same ranges for -1 to +1. Positive indicates that when one variable increases, the other increases as well, while negative indicates the other decreases on increasing the former. And the modulus value of indicates the strength of relation.
- Orthogonal: Uncorrelated to each other, i.e., correlation between any pair of variables is 0.
- Eigenvectors: Eigenvectors and Eigenvalues are in itself a big domain, let's restrict ourselves to the knowledge of the same which we would require here. So, consider a non-zero vector ***v***. It is an eigenvector of a square matrix ***A***, if ***Av*** is a scalar multiple of **v**. Or simply:

  $Av = \lambda v$

  Here, ***v*** is the eigenvector and λ is the eigenvalue associated with it.
- Covariance Matrix: This matrix consists of the covariances between the pairs of variables. The *(i,j)*th element is the covariance between *i*-th and *j*-th variable.

Properties of Principal Component

Technically, a principal component can be defined as a linear combination of optimally-weighted observed variables. The output of PCA are these principal components, the number of which is less than or equal to the number of original variables. Less, in case when we wish to discard or reduce the dimensions in our dataset. The PCs possess some useful properties which are listed below:

The PCs are essentially the linear combinations of the original variables, the weights vector in this combination is actually the eigenvector found which in turn satisfies the principle of least squares.

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The PCs are orthogonal, as already discussed.
The variation present in the PCs decrease as we move from the 1st PC to the last one, hence the importance.

The least important PCs are also sometimes useful in regression, outlier detection, etc.

Applications of Principal Component Analysis

PCA is predominantly used as a dimensionality reduction technique in domains like facial recognition, computer vision and image compression. It is also used for finding patterns in data of high dimension in the field of finance, data mining, bioinformatics, psychology, etc.

Singular-Value Decomposition (SVD)

The Singular-Value Decomposition, or SVD for short, is a matrix decomposition method for reducing a matrix to its constituent parts in order to make certain subsequent matrix calculations simpler.

For the case of simplicity we will focus on the SVD for real-valued matrices and ignore the case for complex numbers.

1 A = U .Sigma . V^T

Where A is the real m x n matrix that we wish to decompose, U is an m x m matrix, Sigma (often represented by the uppercase Greek letter Sigma) is an m x n diagonal matrix, and V^T is the transpose of an n x n matrix where T is a superscript.

The Singular Value Decomposition is a highlight of linear algebra.

Applications of unsupervised machine learning

Some applications of unsupervised machine learning techniques are:

Clustering automatically split the dataset into groups base on their similarities

Anomaly detection can discover unusual data points in your dataset. It is useful for finding fraudulent transactions

Association mining identifies sets of items which often occur together in your dataset

Latent variable models are widely used for data preprocessing. Like reducing the number of features in a dataset or decomposing the dataset into multiple components

Disadvantages of Unsupervised Learning

- You cannot get precise information regarding data sorting, and the output as data used in unsupervised learning is labeled and not known
- Less accuracy of the results is because the input data is not known and not labeled by people in advance. This means that the machine requires to do this itself.
- The spectral classes do not always correspond to informational classes.
- The user needs to spend time interpreting and label the classes which follow that classification.
- Spectral properties of classes can also change over time so you can't have the

same class information while moving from one image to another.

Reinforcement learning

Reinforcement learning is an area of Machine Learning. It is about taking suitable action to maximize reward in a particular situation. It is employed by various software and machines to find the best possible behavior or path it should take in a specific situation. Reinforcement learning differs from the supervised learning in a way that in supervised learning the training data has the answer key with it so the model is trained with the correct answer itself whereas in reinforcement learning, there is no answer but the reinforcement agent decides what to do to perform the given task. In the absence of training dataset, it is bound to learn from its experience.

Example : The problem is as follows: We have an agent and a reward, with many hurdles in between. The agent is supposed to find the best possible path to reach the reward. The following problem explains the problem more easily.

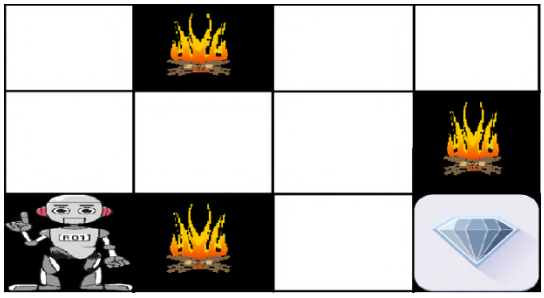

Fig 10

The above image shows robot, diamond and fire. The goal of the robot is to get the reward that is the diamond and avoid the hurdles that is fire. The robot learns by trying all the possible paths and then choosing the path which gives him the reward with the least hurdles. Each right step will give the robot a reward and each wrong step will subtract the reward of the robot. The total reward will be calculated when it reaches the final reward that is the diamond.

Main points in Reinforcement learning –

- Input: The input should be an initial state from which the model will start
- Output: There are many possible output as there are variety of solution to a particular problem
- Training: The training is based upon the input, The model will return a state and the user will decide to reward or punish the model based on its output.
- The model keeps continues to learn.
- The best solution is decided based on the maximum reward.

There are many different algorithms that tackle this issue. As a matter of fact, Reinforcement Learning is defined by a specific type of problem, and all its solutions are classed as Reinforcement Learning algorithms. In the problem, an agent is supposed to decide the best action to select based on his current state. When this step is repeated, the problem is known as a **Markov Decision Process**.

A **Markov Decision Process (MDP)** model contains:

- A set of possible world states S.
- A set of Models.
- A set of possible actions A.
- A real valued reward function R(s,a).
- A policy the solution of **Markov Decision Process**.

A **State** is a set of tokens that represent every state that the agent can be in.

A **Model** (sometimes called Transition Model) gives an action's effect in a state. In particular, T(S, a, S') defines a transition T where being in state S and taking an action 'a' takes us to state S' (S and S' may be same). For stochastic actions (noisy, non-deterministic) we also define a probability P(S'|S,a) which represents the probability of reaching a state S' if action 'a' is taken in state S. Note Markov property states that the effects of an action taken in a state depend only on that state and not on the prior history.

An **Action** A is set of all possible actions. A(s) defines the set of actions that can be taken being in state S.

A **Reward** is a real-valued reward function. R(s) indicates the reward for simply being in the state S. R(S,a) indicates the reward for being in a state S and taking an action 'a'. R(S,a,S') indicates the reward for being in a state S, taking an action 'a' and ending up in a state S'.

A **Policy** is a solution to the Markov Decision Process. A policy is a mapping from S to a. It indicates the action 'a' to be taken while in state S.

Types of Reinforcement: There are two types of Reinforcement:

1. **Positive** – Positive Reinforcement is defined as when an event, occurs due to a particular behavior, increases the strength and the frequency of the behavior. In other words it has a positive effect on the behavior.

   Advantages of reinforcement learning are:

   - Maximizes Performance
   - Sustain Change for a long period of time

   Disadvantages of reinforcement learning:

   - Too much Reinforcement can lead to overload of states which can diminish the results

2. **Negative** – Negative Reinforcement is defined as strengthening of a behavior because a negative condition is stopped or avoided.

   Advantages of reinforcement learning:

   - Increases Behavior
   - Provide defiance to minimum standard of performance

   Disadvantages of reinforcement learning:

   - It Only provides enough to meet up the minimum behavior

Various Practical applications of Reinforcement Learning –

- RL can be used in robotics for industrial automation.
- RL can be used in machine learning and data processing
- RL can be used to create training systems that provide custom instruction and materials according to the requirement of students.

RL can be used in large environments in the following situations:

1. A model of the environment is known, but an analytic solution is not available;
2. Only a simulation model of the environment is given (the subject of simulation-based optimization);[6]
3. The only way to collect information about the environment is to interact with it.

Brute Force Algorithms refers to a programming style that does not include any shortcuts to improve performance, but instead relies on sheer computing

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power to try all possibilities until the solution to a problem is found.

A classic example is the traveling salesman problem (TSP). Suppose a salesman needs to visit 10 cities across the country. How does one determine the order in which cities should be visited such that the total distance traveled is minimized? The brute force solution is simply to calculate the total distance for every possible route and then select the shortest one. This is not particularly efficient because it is possible to eliminate many possible routes through clever algorithms.

Another example: 5 digit password, in the worst case scenario would take 10^5 tries to crack.

The time complexity of brute force is **O(n*m)** . So, if we were to search for a string of 'n' characters in a string of 'm' characters using brute force, it would take us n * m tries.

Dynamic Programming (DP) is one of the techniques available to solve self-learning problems. It is widely used in areas such as operations research, economics and automatic control systems, among others. Artificial intelligence is the core application of DP since it mostly deals with learning information from a highly uncertain environment.

dynamic programming refers to a collection of algorithms which can be used to compute optimal policies given a perfect model of the environment as a Markov decision process."

III. CONCLUSION

This paper surveys various machine learning algorithms. Today each and every person is using machine learning algorithm knowingly or unknowingly. From getting a recommended product in online shopping to updating photos in social networking sites. This paper gives an introduction to most of the popular machine learning algorithms.

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A Review: How to Embark on Machine Learning Using Various Tools

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ABSTRACT

Learning, like intelligence, covers such a broad range of processes that it is difficult to define precisely. A dictionary definition includes phrases such as "to gain knowledge, or understanding of, or skill in, by study, instruction, or experience," and "modification of a behavioural tendency by experience." As regards machines, we might say, very broadly, that a machine learns whenever it changes its structure, program, or data (based on its inputs or in response to external information) in such a manner that it's expected future performance improves.

I.APPLICATIONS OF MACHINELEARNING

- **Online Fraud Detection**
  Machine learning is proving its potential to make cyberspace a secure place and tracking monetary frauds online is one of its examples. For example: Paypal is using ML for protection against money laundering. The company uses a set of tools that helps them to compare millions of transactions taking place and distinguish between legitimate or illegitimate transactions taking place between the buyers and sellers.
- **Search Engine Result Refining**
  Google and other search engines use machine learning to improve the search results for you. Every time you execute a search, the algorithms at the backend keep a watch at how you respond to the results. If you open the top results and stay on the web page for long, the search engine assumes that the results it displayed were in accordance to the query[1].
- **Online Customer Support**
  A number of websites nowadays offer an option to chat with customer support representative while they are navigating within the site. However, not every website has a live executive to answer your queries. In most of the cases, you talk to a chatbot. These bots tend to extract information from the website and present it to the customers.
- **Videos Surveillance**
  The video surveillance system nowadays is powered by AI that makes it possible to detect crime before they happen. They track unusual behaviour of people like standing motionless for a long time, stumbling, or napping on benches etc. The system can thus give an alert to human attendants, which can ultimately help to avoid mishaps.

There are a number of ways where machine learning has been proving its potential and how machine learning is changing your day-to-day life

II. TYPES OF MACHINE LEARNING

❖ Supervised learning

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The majority of practical machine learning uses supervised learning. Supervised learning is where you have input variables (X) and an output variable (Y) and use an algorithm to learn the mapping function from the input to the output[10].

- Regression
- Classification

❖ Unsupervised learning

Unsupervised learning is where you only have input data (X) and no corresponding output variables. The goal for unsupervised learning is to model the underlying structure or distribution in the data in order to learn more about the data. These are called unsupervised learning because unlike supervised learning above there is no correct answer and there is no teacher. Algorithms are left to their own devises to discover and present the interesting structure in the data.

Unsupervised learning problems can be further grouped into clustering and association problems.

- **Clustering**: A clustering problem is where you want to discover the inherent groupings in the data, such as grouping customers by purchasing behaviour.
- **Association**: An association rule learning problem is where you want to discover rules that describe large portions of your data, such as people that buy X also tend to buy Y.

❖ Reinforcement learning

Reinforcement learning is an area of Machine Learning. It is about taking suitable action to maximize reward in a particular situation. It is employed by various software and machines to find the best possible behavior or path it should take in a specific situation. Reinforcement learning differs from the supervised learning in a way that in supervised learning the training data has the answer key with it so the model is trained with the correct answer itself whereas in reinforcement learning, there is no answer but the reinforcement agent decides what to do to perform the given task. In the absence of training dataset, it is bound to learn from its experience.

There are two types of Reinforcement[2]:

- **Positive**–Positive Reinforcement is defined as when an event, occurs due to a particular behavior, increases the strength and the frequency of the behavior. In other words, it has a positive effect on the behavior.
- **Negative**–Negative Reinforcement is defined as strengthening of a behavior because a negative condition is stopped or avoided.

III. TOOLS USED IN MACHINE LEARNING

Tools are a big part of machine learning and choosing the right tool can be as important as working with the best algorithms. Machine learning tools make applied machine learning faster, easier and more fun.

A remote tool is hosted on a server and called from your local environment. These tools are often referred to as Machine Learning as a Service (MLaaS).

Example of remote tools:

- AWS Machine Learning
- Microsoft Azure Machine Learning

ELEMENTS OF MACHINE LEARNING

- Generalization: How well a model performs on new data.
- Data:
  - Training data: specific examples to learn form.
  - Test data: new specific examples to assess performance.
- Models (theoretical assumptions)
  - decision trees, naive bayes, perceptron, etc.
- Algorithms:
  - Learning algorithms that infer the model parameters from the data.
  - Inference algorithms that infer prediction from a model.

NUMPY

Installation or Setup

Installing numpy with Anaconda a cross-platform (Linux, Mac OS X, Windows) Python distribution for data analytics and scientific computing.

Command for installing numpy:

conda install numpy

To update numpy to the latest version in anaconda or miniconda use:

conda update numpy

Installing numpy with pip:

pip install numpy

Import numpy library:

```
import numpy as np
```

Creating 1D Array from List

```
My_list=[1,2,3,4,5]
```

```
np.array(My_list)
```

```
array([1, 2, 3, 4, 5])
```

Creating 2D Array from List

```
np.array([[1,2,3],[4,5,6],[7,8,9]])
```

```
array([[1, 2, 3],
       [4, 5, 6],
       [7, 8, 9]])
```

Creating Array with help of arange method.

```
np.arange(2,12)
```

```
array([ 2,  3,  4,  5,  6,  7,  8,  9, 10, 11])
```

Fig1: Creating Array with help of arrange method

Create Zero's matrics

```
np.zeros((3,2))
```

```
array([[0., 0.],
       [0., 0.],
       [0., 0.]])
```

Creating unit matrics

```
np.ones((3,2))
```

```
array([[1., 1.],
       [1., 1.],
       [1., 1.]])
```

```
np.eye(4)
```

```
array([[1., 0., 0., 0.],
       [0., 1., 0., 0.],
       [0., 0., 1., 0.],
       [0., 0., 0., 1.]])
```

Fig 2: Creating unit matrices

```
np.random.rand(4)
```

```
array([0.81626231, 0.62089421, 0.36626622, 0.77068519])
```

```
np.random.rand(4,4)
```

```
array([[0.18937155, 0.96255073, 0.55675231, 0.357459  ],
       [0.95720688, 0.95950808, 0.34119861, 0.31332149],
       [0.53726093, 0.44567789, 0.73056941, 0.16141922],
       [0.15594651, 0.23578237, 0.50308904, 0.89750985]])
```

Fig 3: Using random.rand with numpy

```
mat=np.random.rand(20).reshape(5,4)
mat
```

```
array([[0.15299962, 0.64669223, 0.95109931, 0.53775958],
       [0.12832676, 0.71483939, 0.86208107, 0.4120665 ],
       [0.86606395, 0.96338422, 0.55607608, 0.74895943],
       [0.19223799, 0.92543899, 0.58361302, 0.51467429],
       [0.67558236, 0.74893868, 0.07982758, 0.42191947]])
```

```
type(mat)
```

```
numpy.ndarray
```

```
mat.max() # Maximum value in the mat
```

```
0.963384219038888
```

```
mat.min() # Minimum value in the mat
```

```
0.07982757992763256
```

Fig 4: Finding min () and max () in an array

IV .PANDAS

Pandas is Python package providing fast, flexible, and expressive data structures designed to make working with "relational" or "labelled" data both easy and intuitive. It aims to be the fundamental high-level building block for doing practical, real world data analysis in python. It is open source library built on top numpy. It also built- in visualization features. It can work with data from wide variety of sources.

Installation or Setup

Installing pandas with Anacondaa cross-platform (Linux, Mac OS X, Windows) Python distribution for data analytics and scientific computing.

Command for installing pandas:

conda install pandas

To update pandas to the latest version in anaconda or miniconda use:

conda update pandas

Installing pandas with pip:

pip install pandas

Import pandas library:

```
In [5]: import pandas as pd
```

Data Structure in pandas:

- Series
- DataFrame

Series

Series is a one-dimensional labelled array capable of holding data of any type (integer, string, float, python objects, etc.). The axis labels are collectively called index.

```
import pandas as pd
```

```
import numpy as np
```

Initialise Series

```
labels=['a','b','c']
my_data=[10,20,30]
arr=np.array(my_data)
d={'a':10,'b':20,'c':30}
```

Passing Array as parameter

```
pd.Series(data=arr)
```

```
0    10
1    20
2    30
dtype: int64
```

Passing List as parameter

```
pd.Series(my_data,labels)
```

```
a    10
b    20
c    30
dtype: int64
```

Fig 5: Initialize Series Using Pandas

Passing dictionary as parameter

```
pd.Series(d)
```

```
a    10
b    20
c    30
dtype: int64
```

Fig 6: Passing dictionary as parameter

Data frame

A Data frame is a two-dimensional data structure, i.e., data is aligned in a tabular fashion in rows and columns.

Features of Data Frame

- Potentially columns are of different types
- Size – Mutable
- Labelled axes (rows and columns)
- Can Perform Arithmetic operations on rows and columns

Initialise DataFrame

Arange return 20 number and reshape form a matrix of 5 x 4

```
import numpy as np
import pandas as pd
```

```
mat=np.arange(20).reshape(5,4)
```

```
mat
```

```
array([[ 0,  1,  2,  3],
       [ 4,  5,  6,  7],
       [ 8,  9, 10, 11],
       [12, 13, 14, 15],
       [16, 17, 18, 19]])
```

```
df=pd.DataFrame(mat,['A','B','C','D','E'],['W','X','Y','Z'],)
```

```
df
```

	W	X	Y	Z
A	0	1	2	3
B	4	5	6	7
C	8	9	10	11
D	12	13	14	15
E	16	17	18	19

Fig 7: Initialize Data Frame

V. MATPLOTLIB

It is an excellent 2D and 3D graphics library for generating scientific figures.

Some of the major Pros of Matplotlib are:

- Generally easy to get started for simple plots
- Support for custom labels and texts
- Great control of every element in a figure
- High-quality output in many formats
- Very customizable in general

Installation or Setup

Install it with pip or conda at command line or terminal

- conda install matplotlib
- pip install matplotlib

Importing

Import the matplotlib.pyplot module under the name plt:

```
import matplotlib.pyplot as plt
```

Fig 8: Importing Matlplotlib

Matplotlib can generate high-quality output in a number formats, including PNG, JPG, EPS, SVG, PGF and PDF.

```
fig.savefig("filename.png")
```

Here we can also optionally specify the DPI and choose between different output f

```
fig.savefig("filename.png", dpi=200)
```

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A Detailed Review of various Wheat Quality Assessment Techniques

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ABSTRACT

The image processing is the approach which can process data stored in the form of pixels. The plant disease detection and quality assessment is the major issue of image processing. The quality assessment methods have various steps which are pre-processing which is used to converts image, segmentation which is based on threshold and region based segmentation and feature extraction consists color and texture features. Classification, decision tree will be applied which can analyze the quality of wheat plant. The various quality assessment techniques with their steps are reviewed and analyzed in this paper.

Keywords

Feature Extraction, Segmentation ,Classification Quality Assessment

1.INTRODUCTION

Quality has been the subject of a large number of studies. The basis of quality assessment is often subjective with attributes such as appearance, smell, texture, and flavor, frequently examined by human inspectors. Quality can be further divided into external and internal quality. External quality includes attributes concerning appearance (e.g. color, size and shape). Internal quality includes attributes concerning flavor and texture. The most important culture being followed in India since ancient times is agriculture. In agriculture domain, the economic growth can be attained using different means. The production and quality of crops can be improved and increased by different ways. The production of crop can be predicted using data mining approach. In general, data mining approach analyzes data from different viewpoints and summarizes this data into valuable information. Data mining software is a methodical tool. This tool permits the scrutinizing of data from many different perspectives. This tool classifies and summarizes the discovered associations. quality of a wheat crop is determined by the complex interaction of water availability, nutrition, environment, pest and disease and genetic make-up. Statistical models lack the capacity to predict grain quality attributes due to the interaction and feedback processes that occur across the multiple variables describing crop growth.

2. Proposed Techniques

The quality assessment is the major challenge of image processing due to dynamic nature of the input images. The quality assessment model can be designed on the basis of feature extraction and segmentation. Following are the various phases of quality assessment model:

2.1 Pre-Processing: Pre-processing is an improvement of the image data that suppresses unwanted distortions or enhances some image

features important for further processing. In the phase of pre-processing, the plant image is taken as input for quality assessment .The input image can be converted to the gray scale for the quality assessment.

2.2 Segmentation: In Segmentation process ,the threshold based segmentation and region based segmentation are used in this phase.thresold approach will segment whole into two parts which are above and below threshold value .The region based segmentation is applied after the threshold based segmentation .The K-mean algorithm is applied for region based segmentation.

2.3 Feature Extraction: In this phase, the texture feature and color feature of the input image will be extracted for quality assessment .The technique of histogram equalizer is used for color feature extraction and GLCM is used for texture feature analysis. Histogram equalization is a computer image processing technique used to improve contrast in image.

2.4 Classification: The classification technique is a systematic approach to build classification models from an input data set. For example, neural networks, decision tree classifiers, rule-based classifiers, support vector machines, and naive Bayes classifiers are different technique to solve a classification problem. Each technique adopts a learning algorithm to identify a model that best fits the relationship between the attribute set and class label of the input data. Therefore, a key objective of the learning algorithm is to build predictive model that accurately predict the class labels of previously unknown records.

LITERATURE SURVEY

Adnan Zahid, et.al (2018) presented preliminary results on employing Terahertz (THz) technology for measuring the water contents of leaves. The main purpose of this work is to highlight transmission constraints of terahertz radiation through the plants in the THz frequency region [7]. Multiple leaves of plants are examined using the THz Swissto12 system and the effect of thickness and water contents on transmission loss and attenuation are observed at different frequency regions, which can lead to meaningful information to study and analyze the existence of any pesticides in leaves with terahertz frequencies. The results of this paper pave the way for applicability of terahertz frequencies for sensing the quality of life in plants.

GuanjunGuo, et.al (2018) proposed a novel cascaded cropping regression (CCR) method to perform image cropping by learning the knowledge from professional photographers [8]. The proposed CCR method improves the convergence speed of the cascaded method, which directly uses random-ferns regressors. In addition, a two-step learning strategy is proposed and used in the CCR method to address the problem of lacking labeled cropping data. Specifically, a deep convolutional neural network (CNN) classifier is first trained on large-scale visual aesthetic datasets. The deep CNN model is then designed to extract features from several images cropping datasets, upon which the cropping bounding boxes are predicted by the proposed CCR method. Experimental results on public image cropping datasets demonstrate that the proposed method significantly outperforms several state-of-the-art image cropping methods.

Wenguan Wang, et.al (2018) studied the problem of photo cropping, which aims to find a cropping window of an input image to preserve as much as possible its important parts while being aesthetically pleasant [9]. Seeking a deep learning-based solution, a neural network is designed that has two branches for attention box prediction (ABP) and aesthetics assessment (AA), respectively. Given the input image, the ABP network predicts an attention bounding box as an initial minimum cropping window, around which a set of cropping candidates are generated with little loss of important information. Then, the AA network is employed to select the final cropping window with the best aesthetic quality among the candidates. The two sub-networks are designed to share the same full-image convolutional feature map, and thus are computationally efficient. By leveraging attention prediction and aesthetics assessment, the cropping model produces high-quality cropping results, even with the limited availability of training data for photo cropping. The experimental results on benchmark datasets clearly validate the effectiveness of the

proposed approach. In addition, our approach runs at 5 fps, outperforming most previous solutions.

Engr. ZahidaParveen, et.al (2017) developed an image processing algorithm to grade the rice on the basis of length, width, area and area of chalky and also worked on the color detection on the rice grain [10]. From the results obtained, it is concluded that some rice are better on the basis of their length, some are better on the basis of their width while some can be termed good in quality on the basis of their area and area of the chalky. However it is not essential that all features can be present in the rice grain. More data can be acquired for further validation of our techniques .For further research, the moisture content in the rice grain can also be added to grade the overall quality of the rice grain.

Deepika Sharma, et.al (2017) proposed a system that determines the quality of food. Initially, the grain samples run on the conveyor belt and then random images of grains are captured by the camera [11]. The image processing algorithm is applied on the grain samples through MATLAB. The classification has been done according to color, shape and size. It results good, bad and medium quality by using Neural Network (NN) classifier. The final output is displayed on the LCD also the message will be sent to higher authority through GSM module. This system can be implemented in food industries at later stage for grading purpose which will ma the task of classification of grains simpler for the public.

Table 1: Comparison Analysis

Technique Used	**Description**	**Results**
Terahertz technology	The main purpose of this work is to highlight transmission constraints of terahertz radiation through the plants in the THz frequency region. Multiple leaves of plants are examined using the THz Swissto12 system and the effect of thickness and water contents on transmission loss	The results of this paper pave the way for applicability of terahertz frequencies for sensing the quality of life in plants
Deep Convolutional Neural Network (CNN)	A novel cascaded cropping regression (CCR) method to perform image cropping by learning the knowledge from professional photographers. The proposed CCR method improves the convergence speed of the cascaded method, which directly uses random-ferns regressors.	Experimental results on public image cropping datasets demonstrate that the proposed method significantly outperforms several state-of-the-art image cropping methods
Deep Learning	A cropping window of an input image to preserve as much as possible its important parts while being aesthetically pleasant. Seeking a deep learning-based solution, a neural network is designed that has two branches for attention box prediction (ABP) and aesthetics assessment (AA), respectively	The experimental results on benchmark datasets clearly validate the effectiveness of the proposed approach. In addition, our approach runs at 5 fps, outperforming most previous solutions
Histogram Approach	An image processing algorithm to grade the rice on the basis of length, width, area and area of chalky and also worked on the color detection on the rice grain. From the results obtained, it is concluded that some rice are better on the basis of their length, some are better on the basis of their width while some can be termed good in quality on the basis of their area and area of the chalky	The rice grain. More data can be acquired for further validation of our techniques .For further research, the moisture content in the rice grain can also be added to grade the overall quality of the rice grain.
Neural Network (NN) classifier	A system that determines the quality of food. Initially, the grain samples run on the conveyor belt and then random images of grains are captured by the camera	The final output is displayed on the LCD also the message will be sent to higher authority through GSM module

Conclusion

In this paper, it is concluded that quality assessment is the major challenge of image processing due to complex nature of the input data. The quality assessment has various steps like pre-processing, segmentation, feature extraction and classification. In this review paper various techniques of quality assessment of wheat plant is analyzed. In future, novel method will be proposed for the quality assessment.

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A Review on Different Security Attacks and Challenges of WSN

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ABSTRACT

WSN is an emerging ground to research and development, due to a large number of application avail benefits from such systems and has lead to the development of tiny, cheap, disposable and self contained battery powered computers, known as sensor nodes or "motes", So the demanding and challenging part of wireless sensor network is security makes it more severe constraints than conventional networks. However, there are several typesof sensor network , helps to trace the challenges to make secure network. In this paper, we investigate the security related issues and challenges in wireless sensor networks. We identify the security threats, review proposed security mechanisms for wireless sensor networks.

Keywords *: Wireless Sensor Networks (WSNs), Security Attacks And Challenges, Security Mechanism*

I. INTRODUCTION

A group of two or more computing devices linked via a form of communications technology. For example, a business might use a computer network connected via cables or the Internet in order to gain access to a common server or to share programs, files and other information.

A computer network consists of a collection of computers, printers and other equipment that is connected together for the purpose of sharing data. The connection between computers can be done via cabling, most commonly the Ethernet cable, or wirelessly using wireless networking cards that send and receive data through the air. Connected computers can share resources like access to the Internet, printers, file servers, and others.

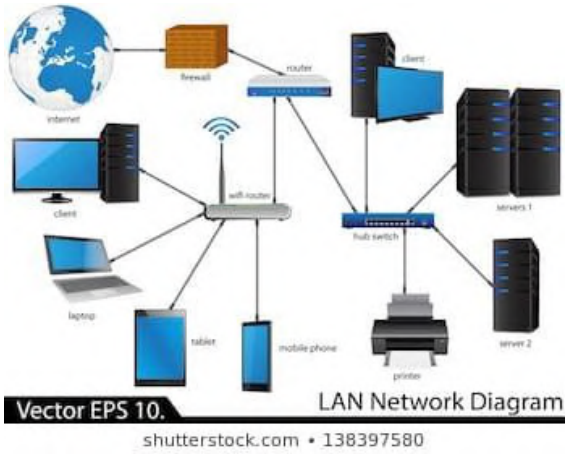

Figure 1. LAN Network

Types of Network

There are two main types of network i.e. wired network and wireless network [1]

a) Wired Networks

Wired network are those network in which computer devices attached with each with help of wire. The wire is used as medium of communication for transmitting data from one point of the network to other point of the network.

b) Wireless Networks

A network in which, computer devices communicates with each other without any wire. When a computer device wants to communicate with another device, the destination device must lays within the radio range of each other [1]. Users in wireless networks transmit and receive data using electromagnetic waves. Recently wireless networks are getting more and more popular because of its mobility, simplicity and very affordable and cost saving installation.

II. WHY USED WIRELESS NETWORKS?

Wireless networks are getting popular due to their ease of use. Consumer/user is no more dependent on wires where he/she is, easy to move and enjoy being connected to the network. One of the great features of wireless network that makes it fascinating and distinguishable amongst the traditional wired networks is mobility [1]. This feature gives user the ability to move freely, while being connected to the network. Wireless networks comparatively easy to install then wired network. There is nothing to worry about pulling the cables/wires in wall and ceilings. These can range from small number of users to large full infrastructure networks where the number of users is in thousands.

Figure 1.1. Communications in Wireless Networks

2.1 Wireless ad-hoc Network:

A wireless ad-hoc network consists of a collection of nodes that communicate with each Other through wireless links without a pre-established networking infrastructure. It originated from battlefield communication applications, where infrastructure networks are often impossible [2]. Due to its exibility in deployment, there are many potential applications of a wireless ad-hoc network. For example, it may be used as a communication network for a rescue-team in an emergency caused by disasters, such as earthquakes or floods, where infrastructures may have been damaged.

It may also provide a communication system for pedestrians or vehicles in a city. Another example of a wireless ad-hoc network is a rooftop network, which consists of a number of wireless nodes spread over an area to provide local networking service and access to wired networks, such as the Internet, for residents in the neighborhood. Another application of wireless ad-hoc networks is a sensor network, which consists of a large number of small computing devices deployed in a region that collect data and may send the information to a central server.

Figure 1.2. Simple ad-hoc networks [3]

2.2 Manet:

A mobile ad hoc network is formed by mobile hosts. Some of these mobile hosts are willing to forward packets for neighbors. All nodes are capable of moving and can be connected dynamically in an arbitrary manner. The responsibilities for organizing and controlling the network are distributed among the terminals themselves. In this type of networks, some pairs

of terminals may not be able to communicate directly with each other and have to rely on some other terminals so that the messages are delivered to their destinations [4]. Such networks are often referred to as multi-hop or store-and-forwardnetworks. The nodes of these networks function as routers, which discover and maintain routes to other nodes in the networks. The nodes may be located in or on airplanes, ships, trucks, cars, perhaps even on people or very small devices. Figure 1.7 shows an example for vehicle-to-vehicle network communicating with each other by relying on peerto-peer routings.

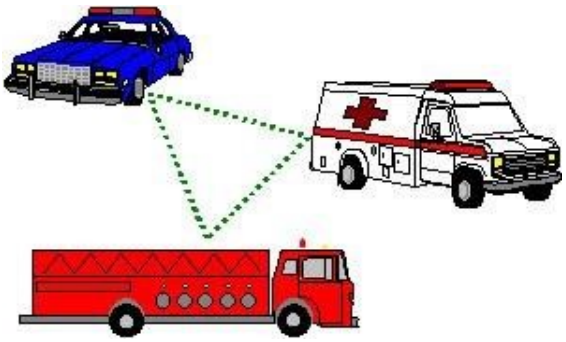

Figure 1.3. Example of a vehicle-to-vehicle network [4]

2.3 Wireless Sensor Networks

Wireless Sensor Networks consists of individual nodes that are able to interact with their environment by sensing or controlling physical parameter; these nodes have to Collaborate in order to fulfill their tasks as usually, a single node is incapable of doing So, and they use wireless communication to enable this collaboration [5]. The definition of WSN, according to, Smart Dust program of DARPA is: "A sensor network is a deployment of massive numbers of small, inexpensive, self powered devices that can sense, compute, and communicate with other devices for the purpose of gathering local information to make global decisions about a physical environment".

III.INTRODUCTION TO WIRELESS SENSOR NETWORKS

A wireless sensor and actuator network (figure 1.5) is a collection of small randomly dispersed devices that provide three essential functions; the ability to monitor physical and environmental conditions, often in real time, such as temperature, pressure, light and humidity; the ability to operate devices such as switches, motors or actuators that control those conditions; and the ability to provide efficient, reliable communications via a wireless network.

WSANs are typically self-organizing and self-healing. Self-organizing networks allow a new node to automatically join the network without the need for manual intervention. Self-healing networks allow nodes to reconfigure their link associations and find alternative pathways around failed or powered-down nodes.

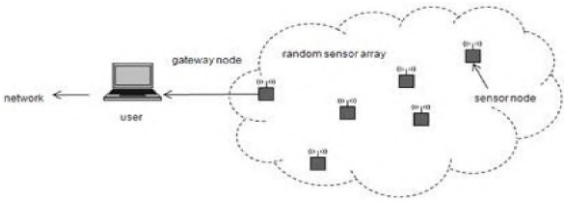

Figure 1.4. Wireless sensor network.

Wireless sensor networks use three basic networking topologies; point-to-point, star (point-to-multipoint), or mesh (figure 1.6). Point-to-point is simply a dedicated link between two points. Star networks are an aggregation of point-to-point links, with a central master node.

In the mesh topology, every node has multiple pathways to every other node, providing the most resiliency and flexibility.

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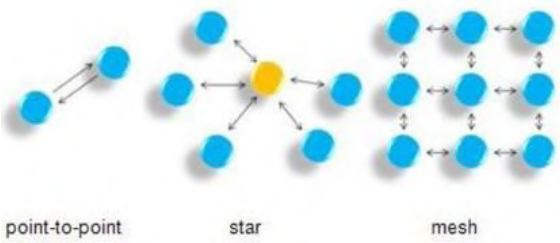

Figure 1.5. Basic wireless network topologies.

3.2 Components of Wireless Sensor Network

Basically, each sensor node comprises sensing, processing, transmission, mobilizer, position finding system, and power units. Sensor nodes coordinate among themselves to produce high-quality information about the physical environment.

- Sensor Field: A sensor field can be considered as the area in which the nodes are placed.
- Sensor Nodes: Sensors nodes are the heart of the network. They are in charge of collecting data and routing this information back to a sink.
- Sink: A sink is a sensor node with the specific task of receiving, processing and storing data from the other sensor nodes. Sinks are also known as data aggregation points.
- Task Manager: The task manager also known as base station is a centralized point of control within the network, which extracts information from the network and disseminates control information back into the network. The base station is either a laptop or a workstation.

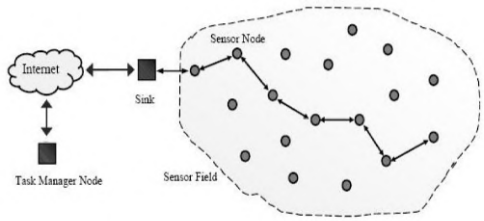

Figure 1.6. Components of Wireless Sensor Network [5]

3.1 Applications of WSN

1. Area monitoring
2. Air pollution monitoring
3. Greenhouse monitoring
4. Landslide detection
5. Industrial monitoring
6. Forest fires detection
7. Water/wastewater monitoring
8. Volcano monitoring
9. Agriculture
10. Structural monitoring

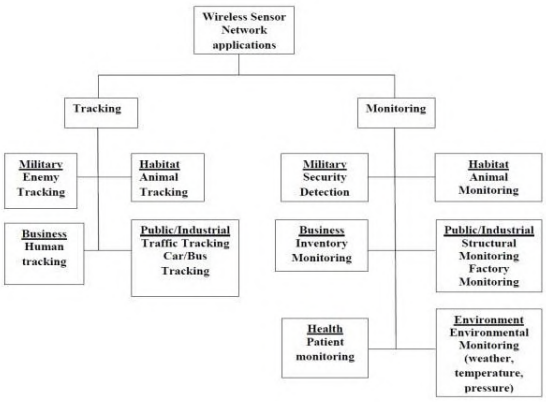

Figure 1.7. Wireless Sensor Network Applications

IV. ATTACKS ON SENSOR NETWORKS

Wireless Sensor networks are vulnerable to security attacks due to the broadcast nature of the transmission medium. Furthermore, wireless sensor networks have an additional vulnerability because nodes are often placed in a hostile or dangerous environment where they are not physically protected. Basically attacks are classified as active attacks and passive attacks.

A. Passive Attacks

The monitoring and listening of the communication channel by unauthorized attackers are known as passive attack. The Attacks against privacy is passive in nature. Some of the more common attacks [8] against

sensor privacy are: Monitor and Eavesdropping, Traffic Analysis, Camouflage Adversaries.

B. Active Attacks

The unauthorized attackers monitors, listens to and modifies the data stream in the communication channel are known as active attack. The following attacks are active in nature. Routing Attacks in Sensor Networks, Denial of Service Attacks, Node Subversion, Node Malfunction, Node Outage, Physical Attacks, Message Corruption, False Node, Node Replication Attacks, Passive Information Gathering etc.

V.SECURITY MECHANISM

The security mechanisms are actually used to detect, prevent and recover from the security attacks. These can be categorized as high level and low-level. Figure 3 shows the order of security mechanisms.

A. Low-Level Mechanism

Low-level security primitives for securing sensor networks includes, Key establishment and trust setup, Secrecy and authentication, Privacy Robustness to communication denial of service, Secure routing, Resilience to node capture etc.

B. High-Level Mechanism

High-level security mechanisms for securing sensor networks, includes secure group management, intrusion detection, and secure data aggregation.

VI.CHALLENGES OF SENSOR Networks

A wireless sensor network is a special network which has many constraint compared to a traditional computer network.

A. Wireless Medium

The wireless medium is inherently less secure because its broadcast nature makes eavesdropping simple.

B. Ad-Hoc Deployment

The ad-hoc nature of sensor networks means no structure can be statically defined. The network topology is always subject to changes due to node failure, addition, or mobility. Nodes may be deployed by airdrop, so nothing is known of the topology prior to deployment. Since nodes may fail or be replaced the network must support self configuration.

C. Hostile Environment

The next challenging factor is the hostile environment in which sensor nodes function. Since nodes may be in a hostile environment, attackers can easily gain physical access to the devices.

D. Resource Scarcity

The extreme resource limitations of sensor devices pose considerable challenges to resource-hungry security mechanisms.

E. Immense Scale

Simply networking tens to hundreds or thousands of nodes has proven to be a substantial task. Security mechanisms must be scalable to very large networks while maintaining high computation and communication efficiency.

F. Unreliable Communication

Certainly, unreliable communication is another threat to sensor security. The security of the network relies heavily on a defined protocol, which in turn depends on communication.

Unreliable Transfer

Normally the packet-based routing of the sensor network is connectionless and thus inherently unreliable.

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Conflicts

Even if the channel is reliable, the communication may still be unreliable. This is due to the broadcast nature of the wireless sensor network.

Latency

The multi-hop routing, network congestion and node processing can lead to greater latency in the network, thus making it difficult to achieve synchronization among sensor nodes.

G. Unattended

Operation Depending on the function of the particular sensor network, the sensor nodes may be left unattended for long periods of time. There are three main cautions to unattended sensor nodes

- Exposure to Physical Attacks

The sensor may be deployed in an environment open to adversaries, bad weather, and so on.

- Managed Remotely

Remote management of a sensor network makes it virtually impossible to detect physical tampering and physical maintenance issues.

- No Central Management Point

A sensor network should be a distributed network without a central management point. This will increase the vitality of the sensor network. However, if designed incorrectly, it will make the network organization difficult, inefficient, and fragile.

VII.CONCLUSION

The deployment of sensor nodes in an unattended environment makes the networks vulnerable. Wireless sensor networks are increasingly being used in military, environmental, health and commercial applications. Sensor networks are inherently different from traditional wired networks as well as wireless ad-hoc networks. Security is an important feature for the deployment of Wireless Sensor Networks. This paper summarizes the attacks and their classifications in wireless sensor networks and also an attempt has been made to explore the security mechanism widely used to handle those attacks. The challenges of Wireless Sensor Networks are also briefly discussed. This survey will hopefully motivate future researchers to come up with smarter and more robust security mechanisms and make their network safer.

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VARIETY OF CYBER ATTCAKS OVER NETWORK AND ITS MITIGATION TECHNIQUES

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ABSTRACT

Network security is becoming of outmost importance because of intellectual property that can be easily acquired through the internet. The Network Security management is different for all kinds of situations and is necessary as the growing use of internet. New Threats Demand New Strategies as the network is the door to your personal or organizational information for both legitimate users and would-be attackers.While developing a secure network, the following needs must be taken care of Confidentiality, Integrity.

INTRODUCTION

An attack in computer networks is any attempt to expose,destroy, alter, disable, steal or gain unauthorized access to someone's personal information or make unauthorized use of an asset. It may be defined as actions directed against computer to disrupt equipment operations, change processing control, or modify stored data on device. Different attack methods target different vulnerabilities and involve different types of techniques, and several may be within the current capabilities of some terrorist groups or an individual hacker.It includes provisions made in an underlying computer network infrastructure, policies adopted by the network administrator to protect the network and the network-accessible resources from unauthorized users. There is a so large and vast amount of personal, military, commercial, and government information on networks worldwide available.

TYPES OF ATTACKS

- **Active Attacks**

These kinds of attacks include injecting a malicious code, breaking into secured features and stealing or modifying information. In these kinds of attacks the data transmitted can be altered by the attacker or the whole data stream can be changed. Active attacks can be detected but these are difficult to prevent. Various error detection and correction techniques are used at various network layers to acquire a safe data transmission.In an active attack, the attacker tries to bypass into secured systems in the going on communication. This can be done with stealth, viruses, worms, or Trojan horses. Active attacks include attempts to circumvent protection features, introducing malicious code, and stealing or modifying information. The unauthorized attackers monitors, listens to and modifies the data stream in the channel are known as active attack. These attacks are mounted against a

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network backbone, exploit information in transit, or attack an authorized remote user during an attempt to connect to a network. Active attacks result in the dissemination of data files, DoS, or modification of data Active attacks can take place in many ways: Masquerading, Replay, Spoofing attack, Wormhole attack, Modification, Denial of services, Sinkhole, and Sybil attack and Denial of Service. The following types of active attacks

1. Fabrication:Fabrication attacks authenticity, the term “fabrication” is used when we refer to attacks performed by generating false routing messages.A malicious node generates the false routing message. This means it generate the incorrect information about the route between devices.
2. Sinkhole: Sinkhole is a service attack that prevents the base station from obtaining complete and correct information. In this attack, a node tries to attract the data to it from his all neighbouring node. Selective modification, forwarding or dropping of data can be done by using this attack.
3. Modification:Modification attacks integrity.If we access a file in an unauthorized manner and alter the data it contains, we have affected the integrity of the data in the file.It involves tampering with your asset. This attack cause communication delays between sender and receiver.
4. Wormhole:This attack is also called the tunnelling attack. In this attack an attacker receives a packet at one point and tunnels it to another malicious node in the network. So that a beginner assumes that he found the shortest path in the network.
5. Denial of services: In denial of services attack, malicious node sending the message to another node and consume the bandwidth of the network. The main aim of the malicious node is to make network busy and increase traffic. If a message from unauthenticated system will be received, then receiver will not receive that message because the receiver is busy and beginner has to wait for its response.
6. Spoofing: When a person maliciously miss-present his/her identity, so that the sender change the topology and harm the receiver information for unauthenticated purposes. In the spoof attack, the hacker modifies the source address of the packets and then sending it so that they appear to be coming from someone else. This may be an attempt to bypass the firewall rules.
7. Blackmail Attacks: A black mail attack is correctly against routing protocols that uses mechanisms to identifyvarious malicious nodes and propagate messages that try to blacklist the other user.
8. Grayhole Attacks:A gray hole attack is a variation of the black hole attack, where the malicious device is not initially malicious, it turns malicious later. This attack includes dropping all data packets but it lets control messages to route through it

- **Passive Attacks**

Passive Attack: These kinds of attacks are very difficult to detect because the attacker

or hacker doesn't alter or change the original data. However, it keeps tracks of all the conversation happening between two trusted parties. It can only be prevented through encryption. A passive attack monitors unencrypted traffic and looks for clear-text passwords and sensitive information that can be used in other types of attacks. The monitoring and listening of the communication channel by unauthorized attackers are known as passive attack. A Passive attack attempts to learn or make use of information from the system but does not affect system resources. Passive Attacks are in the nature of eavesdropping on or monitoring of transmission. The goal of the opponent is to obtain information is being transmitted. It is of different types:

1. Traffic Analysis: In this attack, the attacker senses the communication path between sender and receiver. An attacker can sense the data being transferred on the network. There is no modification of data through traffic analysis. It can be performed in any situation whether the message is encrypted or decrypted. The greater the number of messages observed, or even intercepted and stored, the more can be inferred from the traffic. It is performed in the context of military intelligence.

2. Eavesdropping: The main aim of this attack is to find out some secret or confidential information from communication. This secrete information may be privet or public key of sender or receiver or any secrete data. It is also known as snooping or sniffing attack. It only steals necessary information that the computer, mobile be transferred on a network. It is a serious attack to Wireless Sensor Network (WSN).

3. Monitoring: The attacker can read the confidential data without alteration of data. It monitors the content of data being transmitted.

4. Replay Attack: It is also called playback attack. In this valid information transmission is maliciously delayed or repeated. This can be done by originator who obstruct the data and retransmit it. At that time, an attacker can obstruct the password.

- **Close-in Attack**

A close-in attack involves attempting to get physically close to network components, data, and systems in order to learn more about a network for evil purposes. It consist of regular individuals attaining close physical proximity to networks, systems, or facilities for the purpose of gathering,modifying, or denying access to information on network. One of the popular form of this attack is social engineering. In a social engineering attack, the attacker compromises the network or system through social interaction with a person, which may include an e-mail message or phone. Various hoax can be used by the individual in order for revealing information about the security of company. The information that the person reveals to the hacker would most likely be

used in a subsequent attack to gain unauthorized access to a system or network.

- **Spyware attack**

Spyware is any program that monitors your online activities or installs programs without users consent for some kind of profit or to capture personal information. And this captured information is maliciously used by the legitimate user for that particular kind of evil work. It spyes your activites and is a serious threat.Spyware is one of the most common threats to internet users. The primary purpose of spyware is usually to obtain credit card numbers, banking information and passwords . Spyware may seem difficult to detect; often, the first indication a user has is that the computer device has been infected with spyware is a noticeable when there is reduction in processor or network connection speeds and in the case of mobile devices battery life anddata usage . Antispyware tools can be used to prevent or remove spyware.

- **Password Attack**

An attacker tries to crack the passwords stored in a password-protected file or a network account database. There are three major types of password attacks: a dictionary attack, a brute-force attack,keylogger attack, hybrid attack,etc. Brute Force Attack is one of the most common forms of attack methods, and the easiest for hackers to perform.A hacker uses a computer program to login to a user's account with all possible password combinations. In addition, brute force accounts donot start at random,they start with the easiest-to-guess passwords. Dictionary Attack allows hackers to employ a program which works through common words. A brute force attack goes letter by letter, whereas a dictionary attack only tries possibilities that are most likely to succeed. Also, these attacks rely on a few key factors of users' psychology. So a dictionary attack starts with those words and variations such as adding numbers at the end, replacing letters with numbers, etc.Keylogger Attack. A keylogger attacks install a program on user's node to track all of its keystrokes. So as the user types in their usernames and passwords, the hackers record them for use. This infect the usersendpoints.

- **Distributed Attack**

A distributed attack is the adversary introduce code, such as a Trojan horse,viruses, worms or backdoor program. These attacks introduce malicious code such as a back door to a product to gain unauthorized access to information Virus are programs that are written in order to harm or modify the working of the other's computer without its permission and knowledge. There are three ways in which a virus can enter an a system i.e. through E-mail containing viruses which can infect system's email and spread, Network viruses which breach the system through unprotected ports , Web based viruses that infect your system by visiting their web

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page and also affects other internal network systems.A computer worm is a type of malware that spreads copies of itself from device to device. It can replicate itself without any human interaction, and it does not need to attach itself to a software program in order to cause damage. A Trojan horse, or Trojan, is a type of malicious code or software that looks genuine but can take control of your device. It is designed to damage, disrupt, steal, or in general inflict some other harmful action on your data or network. It acts as a bona fide application or file to trick you. It seeks to deceive you into loading and executing the malware on yoursystem.

- **Buffer overflow Attack**

A buffer overflow attack is when the attacker sends more data to an application than the expected. A buffer overflow attack usually results in the attacker gaining administrative access to the system in a command prompt or shell. In a buffer-overflow attack, the extra data sometimes holds specific instructions for actions intended by a malicious user, and would use a buffer-overflow exploit to take advantage of a program that is waiting on a user's input. There are two types of buffer overflows: stack-based and heap-based. Heap-based, that is difficult to execute. Stack-based buffer overflows, which are more common,exploit applications and programs by using what is known as a stack: memory space used to store use

- **Insider Attack**

According to a Cyber Security Watch survey insiders were found to be the cause in 21 percent of security breaches, and a further 21 percent may have been due to the actions of insiders. More than half of respondents to another recent survey said it's more difficult today to detect and prevent insider attacks than it was in 2011, and 53 percent were increasing their security budgets in response to insider threats [3].It is a security risk that originates from within the targeted organization. It commonly involves a current or former employee or business associate who has access to sensitive information within the network of an organization, and who misuses this access.Traditional security measures tend to focus on external threats and are not always capable of identifying an internal threat introduced from inside an organization.Types of insider threats include:Malicious insider,Careless insider, mole.

- **Phishing**

When the user attempts to log on with their account information, the hacker records the username and password and then tries that information on the real site. In phishing attack the hacker creates a fake web site that looks exactly like a popular site such as the Facebook or PayPal. These kinds of attackers pretend to be as trustworthy persons with an intention to capture sensitive information through fraud email and messages. These attacks take about 9-10 days to resolve.

Phishing Techniques:

- Email Phishing Scams
- Spear Phishing
- Voice Phishing (Vishing)
- Smishing
- Search Engine Phishing
- Whaling

- **Hijack**

A Hijack Attack is a form of active wiretapping in which the attacker seizes control of a previously established communication association. In other words, this is a kind of an attack in which the hacker intercepts or takes over session between the user and another system and finally disconnects the later from the communication. You still believe that you are talking to the original party and may send private information to the hacker by accidently. Example of Hijack Attack First the attacker uses a sniffer to capture a valid token session called "Session ID", and then he uses the valid token session to gain unauthorized access to the Web Server. Manipulating the token session executing the session hijacking attack.

Types of Hijacking:

- Application Layer Hijacking
- Transport Layer Hijacking

- **Exploit Attack**:

It is a piece of software, a chunk of data that takes advantage of a bug or vulnerability to cause accidental or unexpected behaviour to occur on computer software, hardware, or something electronic. Such behaviour frequently includes things like allowing privileges escalation and denial of service attacks or gaining control of a computer system. It may result from a combination of software already infected by a computer virus, worms, bugs or weak passwords. These exploits require security patches or security fixes in order to prevent the unauthorized access to user's data or integrity.

NETWORK ATTACK	PERCENTAGE OF ATTACKS
Brute Force	19%
Browser	36%
SSL	11%
Scan	3%
Backdoor	3%
Denial of service	16%
Others	9%

Table1: Network Attacks with Percentage Source: [4]–[7]

TECHNOLOGY FOR PROVIDING NETWORK SECURITY

➢ Intrusion Detection Systems

An Intrusion Detection System (IDS) is a protective measure that helps with computer intrusions. It can be software or hardware devices used to detect an attack. IDS products are used to monitor connection in determining whether attacks are been launched or not. Some IDS systems just monitor and alert of an attack, whereas others try to block and rectify the attack. The systems used to detect malacious things happening are referred to generally as intrusion detection systems. Intrusion detection in corporate and government networks is a fast-growing field of security research,The typical antivirus

software is an example of an intrusion detection system.

- Anti Malware Software

Viruses, worms and Trojan horses,etc are of malicious software, or Malware. Special tools such as anti-malware are used to detect them and cure an infected system.It protects the infections caused by many types of malware, including all types of viruses, worms, ransomware,spyware,etc. Antimalware software can be installed on individual devices,through gateway server or dedicated network appliance.Example of Anti malware software are:McAfee,Quick heal,etc.

- Firewall

A firewall can be defined as a device which acts as interconnection between the internet and the organization network. Firewall let's only those packets to be transmitted a networkwhich fulfils its perimeters configured by the firewall administrator to be a safe data packet and filters the other packets. Firewall acts at network, transport and application layers.

It is basically of two types:

- Gateway Firewalls
- Packet Filtering Firewalls
- Stateful inspection Firewalls
- Cloud Firewalls
- Software Firewalls
- Hardware Firewalls

- Secure Socket Layer (SSL)

It is a standard way to achieve security between a web browser and website. It is designed to create a secure channelbetween the web browser and the web server, so that information exchanged is protected within the secured tunnel. SSL provides authentication of clients to server through the use of digital certificates.

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Weed Detection Approach Using Feature Extraction and KNN Classification

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Abstract

The image processing is the vital technology involved in the agricultural fields. One of the basic motives of agricultural production is to lucre greatest amount of crop yield at low cost. Weeds are the unwanted plants that are present within the field and they can be detected and removed by different manual and automatic techniques. Image processing is the most preferred approach to identify the weed in the field crop. The technique of textural feature analysis and morphological scanning followed by the KNN Classifier is applied to Sugar beet plant for the classification of weed plant from field crop. The results of the weed detection are evaluated in terms of Accuracy, Precision, Recall and Execution time.

Keywords

Textural Features, KNN Classifier, Weed Detection

Introduction

A two-dimensional function f(x, y) is characterized as an image wherein the spatial coordinates are defined by x and y. The intensity or grey level of the image at a specific point is characterized by the amplitude of the pair of coordinates (x, y). A digital image is accomplished when x, y and intensity values of f are all finite, and the discrete amounts [1]. A finite number of elements together generate a digital image. There is a specific location and value for each of the elements involved which are also known as image elements, pixels and picture elements. The elements of a digital image can be represented by the term commonly known as pixel. The algorithms that are used in creation, processing, communication and displaying of digital images are collectively known as Digital Image Processing. A digital image is given as input and efficient algorithms are applied to process that image. An improved image is achieved as output in this process [2]. The 70% of total population of India depends upon agriculture due to which it is also known as the agricultural country. The appropriate fruit and vegetable crops can be chosen by the farmers from huge range of diversity available. However, it is highly technical to cultivate these crops so as to provide optimum yield and quality. The technological support can be used for improving these approaches. It is important to monitor the perennial fruit crops closely to manage them. Particularly any kind of diseases possible within the crops and fruits need to be identified so that the production post-harvesting is higher [3]. Thus, image processing is the most important technology involved in the agricultural regions. A huge impact can be caused on the agricultural production due to the regional weather patterns [4]. The losses that can possibly be caused in unfavorable conditions can be minimized by the crop managers with the help of prediction. Further, when the potential exists for favorable growing conditions, the crop prediction can be maximized by these predictions as well [5]. The agro meteorologists have always been paying close attention to the prediction of harvest yield for the most part within particular plants like corn, wheat, rice and so on. The national as well as international economic programming is hugely affected by these yields. The climatic events directly affect the dry farming crop production due to which their management and control

quality is very important [6]. The meteorological data is utilized to predict these factors more accurately. Several yield prediction models have been generated over the years. The broader categorization of these models is done into two groups that are Statistical Models and Crop Simulation Models. The approach of the project is to accomplish a benchmark strategy for building up a continuous weed identification framework through binary classification when vegetation is distinguished, that is, to separate soil and plants, then, to apply a feature extraction for segregating weed [7]. Firstly, Green plant detection algorithm is actualized to expel soil from image to such an extent that image data is decreased. The next stages of algorithm are mainly focused on vegetation. In second stage, a noise called "salt and pepper" is removed using median filtering. The median filtering method provides benefit of border preservation. Third, the past yield is changed over to binary; now, small objects are evacuated so as to evade exceptions. After, the pixels associated around their neighborhood are named, in this manner; all objects in the image are distinguished [8]. At last, area is calculated for each object.

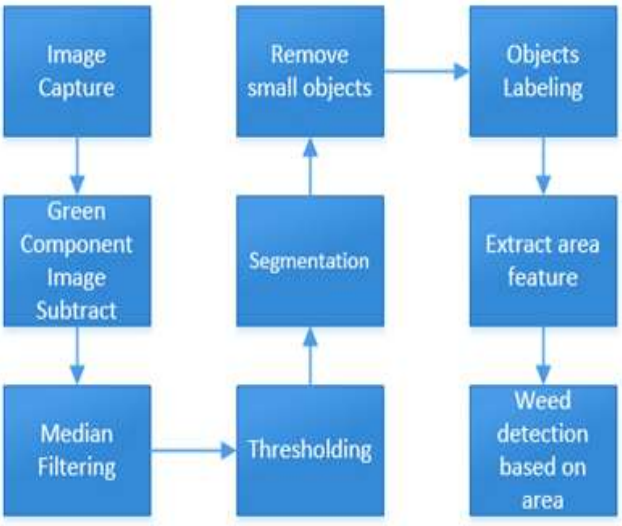

Fig 1: Steps for Weed Detection [6]

The figure number 1 shows various steps for the weed detection. The weed detection has the steps of pre-processing, segmentation; feature extraction and labeling of the weed parts from the image. The digital images were captured in outdoor light conditions with point of view projection over harvest. Catches have 8MP resolution in RGB color space with JPG extension [9]. The primary thought of yield images procurement is to abstain from lighting and sharpness issues; thusly, color changes about vegetation are diminished. The accuracy of the initial step of the plant characterization algorithm increments gave that green color over objects is kept.

Literature Review

Camilo Andrés Pulido-Rojas, et.al (2016) presented a machine vision approach to detect wild plant in vegetable yields with the help of outside pictures. The proposed approach could be an element of a wild plant exclusion mobile robot with camera obscura for light controlled circumstances [10]. The main aim of this study was to propose a valuable algorithm for discriminating wild plant with the help of image filtering technique. Image filtering technique was utilized for the extraction of color and region features. After this, a procedure was applied for the labeling of all available objects. Lastly, a classification approach was presented on the basis of area. The performance of proposed algorithm was evaluated in terms of certain factors such as sensitivity, specificity, positive and negative forecasted values etc.

Hossein Aghighi et.al (2018) implemented [11] modified ML techniques. These techniques included several approaches such as Boosted regression tree (BRT), Random forest regression (RFR), Support vector regression, and Gaussian process regression (GPR). Several classic regression methodologies were used to compare the performances these approaches. These approaches were compared by including standardized NDVI(Normalized Difference Vegetation Index) values of whole fodder maize farms. This phenomenon produced a two-dimensional data suite every year. The proposed approach was employed hundreds of times and the

metrics are calculated which is used to evaluate their performance and stability.

Anshul Garg et.al (2017) resultant [12] of the past distributed research work in which the analyst outline a relapse based fluffy time arrangement and manages hesitation, jumbling veracity, and falseness the different aspects of the fuzzy contexture and outfits a superior and a more veracious outcome than the techniques that are true and apparent. Frequency based partitioning technique had been utilized as the segment of talk and genuine creation as the significant talk. Fuzzy Logical Relationships of differing degrees have been utilized to assess the fuzzification mechanism.

Yolanda. M. Fernandez-Ordoñez et.al (2017) objectified [13] the evaluation of crop and total quantity of maize crop through the utilization of Spot-5 satellite pictures and practical systems. This system scrutinized that 1) yield (Y) as a function of LAI, and b) yield as a function of NDVI. It was realized that the LAI resultant forecast system overvalued yield by 14%, while the NDVI obtained a precision rate of 97%. The LAI resultant system performance was due to disparity in the gathering of farm data. This data was collected in dissimilar time hours throughout the day.

Luminto et.al (2017) developed [14] a multiple linear regression model for predicting the farming time of rice crop. This model provided utmost Farmer Exchange Rate of period 2016/2017 in two seasons. The proposed model was considered extremely appropriate technique for prediction. This approach was based on multiple dependent variables. This technique could be implemented easily and was quicker as compared to other mine learning algorithms. The tested outcomes depicted that this technique was used to predict variables and the results were not as satisfactory as it was for some of the variables. The algorithm gives higher RMSE value and produced a discrepancy rate value. It was seemed to generate comparatively larger error in comparison with other factors' integration.

P. S. Vijayabaskar et.al (2017) constructed [15] a system to test the productiveness of earth. This testing gave an idea related to the plantation of crop on the basis of values provided by sensor. This system predicted the harvest production and provided area wise data about plant as graph. The proposed approach also recommended compost. This fertilizer or compost could be mixed to the earth for increasing harvest production. With the help of proposed model, cultivators can share their knowledge regarding their production through farmer conversation.

Problem Formulation

The unwanted plants that exist within the field are known as weeds. There is no classification of weeds since they are not considered weed if they grow in a place where they are required. To identify the unwanted growth of weed within the plants, it is necessary to study the research issues of weed plant detection within agricultural field. The growth of the plant is affected by the already existing seeds grow additionally in the soil. So we have to recognize the area of weed so that the actual plants are not affected by spraying. Huge attention should be given to research on precision agriculture as the natural resources and land availability is decreasing and the world population is increasing by each day. This problem is solved mainly by applying the image processing techniques. To implement the approach, technique of feature extraction and classification need to be applied. To improve the accuracy for weed classification, the KNN classifier is applied in this research work

Research Methodology

Following are the general steps applied to detect weed using image processing:

a. **Image Acquisition**: Sugar Beet Plant images are gathered from online dataset using high resolution camera to increase the accuracy in RGB format. Within a respective size and in jpg format, every achieved image is stored.

b. **Pre-processing**: The poor resolution of an image and unwanted background, the noise, and the lighting variations are various factors based on which the obtained images are affected. To perform RGB to Gray scale conversion, certain pre-processing tools are applied. Further, the noise and unwanted objects from background are removed using the filtering techniques such that the gray scale images can be converted to binary image.

c. **Segmentation and Feature Extraction**: To detect the weed, the features are extracted after pre-processing. A process in which a set of features are defined such that an efficient representation can be seen for analysis and classification is known as feature extraction. There are various types of features existing in an image. The DWT algorithm is used for the feature extraction. The DWT algorithm uses the "Haar" wavelet for the feature extraction. The region based segmentation approach called k-mean is used for the segmentation. In the k-mean segmentation, the centroid points are selected and from that points Euclidian distance is calculated which can segment the data into certain classes.

d. **Classification**: For weed classification, this step is performed. An input is given to the classifiers in the form of feature vectors. The images of various weeds are used to train, validate and test the classifiers in classification process. The KNN classification method is applied for the classification. In K-Nearest Neighbor classifier, the classification i.e. to which group the specified point belongs is relied on the computation of the least remoteness amid the specified point and other points. In the form of a classifier, the closest associate does not comprise any kind of training procedure.. For the plant leaf categorization, the Euclidean distance amid the test patterns and training samples are computed. In this way, it discovers analogous ways and consequently the class for test patterns. A pattern is classified on the basis of maximum amount of votes from the k neighbors, by means of the pattern being allocated to the class mainly frequent amid its k nearest neighbors.

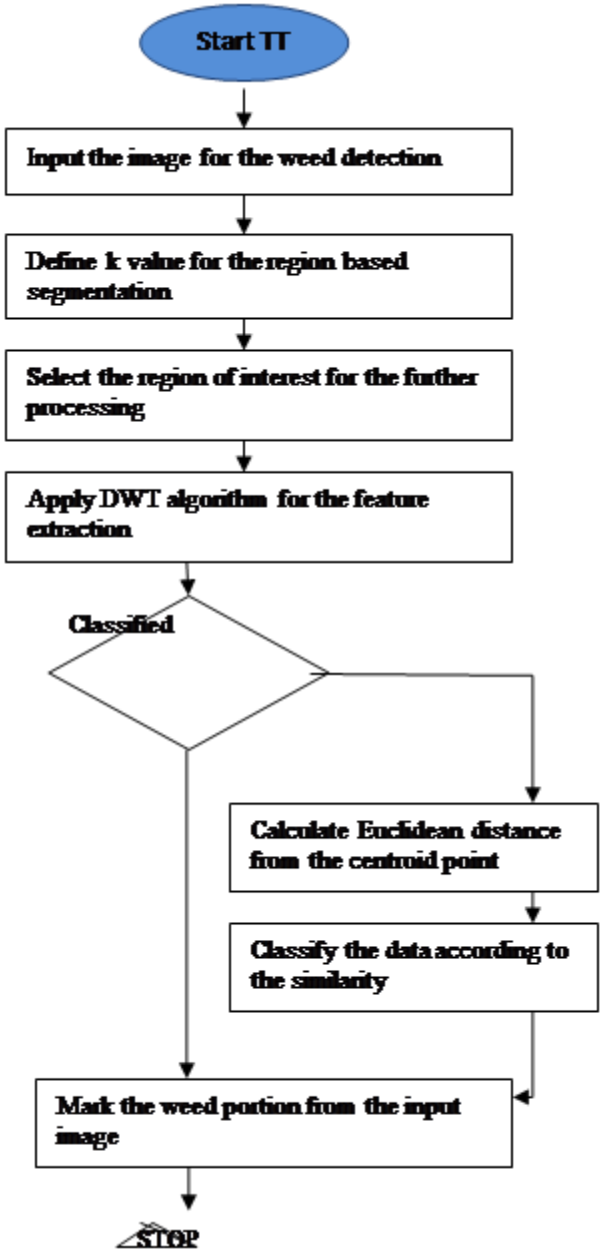

Fig 2: Proposed Methodology

Result and Discussion

This research work is related to the weed detection, on sugar beet plant. The data set is collated from the different internet sources. The proposed approach has the various phases like pre-processing, segmentation, feature extraction and classification. The proposed methodology is implemented in MATLAB using computer vision and neural network toolbox. The performance of the proposed model is analyzed in terms of accuracy, precision, recall and execution time.

1. Precision: In pattern recognition, information retrieval and binary classification, precision (also called positive predictive value) is the fraction of relevant instances among the retrieved instances.

$$\text{Precision} = \frac{\text{TruePositive}}{\text{TruePositive} + \text{FalsePositive}}$$

2. Recall: Recall is the fraction of relevant instances that have been retrieved over the total amount of relevant instances.

$$\text{Recall} = \frac{\text{TruePositive}}{\text{TruePositive} + \text{FalseNegative}}$$

3. Accuracy: Accuracy is defined as the number of points correctly classified divided by total number of points multiplied by 100

$$Accuracy = \frac{\text{Number of points correctly classified}}{\text{Total Number of points}} * 100$$

4. Execution Time: - The execution time is the time which is taken by the algorithm to get completed.

The input images and comparison of Linear Interpolation and KNN classification is shown as below in terms of various parameters.

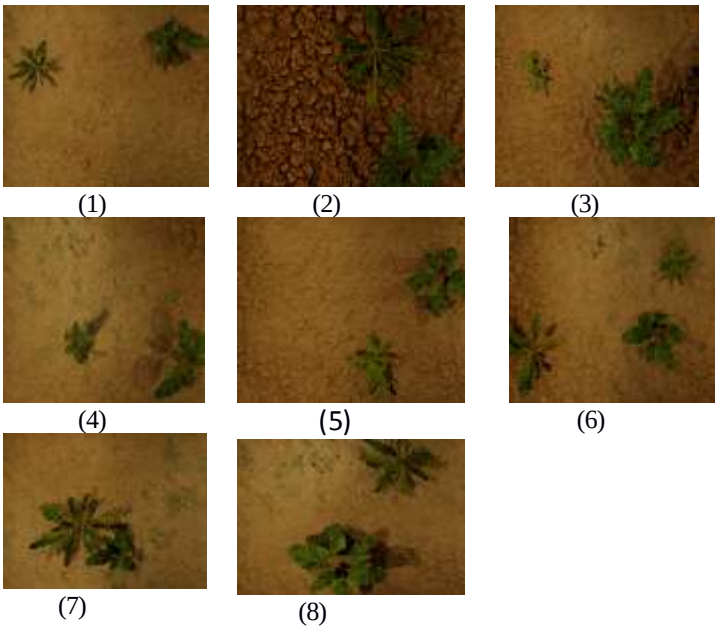

Image Number	Linear Interpolation	KNN Classification
1	88.26	91.26
2	88.15	93.02
3	89.23	92.94
4	89.21	91.37
5	90.34	91.83
6	88.49	92.54
7	90.37	93.50
8	89.08	93.14

Table 1: Comparison in terms of Accuracy(%)

Image Number	Linear Interpolation	KNN Classification
1	83.65	92.99
2	78.69	86.89
3	81.72	90.70
4	83.50	92.72
5	82.37	91.97
6	82.69	91.84
7	83.00	92.29

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8	82.74	91.77

Table 2: Comparison in terms of Precision (%)

Image Number	Linear Interpolation	KNN Classification
1	72.52	75.38
2	93.47	99.88
3	80.08	83.79
4	73.08	76.34
5	77.43	79.02
6	76.20	79.50
7	74.99	77.89
8	75.99	79.76

Table 3: Comparison in terms of Recall (%)

Image Number	Linear Interpolation	KNN Classification
1	0.4640	0.3876
2	0.2541	0.2515
3	0.2525	0.2325
4	0.2767	0.2182
5	0.2254	0.2075
6	0.2815	0.2363
7	0.2278	0.2221
8	0.2284	0.2115

Table 4: Comparison in terms of Execution Time (sec)

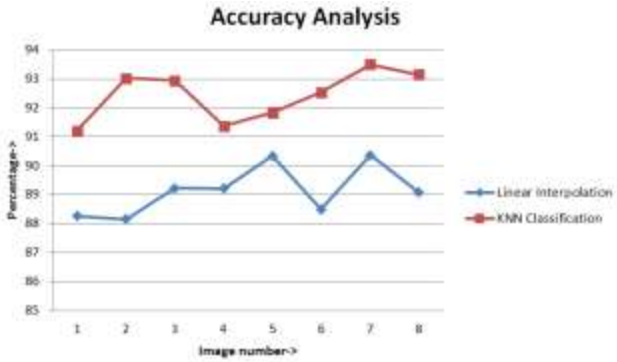

Fig 3: Accuracy Analysis

As shown in figure 3, the two algorithms which are linear interpolation and KNN are applied for the weed detection. It is analyzed that KNN classification method gives high accuracy for the weed detection as compared to linear interpolation.

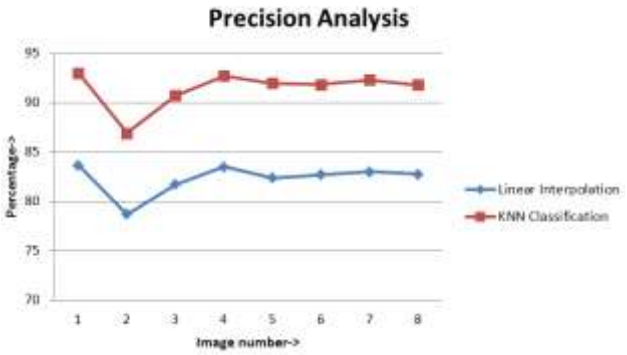

Fig 4: Precision Analysis

As shown in figure 4, the precision value of the linear interpolation method is compared with the KNN classification method. The precision value of KNN classifier is high as compared to linear interpolation.

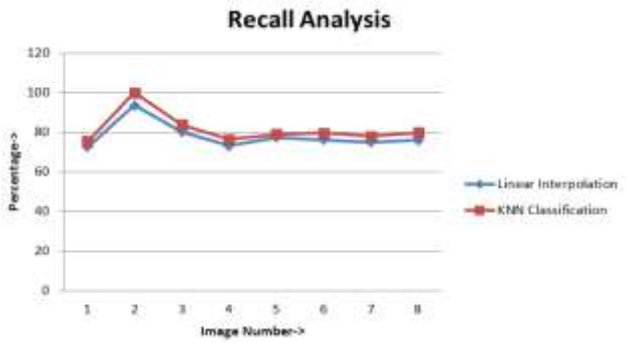

Fig 5: Recall Analysis

As shown in figure 5, the recall value of the linear interpolation method is compared with the KNN classification method. The recall value of KNN classifier is high as compared to linear interpolation

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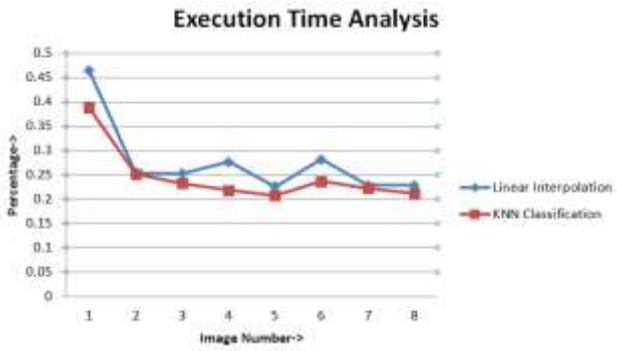

Fig 6: Execution time

As shown in figure 6, the execution time of linear interpolation is compared with the KNN classification. It is analyzed that KNN classification method take less time for the weed detection as compared to linear interpolation

Conclusion

In this paper, we proposed a way to deal with limit the human exertion to differentiate between crop and weed from input field crop images. The KNN classification approach is applied which classify weed and plant from the image. The approach of weed detection is implemented and results of the implemented algorithm are analyzed in terms of various parameters accuracy, precision, recall and execution time. After calculating the parameters, we deduced that KNN is the best technique than Linear Interpolation [16]. In future, classification model will be implemented for the weed detection to increase accuracy. The accuracy for the weed detection is increased upto 8 percent with the proposed approach.

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Proceedings of International Conference on Data Sciences & Machine Learning (ICDSML2020)

Review: ZigBee Technology

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Abstract

This abstract tells about a Wireless Technological Device which is popular for extremely Low Power, and Low Bit Rate Wireless PAN Technology called ZigBee.ZigBee is designed for wireless Automation and other lower data tasks, such as smart home automation and remote monitoring. ZigBee is a low-cost, low-power, wireless mesh networking standard. The low cost allows the technology to be widelydeployed in wireless control and monitoring applications, the low power usage allowslonger life with smaller batteries, and the mesh networking provides high reliability andlarger range. Due to the low-cost and low power usage this wireless technology is widely used in Home Automation, Smart Energy, Telecommunication Applications, Personal Home, and Hospital Care. ZigBee enables new opportunities for wireless sensors and control networks. ZigBee is standard based, low cost, can be used globally, reliable and self-healing, supports large number of nodes, easy to deploy, very long battery life and secure

Keywords-Sensor Networks, ZigBee, Mobile coordinator

Introduction

Technologists have never had trouble coming up with potential applications of wireless sensors. The wireless sensors are much easier to install than the sensors that need wiring as 80% of cost is spent on the sensor installation in case of wired sensors. But there was still a problem with wireless sensors that it consumed too much power.So,Zigbee technology came into existence. Zigbee is a wireless technology formalized by IEEE 802.15.4 standard for transfer of data. It interconnects simple, low power, low processing capability wireless nodes. Power needed for ZigBee nodes is very small i.e 1mW (or less power). But still it provides range up to 150 meters in outdoor which is achieved by the technique called direct sequence spread spectrum (DSSS). ZigBee is developed by ZigBee alliance and task group, which include hundreds of member companies like Ember, Freescale, Chipcon, Invensys, Mitsubishi, CompXs, AMI Semiconductors, ENQ Semiconductors etc from semiconductor and software developers to original equipment manufacturers. ZigBee and 802.15.4 are not the same. ZigBee protocol is supported solely by the ZigBee alliance that uses the transport services of the IEEE 802.15.4 network specification. ZigBee alliance is responsible for ZigBee standard and IEEE is responsible for IEEE 802.15.4. It is like TCP/IP using IEEE 802.11b network specifications. ZigBee alliance defines the network, security and application layers whereas IEEE 802.15.4 defines the physical and media access control layers ZigBee takes its name from the zigzag flying of bees that forms a mesh network among flowers. It is an individually simple organism that works together to tackle complex tasks. The technique that honey bees use to communicate new-found food sources to other members of the colony is referred to as the ZigBee principle. 1.2 ZigBee and ZigBee PRO ZigBee is robust mesh network defined by the core ZigBee specification.

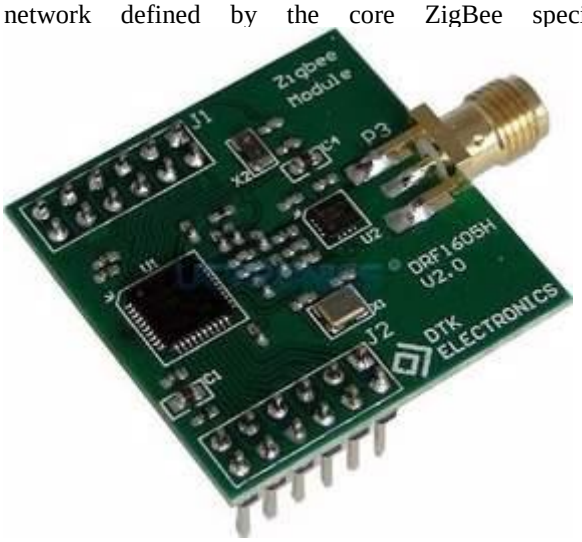

Fig:-1

It is an innovative, self-healing, self-configuring system, with battery-free nodes that provide ease of use, flexibility and mobility ZigBee / ZigBee Pro are mesh communication protocols that sits on top of IEEE 802.15.4 PHY. ZigBee PRO is an enhancement of the original ZigBee protocol, providing a number of extra features that are particularly useful for very large networks (that may include hundreds or even thousands of nodes). The new innovative feature of ZigBee PRO is the Green Power which supports energy harvesting devices without external power supplies. 1.3 Digi zigBee & zigBee-PRO Modules Digi is a member of the ZigBee Alliance and has developed OEM solutions based on the ZigBee architecture. zigBee / zigBee Pro are product names for radio communications modules made by Digi. The zigBee and zigBee-PRO modules provide an easy-to-implement solution and a powerful boost to range and reliability to companies looking to offer ZigBee..

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Comparison of various wireless technologies is as follows Topologies

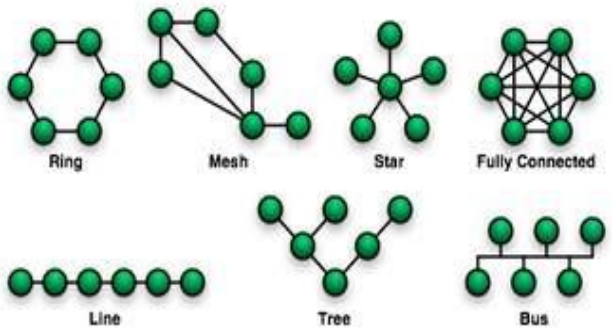

Fig:-2

F8913 EMBEDDED ZIGBEE MODULE

1.ZigBee Module Support UART

2.ZigBee Module Low power consumption design, support multi-sleep and trigger modes to reduce the power dissipation farthest

3.ZigBee Module Supply 5 I/O channels, compatible 3 analog inputs and 2 pulse input counters

4. ZigBee Module Support auto recovery mechanism, including online detect, auto redial when offline to make it always online

5. ZigBee Module Support ZigBee wireless data transmission

6. ZigBee Module Support Point-to-Point, Point-to-Multipoint, Peer-to-Peer and Mesh

network

Fig:-3

ADVANTAGES OF ZIGBEE

The ZigBee protocol was designed to carry data through the hostile RF environments that routinely exist in commercial and industrial applications. ZigBee protocol features:

- Low duty cycle - Provides long battery life
- Low latency • Support for multiple network topologies: Static, dynamic, star and mesh
- Direct Sequence Spread Spectrum (DSSS)
- Up to 65,000 nodes on a network
- 128-bit AES encryption – Provides secure connections between devices • Collision avoidance
- Link quality indication
- Clear channel assessment
- Retries and acknowledgements
- Support for guaranteed time slots and packet freshness .

APPLICATIONS OF ZIGBEE

ZigBee is the wireless technology that:

- Enables broad-based deployment of wireless networks with low cost, low power solutions.
- Provides the ability to run for years on inexpensive primary batteries for a typical monitoring application.
- Addresses the unique needs of remote monitoring & control, and sensory network applications.

However, ZigBee technology is well suited to a wide range of building automation , industrial automation , medical and residential control & monitoring applications . Essentially, applications that require interoperability and/or the RF performance characteristics of the IEEE 802.15.4 standard would benefit from a ZigBee solution.

SECURITY IN ZIGBEE

ZigBee's security services include methods for key establishment and transport, device management, and frame protection. The ZigBee specification defines security for the MAC, NWK and APS layers. Security for applications is typically provided through Application Profiles. Security and data integrity are key benefits of the ZigBee technology. ZigBee leverages the security model of the IEEE 802.15.4 MAC sub layer which specifies four security services:

- access control—the device maintains a list of trusted devices within the network
- data encryption, which uses symmetric key 128-bit advanced encryption standard
- frame integrity to protect data from being modified by parties without cryptographic keys
- sequential freshness to reject data frames that have been replayed—the network controller compares the freshness value with the last known value from the device and rejects it

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if the freshness value has not been updated to a new value . There are three keys that need to be considered:

• Master key- They are preinstalled in the device/ node. Their function is to keep the link keys exchange confidential in the Key Establishment procedure

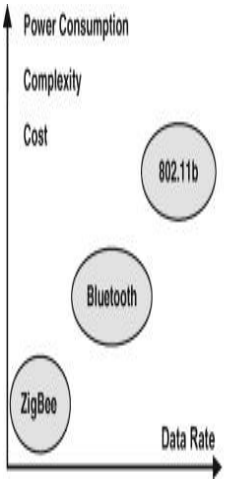
. • Link keys- These are unique in each node and are managed by the application layer. More memory resources are required because there is a need for encrypting the information shared between two devices.

• Network Key- It's a key that is shared among all the nodes in the network. It is generated at different intervals. Only if the node has the network key they can join the network. The new network key is shared using the old network key. There are two policies that the trust centre (the one which generates the network key) follow:

• Commercial mode: Shares the master and link keys with any devices in the network.

• Residential mode: Share only the Network key (this is done in order to cope with low memory resources).

COMPARISON BETWEEN VARIOUS WIRELESS NETWORKS: -



	Data Rate	Typical Range	Application Examples
ZigBee	20 to 250 Kbps	10–100 m	Wireless Sensor Networks
Bluetooth	1 to 3 Mbps	2–10 m	Wireless Headset Wireless Mouse
IEEE 802.11b	1 to 11 Mbps	30–100 m	Wireless Internet Connection

Fig:-4

USAGE OF ZIGBEE IN FUTURE

1) Various types of areas such as defence, national security, monitoring and control etc are facilitated by devices based on ZigBee standard. To get the maximum throughput from a ZigBee network, the placement of the nodes need to be considered specifically. An important role has been played by the movements of the nodes in a ZigBee network from the perspective of the throughput and efficiency of the network

. 2) In a ZigBee network ,a wireless sensor network is usually constructed by using a tree topology. These wireless sensor networks are used for applications that require the delivery of data. Using the tree topology for the placement of nodes in the network and by configuring the movement of the nodes according to the group mobility model, network gives the maximum throughput and possess minimum data dropped in the network.

3) This is a significant obstacle to ZigBee which means that most of the wireless devices should have a level of automated intelligence embedded in them so as to enable easy commissioning and flexible use. Addressing this challenge will require advanced planning to automate issues faced by the people who will actually have responsibility for installing the Zigbee application.

4) In the Wireless sensor networks, the coordinator is responsible for sending the signal to all the sensor nodes connected to it.As the distance from the coordinator increases, the signal strength becomes weak causing communication with target nodes difficult as a result the connection breaks with all the widely distributed wireless sensor nodes. Therefore, it is difficult to perform stable and reliable communication with wide range nodes.

5) Chipcon is using ZigBee to produce a road map product that reduces the chip and system costs and increases integration level with low power consumption. Sensors are currently being used in environmental and agricultural applications, but the main target - home automation. ZigBee technology is also being used and tested in applications related to health monitoring.

6) A Wireless sensor network(WSN) consists of spatially distributed wireless nodes at the bottom most layer. These sensor nodes are usually battery powered devices and consume very low power. Data is routed from these devices to the gateway by the help of the subsystem on the top of these devices. These sensor nodes can act both as a full functional device and reduced functional device. But one of the major issue in wireless sensor networks is the hot-spot i.e. all the FFD's connected to the coordinator are responsible for sending the data to the coordinator on the behalf of nodes connected to them. So these nodes consume more power which increases the load on them and die out much earlier as compared to other nodes which breaks the connection with the entire network. In order to overcome the hot-spot problem, using the mobile coordinator is the best solution.

7) Control overhead is a very important indicator for measure performance of ZigBee routing protocol. More control overhead will add network energy consumption and reduce network survival time.

8) Energy consumption is also a challenge of Zigbee. ZigBee was specifically designed for home applications and have some features like high latency due to the low power consumption ,low cost, long battery life etc. The configuration is the main issue and it should be done very carefully. Selection of the routing method and type of topology plays an important role because Zigbee aims to achieve greater efficiency. A mixed routing strategy of AODV and Tree Routing is also designed in the ZigBee specification. But there is no method designed to balance these two Routing modes in order to achieve better performance .So choosing the best method is also a challenge for Zigbee. .

CONCLUSION

We analyze the performance of mobile ZigBee Network with stationary ZigBee network schemes. From the simulation results, it is concluded that the node mobility in ZigBee networks result in more delays and system load due to the reason that the node connections of mobile ZigBee nodes changes very fast, due to the fast-varying ZigBee stations in the mobile ZigBee systems, which results route failures. Though results are in terms of throughput and Hops/Route gets better with mobility as nodes gets evenly distributed over the entire network, which makes end nodes easier to communicate with coordinator

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Review: Artificial Intelligence and Machine Learning

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I.Abstract

Long days ago, there was all kind of work which is only done by the humans. There were no such machines and technologies like today. At that time, science is not developed and technologies were not invented. So the working is totally dependent on the peoples and humans have recognised that "Today‟s science is the tomorrow‟s technology". New superiorly advanced technologies are not less than blessing of god. Adaptive inventions for reducing the human work and bright future were invented which is simply called as Artificial Intelligence and Machine learning. Even though there were many false assumptions at the early beginning, we are witnessing a new era of errorless technology and superior science. This review involves the general concepts of artificial intelligence and machine learning.

II.Introduction

As the humans have proved their presence on the earth, it is important that every individual should understand what artificial intelligence and machine learning is going to mean for the human race .As a nice poem summarized by W. H. Auden which gives the relationship between human life and robotics: Those who will not reason Perish in the act; Those who will not act Perish for that reason. The poem explains that "Fittest survival" i.e. only those humans/machines will survive who prove their existence by their best performance, high intelligence and maximum capacity. Hence it‟s high time and precipice of one of the most magnificent discoveries of supremacy since man learnt to create tools and fire. It is a road that once we walk ahead; there will be no turning back, once we achieve machine super intelligence which will be selflearning, completely automatic and self-improvingAs we see any sci-fi movie like iron man, star wars, terminator etc. Which vary in completely equipped super hero‟s to the world destroying super robots .Even if anyone has seen missile or space shuttle launching, automatically driven cars, or simple robots which help in household chores to hard power full muscle works, which are very great examples of human intelligence. No doubt that artificial intelligence and machine learning are the two hottest buzzword all over the world right now, and often seem to be used interchangeably.

III .ARTIFICIAL INTELLIGANCE (AI)

According to father of artificial intelligence John McCarthy, who coined the term "Artificial intelligence" in 1956, said that "It is the combination of science and engineering to make intelligent devices for human welfare." "Artificial intelligence is an intellect [13] that is much smarter than the best human brain in practically every field, including computer science and linguistic logic."It is a modern method of machines which will do muscle work and illustrate complex questions in a "intellectual" manner. It is concerned with the basic and most important aspects in our life i.e. philosophy, computer science, mathematics, linguistics, biology, neuron science, sociology etc. AI plays a very important role to exhibit intelligent behaviour, to learn, demonstrate and give advice to the user.

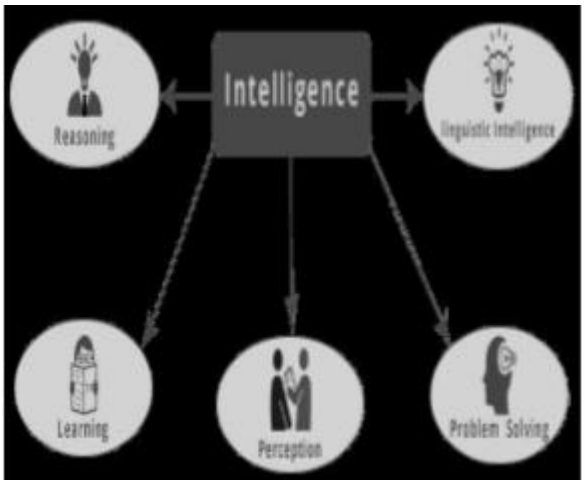

Fig1: Diagram of sectors in AI

Artificial General Intelligence or AGI is a system that defines that the machine can do intellectual behaviour as the humans can do many processes at a time. A broader view to artificial intelligence is that it can be the combination of learning, perception, problem solving and adapting new solutions to the system. It also involve linguistic logic and reasoning [1]. Artificial intelligence has 2 types:

1.Weak AI
2. Strong AI

1. Weak AI. The principle of Weak AI is that the machinebehave as if they are intelligent. Weak AI proves that virtual abilities like thinking, talking, moving can be done by machine if they are programmed in that manner. E.g. In the chess game, the computer can play and move players automatically.. The computer does not have thinking ability but in actual it is programmed so that the computer always takes right step.

2.Strong AI: The principle of Strong AI is that the machines will do calculations and think itself and will predict the answer in future. E.g. The artificial intellectual supercomputer „WATSON" invented by IBM. Thus in future, there will be definitely such machines or may be humanoids which will do its own work and think more powerful than human beings.

IV. MACHINE LEARNING

A machines the access to data of a machine learning are more ease in human work and just to learn current application of AI which promotes the reality just to be able to give them for themselves. Learning is a key hallmark of artificial intelligence. It is an ability of the machines to take real – time data and feedback and improves performance over a time. Machine learning is type of artificial intelligence which has ability to learn and takes the data to get good output. Both the terms, Artifical intelligence. They actually work like a super-computer. These machines or generally known as "Humanoids" are very perfect at their work. The concept Machine learning is technically a idea that we can build machines to process data and Machine learning is based on the but it's more specific than the overall.

Reasons for this are numerous: lack of (suitable) data, lack of access to the data, data bias, privacy problems, badly chosen tasks and algorithms, wrong tools and people, lack of resources, and evaluation problems.

1.Machine learning approaches in particular can suffer from different data biases. A machine learning system trained on current customers only may not be able to predict the needs of new customer groups that are not represented in the training dataIn . A s machine learning is used more often in products and services, there are some significant considerations when it comes to users' trust in the Internet. Several issues must be considered when addressing AI, including, socio-economic impacts; issues of transparency, bias, and accountability; new uses for data, considerations of security and safety, ethical issues; and, how AI facilitates the creation . Image recognition is one of the most common uses of machine learning. There are many situations where you can classify the object as a digital image.

2.Machine learning can be used for face detection in an image as learning is also used for character recognition to discern handwritten as well as printed letters. We can segment a piece of writing into smaller images, each well. There is a separate category for each person in a database of several people. Machine containing a single character.

3. Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. Machine learning focuses on the development of computer programs that can access data and use it learn for themselves.

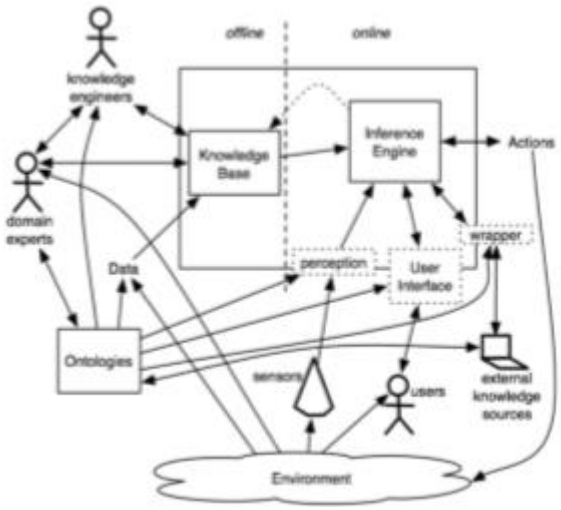

Fig 2: a Diagram representing machine learning mechanism

The diagram explains that machine learning done not only depend on how the know ledged engineer perform on training bases but also how he works for new experiments. Machine learning is one of the most important technical approaches to AI and the basis of many recent advances and commercial applications of AI. Modern machine learning is a statistical process that helps to define the output and future use of data.

There are following types of learning:

1.Supervised learning
2.Unsupervised / predictive learning
3.Reinforcement learning

1.Supervised learning

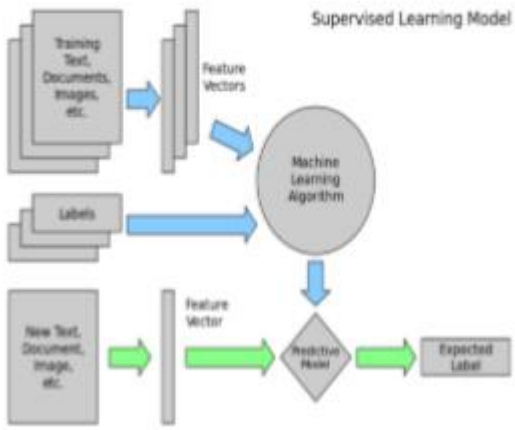

Fig 3: b Supervised learning model

Supervised learning provides you with a powerful tool to classify and process data using machine language. With supervised learning you use labeled data, which is a data set that has been classified, to infer a learning algorithm. The data set is used as the basis for predicting the classification of other unlabeled data through the use of machine learning algorithms.

2.Unsupervised / predictive learning

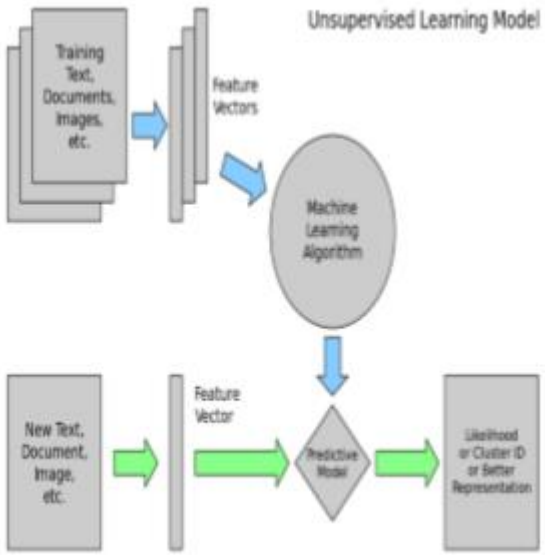

Fig 4: c Unsupervised learning model

Unsupervised learning is a branch of machine learning that learns from test data that has not been labeled, classified or categorized. Instead of responding to feedback, unsupervised learning identifies commonalities in the data and reacts based on the presence or absence of such commonalities in each new piece of data. Alternatives include supervised learning and reinforcement learning.

3. Reinforcement learning

Reinforcement learning is an area of Machine Learning. It is about taking suitable action to maximize reward in a particular situation. It is employed by various software and machines to find the best possible behavior or path it should take in a specific situation. Reinforcement learning differs from the supervised learning in a way that in supervised learning the training data has the answer key with it so the model is trained with the correct answer itself whereas in reinforcement learning, there is no answer but the reinforcement agent decides what to do to perform the given task. In the absence of training dataset, it is bound to learn from its experience.

V.APPLICATIONS OF AI AND MACHINE LEARNING

As we know that how AI is most useful topic in human life. There are many day-today examples of AI. There is siri by apple, google now by google, Watson by IBM and cortana by windows mobile for various operating systems which are intelligent digital personal assistants which have speech and gesture recognition system which helps the user to find and sort out all the needed things without any physical appearance.

Fig 5: a Siri by apple

Fig 6: b Watson by IBM

Fig 7: c Cortana by Microsoft

It will give all the information to you like....”where is nearest restaurant/college/bus station?” or it will remind your pending work, alarm clock, personal information as well as your friend‟s birthday or important meetings to handle, etc.

Many future and current researches are going on by scientists on humanoids i.e. robotics along with human behaviour and feelings. There are also high performance cars along with automatic drivers assists, missiles with radar, satellites and navigation systems.

Fig 8: d. Valkyrine

Fig 9: e Google self-driving car

The self-driving car called „Waymo‟. which is a google initiative drives on the road without driver. Again NASA and GOOGLE are together for first ever humanoid astronaut known as „Valkyrine‟ which is an absolute example of artificial intelligence.

VI.CONCLUSION

The entire world is on the way of Digitalization and for that purpose the artificial intelligence and machine learning concepts plays an important role. Our research paper is totally based upon, how the intelligence and new machine technologies get invented in our day to day life. Today‟s machines are ready to give the knowledge based education and are responsible for improving the intelligence. In future, we don‟t think and imagine about the progress of world due to only Artificial Intelligence and Innovative Machines. We can‟t imagine about what happening in surrounding and in all over world because of scientists and engineers. Scientist developed the Robots who is working like a Human Being and also the research is going on to create the best world in future. Youth generation support is one of the most important parts to develop the new technologies. Combination of Science and Engineering and the quality machine learning will surely take the world at its highest fit.

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Review: Superiority of blowfish algorithm in wireless networks

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Abstract:

Encryption calculation assumes a critical job in data security which ensures the ongoing developing web and system applications. They are utilized to verify the information in remote systems against malignant assaults however verifying information likewise devours assets, for example, C.P.U time, Memory, battery power, encryption time and so forth. Right now, assessed the exhibition of four symmetric key encryption calculations; AES, DES, 3DES and Blowfish which ordinarily utilized for information encryption as far as encryption time, unscrambling time and throughput. Right now, assessed encryption time, unscrambling time and throughput for each of the four encryption calculations in Visual Basic's condition utilizing huge size content information (.doc). Trial results show that Blowfish encryption calculation might be increasingly appropriate for remote systems. Study uncovers that Blowfish gives preferable exhibition over AES, DES and 3DES as far as encryption time, unscrambling time and throughput.

Catchphrases

AES, Blowfish, DES, Encryption Algorithm, Security.

Presentation

Cryptography is a study of data security. It is the specialty of ensuring the information. It stores and transmits the data securely over the shaky medium like Internet by encoding content information into a structure non unmistakable arrangement with the assistance of different encryption calculations and just the expected client will have the option to change over it into unique content. The procedure which changes over unique information into the incoherent structure is called encryption process. The scrambled information is called figure content.

The turn around of information encryption is information decoding which changes over the figure message once again into the first content. Unique content is additionally called plain content. Cryptology is a blend of Cryptography (encryption) and cryptanalysis (decoding). Cryptography calculations are named: Symmetric (private key) calculation and lopsided (open key) calculation. In symmetric calculations utilizes just one key for scramble the information and same for unscramble the information.

Uneven key calculation utilizes two keys, one is utilized to scramble the information and other is utilized to decode the information. Length of Key has a significant spot in Symmetric key encryption [1]. For a similar calculation, encryption utilizing longer key is difficult to cryptanalyze.

RESEARCH BACKGROUND

To give more perspectives of the performance of the compared algorithms this section discusses the results obtained from other resources:

Diaa Salama et.al (2011) paper presents a performance evaluation of selected symmetric encryption algorithms on power consumption for wireless devices. The selected algorithms are AES, DES, RC6, Blowfish, RC2 and 3DES. There is insignificant difference between open key authentications and shared key authentication in ad hoc Wireless LAN connection with excellent signals. In case of poor signal it is found that, transmission time increased minimum by 70 % over open sheered authentication in ad hoc mod.

Simar Preet Singh et.al (2011) study uncovers that Blowfish has preferable presentation over other usually utilized encryption calculations. Since Blowfish has no known security frail focuses up until this point, it very well may be considered as an incredible standard encryption calculation. AES indicated horrible showing results contrasted with different calculations, since it requires all the more preparing force. M. Umaparvathi et.al (2010) examined the examination of the most generally utilized symmetric encryption calculations AES (Rijndael), DES, 3DES and Blowfish as far as force utilization. A correlation has been led for those encryption calculations at various information types like content, picture, sound and video. Results demonstrated that AES has a superior exhibition than other regular encryption calculations utilized. Since AES has no known security Weak focuses up until now, this makes it an astounding contender to be considered as a standard encryption calculation. 3DES indicated lackluster showing results contrasted with different calculations since it requires all the more handling force.

Tingyuan Nie et.al (2010) talked about the presentation of two symmetric key encryption calculations: DES and Blowfish which usually utilized for arrange information encryption. Right now, examined encryption security, assessed encryption speed and force utilization for the two calculations. Trial results show that Blowfish calculation runs quicker than DES, while the force utilization is nearly the equivalent. It is demonstrated that Blowfish calculation possibly progressively reasonable for remote system which trades little size bundles. Allam Mousa et.al (2006) paper Analyzing the RC4 parameters have indicated that the speed of encryption or unscrambling time is legitimately identified with the encryption key length and to the information document size if the information is sufficiently huge. Information type is additionally significant since picture information requires

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bigger time to be handled than content or sound information basically because of the bigger document size. This relationship had been changed over into conditions tomodel these connections thus might be utilized to anticipate the exhibition of the RC4 under various conditions.

STRATEGY TO EVALUATE PERFORMANCE

This area portrays the recreation procedures which are utilized to assess the exhibition of different symmetric calculations. What's more this segment will talk about the system related parameter like exploratory set-up and execution measurements.

Experimental Set-up

The different symmetric encryption calculations have been executed in Visual Basic language and the analysis has been completed utilizing a Laptop having 2.20 GHz Intel Pentium Core 2 Duo processor with 4 GB RAM on Windows 7 home premium, 32-piece working framework. Right now scrambles and decodes the content record of 98 MB.

Description of the Snapshot

The fig. 1 shows the screen shot of the product which is utilized by the client. Right off the bat the drive has been chosen then organizer after the specific record (which is to be scramble or unscramble) and finally when we press the encode key;ss
the encryption time and the throughput of encryption time will be determined naturally and showed on the characterized discourse box and to get the unscrambling and throughput of decoding time; above all else we reset it and again a similar strategy is followed while choosing the document and comparatively the estimation of unscrambling time and throughput of unscrambling time is determined by squeezing the decode key.

Performance measurements

The presentation measurements are encryption time (milliseconds), decoding time (milliseconds) and throughput (Mb/sec.).

Encryption Time: It is the time that an encryption calculation takes to deliver a figure content from a plain book. Encryption time is utilized to compute the throughput of an encryption procedure. As it were, it shows the speed of the encryption procedure. The encryption time is commonly determined in milliseconds. It is the time taken by an encryption calculation to encode the information. Less is the encryption time; more will be execution of that calculation.

Unscrambling Time: It is the time that an encryption calculation takes to create a plain book from a figure content. Decoding time is utilized to figure the throughput of an unscrambling procedure. At the end of the day, it shows the speed of the decoding procedure. The decoding time is commonly determined in milliseconds. It is the time taken by an encryption calculation to unscramble the information. Less is the decoding time; more will be execution of that calculation Throughput: The throughput of the encryption conspire is determined as the absolute plain content in encoded in Kbytes isolated by the encryption time in milliseconds. The unit of throughput is MB/Sec. More is the throughput; more will be the presentation.

The throughput of the encryption conspire is determined as the proportion of all out plain content by encryption time.

Throughput of Encryption Algorithm = Tp (Kbytes) Et (Milliseconds)
Where; Tp: Total Plain Text (Kbytes) Et: Encryption Time (Milliseconds)

END AND FUTURE SCOPE

We introduced a reasonable examination between AES, DES, 3DES and Blowfish regarding Encryption time, Decryption time and Throughput. The displayed recreations demonstrated that Blowfish has better execution as far as Encryption time, Decryption time and Throughput. Second point can be seen here that AES has advantage over the different 3DES and DES as far as throughput and unscrambling time with the exception of Blowfish. In third point at similar conditions 3DES has minimal execution regarding throughput of decoding process. In future the work might be stretched out by including the plans and systems by considering the various information bundle estimates over various sorts of information, for example, picture, sound and video and building up a more grounded encryption calculation with fast and least vitality utilization.

Lets see each step one by one:

Step1: Generation of subkeys:

18 subkeys{P[0]…P[17]} are needed in both encryption aswell as decryption process and the same subkeys are used for both the processes.

These 18 subkeys are stored in a P-array with each array element being a 32-bit entry.

It is initialised with the digits of pi(?).

The hexadecimal representation of each of the subkeys is given by:

- P[0] = "243f6a88"
- P[1] = "85a308d3"
- .
- .
- P[17] = "8979fb1b"

Step2: initialise Substitution Boxes:

4 Substitution boxes(S-boxes) are needed{S[0]…S[4]} in both encryption aswell as decryption process with each S-box having

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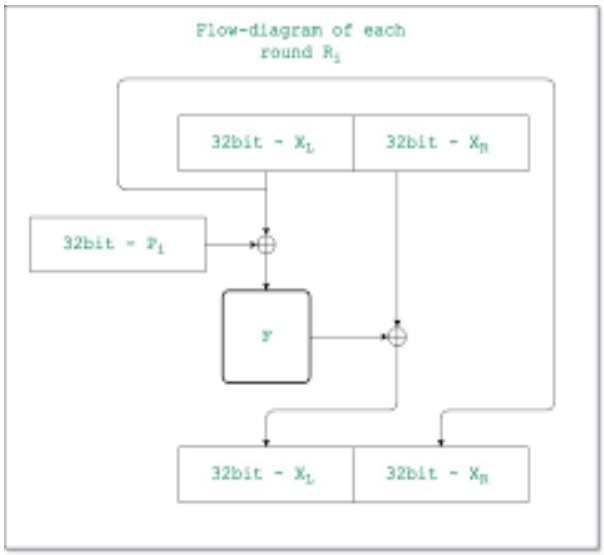
256 entries{S[i][0]…S[i][255], 0&lei&le4} where each entry is 32-bit.

It is initialised with the digits of pi(?) after initialising the P-array.

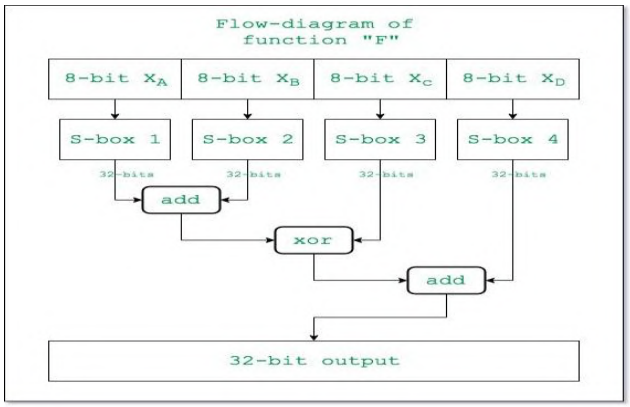
Step3: Encryption:

The encryption function consists of two parts:

Rounds: The encryption consists of 16 rounds with each round(Ri) taking inputs the plainText(P.T.) from previous round and corresponding subkey(Pi).



The description of the function ” F ” is as follows:



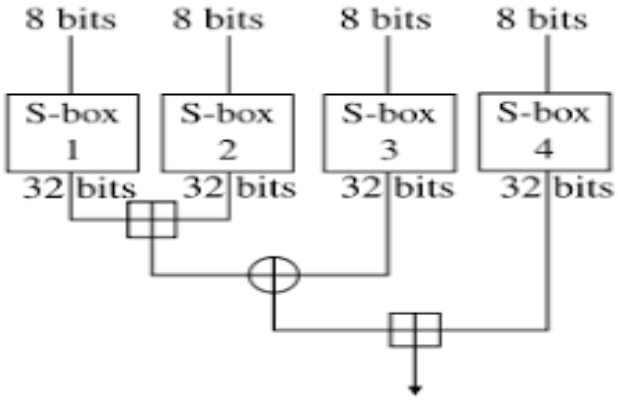
Here the function “add” is addition modulo 2^32.

BLOWFISH IN PRACTICE

Blowfish is a quick square figure, with the exception of when evolving keys. Each new key requires pre-preparing equal to encoding around 4 kilobytes of content, which is exceptionally moderate contrasted with other square figures. This forestalls its utilization in specific applications, yet isn't an issue in others.

In one application Blowfish's moderate key changing is really an advantage: the secret key hashing technique (tomb $2, for example bcrypt) utilized in OpenBSD utilizes a calculation got from Blowfish that utilizes the moderate key calendar; the thought is that the extra computational exertion required gives security against lexicon assaults. See key extending.

Blowfish has a memory impression of a little more than 4 kilobytes of RAM. This requirement isn't an issue in any event, for more seasoned work area and PCs, it prevents use in the littlest inserted frameworks, for example, early smartcards.



Blowfish was one of the principal secure square figures not expose to any licenses and in this way openly accessible for anybody to utilize. This advantage has added to its ubiquity in cryptographic programming.

crypt is a secret key hashing capacity which, joined with a variable number of cycles (work "cost"), misuses the costly key arrangement period of Blowfish to build the remaining task at hand and span of hash figuring, further lessening dangers from savage power assaults.

crypt is likewise the name of a cross-stage document encryption utility actualizing Blowfish created in 2002.

A. Weakness and successors

Blowfish's utilization of a 64-piece square size (instead of for example AES's 128-piece square size) makes it helpless against birthday assaults, especially in settings like HTTPS. In 2016, the SWEET32 assault exhibited how to use birthday assaults to perform plaintext recuperation (for example decoding ciphertext) against figures with a 64-piece square size. The GnuPG venture prescribes that Blowfish not be utilized to scramble documents bigger than 4 GB because of its little square size.

A decreased round variation of Blowfish is known to be helpless to known-plaintext assaults on brilliantly feeble keys. Blowfish executions utilize 16 rounds of encryption, and are not vulnerable to this attack.Nevertheless, Bruce Schneier has prescribed relocating to his Blowfish successor, Twofish.

TWOFISH

In cryptography, Twofish is a symmetric key square figure with a square size of 128 bits and key sizes up to 256 bits. It was one of the five finalists of the Advanced Encryption Standard challenge, yet it was not chosen for institutionalization. Twofish is identified with the previous square figure Blowfish

Twofish's unmistakable highlights are the utilization of pre-figured key-subordinate S-boxes, and a moderately perplexing key timetable.

One portion of a n-bit key is utilized as the genuine encryption key and the other portion of the n-bit key is utilized to adjust the encryption calculation (key-subordinate S-boxes). Twofish obtains a few components from different plans; for instance, the pseudo-Hadamard transform (PHT) from the SAFER group of figures.

Twofish has a Feistel structure like DES. Twofish likewise utilizes a Maximum Distance Separable network.

In 2000, on most programming stages Twofish was marginally more slow than Rijndael (the picked calculation for Advanced Encryption Standard) for 128-piece keys, yet fairly quicker for 256-piece keys.

Yet, after Rijndael was picked as the Advanced Encryption Standard, Twofish has become much more slow than Rijndael on the CPUs that help the AES guidance set.

THREEFISH

Threefish is a symmetric-key tweakable square figure planned as a feature of the Skein hash work, a section in the NIST hash work rivalry.

Threefish uses no S-confines or other table queries request to maintain a strategic distance from reserve timing attacks;its nonlinearity originates from exchanging increases with selective ORs. In that regard, it is like Salsa20, TEA, and the SHA-3 up-and-comers CubeHash and BLAKE.

Threefish and the Skein hash work were structured by Bruce Schneier, Niels Ferguson, Stefan Lucks, Doug Whiting, Mihir Bellare, Tadayoshi Kohno, Jon Callas, and Jesse Walker.

MACGUFFIN (CIPHER)

In cryptography, MacGuffin is a square figure made in 1994 by Bruce Schneier and Matt Blaze at a Fast Software Encryption workshop. It was proposed as an impetus for examination of another figure structure, known as Generalized Unbalanced Feistel Networks (GUFNs). The cryptanalysis continued rapidly, so rapidly that the figure was broken at a similar workshop by Vincent Rijmen and Bart Preneel.

The algorithm

Schneier and Blaze put together MacGuffin with respect to DES, their primary change being that the information square isn't part into equivalent parts in the Feistel organize. Rather, 48 bits of the 64-piece information square are bolstered through the round capacity, whose yield is XORed with the other 16 bits of the information square.

The calculation was trial, expected to investigate the security properties of unequal Feistel systems.

ADVANCED ENCRYPTION STANDARD

The Advanced Encryption Standard (AES), likewise known by its unique name Rijndael (Dutch elocution: [ˈrɛindaːl]) is a particular for the encryption of electronic information built up by the U.S. National Institute of Standards and Technology (NIST) in 2001.

AES is a subset of the Rijndael square cipher created by two Belgian cryptographers, Vincent Rijmen and Joan Daemen, who presented a proposal to NIST during the AES choice process.Rijndael is a group of figures with various key and square sizes.

For AES, NIST chose three individuals from the Rijndael family, each with a square size of 128 bits, yet three diverse key lengths: 128, 192 and 256 bits.

AES has been received by the U.S. government and is presently utilized around the world. It supplants the Data Encryption Standard (DES), which was distributed in 1977. The calculation depicted by AES is a symmetric-key calculation, which means a similar key is utilized for both scrambling and unscrambling the information.

In the United States, AES was declared by the NIST as U.S. FIPS PUB 197 (FIPS 197) on November 26, 2001. T

his declaration followed a five-year institutionalization process in which fifteen contending structures were exhibited and assessed, before the Rijndael figure was chosen as the most reasonable (see Advanced Encryption Standard procedure for more subtleties).

AES got successful as a government standard on May 26, 2002, after endorsement by the Secretary of Commerce.

AES is remembered for the ISO/IEC 18033-3 standard. AES is accessible in a wide range of encryption bundles, and is the sole openly available figure affirmed by the National Security Agency (NSA) for top mystery data when utilized in a NSA endorsed cryptographic module (see Security of AES, beneath).

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Review and Analysis of Palm Recognition System Using Geometry Features.

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***Abstract*— Biometric acknowledgment is a rising innovation and achieving superior from most recent quite a while. Our proposed framework centers around various highlights got from a solitary format. The point of this work is to consolidate palm print and hand geometry highlight to accomplish exactness and elite. The highlights of enthusiasm for proposed framework are hand geometry, palm length, palm width and palm proportion. In the present work, a methodology is exhibited for programmed identification and acknowledgment of standard two dimensional shapes in low commotion conditions. The work has huge number of direct applications in reality. The calculation proposed depends on finding the edges and accordingly thusly ascertaining the zone of the article helps in distinguishing proof of a predetermined shape. The outcomes were recreated utilizing MATLAB device are empowering and approve the proposed calculation.**

***Keywords*— Hand Geometry, Image Processing, Biometric, Palm Recognition, Edge detection, Feature extraction.**

I. INTRODUCTION

The task of physical item or any occasion to an as of now pre-determined database of classifications is in to a great extent named as example acknowledgment. An example is an article, procedure or occasion. Example significantly focuses on the game plan of the articles as opposed to the fundamental idea of the components. What contains an example is an inquiry? An example can be said as the curves in a unique finger impression or a DNA test or penmanship cursive or a scanner tag of a thing or a human face or any information that frames an important thought. Example acknowledgment is normally done from an immense class. A class is a lot of example that share regular characteristics generally gathered over an equivalent data asset. At the point when the procedure of acknowledgment comes the articles are ordered to the items independently. [1] Anything that is inverse to tumult is design which is untestable and structures an important sense for information.

A person can without much of a stretch characterize an item or a hint of component of human or any substance whatever be the direction or facial changes or a few bends as well yet in the event that a similar assignment is to be completed by the machine or the PC in coordinating it turns into a mind boggling task for it since it has information spared in one arrangement the directions are not there so perceiving the example is a key idea which has increased a ton of significance in the ongoing occasions however the innovation has won since the 1960s.But in late patterns it is a wide examined field.[2] Example acknowledgment is that piece of computerized reasoning which encourages the machines to think and get the appropriate responses simply similar people however from the machines.

For e.g., a person a youthful grown-up can undoubtedly group the letters written in any foundation or regardless of whether the pieces of the letters are absent or littler or bigger the text style. But for the machines that is PCs to perceive and give yields dependent on the varieties it has seen for something very similar and making sounds or coordinating procedure for the examples. Example acknowledgment is the strategy to spectator the earth and separate changes and produce the alluring yield the same human mind. The best example acknowledgment method actualized effectively and discovered all-inclusive right is the human cerebrum. [3] Through different inquires about still the arrangement isn't discovered that how a human mind shapes a right and comprehensive techniques for the example acknowledgment. The exploration for fake executed example acknowledgment is going on since such a large number of decades not had the option to locate a healthy answer for the example acknowledgment for the elements.

II. LITERATURE REVIEW

The fundamental thought behind doing a writing overview is to pick up information with respect to the related work. As was for our situation, a few research paper was mulled over and studied. Stress is laid to outline the idea of various creators who has worked right now.

In the previous decades, a few three-dimensional face acknowledgment calculations have been planned, and assessed. They differ broadly in principle, instruments, and strategies. Here we propose another 3D face acknowledgment calculation, completely created in MATLAB, whose structure thoroughly originates from differential geometry. The initial step being extraction of 17 delicate tissue tourist spots depending on geometrical properties of facial shape.

Enrico Vezzetti, Federica Marcolin, Giulia Fracastoro [4] :Vezetti and Marcolin have utilized subordinates, coefficients of the key structures, head, mean, and Gaussian ebbs and flows, and shape and curvedness records. At that point, a lot of geodesic and Euclidean separations, together with nose volume and proportions among geodesic and Euclidean separations, has been registered and added in a last score, used to think about countenances. The most elevated commitment of this work is that its hypothetical premise is differential geometry with its different descriptors, which is something very surprising in the field.

Xiang Bai, XingweiYang[5]: Due to issues experienced like mutilation, commotion, division mistakes, cover, and impediment

of items in computerized pictures, it is practically difficult to remove a total article shape or to section the articles in general. Be that as it may, now and again parts of shapes can be accurately remade either by performing edge gathering or as parts of limits of divided areas. Subsequently, acknowledgment of articles dependent on their shapes is by all accounts a promising examination course. The fundamental commitment of the paper distributed by Xiang Bai and Yang is a framework for distinguishing and perceiving of shape parts in advanced pictures. Discovery and acknowledgment, both, depend on shape relationship of form parts. For each form part delivered by form gathering, they have utilized shape likeness to get the most comparative shape parts in a database of realized form sections. A shape-based grouping of the recovered form parts at that point performs concurrent identification and acknowledgment. Complete forms of realized items are parsed utilizing discrete bend advancement. At that point, their portrayal is built that is invariant to scaling, pivot, and interpretation.

Rong-Xiang Hu , Wei Jia [6] Xiang Hu and David Zhang proposed hand shape acknowledgment technique which they named as Coherent Distance Shape Contexts (CDSC). It depends on two traditional shape portrayals, i.e., Shape Contexts (SC) and Inner-separation Shape Contexts (IDSC). CDSC is equipped for catching discriminative highlights from hand shape. It can manage the inaccurate correspondence issue of hand milestone focuses. In particular, it can separate highlights for the most part from the form of fingers. To check the viability of CDSC, they make another picture database containing 4000 grayscale left hand pictures of 200 subjects, on which CDSC has accomplished the precise ID pace of 99.60% for recognizable proof and the Equal Error Rate of 0.9% for confirmation. These are practically identical with the best in class hand shape acknowledgment strategies.

Shefali Sharma[7]:A multimodal biometric framework for individual character check was proposed utilizing hand shape and hand geometry in the paper distributed by Shefali Sharma and others. Shape and geometry highlights were determined with the assistance of just the form of the hand picture for which just one picture securing gadget is adequate. Preparing was finished as for a steady reference point at the wrist line which is increasingly steady when contrasted with the centroid against the finger revolution and pinnacles and valleys assurance. Two shape based highlights were extricated. This was finished by utilizing the separation and direction of each purpose of hand shape regarding the reference point followed by wavelet deterioration to diminish the measurement. Seven separations were utilized to encode the geometrical data of the hand. Shape and geometry based highlights were melded at score levels and their exhibitions assessed utilizing standard ROC bends between bogus acknowledgment rate, genuine acknowledgment rate, equivalent mistake rate and decidability file. Numerous similitude measures were utilized to look at the precision of the presented strategy. Execution of framework is investigated for shape based (separation and direction) and geometrical highlights independently just as for every single imaginable mix of highlight and score level combination. The proposed highlights and combination techniques are contemplated more than two hand picture datasets, (1) JUET contact database of 50 subjects having 10 layouts each and (2) IITD contactless dataset of 240 subjects with 5 formats each. The proposed strategy outflanked different methodologies with the best 0.31% of EER.

III. PROPOSED METHODOLOGY

There are a few models actualized since the time the example acknowledgment has developed. The models are ordered dependent on their working and the working models.

A. Statistical Method

Right now what is done is each example is completely presented as highlights. Here the space involved by the examples are non-covering that is they don't exist together with one another. It takes a full outline of the pictures to be analysed and relying upon that shapes a procedure which is wanted. The model works the best when there is an unmistakable way of room between the pictures and it doesn't frame a group. Long it implies it has an appropriate interclass separation between the areas of two explicit articles. The choice is taken dependent on the likelihood conveyance and afterward the yield is extricated. [8] There are different middle of the road steps which makes it an effective model for the preparation motivation behind example acknowledgment. In view of the examination and the past database it learns and adjusts for the future examples to be perceived. If there should arise an occurrence of the mutilations and the loud example the model works the best since it mulls over the numerical model of restrictive likelihood energetically. Contingent on the model is administered or solo the model factual changes the structure. The regulated model is understood by the statically model as far as discriminant investigation and the solo is unravelled as the important part examination. Discriminant investigation is progressively effective in wording to head segment examination in time exactness and time experienced.

B. Structural or Syntactical Model

It includes progressively complex pictures and examples that can perceived by the example model than the statically model. The word basic model is named all things considered in light of the fact that the example acknowledgment is finished by the methods for a chain of command that is a tree development which is additionally partitioned into sub examples and afterward the examination is finished. The model did the acknowledgment methods utilizing two straightforward techniques. They are:

a. Language structure examination
b. Structure Comparison

The acknowledgment of complex articles requires a chain of importance along these lines this example is chosen. A less complex sub designs makes up a perplexing example. The model is additionally called as syntactic model because of the sub designs how they are framed the punctuation behind that and the endeavours to perceive the last item from the sub designs and their related dialects. The basic portrayal is known as the natives and the language depiction of the principles of the language is known as the example depiction language. [9] Increased arrangement of example dialects increments the multifaceted nature of the linguistic structure investigation framework. This model is generally utilized for the shape investigation and the surface developments of forms and the examples that have auxiliary worth. A progressive auxiliary model is utilized where there are more than sub models that are utilized like 2dimensional math issues, chromosomes and unique mark must be distinguished.

C. Template matching model

One of the most straightforward and well prestigious procedure is the format coordinating strategy. It by and large looks at tremendous the pixels, bends and the picture too. The picture model is as of now present the fundamental examination is conveyed between the example gave and the example to be coordinated contemplating the picture pivots, scaling and the varieties that an example can experience. The human cerebrum recalls a face regardless of whether it transforms left or right comparably it takes into al potential changes that an example can retained and frames an example coordinating in like manner. This strategy isn't appropriate for huge pictures since that will have a great deal of executions and it can't function admirably with the misshaped tests. It matches with the format that has been encouraged as of now. [10] The better the database the amazing the acknowledgment and coordinating.

D. Neural network model

Neural system originates from the term neurons in the human body. There a great many nerves and sub nerves associated with one another and working equal continuous and recognized. Additionally, here the model accepts the neuron like availability found in people and associates the units and the subunits which are interconnected at the same time and in particular equal. Typically, the neural system is known as the fake neural system. The human cerebrum learning is a ceaseless procedure also the model has a database and it follows a versatile learning technique simply like people. [11] It learns the mind boggling connections between the examples and the way to deal with follows. The quantity of neurons increments the better lucidity of the examples at a short interim of time. Like the statically model.

E. Fuzzy Set Model

The thinking about an individual was read for different years before building up this model. The human cerebrum how it frames an example is yet obscure yet the probability how it shapes an example and answers to some magical inquiries is fluffy that is it isn't fixed. It fluctuates once in a while it is a thing and at various it is unique so it very capricious dependent on the human instinct this model is created which likewise involves a spot for the flighty goals and varieties that are framed. So the fluffy sets are created. It significantly classifications two ideas speculation and the reflection.

IV. PROPOSED ALGORITHM

The figure below depicts our proposed calculation which comprises of three stages. First stage includes pre-processing in which pictures are gathered, changed over into paired structure, clamour evacuation and differentiation upgrade is performed. Second stage is include extraction and in third eliminate coordinating is conveyed.[12]

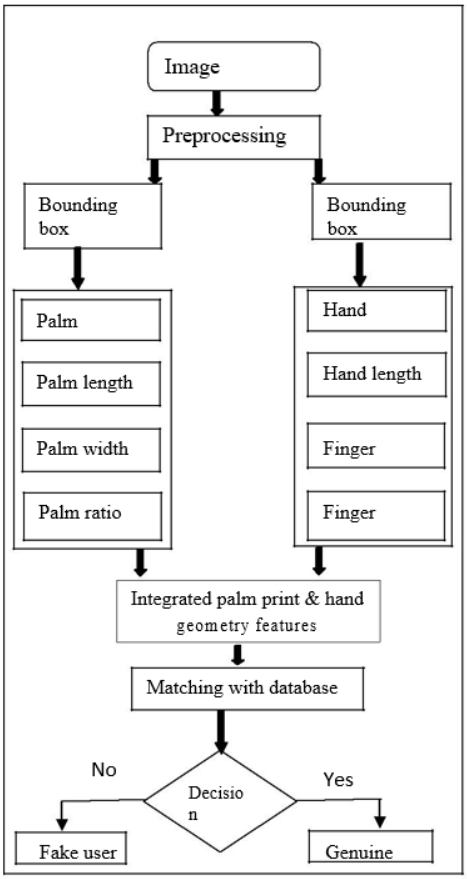

Figure 1 Proposed Algorithm

V. COMPARISON

Comparison of various techniques based on FAR (False Acceptance Ratio), FRR (False Rejection Ratio) and ERR (Equal Error Rate) parameters. In this section we compare the work done on hand geometry recognition using different methods.

S.no	No. of Samples	Recognition Method	FAR/FRR/EER	Identification Rate
1	20	Coherent Distance Shape Contexts	EER = 0.9%	99.60%
2	50	Distance Classifier	EER = 0.31%	-
3	6-8	Normalized Similarity Measure	FAR = 1.304% FRR = 1.2766%	94.6%
4	10	Hand Contour and Shape	EER = 0.31%	99.87%

Table 1: Comparison of Various Techniques

VI. CONCLUSION

The general execution of the proposed framework shows that the proposed work can be utilized for check reason in medium level association. The framework has been tried for various security estimations which produce great outcomes, anyway improvement is conceivable in proposed framework.

Proposed framework is contrasted and different calculations, for example. This framework for the most part relies upon the hand geometry of the framework and palm length and width. The framework can be additionally updated by limiting the preparing time, improving security level and the utilization of neural put together classifier prepared with respect to enormous database.

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The Effectiveness of Artificial Intelligence in Mechanical Engineering

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***Abstract*— With the advancement of computer technology, the application of artificial intelligence technology is becoming more widespread. In this research paper we addressed the important role that artificial intelligence plays in the current mechanical industry. Impact of Artificial Intelligence with Smart Machines and Automated Engineering Robots. It also introduces the concept of mechanical and electronic engineering and explores the interaction of mechanical and electronic engineering with the technologies of artificial intelligence. The technology used in machines these days helps solve real-world problems and complex situations. Many AI (Artificial Intelligence) algorithms have been able to provide solutions to many engineering approaches. Algorithms such as computing systems, fuzzy logic systems and neural networks have been developed to solve engineering problems. Over the years, Artificial Intelligence has made a positive impact on the engineering industry and has created smart systems that will greatly assist human life and broaden the scope of researchers for future development.**

***Keywords*— Artificial Intelligence, Mechanical Engineering, Complex Algorithms, Smart Systems, Neural Networks**

I. INTRODUCTION

Artificial Intelligence is a computer science field used to develop algorithms to implement complex, intensive programs. This is basically a magic wand towards smart machine automation. AI is a computer science field that enables computers to perform intellectual work on the research they are doing. This field is the result of translating "human intelligence" into computers to give a better product and unified field. Initially, AI experienced a major setback in the 1970s in the eighth report, and the second 1987-1993 AI winter as reported in the 1966 report. The advent of AI in the 21st century has blessed the tech industry with autonomous products such as machine learning and drone development, smart self-driving cars and automatic rockets. Artificial intelligence has been generalized into the field of computer science, which focuses on machine development, focusing on what people perceive as "intelligent".

II. THE ARTIFICIAL INTELLIGENCE RESEARCH DIRECTORATE

A. *Machine Learning:* It focuses on how software can mimic human learning behaviour, reorganize the existing information structure with the knowledge and skills, and continually increase its efficiency. It is the foundation of artificial intelligence, and the only way that machines have their own knowledge is through it. The machine learning is widely used in all areas of artificial intelligence, but it cannot be used for deductive reasoning.

B. *Expert System:* Another important area of artificial intelligence research is the Expert System (ES). Basic thinking techniques in using technology to solve specific problems will be discussed. ES turns theoretical research into a practical application of artificial intelligence: specialist systems can be viewed as specialized knowledge of computer intelligent program systems, which can use expertise and experience in specific fields, and logical techniques with artificial intelligence. Solving and simulating complex problems is often solved by experts. As shown in Figure 1, the basic system of experts includes Knowledge Base, Logic Machine, Database, Interpretation System, Knowledge Acquisition and User Interface.

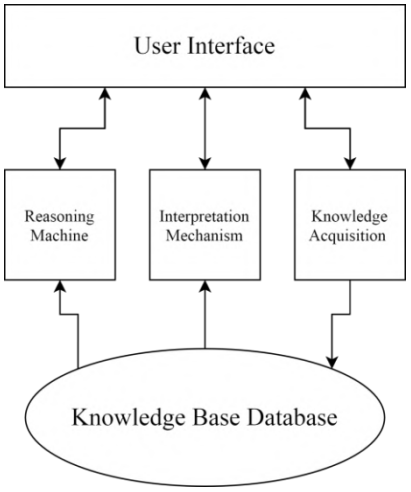

Fig. 1 Expert System Basic Structure

C. *Pattern Recognition:* Research in sample identification consists mainly of two aspects: one way of considering an organization that is part of the science awareness department; the other condition is the pattern recognition with the device at work. Formerly the subject of work involving physiologists, psychiatrists, biologists and neurophysiologists. It was later studied extensively by mathematicians and computer scientists and extended to document recognition, voice recognition, fingerprint detection, remote sensing and medical diagnostics. It has made people's lives much easier.

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D. Neural Network: Artificial Neural Network (ANN) is a mathematical construct, derived from the viewpoint of information processing, by abstracting the human neural network. This consists of a large number of neurons that are linked to one another. Each neuron represents a particular function of the output, called an excitation function. The relation between each of the two neurons reflects a weighting, called weight, through the associated signal. If neural network interaction mode shifts weight and reward feature, the network performance will also shift.

E. Deep Learning: Intensive theory of learning arises from the study of artificial neural networks which are part of the machine learning area. Deep learning applies to deep learning, learning, knowing the master concepts in oneself, and understanding unfamiliar data with sounds, images and other data. This technique is more familiar with the human brain. Deep learning is primarily about building a deep structure to learn multi-level representation, not referring specifically to a machine learning algorithm or model, but rather a technology.

III. Artificial Neural Network

It is defined as computational models designed with the use of machine learning, computer science and other research fields. Like other machine learning technologies, neural networks are also used to solve various tasks such as speech recognition, computer vision and many other feature-based detection systems. Generally, neural networks focus on solving problems, which help people find solutions to an existing problem. An Artificial Neural Network (ANN) model has been developed to analyse and simulate the correlation between mechanical properties between aluminium plate parameters and friction stir welding (FSW). In recent years, researchers and scientists have taken a keen interest in the design of mechanical engineering through the beginnings of artificial intelligence works. Artificial neurons are interconnected forms of neural biological networks. The model below depicts the neuron's real-life actions in the form of electrical messages they provoke.

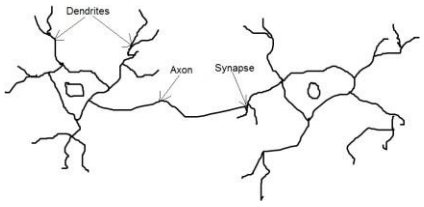

Fig. 2 Neural Biological Network

Typical inputs include basic parameters such as welding speed, tool rotation speed. Therefore, the outputs are tensile strength, elongation factor and yield strength. The ANN model can be used to measure the Mechanical properties of sheets of welded aluminum that represent the functions of welding speed and rotational speed. This mimics the combined effects on the mechanical properties of the welding speed and the intensity of the movement. Artificial neural networks are defined with proper inputs and outputs to use latent trajectories to predict various behavioural processes. A neural network consists of an artificial neuron cluster and processes data using a connection calculation method. In most cases, the ANN is a compatible device that changes its structure to support external or internal data flowing through the entire educational network. Sometimes they want to model specific relationships between inputs and outputs, or they want to see different models.

IV. ANN Mathematical Model

Mathematical Model ANN As indicated in Figure 3, the inputs act as a sink, which describes the loads that determine the frequency of individual signals. The mathematical model also describes the processing unit and the activation mechanism which controls the Neuron's output amplitude.

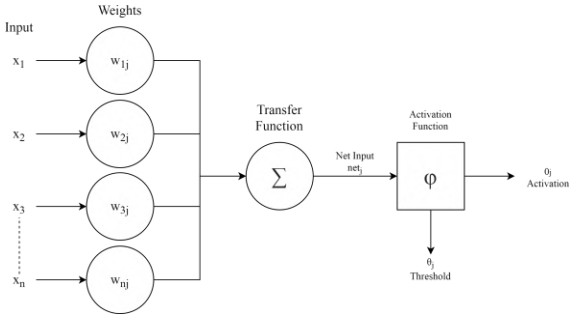

Fig. 3 Mathematical Model of Artificial Neural Network

Neural networks have historically been used to refer to biological neuron networks or lines, although the general use of the term generally applies to ANNs. That is, galvanized by biochemical processes such as brain networks.

V. Role of Artificial Intelligence for Mechanical Engineering Data Reduction

Square measurement of the Artificial Neural Network (ANN) and Vector Support Machine (SVM) used to estimate the TDA of the gear vibration signal. 2 models received class measurement. The computer file contains the synchronous signals of the rotating gear vibration and the output is also the TDA signal of the gear vibration. The maximum likelihood approach is used for the coaching of MLP networks. As value functions, the number of error squares and the weighting regularization are also used

VI. CAD Technology, Product Design and Sketch

This abstraction is explored on multiple layers of design tools. The term sketch speaks to a physical device, but it can also be used in a manner, such as an Associate in Nursing Inter sector Style Target or an Associate in Nursing Outsource Image, a Business Development Document. In accordance with Darus (2004), the existence of different levels of

abstraction between the background perception systems, there is identity confusion regarding ―CAD‖ objects, and it is obvious. Researchers have targeted aspects of early exploitation style, differentiating older devices with abstract planning steps on psychological features, and generally newer generation tools. Such an understanding of the advantages and disadvantages of sketches and CAD procedures should generally be done in favour of a 1 or an anti-styling device. Previous analysis suggests a different approach: studying the operation of styles as a whole process that takes advantage of each resource's complimentary possibilities.

VII. Artificial Intelligence Mechanics

The reduction of mechanical properties from experimental capacity is essentially an inverse study, where the information relates to computer estimation by changing the parameters of the process response until appropriate evaluation. This is usually done manually by trial and error. The mechanical behaviour of composite materials depends on the mechanical response of the component to the phase. Components of composite structure generally behave differently to their monolithic forms, and to create the mechanical behaviour of the material, it is important to understand the valuable mechanical nature of each process.

Artificial neural networks are often used to model the structural behaviour of monolithic and composite materials, usually in addition to finite part modelling. This follows the previous discussion on how we can build a neural network for the network. Anywhere we have an appropriate range for input and output variables; they want to estimate the uncertain output value for some specific input set. Huh. In application areas such as internal control, upcoming product, job search planning, supply / demand specification, style and analysis approaches, and style optimization elsewhere, these ANN options serve to benefit mechanical engineers. In the following section we discuss the lack of an ANN evaluated case for the determining natural frequency of split cantilever plate.

VIII. Mechanical and Electronic Engineering Concept

Mechanical engineering and electrical engineering is a science and technology that encompasses all aspects of physics, the center of which is mechanical electronics, together with related information processing and smart network expertise. In mechanical and electrical engineering theory of these disciplines has been widely used. The design of mechanical and electrical engineering requires the integration of computer technology, network technology and mechanical technology to combine various mechanical components to improve design. Although specialized in mechanical and electronic engineering design, the architecture is simple, the construction is not difficult and its performance is good. Mechanical and electronic engineering is highly efficient when it goes into production, smaller in size, replacing traditional machines.

IX. Relationship between Artificial Intelligence, Mechanical Engineering and Electronic Engineering

With the rapid development of electronic information, mechanical and electronic engineering has been widely employed as a fundamental discipline in our lives. But there are also flaws in mechanical and electronic engineering, such as the unstable system, the explanation for the failure is the flawed component in the electronic information system. Artificial intelligence itself can transfer the information quickly and process it in a timely manner which can effectively compensate for this deficiency. Electronic information systems can withstand much hardship and resistance in the input and output stage of mechanical and electronic engineering, if the input information is so complex that the electronic information system is likely to be faulty, then you must solve the problem manually. If you can combine the two elements, you can overcome the mechanical and electrical engineering problems and limitations.

X. Application of Artificial Intelligence in Mechanical Engineering

Artificial intelligence techniques are currently used in the diagnosis of mechanical engineering failures. In general, fault-based approaches to artificial intelligence include rule-based reasoning (RBR), case-based reasoning (CBR), and diagnosis-based diagnosis of tree failure. The RBR and CBR logic is based on the basic structure and basic principle of a traditional expert system. Figure 4 shows the general structure. The system includes a fictitious case database, a diagnostic protocol, a misdiagnosis database, a fault logic machine, a knowledge processing, a fault diagnosis interpreter, a learning system, and an expert interface man-machine system.

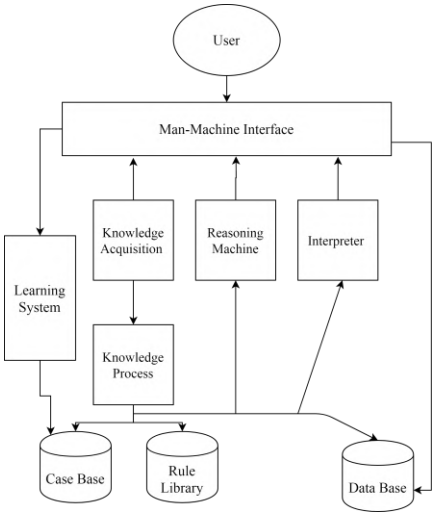

Fig. 4 Overall Structure of the System

The diagnostic system's basic working process is: First, the user inputs the online data that the machine monitors via the man-machine interface. Secondly, reasoning machine activates the corresponding rules for obtaining diagnostic

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results according to the positive reasoning mechanism, provides diagnostic expert advice and then retrieves the case through a certain algorithm in the database; then gets the most similar case, calculate the similarity by historical case, and complete the high-efficiency mechanical fault diagnosis. Finally, adding new cases will further improve the expert diagnosis system.

A. *Intelligent Diagnostic System for Rotating Machinery:* From the situation of mechanical equipment fault diagnosis, the theory and method of rotational machinery fault diagnosis technology has been improved day by day during the development of several years. It has achieved great economic advantages in the practical application. The fan diagnostic method is used as an example in this paper; in reality it is the uniformly implemented neural network diagnosis framework in the specification for fan fault diagnosis.

The system consists of two components: fan and engine. The main system can be divided into five subsystems according to the type of monitoring parameters: vibration, temperature, noise, oil and performance, in which the fault diagnosis and decision system is the core of the entire smart system

B. *Intelligent Diagnosis System for Reciprocating Machinery:* Because the reciprocating system has a set of high-speed reciprocating movement efficiency, the kinematics and fluid anatomy are much more complicated than the revolving machines, it is more difficult to diagnose fault. Investigation into the cause of failure and investigation diagnosis techniques is not enough. Diesel is a typical reciprocating engine; the integrated neural network diagnostic system is in fact a universal integrated neural network diagnostic system for diesel engine failure diagnostics applications.

Diesel engine failure can be divided into mechanical failure and performance failure. A sub-neural network can be used to diagnose performance faults, with performance parameters such as input such as power, speed, cylinder pressure, water temperature and so on. Two sub-neural networks diagnose the mechanical fault, and the integrated neural network diagnostics system is formed using the commonly used vibro acoustic (VA) signal and oil analysis information as input.

XI. Conclusion

From previous issues and case studies, it is often seen that ANNs should encourage the use of analytical methods to save time and effort on specific issues that are difficult and cumbersome. The application of ANN in the event of damage eliminates the need to repeatedly change the beam for various crack parameters and restart the iron analysis. Instead we sometimes simulate the beam to obtain enough information for the coaching of neural networks, and then the remaining defined performance values are often drawn from the neural network.

ANN offers a great many advantages to traditional approaches. Typically you would anticipate the network to be well-coached, based on the application's function and the intensity of the internal data model. The same applies to problems where relationships can be very dynamic or non-linear. Engineers start banking on additional and additional AI methods, regardless of branch or region. The use of ANN in the lower position repeatedly eliminates the need to adjust the beam for similar fracture conditions and restart the iron analysis.

This paper also reviews the artificial intelligence composition and development, as well as the relation between mechanical engineering, electrical engineering and artificial intelligence (AI). It also summarizes related mechanical engineering applications. Theoretical and practical research shows that intelligent technology has been commonly used in all fields of mechanical systems, together with information exploration and generalized artificial intelligence and other computer technology, which allows artificial intelligence more effective in the mechanical system and other areas.

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A Review: Android Versions

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ABSTRACT

Android is a mobile operating system based on a modified version of the Linux kernel and other open source software, designed primarily for touchscreen mobile devices such as smartphones and tablets. Android is developed by a consortium of developers known as the Open Handset Alliance, with the main contributor and commercial marketer being Google.

Initially developed by Android Inc., which Google bought in 2005, Android was unveiled in 2007, with the first commercial Android device launched in September 2008. The current stable version is Android 10, released on September 3, 2019. The core Android source code is known as Android Open Source Project (AOSP), which is primarily licensed under the Apache License. This has allowed variants of Android to be developed on a range of other electronics, such as game consoles, digital cameras, PCs and others, each with a specialized user interface. Some applications of android include Android TV for televisions and Wear OS for wearable, both developed by Google.

Keywords — Google, Android, Lollipop, Android OS service.

I. INTRODUCTION

Android is a Linux based operating system it is designed primarily for touch screen mobile devices such as smart phones and tablet computers. The operating system have developed a lot in last 15 years starting from black and white phones to recent smart phones or mini computers. One of the most widely used mobile OS these days is android[1]. The android is software that was founded in Palo Alto of California in 2003.

The android is a powerful operating system and it supports large number of applications in Smartphones. These applications are more comfortable and advanced for the users. The hardware that supports android software is based on ARM architecture platform. The android [7] is an open source operating system means that it's free and any one can use it. The android has got millions of apps available that can help you managing your life one or other way and it is available low cost in market at that reasons android is very popular. The android development supports with the full java programming language. Even other packages that are API and JSE are not supported. The first version 1.0 of android development kit (SDK)[5] was released in 2008 and latest updated version is jelly bean.

II. Features of Android

Android is open source and freely available to manufacturers for customization, there are no fixed hardware and software configurations. However, Android itself supports the following features[2]:

A. *Storage:*
Uses SQLite, a lightweight relational database, for data storage.

B. Connectivity
Supports GSM/EDGE, IDEN, CDMA, EV-DO, UMTS, Bluetooth (includes A2DP and AVRCP), WiFi, LTE, and WiMAX.

C. Messaging
Supports both SMS and MMS. Chapter 8 discusses messaging in more detail.

D. Web Browser
Based on the open-source WebKit, together with Chrome's V8 JavaScript engine

E. Media Support
Includes support for the following media: H.263, H.264 (in 3GP or MP4 container), MPEG-4 SP, AMR, AMR-WB (in 3GP container), AAC, HE-AAC (in MP4 or 3GP container),

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MP3, MIDI, Ogg Vorbis, WAV, JPEG, PNG, GIF, and BMP

F. Hardware Support
Accelerometer Sensor, Camera, Digital Compass, Proximity Sensor, and GPS

G. Multi-touch
Supports multi-touch screens

H. Multi-tasking
Supports multi-tasking applications

I. Flash support
Android 2.3 supports Flash 10.1.

J. Tehering
Supports sharing of Internet connections as a wired/wireless hotspot

III. Version history

Android is modernizing day by day since its release. These types of upgrades to the base operating system primarily concentrating on dealing with bugs together with incorporating additional features to provide additional accustomed environment. In many instances each and every latest version of the Android operating system is actually matured under a code name according to a dessert item. Several Of Android Operating System versions[3] are

A. Android versions 1.0 to 1.1: The early days
Android made its official public debut in 2008 with Android 1.0 — a release so ancient it didn't even have a cute codename. Things were pretty basic back then, but the software did include a suite of early Google apps like Gmail, Maps, Calendar, and YouTube, all of which were integrated into the operating system — a stark contrast to the more easily updatable standalone-app model employed today

B. Android version 1.5 : Cupcake
With early 2009's Android 1.5 Cupcake release, the tradition of Android version names was born. Cupcake introduced numerous refinements to the Android interface, including the first on-screen keyboard — something that'd be necessary as phones moved away from the once-ubiquitous physical keyboard model.
Cupcake also brought about the framework for third-party app widgets, which would quickly turn into one of Android's most distinguishing elements, and it provided the platform's first-ever option for video recording.

C. Android version 1.6 : Donut
Android 1.6, Donut, rolled into the world in the fall of 2009. Donut filled in some important holes in Android's center, including the ability for the OS to operate on a variety of different screen sizes and resolutions — a factor that'd be critical in the years to come. It also added support for CDMA networks like Verizon, which would play a key role in Android's imminent explosion.

D. Android version 2.0 to 2.1 : Eclair
Keeping up the breakneck release pace of Android's early years, Android 2.0 Eclair, emerged just six weeks after Donut; its "point-one" update, also called Eclair, came out a couple months later. Eclair was the first Android release to enter mainstream consciousness thanks to the original Motorola Droid phone and the massive Verizon-led marketing campaign surrounding it.
The release's most transformative element was the addition of voice-guided turn-by-turn navigation and real-time traffic info — something previously unheard of (and still essentially unmatched) in the smartphone world. Navigation aside, Eclair brought live wallpapers to Android as well as the platform's first speech-to-text function. And it made waves for injecting the once-iOS-exclusive pinch-to-zoom capability into Android — a move often seen as the spark that ignited Apple's long-lasting "thermonuclear war" against Google.

E. Android version 2.2 : Froyo
Just four months after Android 2.1 arrived, Google served up Android 2.2, Froyo, which revolved largely around under-the-hood performance improvements. Froyo did deliver some important front-facing features, though, including the addition of the now-standard dock at the bottom of the home screen as well as the first incarnation of Voice Actions, which allowed you to perform basic functions like getting directions and making notes by tapping an icon and then speaking a command.

Notably, Froyo also brought support for Flash to Android's web browser — an option that was significant both because of the widespread use of Flash at the time and because of Apple's adamant stance against supporting it on its own mobile devices. Apple would eventually win, of course, and Flash would become far less common. But back when it was still everywhere, being able to access the full web without any black holes was a genuine advantage only Android could offer.

F. Android version 2.3 :Gingerbread
Android's first true visual identity started coming into focus with 2010's Gingerbread release. Bright green had long been the color of Android's robot mascot, and with Gingerbread, it became an integral part of the operating system's appearance. Black and green seeped all over the UI as Android started its slow march toward distinctive design.

G. Android version 3.0 to 3.2 : Honeycomb
2011's Honeycomb period was a weird time for Android. Android 3.0 came into the world as a tablet-only release to accompany the launch of the Motorola Xoom, and through the subsequent 3.1 and 3.2 updates, it remained a tablet-exclusive (and closed-source) entity. Under the guidance of newly arrived design chief Matias Duarte, Honeycomb introduced a dramatically reimagined UI for Android. It had a space-like

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"holographic" design that traded the platform's trademark green for blue and placed an emphasis on making the most of a tablet's screen space.
While the concept of a tablet-specific interface didn't last long, many of Honeycomb's ideas laid the groundwork for the Android we know today. The software was the first to use on-screen buttons for Android's main navigational commands; it marked the beginning of the end for the permanent overflow-menu button; and it introduced the concept of a card-like UI with its take on the Recent Apps list.

H. Android version 4.0: Ice Cream Sandwich
With Honeycomb acting as the bridge from old to new, Ice Cream Sandwich — also released in 2011 — served as the platform's official entry into the era of modern design. The release refined the visual concepts introduced with Honeycomb and reunited tablets and phones with a single, unified UI vision.

ICS dropped much of Honeycomb's "holographic" appearance but kept its use of blue as a system-wide highlight. And it carried over core system elements like on-screen buttons and a card-like appearance for app-switching.

Android 4.0 also made swiping a more integral method of getting around the operating system, with the then-revolutionary-feeling ability to swipe away things like notifications and recent apps. And it started the slow process of bringing a standardized design framework — known as "Holo" — all throughout the OS and into Android's app ecosystem.

I. Android version 4.1 to 4.3: Jelly Bean
Spread across three impactful Android versions, 2012 and 2013's Jelly Bean releases took ICS's fresh foundation and made meaningful strides in fine-tuning and building upon it. The releases added plenty of poise and polish into the operating system and went a long way in making Android more inviting for the average user.

Visuals aside, Jelly Bean brought about our first taste of Google Now — the spectacular predictive-intelligence utility that's sadly since devolved into a glorified news feed. It gave us expandable and interactive notifications, an expanded voice search system, and a more advanced system for displaying search results in general, with a focus on card-based results that attempted to answer questions directly.

Multiuser support also came into play, albeit on tablets only at this point, and an early version of Android's Quick Settings panel made its first appearance. Jelly Bean ushered in a heavily hyped system for placing widgets on your lock screen, too — one that, like so many Android features over the years, quietly disappeared a couple years later.

J. Android version 4.4 : Kitkat
Late-2013's KitKat release marked the end of Android's dark era, as the blacks of Gingerbread and the blues of Honeycomb finally made their way out of the operating system. Lighter backgrounds and more neutral highlights took their places, with a transparent status bar and white icons giving the OS a more contemporary appearance.

Android 4.4 also saw the first version of "OK, Google" support — but in KitKat, the hands-free activation prompt worked only when your screen was already on *and* you were either at your home screen or inside the Google app. The release was Google's first foray into claiming a full panel of the home screen for its services, too — at least, for users of its own Nexus phones and those who chose to download its first-ever standalone launcher.

K. Android version 5.0 and 5.1 : Lollipop
Google essentially reinvented Android — again — with its Android 5.0 Lollipop release in the fall of 2014. Lollipop launched the still-present-today Material Design standard, which brought a whole new look that extended across all of Android, its apps and even other Google products.

The card-based concept that had been scattered throughout Android became a core UI pattern — one that would guide the appearance of everything from notifications, which now showed up on the lock screen for at-a-glance access, to the Recent Apps list, which took on an unabashedly card-based appearance.

Lollipop introduced a slew of new features into Android, including truly hands-free voice control via the "OK, Google" command, support for multiple users on phones and a priority mode for better notification management. It changed so much, unfortunately, that it also introduced a bunch of troubling bugs, many of which wouldn't be fully ironed out until the following year's 5.1 release.

L. Android version 6.0: Marshmallow
In the grand scheme of things, 2015's Marshmallow was a fairly minor Android release — one that seemed more like a 0.1-level update than anything deserving of a full number bump. But it started the trend of Google releasing one major Android version per year and that version always receiving its own whole number.

Marshmallow's most attention-grabbing element was a screen-search feature called Now On Tap — something that, as I said at the time, had tons of potential that wasn't fully tapped.

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Google never quite perfected the system and ended up quietly retiring its brand and moving it out of the forefront the following year.

Android 6.0 did introduce some stuff with lasting impact, though, including more granular app permissions, support for fingerprint readers, and support for USB-C.

M. Android version 7.0 and 7.1: Nougat

Google's 2016 Android Nougat[6] releases provided Android with a native split-screen mode, a new bundled-by-app system for organizing notifications, and a Data Saver feature. Nougat added some smaller but still significant features, too, like an Alt-Tab-like shortcut for snapping between apps.

Perhaps most pivotal among Nougat's enhancements, however, was the launch of the Google Assistant — which came alongside the announcement of Google's first fully self-made phone, the Pixel, about two months after Nougat's debut. The Assistant would go on to become a critical component of Android and most other Google products and is arguably the company's foremost effort today.

N. Android version 8.0 and 8.1: Oreo

Android Oreo added a variety of niceties to the platform, including a native picture-in-picture mode, a notification snoozing option, and notification channels that offer fine control over how apps can alert you.

The 2017 release also included some noteworthy elements that furthered Google's goal of aligning Android and Chrome OS and improving the experience of using Android apps on Chromebooks, and it was the first Android version to feature Project Treble — an ambitious effort to create a modular base for Android's code with the hope of making it easier for device-makers to provide timely software updates.

O. Android version 9: Pie

The freshly baked scent of Android Pie, a.k.a. Android 9, wafted into the Android ecosystem in August of 2018. Pie's most transformative change was its hybrid gesture/button navigation system, which traded Android's traditional Back, Home, and Overview keys for a large, multifunctional Home button and a small Back button that appeared alongside it as needed.

Pie included some noteworthy productivity features, too, such as a universal suggested-reply system for messaging notifications, a new dashboard of Digital Wellbeing controls, and more intelligent systems for power and screen brightness management. And, of course, there was no shortage of smaller but still-significant advancements hidden throughout Pie's filling, including a smarter way to handle Wi-Fi hotspots, a welcome twist to Android's Battery Saver mode, and a variety of privacy and security enhancements.

P. Android version 10

Google released Android 10 — the first Android version to shed its letter and be known simply by a number, with no dessert-themed moniker attached — in September of 2019; it's the Android version now shipping on most new devices, and it's slowly but surely making its way to existing phones around the world.

The software brings about a totally reimagined interface for Android gestures, this time doing away with the tappable Back button altogether and relying on a completely swipe-driven approach to system navigation. (If you so choose, that is; unlike Pie, Android 10 *also* includes the traditional Android three-button navigation system as an option on all phones.)

Under the hood, Android 10 introduces a new setup for hot-fix-style updates that'll eventually allow for faster and more consistent rollouts of small, narrowly focused patches. And the software has plenty of other quietly important improvements, including an updated permissions system that gives you more control over exactly how and when apps are able to access location data as well as an expanded system for protecting unique device identifiers (which can be used to track a device's activity over time).

Beyond that, Android 10 includes a system-wide dark theme, a new Focus Mode that lets you limit distractions from specific apps with the tap of an on-screen button, and a long-overdue overhaul of Android's sharing menu. It also lays the groundwork for a new Live Caption feature that'll allow you to generate on-the-fly visual captions for any media playing on your phone — videos, podcasts, or even just regular ol' voice recordings — though that feature wasn't available immediately upon the software's launch and is expected to arrive starting with Pixel phones sometime later this year.

IV. Conclusion

The extended assistance coming from big corporations, specifically Google, have made Google's Android quite possibly the most significant contestants within the mobile sector. The extensive as well as accessibility to smart phones and tablets make it possible for manufacturers to customize the system in order to suit their demands, such as both hardware as well as software layers. Nevertheless, the inconvenient component of this particular platform, which is certainly fragmentation, still remains. It requires a while for designers and manufacturers to consider an innovative new version of Google's Android to previously released devices available in

the industry. Commonly they don't construct an uninterrupted support for almost all. Regardless almost all complications, the release of an innovative new version takes place approximately once a year. The development by itself may perhaps broaden as more computer hardware as well as software companies get working on the project. It really is worth talking about, that the working platform is actually well supported by people outside of the primary Google's Android project.

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Comparison of the Gain and Noise Figure of New Hybrid Technique EDFA-SOA-EDFA and SOA-EDFA-SOA with the Existing Technique EDFA-RAMAN

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Abstract— **Fiber optic communication is adapted worldwide for fast communication process with high accuracy. This study discusses the different optical amplifiers that are used in fiber optic communication to enhance quality of communication. After analyzing the optical amplifiers, a novel communication system is developed by having different configuration on the basis of the amplifiers. The author has developed hybrid amplification model SOA-EDFA-SOA and EDFA-SOA-EDFA. The proposed work is implemented for 64 channels WDM systems at various frequencies for all users. The simulation is performed in Opti-system 7. The gain of proposed hybrid amplifiers is observed to be higher than the gain of the traditional EDFA-RAMAN amplifier.**

Keywords—Optical Communication, Optical Amplifier, Hybrid Amplifiers, SOA-EDFA-SOA, EDFA-SOA-EDFA.

I. INTRODUCTION

F Fiber optic communication is a communication innovation that utilizations light pulses to exchange data starting with one point then onto the next through an optical fiber [1]. The data transmitted is basically digital data created by phone frameworks, digital TV organizations, and PC frameworks [2-4].

An optical fiber is a dielectric cylindrical waveguide produced using low-loss materials, for the most part silicon dioxide. An optical fiber is an adaptable, straightforward fiber made by drawing glass (silica) or plastic to a breadth marginally thicker than that of a human hair. Optical signals are used in a frequent manner to transfer the light signals from one end to another end of the fiber and to locate the wide utilization in fiber optics based communication [5], allow transmission over longer separations and at higher bandwidths (information rates) than wire links.

Fibers are utilized rather than metal wires since signals travel along them with lesser measures of loss; additionally, strands are additionally resistant to electromagnetic obstruction, an issue from which metal wires endure too much [6]. Optical strands are also applicable for brightening and are also enclosed by the group with an objective that it may be used for conveying images.

Along with this lines permitting seeing in kept spaces, as on account of a fiberscope [7]. Exceptionally planned strands are additionally utilized for an assortment of different applications, some of them being fiber optic sensors and fiber lasers [8]. A comprehensive review for different hybrid optical amplifiers is performed in order to understand the recent trend. In [6], various amplifiers are covered along with their specifications. From the survey, it is observed that in [9], author implemented EDFA + SOA + EDFA model for optical communication. But deep analysis of [9] falsifies the aforementioned model. In this paper author had implemented S-band and C-band EDFA model only. Thus, it motivates to design a novel approach with the hybrid of EDFA-SOA-EDFA to acieve effective communication in optical fiber.

II. OPTICAL AMPLIFIERS

Optical amplifiers are used in fiber optics data links. There are three manners by which optical amplifiers can be utilized to improve the execution of optical information links. An amplifier is used for enhancing the optical yield of the transmitter. The signals are amplified just before they enter to an optical fiber [10]. The optical signal is contracted as it goes in the optical fiber. An inline amplifier is used re-establish (recover) the optical flag to its extraordinary power level. An optical pre-amplifier is utilized toward the finishing of the optical fiber link so as to enhance the sensitivity of an optical recipient.

Optical amplifiers are based on structure i.e. apart from its configuration, whether it is semiconductor based or fiber based. The optical amplifiers are additionally arranged based on gadget attributes i.e. regardless of whether it depends on linear characteristic [11] (Semiconductor optical amplifiers and Rare-earth doped fiber amplifiers) or non-linear characteristic (Raman amplifiers and Brillion amplifiers).

A. Semiconductor Optical Amplifier

A semiconductor laser amplifier is an altered semiconductor laser, which regularly has diverse aspect reflectivity and distinctive gadget length [12]. Semiconductor optical amplifier is fundamentally the same as a laser aside from it has no reflecting features. A feeble signal is sent through the active region of the semiconductor, which, by means of stimulated emission, results in a more grounded signal discharged from the semiconductor.

B. Erbium Doped Fiber Amplifier

EDFA is an amplifier that encompasses with three segments i.e. length of erbium doped fiber, laser pump and wavelength selective coupler to connect the wavelength pump and signals. The ideal fiber length utilized relies on the pump power, input signal power measure of erbium doping and pumping wavelength [13]. Erbium doped fiber enhancers (EDFAs) can be broadly utilized in optical fiber communication frameworks because of their similarity with optical fiber. This amplifier has comparatively wider scope wavelength amplification. Due to the feature of wavelength amplification, it is highly adapted for wavelength division multiplexing systems. Hypothetically EDFA is equipped for amplifying every one of the wavelengths extending from 1500 to 1600 nm. Anyway for all intents and purposes there are two windows of wavelength. These are C and L band. This permits the information signal to animate the energized molecules to discharge photons. It is analyzed that the most of the EDFAs pumped by a laser along with the wavelength of 980 nm or 1480 nm.

C. RAMAN Amplifier

Raman gain in optical strands happens from the exchange of intensity starting with one optical shaft then onto the next through the exchange of energy of a phonon. A phonon emerges when a light emission couples with the vibrational methods of the medium [12]. In this example the optical fiber is the amplify medium making the gain given by Raman amplifiers subject to the optical fiber structure. In a silica based filament, the RAMAN gain bandwidth is higher than 260 nm with the peak value of 86 nm from pump wavelength. This influences Raman to increase accessible over the whole transmission range of the fiber as long as a reasonable pump source is accessible. The gain displayed by the Raman impact in combined silica glass is polarization subordinate; along these lines increase just happens if both the signal and pump beams are of a similar polarization [14]. For amplifier based on RAMAN (RFA), power is transmitted from optical pump of fiber transmission. In this the pump wavelength is smaller than the wavelength to be amplified by sum that compares to an optical frequency contrast of around 13.2 THz. Due to SRS

Stimulated Raman scattering the signals at state experiences the gain. It is a non linear optical process in which the pump photon is retained and instantly that are discharged as a photon and a signal photon, in this way amplifying the signal [15].

Hybrid Optical Amplifier

The arrangement of in excess of one amplifier in a setup is called hybrid optical amplifier. Mohammed N. Islam portrayed [1] that the aggregate amplifier gain (GHybrid) is the total of the couple of gains:

$$GHybrid = GEDF \quad (1)$$

There are two types of hybrid amplifiers i.e. Narrow band hybrid Amplifiers (NB-HA) and wide band hybrid amplifiers (WB-HA).The NB-HA utilizes distributed Raman amplification in the transmission fiber together with an EDFA and gives low noise transmission in the C-or L-band. The noise figure of the transmission line is lower than it would be if just an EDFA were utilized. The SWB-HA, then again, utilizes conveyed or discrete Raman enhancement together with an EDFA and gives a low- noise and wideband transmission line or a low- noise and wideband discrete amplifier for the C-and L-groups. The typical gain bandwidth ($\triangle\lambda$) of the NB-HA is 30 to 40 nm, while that of the SWB-HA is 70 to 80 nm.

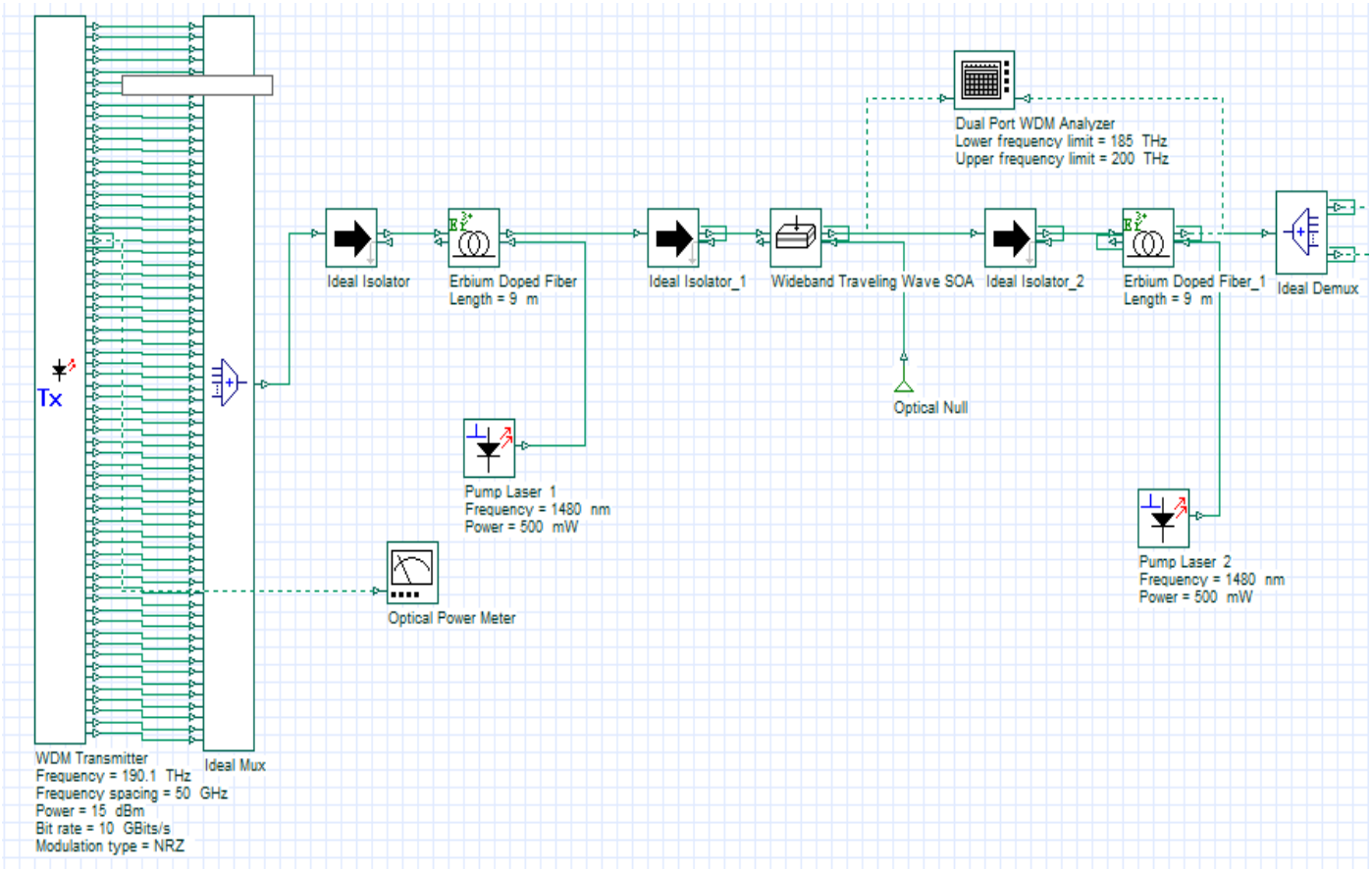
III. PROBLEM FORMULATION

With the increase in the technology of networks and the internet, the need of the users also increases. The necessity of high bandwidth, high information transmission rate and so forth increments. To satisfy this need the idea of WDM and fiber optic was created. WDM is a wavelength division multiplexing. In which the different input signals are joined together and exchanges as a solitary input. It uses the concept of multiplexing and de-multiplexing. There are various numbers of amplifiers that are deployed to retain the gain flat of the signals. Different AMPLIFIERS were combined to build up a legitimate answer for the issue yet at the same time was not exactly proficient to meet the necessities or troubles looked by the clients. In traditional system, the analysis was done by hybridizing the RAMAN and EDFA amplifier. But the obtained results were not quite effective. Consequently there is a prerequisite to grow such a framework which can select to get to the higher bandwidth.

IV. PROPOSED WORK

The past segment gives a short disclosure to the current developments that has been done in the field of optical systems or WDM to make it invaluable to the clients. In any case, subsequent to getting more drew in into the innovations different failures were raise to the presence which were identified with bring down gain bandwidth which did not support higher information transmission rate over the association. Subsequently it is arbitrate to prosper such a system which can beat the past impediments.

The proposed work is decided to implement a hybridization of two amplifiers such as EDFA-SOA-EDFA and SOA-EDFA-SOA. The framework of proposed communication system is comprised of SOA-EDFA-SOA amplifiers and the same system configuration with EDFA-SOA-EDFA amplifier. A WDM system is developed with 64 different users over various range of frequency i.e. from 190.5THz to 193THz. Frequency spacing is 50 GHz in proposed work. The implementation of the design is performed in the opti- system. Acquired schematic is presented in the following figure (Figure 1).



1 Framework of proposed EDFA-SOA-EDFA Amplifier Figure

Table I. PARAMETERS OF PROPOSED SYSTEM

Parameter	Value
Frequency	190.1THz
Frequency Spacing	50GHz
Power	15dBm
Bit rate	10GBits
Modulation Type	NRZ
Minimum Frequency limit	185THz
Upper Frequency limit	200THz

A dual port WDM analyzer is installed to analyze the gain of the signals in proposed work over various ranges of frequencies.

V. RESULTS

In this work, the fiber optical based communication system has been developed with hybrid amplifiers.

The hybridization has been done as EDFA-SOA-EDFA, SOA-EDFA-SOA. This section is represents the results that are observed after implementing the proposed work. The graph in figure 2 defines the comparison analysis of proposed EDFA-SOA-EDFA and SOA-EDFA-SOA.

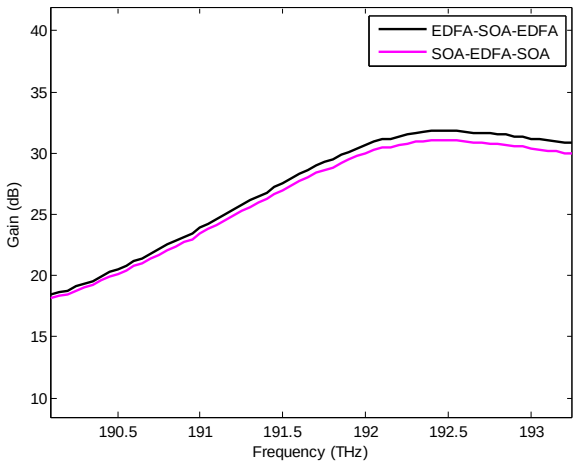


Figure 2. Gain Analyses of EDFA-SOA-EDFA and SOA-EDFA-SOA

The graph in figure 3 depicts the comparison of proposed hybrid amplifiers in terms of noise figure (dB). The evaluation

is done on the basis of the frequencies. The noise figure of both hybrid amplifiers is equal. It varies from 4dB to 5.5dB.

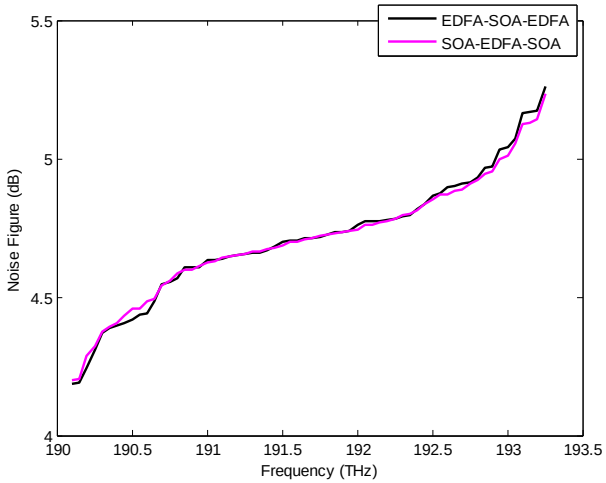


Figure 3 Noise Analyses of EDFA-SOA-EDFA and SOA-EDFA-SOA

The graph in figure 4 and 5 delineate the comparison analysis of traditional EDFA-RAMAN and proposed hybrid amplifiers. The analysis is done to evaluate the performance of proposed amplifiers over traditional amplifiers. The gain of EDFA-RAMAN is lower than the gain of SOA-EDFA-SOA and EDFA-SOA-EDFA respectively. The gain of the EDFA-RAMAN is 10.1dB approximately with the frequency of 190.5 THz and 5dB at 193THz. Whereas the initial gain of proposed hybrid amplifiers are 19dB approximately and at the highest frequency level the gain of EDFA-SOA-EDFA is evaluated to be higher than the gain of SOA-EDFA-SOA.

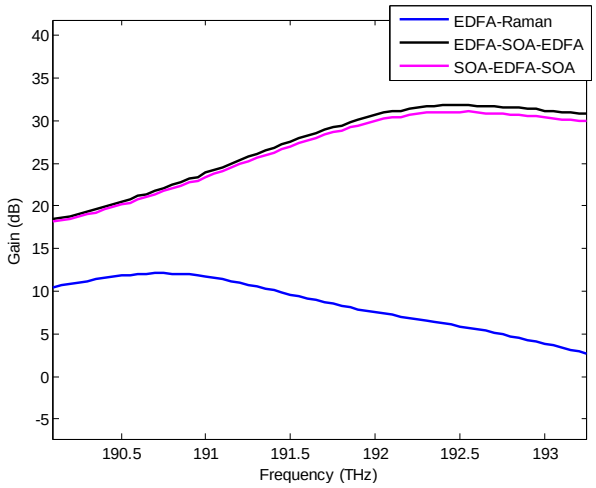


Figure 4 Gain Analyses of EDFA-RAMAN and EDFA-SOA-EDFA and SOA-EDFA-SOA

The noise based comparison analysis of traditional and hybrid amplifiers are shown in figure 6. The noise in traditional EDFA-RAMAN is higher i.e. 9.9dB at 190 THz, 11dB at 191.5 dB and 12.8dB at 193.4THz. Whereas, the noise in proposed hybrid amplifiers is quite lower i.e. 4dB at 190THz and 5.1dB at 193.3THz.

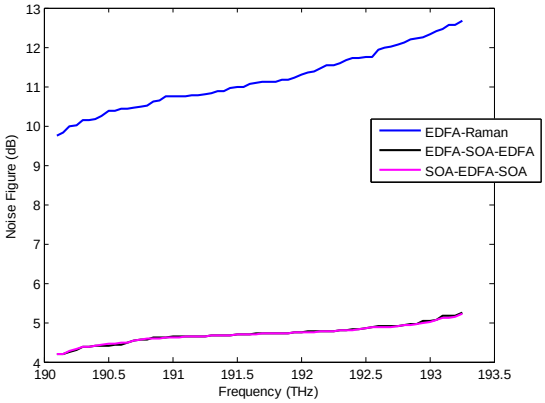


Figure 5 Noise Analyses of EDFA-RAMAN and EDFA-SOA-EDFA and SOA-EDFA-SOA

VI. CONCLUSION

From last few years, it has been seen that the FSO technology has become most accepted topic in telecommunication clinging to its novelty problem solving capabilities. The performance of optical channel is highly prone to the atmospheric turbulence. Therefore, the optical amplifiers are specifically used to amplify the optical signals.

In this study various optical amplifiers are analyzed and the novel hybrid amplification technique has been developed to overcome the issue of traditional EDFA-RAMAN amplifier. The SOA and EDFA amplifiers are collaborated to develop the EDFA-SOA-EDFA and SOA-EDFA-SOA hybrid amplifiers. The simulated performance of the hybrid amplifiers are evaluated in terms of gain and noise figure. The result evaluation sows that the gain of the proposed hybrid amplifier i.e. EDFA-SOA-EDFA is higher than the proposed SOA-EDFA-SOA amplifiers. The noise figure of proposed hybrid amplifiers are is lower than the noise figure of EDFA-RAMAN amplifiers. In future, this technique can be enhanced by implementation advanced modulation techniques.

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WATER TANK AUTOMATION SYSTEM USING NodeMCU 8266 AND ANDROID APP

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ABSTRACT: **With the prospective of life and living, water is the first thought stuck in mind before anything else in our mind .Today when we are approaching moon for water particularly, we can estimate its necessity. As per as the requirement is concern the maintenance is too damn an important factor to keep in mind and monitoring of any of the waterways. As water is all in all for everything dealing from agriculture and leading to industries, it's a frequent source. So having this thought in mind numerous people gave their one after one substitutions for monitoring and this very report came up with the prototype system design implementation and description of needed devices and technologies to improve IOT (internet of things) based water level monitoring and keep track of frequent evaporation in waterways which can be implemented in further smart villages. Water insufficiency is one of the major problems facing major cities of the world and wastage during transmission has been identified as a major culprit. This is one of the motivations for this research, to deploy computing techniques in creating a barrier to wastage in order to not only provide more financial gains and energy saving, but also help the environment and water cycle which in turn ensures that we save water for our future. We presented our research in embedding a control system into an automatic water pump controller through the use of different technologies in its design, development, and implementation. The system used Node MCU, ULN 2003 to automate the process of water pumping in an over-head tank storage system and has the ability to detect the level of water in a tank, switch on/off the pump accordingly the status on tank.**

Keywords: Water level sensor, NodeMcu, Android App, IoT

I. INTRODUCTION

As we know in today's era we can't expect anything without internet we have been totally depended on internet for everything leading from morning till evening. It's a vast tech and the growth of internet is in furious .we are connecting each and every single thing to the internet itself and is completely known as iot i.e. internet of things where various things parameters are connected on the single platform. IOT devices are used to collect, monitor, evaluate and notify the patient with the information. From the development of technologies (Internet of Things) is changing the human life into a new level. An **IoT** system consists of sensors/devices which "talk" to the cloud through some kind of connectivity. Once the data gets to the cloud, software processes it and then might decide to perform an action, such as sending an alert or automatically adjusting the sensors/devices without the need for the user. Internet of Things is the concept of connecting any device (so long as it has an on/off switch) to the Internet and to other connected devices. The IoT is a giant network of connected things and people – all of which collect and share data about the way they are used and about the environment around them. That includes an extraordinary number of objects of all shapes and sizes – from smart microwaves, which automatically cook your food for the right length of time, to self-driving cars, whose complex sensors detect objects in their path, to wearable fitness devices that measure your heart rate and the number of steps you've taken that day, then use that information to suggest exercise plans tailored to you. There are even connected footballs that can track how far and fast they are thrown and record those statistics via an app for future training purposes.

Internet of Things is used for monitor water level. In this paper, water level monitor and indication using Node MCU. We need modern methods to protect and preserve as much water. The wastage of water through storage tanks not only waste water but also waste electrical and mechanical energy required to utilize the pumps [1]

The main objective of this investigation is to build up a framework to monitor a water level3 of a water source from an inaccessible area. The IoT based system given during this study is going to be useful to attain such task. The prototype system experiment of this study allows keeping track of a water supply from remote area continuously. The real usage of the system would require changes in detector and few alternative technologies and source code in spite of the fact that the system and working rule continue as before. The purpose of studying this is to make a complete frame of monitor of water level of water

as per recent evaluation ,raising population caused water distribution issues in our society. Many communities confronted insufficient water supply units for their usual needs. absence of controlling water distribution becomes a horrific problem.some communities have decent water supply but other hav'nt.its all about problems in water distribution lines that damage piplines as of over or low water ,due to which water cant reach to those who resides in high ground area or at distant from pump rooms . this effects water distribution by lack in monitoring.

Today, cities are now transforming and started to adapt smart technologies for sustainable communities. As they participate for economic advancement and the facilities that increase to their vibrancy, water has become a priority in their checklists [2]. Creating water sustainability requires a multidisciplinary approach. It also requires state of the art equipment to facilitate the operation and management especially in collecting and analyzing data to initiate an action for smart management, planning and decision making.

II. PROBLEM STATEMENT

Evaporation is that the modification of water from a liquid to a gas. Water is constantly dissipating from the surface of the Earth, actually pumping increasingly water vapor into the climate. Water and land surface most of this heat energy comes from the surface, not from the air.

At the point when water meets dry air, it's not in equilibrium; water particles evaporate off the surface till the quantity of water within the air creates enough force per unit area to attain equilibrium. Once water is heated to a temperature of 100C, the force per unit area equals that of low-lying atmospheric pressure. Water source is essential and a significant factor in agriculture and farming and it is a key for quality of our life. Monitoring water level of a water source, such as lakes, ponds, rivers etc., plays a key role in agricultural. Even it is useful for our daily needs. For example if the level of water drops below the threshold level in a bore well, the motor pump may get affected due to dry running. There are many other situations where water level monitoring is an important task.

III. REVIEW OF RELATED STUDIES

The popularity of IoT technologies is growing due to its capability in developing various application and only little portions is currently available in the community. Its domain includes health-care, transportation, logistic, smart environment and many more [2].

P. Verma et al. [3] developed an IoT based for water distribution in a campus. They developed a system that will distribute enough water to each tank to satisfy local demands. In their study, ultrasonic sensor has been used to monitor the water level in a tank.

In a study conducted by E. V. Ebere and O. O. Francisca [3], the automatic detection of water level in a tank is done by a comparator circuit. They used the electrical conductivity property of water as an advantage. The copper conductors serve as the water level sensor. When the copper sensor touched by water, voltage runs to the copper which in turn is transferred to the comparator circuit for further processing. Then a micro-controller uses this signal coming from the comparator to control the water pump.

Also another study for automatic water tank filling system was conducted suitable to be used in home activity to reduce energy consumption due to water spills [4]. This study also helps the community to analyze their water consumption. The prototype can be used to solve water pump problems due to the operations of the manual switch as well as the floating ball tap to stop the water tank filling.

IV. LITERATURE SURVEY

A number of reviews on the subject of Wireless Sensors techniques were done in the past either as part of research papers/technical reports on Iot based water Monitoring System

[1] Prof. A. M. Jagtap1, Bhaldar focus on Aquarius-Smart IOT Technology for Water Level Monitoring System, The main objectives of this proposed system is used ultrasonic sensor to detect the level of water in multiple tanks, switch on or off the pump accordingly and display the status on android device. The water level is monitored and its data is sent through notification to the intended user's android device. [5] P. Damor, is used to find the solution for water monitoring & control system. For that IoT is blessing as a solution. Microcontrollers and sensors are very useful for creating that system. Ultrasonic Sensor is used to measuring water level.

[6] A. K. Panigrahi, focus on review of water monitoring system. The main objectives of this proposed system would be complex free as the PLC replaces the necessary sequential relay circuit for the motor control. The whole concept is to build an automatic water pump control system. [7] P. Bhatele, designed a system which is used in represents the method to check and control water level for irrigation system. This paper describes the automatic system to monitor and control water level with

the help of water level sensors and wireless network system.

V. SYSTEM ARCHITECTURE

The proposed system consists of following major components:

1. Carbon Contacts based on conductivity
2. Atmega328
3. Android App
4. Crystall frequency 16Mhz
5. IC ULN2003
6. LED
7. Resistors 1K
8. Buzzer
9. 12 v battery/supply

The main component of this project is Atmega 328p and ULN2003 .ULN2003 is a relay driver IC,which is based on Darlington arryay that contain high voltage and high current bearing abalities. It is designed by seven open collectors Daelington pairs having common emitter which indeicates that the IC has capability of hanling seven different relayas at a time.

A single Darlington pair consists of two bipolar transistors and it operates on the current range of 500mA to 600mA. ULN2003 is a well-known series of IC's. ULN2003 is also the part of this series. ULN2003 operates on 5V and TTL (Transistor-Transistor Logic) and CMOS (Complementary Metal Oxide Semi-Conductor). Its pin configuration is designed so that the input pins are at the left side of the IC whereas the output pins of it are on right side in front of the corresponding input pin. This IC has a very wide range of applications. They are commonly used as relay drivers in order to drive different kinds of loads. ULN2003A can also be used to drive different motor. Some of the other *applications of ULN2003* include logic buffers, lamp drivers, line drivers, LED display, motor driver circuits. The pin diagram of ULN2003 is shown below Fig. 1.

Working of Proposed Design

The proposed circuitry is designed such that it could detect several levels of presence of water in the tank refer Fig. 2. When the water level is reached to the least level the microcontroller detects and fires the Triac for turning the motor ON so that tank could attend the maximum level of water and after that microcontroller turns it back to OFF state.

All the information regarding turning ON, turning OFF and water in tank is sent to the Cloud and hence can be shown in the android based app refer Fig 3. Sensors are used to collect data and simultaneously it is sent to the cloud Infrastructure but it needs a medium or gateway for transferring the data between cloud infrastructure and sensor Refer Fig. 4. The embedded system is connected to the cloud through cellular medium of communication and transports the data to the cloud.

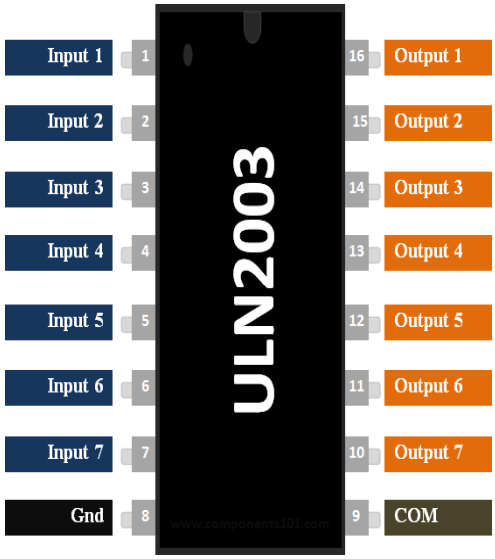

Fig. 1. IC Pin out of ULN2003

Proposed Diagram:

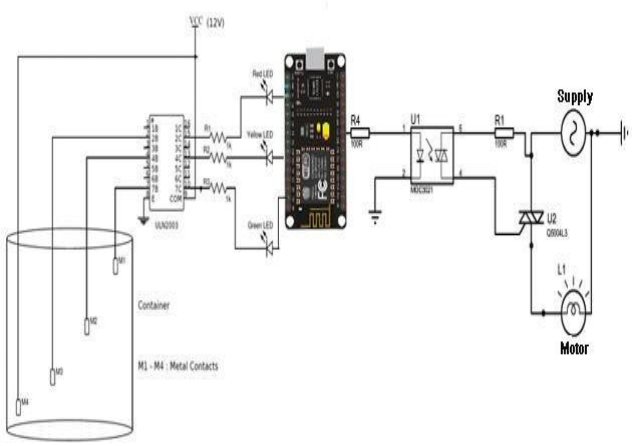

Fig. 2. Proposed Designed

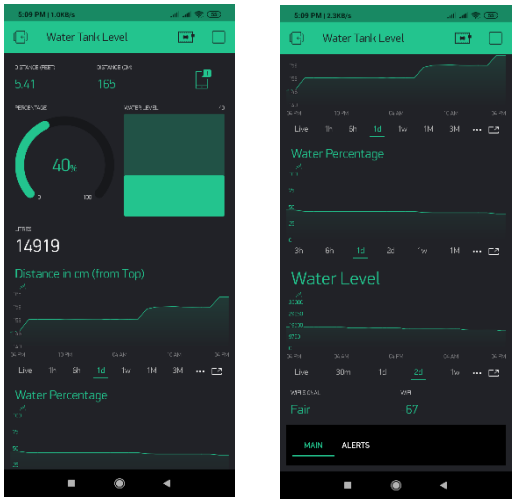

Fig. 3. Mobile App interface

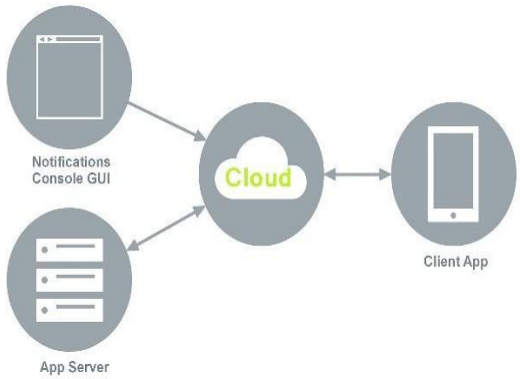

Fig. 4. IoT Architecture

VI. CONCLUSION

By the use of proposed system, it is easy to monitor and automate the process of filling the water tank efficiently. There is no risk of overflow of water, therefore, there is saving of water and energy upto large extent. Water level can be seen graphically by the use of android app. Hence, it is very much user friendly in operation.

Acknowledgement

The authors are indebted to Amritsar College of Engineering and Technology, Amritsar for providing the advanced research facilities while preparing this research paper.

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A Review on Design and Fabrication of Organic Solar cell using Nanoparticles

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Abstract

The available Non-renewable fuel source is not enough to fulfil mankind requirements after 10-15 years. So, the need to search for alternatives is desired, which should not be expensive as well as should provide better efficiency as well. Solar or Photovoltaic cell converts sunlight into electricity. This cell can be made by using different materials like polycrystalline Si, monocrystalline Si, cadmium telluride, amorphous Si. By the generation increases from first to the fourth generation of solar cells, different materials have been used to form a solar cell. This review paper describes a detail description of nanocrystalline semiconductors used to make organic solar cells.

Keywords

Renewable energy, solar cell, photovoltaic cell, nanocrystalline materials.

I.Introduction

The major reason for less efficiency of the solar cell is that more than 60% of solar energy gets converted into the heat by the scattering property this problem can be resolved by using nanocrystalline materials with solar cells. In bulk Si hot carrier relaxation time (carrier returns to non-excited rapidly be losing their energy, due to this excess heat generates) is very quick as compare to nanocrystal particles, which is a cause of more temperature generation. The major reason for using nanocrystalline materials is, by per photon it generates multiple electrons instead of one electron also along with the small size & fewer temperature occurrences.

II. Energy Sources and its types

1. Non-renewable energy source

The source of energy effecting the environment badly and the impact of this can be seen on the human body across all over the world. "2×10^{12}Kg of carbon-di-oxide is present in the atmosphere due to the burning of fossil fuel" [1]. Due to the presence of this excess CO2 on the planet, it affects the greenhouse, which is the reason for global warming and temperature increment. Sea level is also rising which will cause natural disasters [2]. The source of fossil fuel is limited, which cannot be generated again with-in a short period.

2. Renewable energy source

There are various natural sources of energy available on planet like- wind, sun, rainwater from which we can generate electricity. Solar will be a major source of electricity in up-coming days, which will give high efficiency at a low cost.

III. Solar cell and its generations

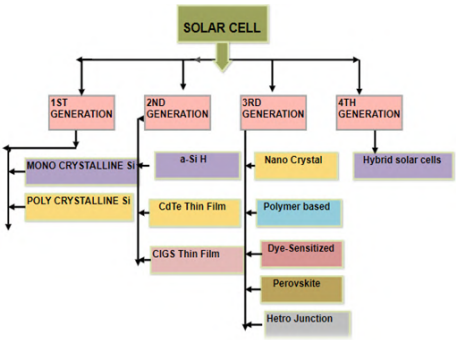

Figure 1 The generation of solar cell

IV. Working of solar cell

The conversion of solar energy into electricity by the photovoltaic effect. When the sunlight falls on the surface of semiconductor material like Si then the some of the photon energy gets absorbed by the material and some are reflected as per bandgap energy of the materials, due to absorbed photon free electrons are created, due to the movement of these free electrons, formation of electrons hole pair, diffusion happened at junction and a huge amount of charge created, shown in Figure 2.

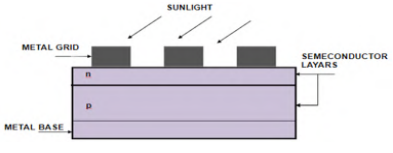

Figure 2: The generation of electricity by sunlight at photovoltaic cell

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The solar panel is made up of thin layer of n-type semiconductor and thick layer of p-type semiconductor, which form p-n junction, that is the reason of electricity generation, when the charge generated then positive charge is accumulated at one side and negative charge at another side and then it get connected with the load and then the flow of current get started in one direction, shown in Figure 3.

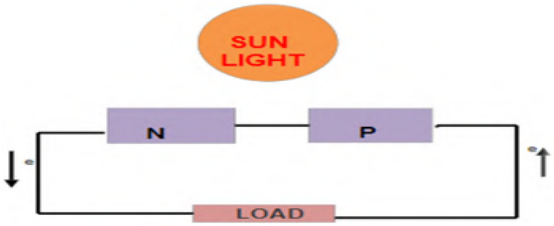

Figure 3: Unidirectional flow of current in PN junction

Organic Solar cell

In organic solar cells are not used widely, because of the high fabrication cost, high vacuum & high temperature of (400^0c-1400^0c) required [3]. The efficiency lies between 10-30% [4]. The advantage of using an in-organic cell that charges are conveyed to the electrode very speedily, due to this less current loss occurs. Polymers are used in organic solar cell, it is of low cost, lightweight.

Dye-sensitized solar cell (DSSC)-

It is an environmental friendly low-cost solar cell, whose efficiency is 12%[5]. The dye is being drawn up by different fruits, leaves, and flowers. [4]

V. Nanoparticles in solar cell

Nanoparticles are in use as a layer of organic solar cells to make its performance better by increasing its light absorption quality. After examination of nanomaterial with different thickness layer, it has been observed that the thicker layer have better absorption capacity as compared to a thinner active layer. By the use of Plasmon, silver, gold Nanoparticles absorption quality can be increased.[3]

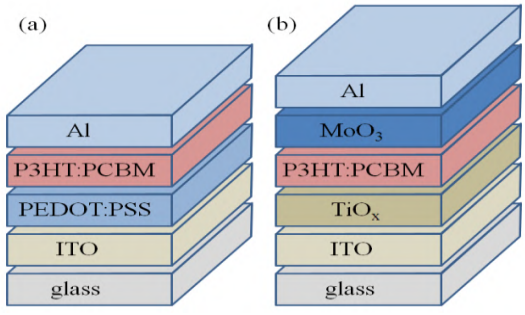

Figure 4 structure of heterojunction solar cell

VI. Comparison between Silver and Gold Nanoparticles

Silica dielectric coating is used for coating on silver NPs. A thin coating will help with carrier transport. After the examination, it has been concluded that for a diameter of 30-35nm NPs, silica coating should be of 5nm. [5]

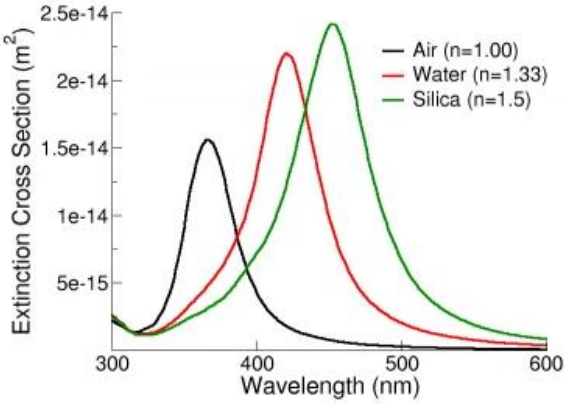

Figure 5 :silver NPs

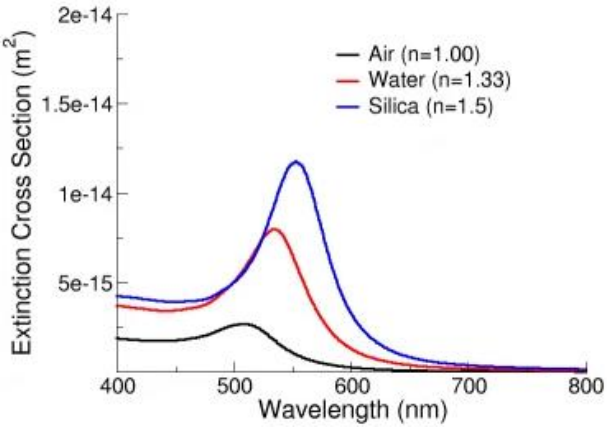

Figure 6 Gold NPs

Conclusion:-

Here we have seen different generations of solar cells, in these different generations, different types of solar cell have been developed now the work area is how we can make this more effective to get better efficiency of the solar energy. The organic cell was an example over here with the coating of Nanoparticles like silver and gold. It has been seen how renewable energy is important for upcoming days and how we can use different organic ways and natural materials for cell fabrication ad flower and fruits are also been in use.

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A New Design Approach to Smart Helmet Using Arduino

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Abstract: An accident is an unexpected action, which occurs in a particular situation and place. Carelessness is the major factor for such accident. The government is forcing the drivers to wear helmet during driving. But many of them are not following the rules. This paper takes research on design of smart helmet system which detects that, the person wearing helmet or not and also the system detect the person is drunk, If the driver using cell phone during driving means the bike will be jammed slowly. Here we have transmitter in the helmet and receiver at the bike. A sensor will be there to ensure that the person is wearing the helmet or not. And also a alcohol sensor is placed in the helmet near the mouth of the driver for Alcohol detection or check whether the driver is drunk. If a vehicle across this system, then the head light is automatically dimmed and dipped. In this system there is a sensor ensures the placing of the helmet in proper manner. The conclusion of this paper is to prevent the accident while driving in the vehicle. This idea will not only save lives but also property. In our project we are using Arduino.

Keywords:- Biker's safety, Smart helmet, Alcohol detection, Arduino.

I.INTRODUCTION

In the modern era use of SMART HELMET using ARDUINO UNO for two wheeler riders is very important in order to reduce the causalities. Two wheelers are most sold vehicles throughout the India. The Indian two wheeler (2W) industry registered sales volume of 13.7 million units in 2012-13, a growth of 2.9% over the previous year FY 2011-12. Lot of people are able to fulfill their dream of buying a vehicle of their own and it's growing ridiculously and will grow more in future. The number of two wheelers are growing, especially the craze among youngsters. The people are buying the two wheelers which are faster and powerful. In accordance with the growth of the number of two wheelers the safety factor also rises. There a lot of accidents those are happening everyday on the roads. There are certain causes which are responsible for it. Certain reasons are responsible for it such as drivers fault, bad road, and mistake from other person on road.

Out of all the most severe case is of head injury, which most of the times lead to body paralysis and sometimes death. The main reason is due to lack of safety gear that is no Helmet. When the people are riding the two wheeler and then aren't wearing helmet and if, by their or some other's mistake they just met with some sort of accident, since the two wheelers have balancing on the two wheels hence after hitting the two wheeler get unbalanced and the rider fall down and at that time his head may collide with the solid surface and if helmet is not there then the head might have serious injuries.

Now these injuries can be minimized by use of helmet but people in our country aren't using helmet as their habit. So in order to minimize the injuries head injuries we came up with an idea that is SMART HELMET. The smart helmet will reduce the number of head injuries. The smart helmet will be such that without wearing it there won't be ignition in combustion chamber. When the rider is not wearing the helmet then there will be cut off

from ignition and as soon as he wore it there will be a connection hence regulating the ignition.

Our helmet sense alcohol also, for this purpose we use alcohol detector. These are the two main issues which motivates us for developing this project. The first step is to identify the helmet is wear or not. If helmet is wear by rider then ignition will start other - wise it will remains off till helmet is not wear. For these we use sensor. The second step is alcohol detection. Alcohol sensor is use as breath analyzer which detect the presence of alcohol in rider breathe if it is permissible range ignition cannot start.

LITERATURE SURVEY

Jesudoss A, Vybhavi R and Anusha B[1] (2019) Proposed the exactness and accuracy are high, which demonstrates that our proposed system is precise in recognizing accidents by using the vibration, load monitoring, MEMEs and high alcohol consumption Sayan Tapadar, Arnab Kumar Saha, Dr. Himadri Nath Saha, Shinjini Ray, Robin Karlose[2](2018) proposes a mechanism by using the parameters such as flex sensor, breathe analyzer, impact sensor, Bluetooth for accident detection and shows how important the alarm by using SVM.

Nilesh M. Verulkar , Swati S. Patil, Namrata A. Gandhi , Komal B. Todkar [3](2018) introduce an electronic smart helmet system that efficiently checks the wearing of helmet and drunken driving.

By implementing this system will reduce the accident rate due to drunken driving. Prashant Ahuja, Prof. Ketan Bhavsar[4](2018) The aim of this proposed model design is to inform the responsible persons at the earliest about the accident so that they can take required actions to save the life of the injured person

Usman Khalil ,Tariq Javid and Adnan Nasir [5](2017) introduce the system aim to timely inform emergency services about the location of accident, in the process of saving precious lives. Among these four accident detection methods, accident detection using VANET is the best method because it not only detects an accident but also provides optimum route to the ambulance to reach the accident spot as soon as possible.

Durga K Prasad Gudavalli, Bh.Sudha Rani and C.Vidya sagar[6] (2017) The Helmet Operated Smart E-Bike to reduce head injuries from road accidents and from bike thefts is developed and tested. The system has mainly focused on helmet use as mandatory by providing two solutions in the helmet itself, which are security lock system and safety engine system. These two applications are operated when user uses the helmet in a proper manner. The RFID tag which is already fixed on the helmet shown on the RFID reader system matched and operated the locking mechanism and no proper RFID tag did not operated the locking mechanism, hence we made it as high security lockingsystem.

Rashmi Vashisth, Sanchit Gupta, Aditya Jain, Sarthak Gupta, Sahil, Prashant Rana [7] (2017) introduce the Smart helmet that is an effective solution to many problems. Wearing the helmet and being sober are necessary conditions for the bike to start, reducing the possibilities of accidents. Even if a person takes cautionsometime accidents do occur. Here our engine cut off feature reduces the chances of fatalities significantly.

Hemendra Kumar, Mohit Kumar, Pratik kumar,Mahiban Lindsay[8] (2016) proposed the system is very effective for the safety purpose of the driver. User has to wear helmet to ride two wheeler vehicle and hence traffic rules will be followed with this. It provides a better security to the rider.

Sagar Patil, Medhini Ganesh Hegde, Saikat Bhattacharjee, Rajeshwari B.C[9] (2016) proposed the system, therefore, seals the safety and security

of the rider as well as the motorcycle and can prove to reduce the fatality of the road accidents. It aims at reducing the threat to life, a person may face in case he meets an accident while riding his motorcycle. The system can be programmed in such a way that in the event of an accident, the system directly alerts a nearby hospital and requests for anambulance

Nitin Agarwal [10] (2015) proposes design of Smart helmet for rider's safety with radio frequency link. When a user wear helmet then a RF signal release from the transmitter

G. Sasikala, Kiran Padol, Aniket A. Katekar and Surender Dhanasekaran [11] (2015) Proposed system aims to reduce fatalities, head and face injuries due to road accidents by usage using RF communication. It also safeguards vehicle by replacing conventional key with keypad. Furthermore, extension of safeguarding mechanism involving multiple operational modes is also considered for implementation

Sudharsana Vijayan [12] (2014) proposes the framework which checks whether the individual is using the helmet and has non-alcoholic breath while driving there is a transmitter in the helmet and a percipient in the bike.

C.Prabha, R.Sunitha , R.Anitha [13] (2014) proposed Vehicle accident detection system can track geographical information automatically and sends an alert SMS regarding accident. Experimental work has been carried out carefully. The result shows that higher sensitivity and accuracy is indeed achieved using this project. EEPROM is interfaced to store the mobile numbers permanently.

Mohd Khairul Afiq Mohd Rasli, Nina Korlina Madzhi, Juliana Johari[14] (2013) introduce the motorcycle's engine will only start is the helmet is worn and the belt has been buckled. So, it will reduce the impact from accident and can prevent motorcycles from being stolen. Besides, the LED will flash when the speed exceeds 100 km/hour as alarm because over the speed limit signal to alert the rider. Peripheral Interface Controller (PIC) 16F84a is good in controlling all sensors and the system. Implementing the wireless module which is 315 MHz Radio Frequency Module to transmit signal from helmet to the motorcycle improved the capability of transmitting data instead of hardwire. Therefore, a rider would not get disturbed by the wire while riding the motorcycle.

Wang don Cheng quan cheng, Li Kai ,Fang Bao-hua[15] (2011) The control system can be used in all kinds of vehicles, can also monitor the alcohol content of drivers, thus prevent frequent occurrence of traffic accident caused by drunk driving. At present most countries detected driver by using alcohol breath tester, to determine the alcohol content of the driver and ensure the driver's life and property safety

Existing system Problem

- Size of all project are bulky and handling is not a easytask.
- Cost are muchexpensive.
- Many waste components are used like LCDdisplay.
- Expensive Microcontroller areused.
- Range issue is also a hugeproblem.

The solution of the above problem can be addressed as anticipate in this research paper

- Size of our project is small and handling is a easytask.
- Cost arecheap.
- Few components areused.
- Arduino uno is used asMicrocontroller.
- Range is alsogood.

II. METHODOLOGY

Methodology is explain with the help of block diagram

Smart helmet is divided into two parts

1. Helmet blockdiagram
2. Bike circuit blockdiagram

1. Helmet block diagram:- Block diagram of smart helmet is shown in Fig1.

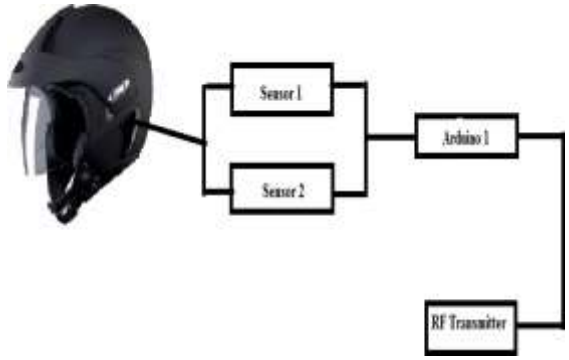


Fig 1 Transmitter side of Smart helmet (Block diagram)

In this block diagram its shows that helmet is parallel connected with Sensor1 and Sensor 2.Sensor 1 is basically a touch sensor which is on when rider wear the helmet. Sensor 2 is a alcoholic sensor that detect the alcohol, if both condition is satisfied then it will goes to the next step ie in arduino1 block , Here we use atmega 328(Arduino uno chip) and then it send the signal to the RF Transmitter and this is connected with RF Receiver that is at the receiver side . Transmitter and receiver are connectedwireless.

2. **Bike circuit block diagram:-** Block diagram of bike circuit is shown in Fig2.

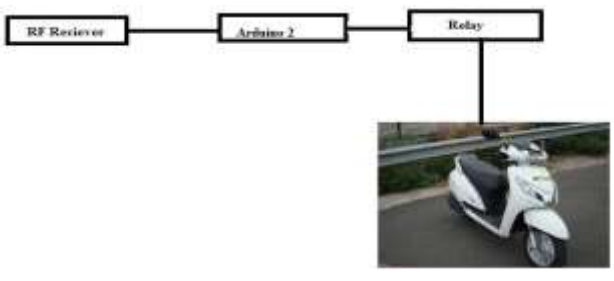


Fig 2 Receiver side of Smart helmet (Block diagram)

In the receiver side firstly RF reciever is used for receiving helmet signal then it will go to arduino2, here we also use the arduino uno and then it attached with relay and this relay is connected with ignition system of bike or active. After when all condition satisfied then two wheelerstarts.

III. PROJECT &WORKING

Working of Smart helmet is divided into two parts.

- Tansmitter i.e Helmetcircuit
- Receiver i.e Bikecircuit

1. Helmet circuit:-Helmet circuit is also divided into three mainparts
   - Sensor
   - Arduino
   - RFTransmitter

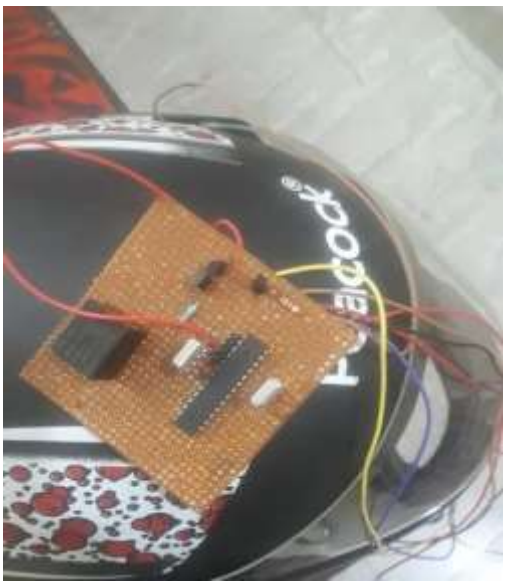


Fig 3 Helmet circuit

 ISBN 978-81-945285-0-0

In smart helmet we use two sensors. One sensor is use to sensing the riders wear the helmet or not, when we close the buckle of helmet then sensor will on and give the instruction to the arduino. Another sensor i.e. Alcohol sensor that are connected parallel with first sensor, it detect that the rider alcoholic condition if condition satisfied then it send the instruction to the Atmega 328 IC. In smart helmet role of arduino is very main. It is the brain and heart of smart helmet. All commands are transmitting and receiving by Arduino. But size of arduino board is large according to helmet so we design a such a that way only atmega 328 is required instead of large arduino board, if condition satisfied then it give the command of starting ignition system of bike . Smart Helmet is wireless so signal are send from transmitter to receiver side through RF module. In Transmitter side RF Transmitter is used to send the signal through wireless path. Range is the main advantages of our smart helmet. It send a signal in every second so whenever condition is not matched then bike will suddenlyoff.

2. Bikecircuit:-

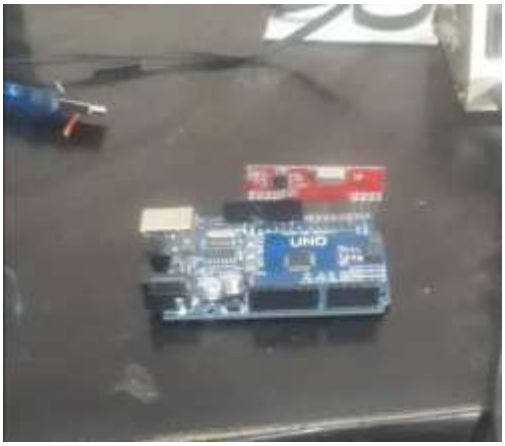


Fig 4 Bikecircuit

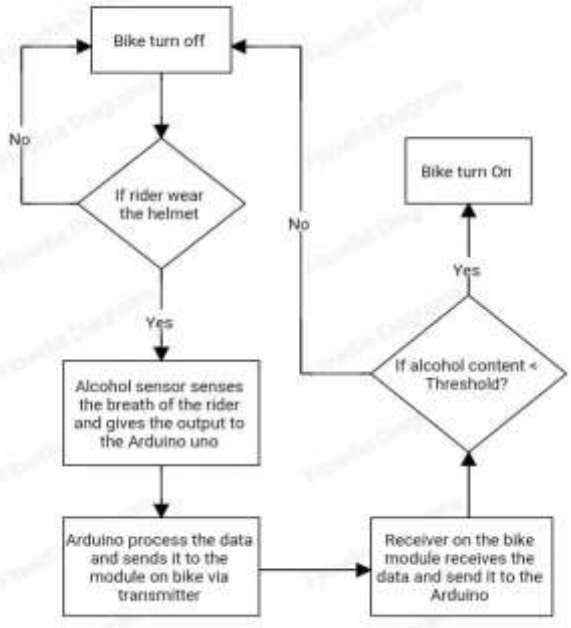
It received the RF signals that are transmitted by RF receiver and further send it to the Arduino. Firstly Arduino received the signals and then check that signal is according to their condition or not if it satisfy then it gives the signal to the Relay. Condition is set in Arduino with programming. It is more clear with flow chart of the smart helmet that shown below. Here we using 6V Relay for starting the ignition system of bike.if it received the high signal through arduino then it will closed the path and ignition system is will start and bike will On. It is more clear from following Flow chart. In the flow chart all working is explain in very a simple method.

IV RESULT

In the above flow chart working is clear. Smart helmet for safe rider is designed with radio frequency link. , as user wear helmet a RF signal radiate from transmitter and these RF signal get sensed and synchronized with the help of address matching by the receiver section placed in the ignition switch of the bike and bike get started and bike stopped working as helmet keep out from head. This means bike work properly till helmet keep on head and also rider is not in alcohol condition.

V COMPARISON WITH EXISTING WORK

Ref	Technology	Alcohol detector	Wireless Technology	Cost	Touch Technology	Size
1	PIC Microcontroller	Yes	This feature is not exist	Expensive	This feature is not exist	Bulky
2	Arduino Nano	Yes(MQ3 Breath Analyzer)	Bluetooth	Expensive	This feature is not exist	Bulky
3	Arduino	Yes	RF Technology	Moderate	This feature is not exist	Bulky
4	Arduino Uno	No	This feature is not exist	Economical	This feature is not exist	Bulky
5	Mobile phone	No	RF Technology	Expensive	Yes	Small
6	Arduino Uno	No	RFID Technology	Expensive	Yes	Bulky
7	Arduino Uno	Yes	RF Technology	Expensive	This feature is not exist	Bulky
8	Arduino Uno	Yes	RF Technology	Expensive	This feature is not exist	Moderate
9	Zigbee	No	RF Technology	Moderate	Yes	Bulky
10	Encoder , Decoder IC	No	RF Technology	Economical	This feature is not exist	Small
11	Encoder , Decoder IC	No	RF Technology	Moderate	This feature is not exist	Bulky
12	Arduino Uno	Yes	RF Technology	Moderate	This feature is not exist	Bulky
13	ARM7 TDMI	No	RF Technology	Expensive	This feature is not exist	Bulky
14	PIC Microcontroller	No	RF Technology	Moderate	Yes	Moderate
15	AT89851 Microcontroller	Yes	This feature is not exist	Economical	This feature is not exist	Bulky
Proposed project	Arduino Uno	yes	RF Technology	Economical	Yes	Small



In above comparison table we see that few project have alcohol detection and few have touch detection ability .We see that every helmet have few limitation or drawbacks so our project remove these limitation , it is fully cleared with comparison table

VI CONCLUSION

The two-wheeler safety system developed with smart helmet and intelligent bike system is reliable and aim stohel pin the prevention, detection and reporting of accidents hence reducing the probability of the drunk drive cases. It also has several advantages compared to the previous systems. Our proposed system gives the primary importance of preventing the accidents and ensures safety for a greater extent in two wheelers. Nowadays, most accident cases occur due to motor bike. The severities of those accidents are increased because of the absence of helmet or by the usage of alcoholic drinks. By implementing this system, a safe two wheeler journey is possible which would decrease the head injuries throughout accidents caused due to the absence of helmet and additionally reduce the accident rate due to drunken driving.

VII FUTURE SCOPE

In future we have a tendency to construct an intelligent system of compact size. Light dimmer sensors can be used to dim the light automatically when light from other vehicles fall on it. Government should enforce laws to install such system in each two wheelers. We can implement various bioelectric sensors on the helmet to measure various activities. We can use small camera for recording of the driver's activity. It can be used for passing message from one vehicle to another vehicle by using wireless transmitter. If in a case helmet gets stolen then bike can be started by the password. We can also use solar cell ,in case if battery is low and we have no source for charging then solar cell are use to give the power to our smart helmet and also charge the battery for use at night time driving.

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Wheat Disease Detection Survey using Digital Image Processing

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Abstract – There are many types of diseases which are present in plants. To detect these diseases pattern are required to recognize them. There are many types of pattern recognition algorithm which gives detection of disease with accuracy. In the existing work back propagation and principal component analysis are used to detect plant diseases. These algorithms are learned from training supervision in neural network. There is an issue of accuracy in these algorithms. These algorithms are able to detect diseases in plant but in accurate way. So to increase the accuracy for plant detection a new method will be proposed.

Keywords – PCA ,B.P, SVD, 2-D,3-Dimages.

1. INTRODUCTION

1.1 What is an Image?

An Image may be defined as a two dimensional function, f (x,y), where x and y are spatial co-ordinates, and the amplitude of at any pair of co-ordinates (x,y) is called the intensity or gray level of that image at that point. When x,y, and the amplitude off are all finite, discrete quantities, we call the image a digital image. The field of digital image processing involves processing digital images by means of digital computer Image processing is composed of a finite number of elements, each of which has a particular location and value. These elements are referred to as picture elements, image elements and pixels. Image processing involves processing or altering an existing image in terms of pixels in a desired manner. [2]

An area of digital image processing applications includes:

- medical applications
- restorations and enhancements
- digital cinema
- image transmission and coding
- color processing
- remote sensing
- robot vision
- face smile
- pattern recognition

1.2 What is Digital Image?

Digital image processing is the use of computer algorithms to perform image processing on digital images. As a subcategory or field of digital signal processing, digital image processing has many advantages over analog image processing. It allows a much wider range of algorithms to be applied to the input data and can avoid problems such as the build-up of noise and signal distortion during processing. Since images are defined over two dimensions, digital image processing may be modeled in the form of multidimensional systems Digital images can be divided into number of pixels. Each pixel represented by numerical value [1].

Image processing is used in a wide variety of applications to improve the visual appearance of images and to prepare images for measurement. Image processing usually refers digital Image processing but optical and analog image processing also are possible. This article is about general techniques that apply to all of them. The acquisition of images is referred to as imaging. Image processing is also known as digital image processing. Optical and analog image processing are also possible. There are different types of image processing fields like computer graphics where images are created, image processing where manipulation and enhancement of images are to be done and computer vision where analysis of images is done [3].

Image processing is also defined as the discipline in which input and output both are images. An image processing defines a new image y in terms of the existing image x. An image can be transformed in two ways. These ways are as follow:

1. Domain Transformation

2. Range Transformation

A pixel is a sample of continuous function. Modern digital technology has made it feasible to control multi-dimensional signals with systems ranges from simple digital circuits to advanced parallel computers. The goal of this manipulation can be divided into three categories

Image Processing (image in -> image out)

Image Analysis (image in -> measurements out)

Image Understanding (image in -> high-level description out)

An image may be considered to contain sub-images sometimes referred to as regions-of-interest. This concept reflects the reality that images commonly contain collections of objects which can be the basis for a region. In a sophisticated image processing system, it should be feasible to apply specific image processing operations to regions that are selected only. Thus, one part of an image might be processed to improve color rendition and other is to be processed to suppress motion blur.

The images should be available in digitized form is the most requirements for image processing of images, that is, arrays of finite length binary words. For digitization, first of all the given Image is sampled on a discrete grid and each sample or pixel is quantized using a finite number of bits. The digitized image is processed by a computer. To display a digital image, it is first converted into analog signal, which is scanned onto a display [4].

1.3. Operations on an Image with the help of Image Processing:

•Euclidean geometry transformations such as enlargement, reduction, and rotation

•Color corrections such as brightness and contrast adjustments

, color mapping, color balancing, quantization, or color translation to a different color space

•Digital compositing or optical compositing (combination of two or more images), which is used in film-making to make a "matte"

•Interpolation, demos icing, and recovery of a full image from a raw image format using a Bayer filter pattern

•Image registration, the alignment of two or more images

•Image differencing and morphing

•Image recognition, for example, may extract the text from the image using optical character recognition or checkbox and bubble values using optical mark recognition

•Image segmentation

•High dynamic range imaging by combining multiple images

•Geometric hashing for 2-D object recognition with affine Invariance.

1.4 Diseases Detection in Wheat [6]

Agriculture has become much more than simply a means to feed ever growing populations. Plants have become an important source of energy, and are a fundamental piece in the puzzle to solve the problem of global warming. There are several diseases that affect plants with the potential to cause devastating economic, social and ecological losses. In this context, diagnosing diseases in an accurate and timely way is of the utmost importance. There are several ways to detect plant pathologist. Some diseases do not have any visible symptoms associated, or those appear only when it is too late to act. In those cases, normally some kind of sophisticated analysis, usually by means of powerful microscopes, is necessary. In other cases, the signs can only be detected in parts of the electromagnetic spectrum that are not visible to humans. A common approach in this case is the use of remote sensing techniques that explore multi and hyper spectral image captures. The methods that adopt this approach often employ digital image processing tools to achieve their goals. The naked eye observation method is generally used to decide diseases severity in the production practice but results are subjective and it is not possible to measure the disease extent precisely. Image processing technology in the agricultural research has made significant development. To recognize and classify fungi disease an automated system has been implemented using algorithm such as back propagation, pca and svd techniques of neural network.[5]

Fig.1: Naked eye Observation to Detect Diseases

Fig.2: Type of Diseases in Wheat

1.5 Artificial Neural Networks

Artificial Neural Networks are electronic models based on the neural structure of the brain. The brain basically learns from experience. It is natural proof that some problems that are beyond the scope of current computers are indeed solved by small energy efficient packages. This brain modeling also promises a less technical way to develop machine solutions.

When to use a BP Neural Network[7]

Here are some situations where a BP NN is a good idea:

•A large amount of input/output data is available, but you're not sure how to relate it to the output.

•The problem appears to have overwhelming complexity, but there is clearly a solution.

•It is easy to create a number of examples of the correct behavior.

•The solution to the problem may change over time, within the bounds of the given input and output parameters (i.e., today 2+2=4, but in the future, we may find that 2+2=3.8).

•Outputs can be fuzzy, or non-numeric. [8]

One of the most common applications of NNs is in image processing. Some examples would be: identifying hand-written characters; matching a photograph of a person's face with a different photo in a database; performing data compression on an image with minimal loss of content. Other applications could be: voice recognition, RADAR signature analysis, stock market prediction. All of these problems involve large amounts of data, and complex relationships between the different parameters.

2. RELATED WORK

All the related works that have been done by other researchers that are related to the current research problem should be summarized in this section.

Savita N. Ghaiwat, Parul Arora, [9] They present survey on different classification techniques that can be used for plant leaf diseases classification. A classification technique deals with classifying each pattern in one of the distinct classes. A classification is a technique where leaf is classified based on its different morphological features. There are so many classification techniques such as k-Nearest Neighbor Classifier, Probabilistic Neural Network, Genetic Algorithm, Support Vector Machine, and Principal Component Analysis, Artificial neural network, Fuzzy logic. Selecting a classification method is always a difficult task because the quality of result can vary for different input data. Plant leaf disease classifications have wide applications in various fields such as in biological research, in Agriculture etc. This paper provides an overview of different classification techniques used for plant leaf disease classification. The k-nearest-neighbor method is perhaps the simplest of all algorithms for predicting the class of a test example. An obvious disadvantage of the k-NN method is the time complexity of making predictions.

Prof. Sanjay B. Dhaygude and Mr. Nitin P. Kumbhar, [11] In this paper they introduced the detection of plant leaf is a very important factor to prevent serious outbreak. Automatic detection of plant disease is essential research topic. Most plant diseases are caused by fungi, bacteria, and viruses. Fungi are identified primarily from their morphology, with emphasis placed on their reproductive structures. Bacteria are considered more primitive than fungi and generally have simpler life cycles. With few exceptions, bacteria exist as single cells and increase in numbers by dividing into two cells during a process called binary fission Viruses are extremely tiny particles consisting of protein and genetic material with no associated protein.

Mr. Pramod S. la ndge, The Author proposed and experimentally evaluate a software solution for automatic detection and classification of plant diseases through Image Processing. Farmers in rural India have minimal access to agricultural experts, who can inspect crop images and render advice. Delayed expert responses to queries often reach farmers too late. This paper addresses this problem with the objective of developing image processing algorithms that can recognize problems in crops from images, based on color, texture and shape to automatically detect diseases or other conditions that might affect crops and give the fast and accurate solutions to the farmer with the help of SMS. The design and implementation of these technologies will greatly aid in selective chemical application, reducing costs and thus leading to improved productivity, as well as improved produce.

Anand.H.Kulkarni and Ashwin Patil R. K, [10] They introduced a methodology for detecting plant diseases early and accurately, using diverse image processing techniques and artificial neural network (ANN). Farmers experience great difficulties in changing from one disease control policy to another. Relying on pure naked-eye observation to detect and classify diseases can be expensive various plant diseases pose a great threat to the agricultural sector by reducing the life of the plants. the present work is aimed to develop a simple disease detection system for plant diseases. The work begins with capturing the images. Filtered and segmented using Gabor filter. Then, texture and color features are extracted from the result of segmentation and Artificial neural network (ANN) is then trained by choosing the feature values that could distinguish the healthy and diseased samples appropriately. Experimental results showed that classification performance by ANN taking feature set is better with an accuracy of 91

Haiguang Wang, Guanlin Li, Zhanhong Ma, Xiaolong Li, [12] In this paper they proposed to achieve automatic diagnosis of plant diseases and improve the image recognition accuracy of plant diseases, two kinds of grape diseases (grape downy mildew and grape powdery mildew) and two kinds of wheat diseases (wheat stripe rust and wheat leaf rust) were selected as research objects, and the image recognition of the diseases was conducted based on image processing and pattern recognition. After image preprocessing including image compression, image cropping and image denoising, K_means clustering algorithm was used to segment the disease images, and then 21 color features, 4 shape features and 25 texture features were extracted from the images. Backpropagation (BP) networks were used as the classifiers identify grape diseases and wheat diseases, respectively. The results showed the diseases could be

effectively achieved using BP networks. Accuracy and the prediction accuracy were both 100%.
Piyush Chaudhary, Anand K. Chaudhari, Dr. A. N. Cheeranand Sharda Godara [13] They proposed an algorithm for disease spot segmentation using image processing techniques in plant leaf is implemented. This is the first and important phase for automatic detection and classification of plant diseases. Disease spots are different in color but not in intensity, in comparison with plant leaf color. So, we color transform of RGB image can be used for better segmentation of disease spots. In this paper, a comparison of the effect of CIELAB, HSI and YCbCr color space in the process of disease spot detection is done. Median filter is used for image smoothing. Finally, threshold can be calculated by applying Otsu method on color component to detect the disease spot. An algorithm which is independent of background noise, plant type and disease spot color was developed and experiments were carried out on different ".

3. PROPOSED MODELLING

3.1 Problem Formulation

The machine leaning is the technique which is applied for the plant disease detection. The machine learning algorithms lean from the previous values and drive new values on the basis of current situations. In the base paper, [14] following are the techniques of machine learning are applied for plant disease detection: -

1. The algorithm of partial least square is applied which utilize or learn the parameters of the plant from the disease need to be detected and also derive the values of the disease symptoms

2. The Gaussian process regression algorithm is being applied which learn the symptoms of the wheat leaf diseases for the disease detection

3. The algorithm of SVD is been applied which take the input of the train dataset which are the symptoms of the disease and test dataset from which disease need to be detected. The algorithm will mark the disease from the test dataset. [15] Pattern recognition aims to classify data (patterns) based on either a priori knowledge or on statistical information extracted from the patterns. The patterns to be classified are usually groups of measurements or observations, defining points in an appropriate multidimensional space. A complete pattern recognition system consists of a sensor that gathers the observations to be classified or described; a feature extraction mechanism that computes numeric or symbolic information from the observations and a classification or description scheme that does the actual job of classifying or describing observations, relying on the extracted features. The classification or description scheme is usually based on the availability of a set of patterns that have already been classified or described. This set of patterns is termed the training set and the resulting learning strategy is characterized as supervised.

Learning can also be unsupervised, in the sense that the system is not given an a priori labeling of patterns, instead it establishes the classes itself based on the statistical regularities of the patterns. The classification or description scheme usually uses one of the following approaches: statistical syntactic and structural or neural. Statistical pattern recognition is based on statistical characterizations of patterns, assuming that the patterns are generated by a probabilistic system. Structural pattern recognition is based on the structural interrelationships of features. Neural pattern recognition employs the neural computing paradigm that has emerged with neural networks.
[16] There is problem of accuracy in existing methods. To overcome this problem a method will be proposed with SVD algorithm to enhance its accuracy.

3.2 Objectives and Scope of Study

1. To analysis the performance of existing image processing techniques for wheat disease detection.

2. To develop improved image enhancement techniques for better wheat disease detection.

3. To propose and implement a technique for wheat disease detection.

4. To test and validate the proposed techniques both Quantitatively and Qualitatively.

4. EXPECTED OUTCOME

Following are the various expected outcomes of this research

1. This research is based on to detect the diseases from the wheat. The proposed algorithm will detect the diseases in the minimum amount of time

2. The proposed algorithm will detect the area of fraction in which disease is spread and also the type of disease

3. To improve performance of PLSR, SVR and GPA algorithm for the wheat disease detection and compare with the existing system

4. Apply improved technique for the wheat disease detection

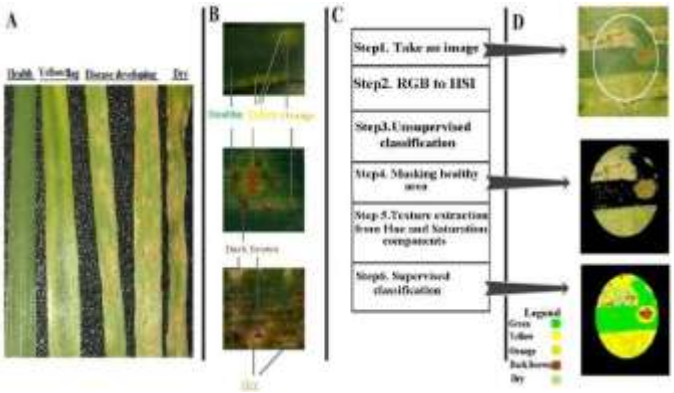

Fig.3: Steps to Detect Disease in Wheat Leaf [12]

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Design and development of Quad copter using Arduino UNO

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ABSTRACT

Quad copter can achieve vertical flight in a stable manner and be used to monitor or collect data in a specific region such as mapping terrains. Technological advances have reduced the cost and increase the performance of the low power microcontrollers that allowed the general public to develop their own Quad copter. The goal of this project is to build, modify, and make improvements in Quad copter design to obtain stable flight. The project used a Quad copter that included a frame, motors, electronic speed controllers, arduino development board, sensor boards, batteries, transmitter and receiver. Currently, the Quad copter can properly stabilize itself. This report also described the auto-commands, and live video streaming that can be implementing at a later stage. Most of the goals in this project have been achieved, resulting in a stable and manoeuvrable Quad copter. Technical up gradation in the field of surveillance as well as in remote package delivering systems have led us to the development of a quadcopter. The quad copter's flight controller is developed using Arduino Uno R3 based microcontroller board and its flight movements can be controlled using a transmitter-receiver setup. A gyro cum accelerometer module is attached to give the exact coordinate location of the place where the quadcopter is positioned whereas the magnetometer module indicates the direction of travel. The microcontroller is supplied with a LIPO battery. The microcontrollers are programmed to turn on the quad rotors using electronic speed controllers (ESCs).

Introduction

In this modern age of technology, quadcopter has become a popular invention in the field of engineering. A quadcopter, also known as UAV (Unmanned Aerial Vehicle) uses four propellers for lift and stabilization. The rotors are placed in square formed upward location with equal distance from the centre of mass. It is controlled by adjusting the rotor angular velocities which are spun by electric motors. Nowadays, quadcopters have generated attention from the researchers as its complex phenomena can be utilized in several real-time applications [1]. The basic concept of flight mechanism is as follows: Yaw, which is turning in left and right direction, is done by increasing the velocity of regular rotating

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motors and extracting same amount of power from counter rotors that is kept in the regular rotors which produces no extra lift (it would not go higher) but since counter torque is now less, the quadcopter rotates. Roll, which is tilting in left and right direction, is done by turning up the speed of one motor and turning down the speed of the motor placed in opposite direction. Pitch, which is moving up and down is controlled similarly as of roll, but using the other set of motors. Roll and pitch are determined from the "front" of drone. For roll or pitch change, thrust is decreased for one rotor and similarly increased for the opposite rotor which causes the quadcopter to tilt. When it tilts, the force vector is split into horizontal as well as vertical component. A quadcopter is operated by varying the RPM spin of its four rotors to control its lift and torque. The thrust is determined using altitude, pitch, and roll angles and is obtained from the ratio of the angles. The thrust plays a key role in maneuvering, and it enables the user to perform flying routine which includes aerial maneuvers. To conduct such maneuvers precise angle handling is required. It serves as a solution to handle the copter with angular precision which illustrates how spin of the four rotors is varied simultaneously to achieve angular orientation along with takeoff, landing and hovering at an altitude [1-2].

Literature Review

The quad rotor project required extensive research into similar systems. By reviewing others work, we Used this insight to develop our system[2]. To this end, research papers from various quad rotor groups were used as guides in the early development of the dynamics and control theory.

Quad rotor platforms used in research remain somewhat the same, having four electric motors pointed vertically upwards and equally spaced in a square fashion. However, there were some groups whom designed their own platforms, whereas commercial models available to the consumer were the Dragon Flyer, the X-UFO and the MD4-200.

1).EARLY DEVELOPMENTS

The earliest invention of the quad copter dates back to 1907 when Louis Breguet invented and flew the first quad rotor helicopter. The drones were then used mainly by the US army for military purposes. The literal introduction of quad copter was in this century where advances in electronics allowed the production of low cost lightweight flight controllers which had the capability of flying an UAV. Furthermore, a number of sensors were incorporated into the flight controller in order to increase the stability of the quad copter. These sensors were accelerometer, gyroscope and magnetometer. This resulted in the popularity of quad copters for small UAVs. With their smaller dimension and manoeuvrability, the quad copters were used for both indoor and outdoor applications. But at the preliminary phases these quadcopters lacked in basic stability and controllability. Thus, new designs were incorporated in the quadcopters using more stable sensors. These

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sensors increased the stability and also allowed it to hover at a predefined altitude. At this stage, the microcontrollers used were complex in nature and flight control was difficult as well due to errors from the controller output.

2). SUBSEQUENT DEVELOPMENTS

The introduction of the advanced and stable sensors helped in increasing the hovering stability of the drone. The hover control was achieved by the PID controller design using a microcontroller. This led to the increase in demand of drones in the field of agriculture to monitor crops of an area [3]. But still the drones were not upgraded enough to perform specific tasks. There were scopes of further developments in the future. Thus, scientists introduced few other sensors like tilt sensors, infrared sensors etc. to make the drones more efficient in their tasks. The tilt sensor monitors the pitch of the drone and the infrared sensor separates the subject of interest from the other objects by the different radiation emitted from the body [4]. The drones at this stage were still less efficient because it had no sensors to monitor the location to where it was flying and remote controlling the drone was a difficult task. At this time, the quadcopter and remote controller were connected to each other using WiFi instead of the traditional radio waves. This increased the range of the controller several times and could be remotely controlled from a faraway place. The quadcopter at this stage could follow a preset path loaded into the memory of the controller [4-5]. The drones were comfortably flown in indoors at low wind speeds. But it suffered from aerodynamic drag forces at outdoors due to heavy wind flow. The sensors used were insufficient in overcoming the wind forces in outdoors and lost stability. This ultimately led to the drone being drifted away towards the wind flow [5]. To make the flight more stable, the sensors were made more efficient. But the advanced sensors were not compatible with the old microcontrollers used. Thus, new microcontrollers are being introduced since the last decade which provides the required output to the sensors and stabilize the flight. The most popular microcontroller used till date amongst them is the Arduino microcontroller since it is very easy to use and program [6-7].

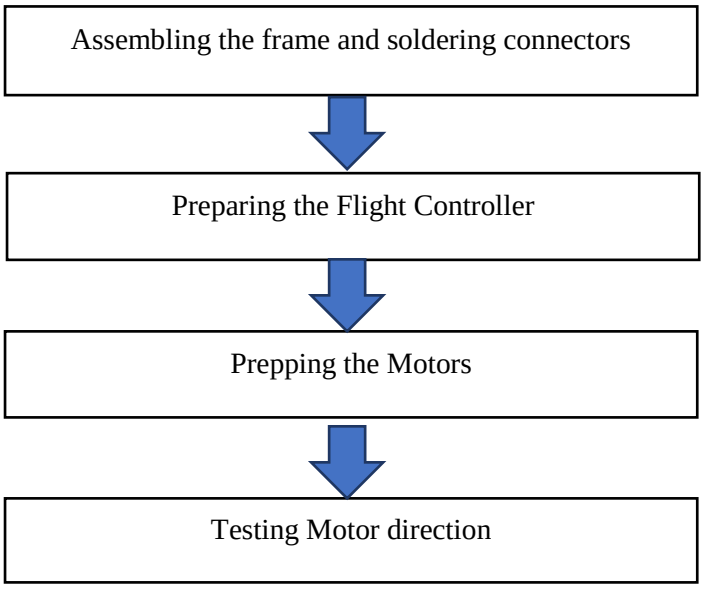
3). RECENT DEVELOPMENTS

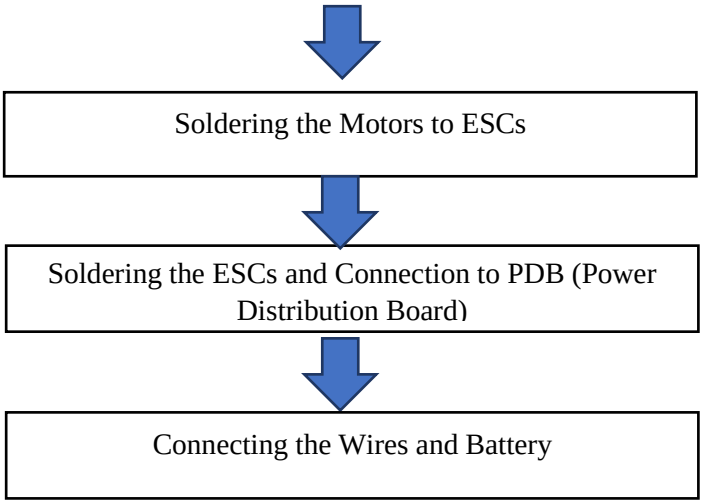
Several advancements have been achieved in the field of quadcopters over the last decade as they have evolved in designs as well as in flight controllability. This is due to the fact that better microcontrollers are being used along with better sensors attached. The introduction of BME 280 (temperature, pressure as well as altitude) sensor along with the gyroscope helped the drone in altitude hold control predetermined by the microcontroller. At this stage, the GUI at the remote station was improved to give the user a nice flight experience. The drones proved useful in the military in remote package delivering missions. With the passage of time, Arduino became a popular microcontroller in making the drones because of its flexibility in programming. Besides that, additional sensors like a camera; an ultrasonic sensor can be attached to the drones. This helped the drones

in calculating distance from the ground which previously were unable to achieve. This revolutionary addition increased its popularity several times. The drones could now be used in way point navigation systems. The coordinates of the waypoints for predetermined flight is fed to the microcontroller. An algorithm is used to calculate the distance between the present GPS position to the first waypoint and heading angle of the present position with respect to geographical north. In this process, succeeding waypoints are calculated and the quad rotor altitude control is done by the controller generated pulse width modulated (PWM) signal which can be used for security surveillance, fire suppression, and for terrain mapping [8-9]. Also, similar other models are made using FY90 microcontroller and are used in coast guard surveillance and rescue missions [10]. Infrared sensors attached to the drones could search for live targets in rescue missions [11]. The other demand of these drones is in the field of agriculture where it is used for crop surveillance, fertilizer spraying and in precision agriculture. The infrared sensor attached to the drones could identify the healthy crops from infected ones. These drones reduced the human efforts and increased the monitoring quality of the crops [12-15]. Another field where it can be useful is during natural calamity to warn people of the situation and inform them about the safety measures to be taken by incorporating microphone enabled heat sensors with a camera for reconnaissance. Here, for this additional security purposes we need several components like microphone, pistol with immobilizing darts, heat resistant frame, small medical devices, mini size quad copter and recognition devices [16]. The developments with these drones are plenty. Previously, the drones could follow a pre-determined path. But the drone was vulnerable to collisions. Lately, quadcopters are being designed which has the technology of obstacle detection and collision avoidance. The quadcopters use a number of ultrasonic sensors in coordination to detect objects around it and avoid them by using simple algorithms. The signals from the sensors are controlled by an Arduino microcontroller. Here, the signals from the sensors are integrated to give a collision avoidance display on the remote controller which can be used to control the quadcopter precisely. But then again, the quadcopter could not provide the location to where it was travelling. This was eliminated in the future where a GPS module is introduced in the system which allows the quadcopter to fly between two coordinates avoiding collision. This development found applications in package delivering systems and thus avoiding collisions on the way [17-18]. Latest developments have been made where the quadcopters are being controlled by voice commands of the user or by simple hand gestures. These developments are still in the initial stages but are soon to become a reality [19-20]. The designed system is based upon programming the quadcopter using Arduino Uno R3 microcontroller. Also, there are

several sensors embedded with the microcontroller for atmospheric condition monitoring and finding its altitude as well as magnetometer and gyro cum accelerometer sensors for finding out exact position of a quadcopter. The sensors are connected to a Wi-Fi based microcontroller IC such that it will automatically transmit the sensor details as and when required. So, remote monitoring is easily achievable. The developed system is designed keeping in mind that the circuitry becomes less complex and the cost remains low. Also there will be a one touch return button designed such that it may return to its base location by pressing a single button. So, the quadcopter can never be lost. This type of system can find its application for remote real-time atmospheric condition monitoring of several areas specifically for crop production and irrigation without installing the sensors at each and every location [21]. Also, if a camera is installed then it can be used for surveillance applications.

Methodology





as chassis of quadcopter. Frame can be achieved different configurations such as + , X , H etc. We used HJ 450 frame . It is a multi rotor design for all pilots for fun.

2. Chassis which is inbuilt with HJ 450 frame has to be soldered for connecting ESC's. Chassis works as a PCB for power supply. We have use insulating material for soldering.
3. A flight controller is the brain of the aircraft[3]. It's basically a circuit board with sensors that detects orientation changes of your drone. It also receives user commands, and controls the motors in order to keep the quadcopter in the air. All parameter of the flight controller has set to be ideal i.e. zero for proper configuration.

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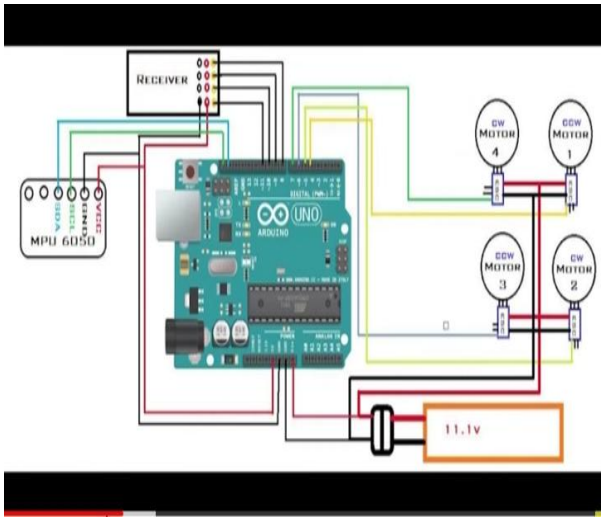
Block Diagram



Fig(1).Circuit Diagram[24]

Working and Results

The ESC's controls the speed of an AC motor with frequency, not voltage. You'll plug an off battery into your power system, you have 11.1 volts going to the motor with the ampere potential of the battery backing that voltage[5]. The AC brushless motors wire true 3-phase AC motors[6][7][8]. The motors DO run on AC Current. The ESC's is a trapezoidal wave generator. It produces 3 separate waves (one for each wire to the motor). The speed of the motor has nothing to do with voltage or amps, but instead the timing of the current fed into it. By increasing and decreasing the wavelength(frequency) of the trapezoidal wave on the 3 phases, the ESC causes the motor to spin faster and slower. The ESC's switches the polarity of the phases to create the waves. This

means that the voltage through any given winding flows ,alternately one direction then the other[9][10][11]. This creates a push-pull effect in the magnetic field of each winding, making the motor more powerful for its size and weight. The motor and the load that is placed on it, is what determines the Ampere draw from the ESC and the battery .In the below picture, we have 2 motors with 3 poles each. Their winding is labelled as poles" A", "B", and "C". The graph (under the 2 motors) shows the 3 separate waves that the ESC's generates to drive a motor. The graph shows the signals time to voltage relationships. The black wave on the graph is the signal that is sent to winding "A". The signal goes to winding "B", and the blue signal goes to winding "C". If you look at "AC Motor l'" and "AC Motor 2", and the signals shown on the graph that are sent to the windings, it is case to see that when we swop any two motor connections, we change the order that the waves hit the windings, and that changes the direction of the motor[12].

1. Arming the motors: We are not aware of arming the motors and how to do it at the initial stage of the project and for this reason we ended up with an ideal copter without any response on throttle. So we went looking back on our work and found no troubles.

2. Building the frame: Several hurdles are passed in building the frame for achieving the centre of gravity, centre of mass at the desired positions designed. The problem faced in selecting the material for building the frame. We used balsa wood for building the frame but its weight was much more than needed and lack stability.

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3. Interfacing the board: To program the board as per our purpose we need to interface it to the computer which needs a cable and a burner. In the beginning we were in search of board drivers and ended up with an error message on computer.

TABLE I. SENSOR OUTPUT VALUES

Serial no.	Sensor	Parameters	Displayed Value
1).	MPU 6050	Gyro(X axis)	4.519 °
		Gyro(Y axis)	10.710 °
		Gyro(Z axis)	14.702 °
		Acc(X axis)	9.077 g
		Acc(Y axis)	0.028 g
		Acc(Z axis)	1.054 g

Conclusion

As per the design specifications, the quad copter self stabilizes using the array of sensors integrated contains an appropriate lift and provides surveillance of the terrain through the camera mounted on it. It acts appropriately to the user specified commands given via a tod controller's purpose 1s to provide real time audio/video transmission from areas which are physically n-accessible by humans. Thus, its functionality is monitored under human supervision, henceforth being beneficial towards military applications. It is easy to manoeuvre thereby providing flexibility in its movement. It can be used to provide surveillance at dug through the usage of infrared cameras[22-23]. The system can further be enhanced the prospects. 1he GPS data logger on the Quad copter stores its current latitude, longitude, and altitude comma separated value file format and can be used for mapping purposes. Project required members not only to interface and program the components of the quad copter, but also exposed them to mechanical components and reality of project management to accomplish the project objectives.

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Website

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DESIGN AND DEVELOPMENT OF SMART GLOVE FOR DUMB AND DEAF PEOPLE

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Abstract

In this manuscript a smart glove for deaf and dumb patient has been designed and developed. About nine billion people in the world are deaf and dumb. The communication between a deaf normal visual people. This creates a very little room for them with communication being a fundamental aspect of human life. The blind people can talk freely by means of normal language whereas the deaf-dumb have their own manual-visual language known as sign language. Sign language is a non-verbal form of intercourse which is found amongst deaf communities in world. The languages do not have a common origin and hence difficult to interpret. The paper aims to facilitate people by means of a glove based communication interpreter system. Speech and gestures are expressions, which are mostly used in communication between human beings .Getting the data is the first step. The second step is that recognizing the sign or gesture, once it has been captured, is much more challenging, especially in a continuous stream. The glove is internally equipped with four flex sensors. For each specific gesture, the flex sensor produces a proportional change in resistance. The processing of these hand gestures is in Arduino uno Board which is an advance version of the microcontroller and the LABVIEW software. It compares the input signal with predefined voltage levels stored in memory. According to that required sound is produced which is stored in memory with the help of speaker. In this project, we will design a simple embedded system based device for solving this problem. In such a way it is easy for deaf and dumb to communicate with normal people.

INTRODUCTION

In our life we meet many disable people, some of them are partially and some are completely disables. The partially impaired people like dumb, deaf, paralysis in one leg or hand manages their life with difficulties and feel separate from others. Here communication plays major role to feel someone better and indulging them in an activity where they may say themselves as independent person. By this thought the paper Smart Hand Gloves for Dumb and deaf People is developed so that disable person can live his life as he wants. K A Baskaran et al. points on the technology used to find the hand gesture using flex sensor and accelerometer. Here, different gesture movements are obtained as the input and are processed to produce voice assistance using data estimation method. A few more applications where the gloves could be used are in gaming industry, controlling a robotic arm using the gloves and helping hand for people with Cerebral Palsy .The technology used to find the hand gesture using flex sensor, gyroscope and Intel gelileogen2 IoT Kit. Here, different gesture movements are obtained as input and processed to produce voice assistance using real time IoT based gesture recognition system. The device also has applications in home automation with different gestures control various functions such as, switching on/off basic electronic appliances . Santiago Aguiar et al. presented an

analysis of the current situation of individuals in Ecuador who suffer hearing impairment leading to speech disorders, who are unable to communicate using common language structures . According to Tushar Choushan et al., the primary goal was to design and implement a low cost wired interactive glove, interfaced with a computer running MATLAB or Octave, with a high degree of accuracy for gesture recognition. Using Hall Effect sensors and accelerometer hand gestures are obtained. Using MATlab the input data was processed and the message was decoded. Novel approach of interpreting the sign language using the portable smart glove was proposed by Nikhita Praveen et al. Using LED-LDR pair, zigbee and microcontroller, the gesture was recognized. The data are then processed through analog to digital converters and ASCII equivalent values. Then the outputs for corresponding gesture are displayed .Mina I et al. proposed a technique using Flex sensor, Gyroscopes and Accelerometer toobtain the hand gestures. Using Arduino and Bluetooth the signals were transmitted from transmitter and receiver section .Akshay D.R et al. presented the implementation of a simple hand glove, to help the physically challenged or bed-ridden patients to be semi independent. The complete gadget would cost around Rs.600 ($10-12), and is easy to fabricate. The range of operation now is limited, due to the RF transmission used. The range can be increased using Zigbee for transmission. S Yarisha Heera et al. proposed gesture recognition system that converts Indian Sign Language to speech with the help of variety of sensors like flex sensor, gyroscope and accelerometer, in order to successfully determine the position and orientation of the hand gesture. The microcontroller implements an in-house developed program to recognize the sign and corresponding Arabic alphabet vocally and textually .Tangible interface using a customized glove are equipped with flex sensors. These sensors are placed across the length of fingers and the thumb. Hand gestures can be captured by the digital glove, which are then converted to speech/text so that it could easily be understood by the common people .Here two major problems are taken into consideration. First one is deaf and dumb people communicating with normal person and second one is communication between deaf and dumb people. To solve this problem we have use two modes of operation in this system. We are measuring the actions performed by the deaf and dumb people using resistors array (Flex sensor) attached to glove in a hand of the user. Once the glove is placed in the hands, whenever an action for sign language is performed, the analog voltage value obtained and the corresponding action is identified by the arduino uno board. LCD displays the message and also play-back is used to play the respective sound

Fig1: Resistance value of flex sensor at rest

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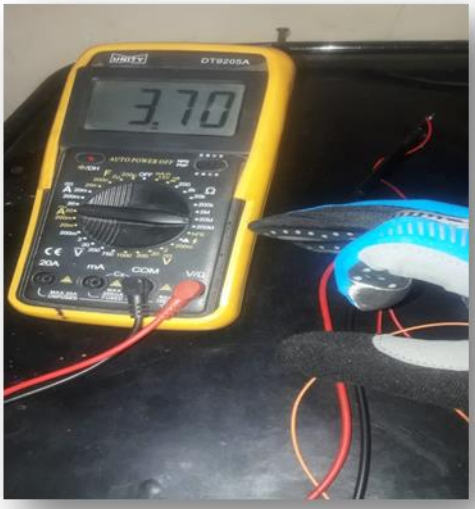

Fig2: Resistance value of flex sensor after bending

The algorithm states that four flex force sensors for four fingers that each sensor has two ranges of voltage and each range indicate one message, this message will display on LCD and vocalize by speaker. Sensors convert the known applied load into voltage and an Arduino microcontroller will receive this voltage and order the LCD and speaker to display. The signs that have been used are shown in Fig.1.

Fig 3: Sign Language [13]

HARDWARE REQUIRED

- Flex sensor
- Arduino uno board
- Speaker
- Lcd 16*2
- Resistors (10k,20k)
- Battery
- SOFTWARE REQUIRED
- Arduino IDE
- Proteus
- LABVIEW

OTHER

- Knowledge of sign language
- LITERATURE SURVEY

Numerous projects have been made by number of engineers and project makers to facilitate the people with disabilities by adding various features and enhancements in the project smart glove for deaf and dumb. The study of enhancements done by some project makers is listed below:

Proposed byK A Baskaran et al.[1] points on the technology used to find the hand gesture using flex sensor and accelerometer. Here, different gesture movements are obtained as the input and are processed to produce voice assistance using data estimation method .A few more applications where the gloves could be used are in gaming industry, controlling a robotic arm using the gloves and helping hand for people with Cerebral Palsy .

According to Tushar Choushan et al.[2]the primary goal wasto design and implement a low cost wired interactive glove, interfaced with a computer running MATLAB or Octave, with a high degree of accuracy for gesture recognition. Using Hall Effect sensors and accelerometer hand gestures are obtained. Using MATlab the input data was processed and the message was decoded.

According to Nikhita Praveen et al.[3]Novel approach of interpreting the sign language using the portable smart glove Using LED-LDR pair, zigbee and microcontroller, the gesture was recognized. The data are then processed through analog to digital converters and ASCII equivalent values. Then the outputs for corresponding gesture are displayed.

Proposed by Santiago Aguiar et al. [4] Presented an analysis of the current situation of individuals in Ecuador who suffer hearing impairment leading to speech disorders, who are unable to communicate using common language structures .

Novel approach of interpreting the sign language using the portable smart glove was Proposed by Mina I et al. [5] A

technique using Flex sensor, Gyroscopes and Accelerometer to obtain the hand gestures. Using Arduino and Bluetooth the signals were transmitted from transmitter and receiver section .

According to Akshay D.R et al.[6] presented the implementation of a simple hand glove, to help the physically challenged or bed-ridden patients to be semiindependent. The complete gadget would cost around Rs.600 ($10-12), and is easy to fabricate. The range of operation now is limited, due to the RF transmission used. The range can be increased using Zigbee for transmission .

According to S Yarisha Heera et al.[7] Proposed gesture recognition system that converts Indian Sign Language to speech with the help of variety of sensors like flex sensor, gyroscope and accelerometer, in order to successfully determine the position and orientation of the hand gesture .

Reference No.	Title	Technology used
[1]	Hand gesture	Flex sensor
[2]	Hand gesture	MATLAB or Octave
[3]	Sign language smart glove	LED-LDR pair, zigbee and microcontroller.
[4]	Sign language smart glove	Flex sensor
[5]	Hand gesture	Flex sensor, Gyroscopes and Accelerometer
[6]	Simple hand glove	Using Zigbee
[7]	Gesture recognition	Flex sensor, gyroscope and accelerometer.

It can be stated from the aforementioned literature survey that deaf and dumb people to communicate with each other but somehow they come up with sign language as a solution. Deaf and dumb people face problem in communication to normal person. As for communicating to each other, both need to have knowledge about sign language and this is bit difficult scenario .Normal person can communicate with deaf and dumb people but as they are not aware of all the signs and terminologies it is difficult for them to communicate. Normal speed of any deaf and dumb person of talking is more than normal person after normal person learn sign language. There must be an intermediate system.

The solution of the above problem can be addressed as anticipate in this research paper the person who wears the glove should hold it for about 2 seconds in order to detect the particular gesture. Every gesture consists of bending of fingers of hand in a particular order with specific angle correspondingly. The sensor values that are being generated by each of the Flex sensors fed to the microcontroller. For every bending of Flex sensors produces different analog values based on positions of these sensors. The different gestures are assigned with different sensor values to identify a particular alphabet.The use of this glove eliminates the necessity to learn sign language for communication with speech and hearing impaired

METHODOLOGY

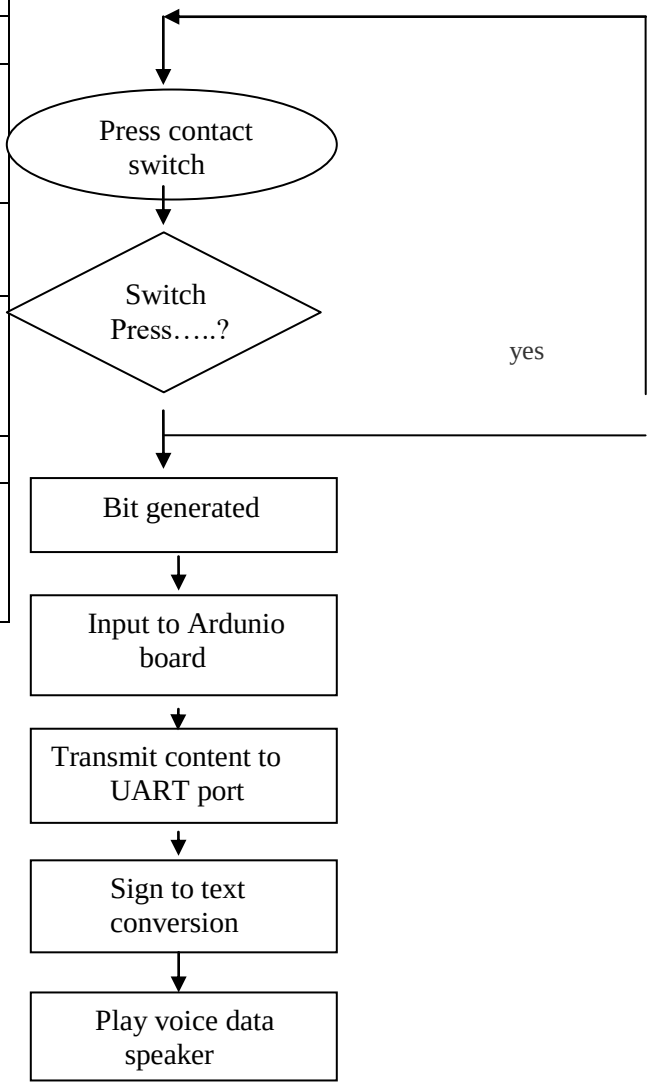

Fig 4: Procedure to design the project

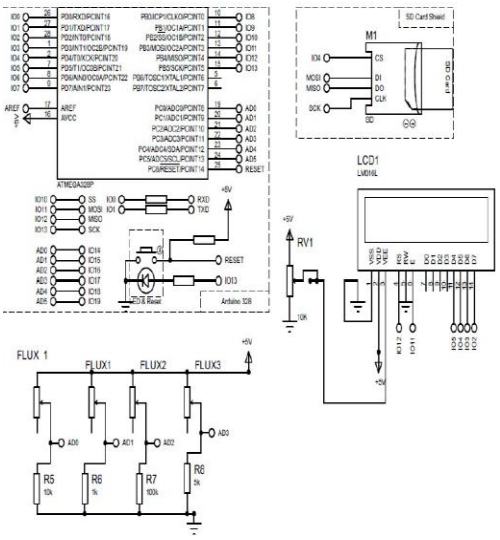

Fig 7: Circuit diagram of smart glove

WORKING:

The work of this project start from movement of hand gloves where the flex sensors are attached, and the value of sensor changes when its experiences the bending. The flex sensor is another type of potentiometer are attach to the fingers when we bend the figure the value of the sensor get changes. The changing value of the sensor is depend upon the resistance and applied angle of the bending when we bend the sensor at some particular angle we can see the value of the resistance is increase and accordingly the output get reduced. On the other way we can say that it's like a inversely proportional when the resistance of the sensor is increase at that instant the value of output decrease and accordingly we can make project by getting the advantage of this process.

After looking at the changing value of the output, the value of the get recorded by the arduino and show from the display attached to it. Here the process gets started the arduino gets different value from the sensor. The output value we can continuously see from the LCD which attached to it. When system get ON, it stays initially in Mode 0 where glove give status about user; his finger sensor value and position of palm and all these get displays on LCD Screen Attached to it. The user can generate different gesture and user can change Mode by particular patterns as coded. According the programming we have made there are three modes and modes are change when all the sensor give low output. Here we are trying to create the project such that it can work in the two different applications. In this Mode, user can use feature of Voice and Playback by generating desired gestures then recorded voice can be played. When the mode gets activated, the sensor gives some value to the Arduino and according to the programming the signal passes from the Arduino to the voice and playback recorder (APR33A3). The recorder check which port or section is active at that time and sound which already recorded in the recorder it play. The sound we hear from the speaker which attached to the recorder.

RESULT

Disabled persons can use these gloves to convert sign performed by them into speech.From the convenience of simple flex sensors, a user is able to interact with others in more comfortable and easier manner. This makes it possible for the user to not only interact with their community but with others also and they can also live normal life. The end product will have a cheap and simplistic design making it easy for users to interact with. The system is capable of recognizing signs more quickly. Furthermore real time recognition ratio of nearly 99% can be easily achieved

TABLE II. COMPARISON WITH EXISTING DEAF - DUMB SYSTEMS

CONCLUSION

The main aim of the project is to reduce the communication gap between deaf or mute community and normal people. This system is proposed to improve lifestyle of deaf and dumb people.. This technology could mean a new way for about 70 million people with hearing and speech impairment to verbally communicate and connect to people around them. High degree of accuracy was obtained for the gesture recognition as per the amount of data made to train the machine. Machine learning employed helped to predict the gesture with respect to the trained dataset. This project has discussed smart gloves for deaf and dumb communities. The primary objective was to make a device that could read the sign language to help deaf and dumb people to be able to communicate more efficiently with normal people. Deaf and dumb people rely of interpreters to in daily basis for communication. However, they cannot

depend on interpreters in everyday life mainly due to high cost

and difficulty in finding and scheduling qualified interpreters. This system will help them in improving their quality of life significantly. A huge drawback of this model is the closeness of dataset of different alphabet and word with each other. Which could have been overcome by increasing the data set. Regardless of the issues mentioned, the designed glove could assist in bridging communication gap between deaf and dumb people and normal population to certain level.

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Review: Blockchain and Cryptocurrency: The Future of Digital Transactions.

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Abstract*—Blockchain, the establishment of Bitcoin, has gotten broad considerations. Blockchain fills in as an unchanging record which permits exchanges happen in a decentralized way. Blockchain-based applications are jumping up, covering various fields including financial administrations, notoriety framework and Internet of Things (IoT).There are as yet numerous difficulties of blockchain innovation, for example, versatility and security issues holding back to be survived. This paper displays a far reaching outline on blockchain innovation. We give an outline of blockchain architechture firstly and think about some average agreement calculations utilized in various blockchains. Besides, specialized difficulties and ongoing advances are briefly recorded. We additionally spread out conceivable future patterns for blockchain.

Index Terms*—Blockchain, Blockchain architecture, decentralization, consensus, scalability, Bitcoin, Gridcoin, Ethereum coins.

I. Introduction

Nowadays cryptographic money has become a popular expression in both industry and the scholarly world. As one of the best digital currency, Bitcoin has delighted in a tremendous accomplishment with its capital market arriving at 10 billion dollars in 2016 [1]. With an exceptionally planned information stockpiling structure, exchanges in Bitcoin system could occur with no outsider and the center innovation to construct. Bitcoin is blockchain, which was first proposed in 2008 and executed in 2009 [2]. Blockchain could be viewed as an open record and every single submitted exchange are put away in a rundown of squares. This chain develops as new squares are annexed to it consistently. Uneven cryptography and circulated agreement calculations have been executed for client security and record consistency. The blockchain innovation by and large has key attributes of decentralization, persistency, namelessness and auditability. With these attributes, blockchain can significantly spare the cost and improve the efficiency. Since it permits installment to be finished with no bank or any go-between, blockchain can be utilized in different financial administrations, for example, advanced resources, settlement and online installment [3], [4]. Furthermore, it can likewise be applied into different fields including keen agreements [5], open administrations [6], Internet of Things (IoT) [7], notoriety frameworks [8] and security administrations [9].Those fields favour blockchain in multiple ways .First of all, blockchain is unchanging. Exchange can't be altered once it is pressed into the blockchain. Organizations that require high unwavering quality and genuineness can utilize blockchain to draw in clients.

Additionally, blockchain is disseminated and can keep away from the single purpose of disappointment circumstance.

With respect to keen agreements, the agreement could be executed by excavators consequently once the agreement has been conveyed on the blockchain. Despite the fact that the blockchain innovation has extraordinary potential for the development of things to come Internet frameworks, it is confronting various specialized difficulties. Right off the bat, adaptability is an immense concern. Bitcoin square size is constrained to 1 MB now while a square is mined about like clockwork. Hence, the Bitcoin arrange is limited to a pace of 7 exchanges for every second, which is unequipped for managing high recurrence exchanging. Be that as it may, bigger squares implies bigger extra room and more slow proliferation in the system.

Blockchain is an arrangement of squares, which holds a total rundown of exchange records like ordinary open record [14]. Figure 1 outlines a case of a blockchain. With a past square hash contained in the square header, a square has just one parent square. It is important that uncle squares (offspring of the square's progenitors) hashes would likewise be put away in ethereum blockchain [15]. The first square of a blockchain is called beginning square which has no parent square. We at that point clarify the internals of blockchain in subtleties.

II. BLOCKCHAIN ARCHITECTURE

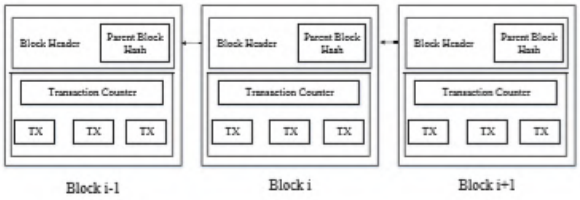


Fig. 1: An example of blockchain which consists of a continuous sequence of blocks.

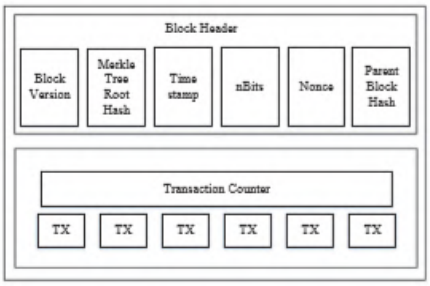


Fig. 2: Block structure

A. BLOCK

A block comprises of the square header and the square body as appeared in Figure 2. Specifically, the square header incorporates:

(I) Block rendition: shows which set of square approval rules to follow.

(ii) Merkle tree root hash: the hash estimation of the considerable number of exchanges in the square.

(iii)Timestamp: current time as seconds in all inclusive time since January 1, 1970.

(iv) nBits: target edge of a substantial square hash.

(v) Nonce: a 4-byte field, which for the most part begins with 0 and increments for each hash estimation.

(vi) Parent square hash: a 256-piece hash esteem that focuses to the past square. The square body is made out of an exchange counter and exchanges. The most extreme number of exchanges that a

square can contain relies upon the square size and the size of every exchange. Blockchain utilizes an uneven cryptography system to approve the verification of exchanges [13]. Computerized signature dependent on deviated cryptography is utilized in a conniving domain. We next briefly outline advanced mark

B. Computerized Signature

Each client possesses a couple of private key and open key. The private key that will be kept in confidentiality is utilized to sign the exchanges. The computerized marked exchanges are communicated all through the entire system. The common computerized mark is engaged with two stages: marking stage and verification stage. For example, a client Alice needs to send another client Bob a message.

(1) In the marking stage, Alice scrambles her information with her private key and sends Bob the encoded outcome and unique information.

(2) In the verification stage, Bob approves the incentive with Alice's open key. In that manner, Bob could without much of a stretch check if the information has been altered or not. The commonplace advanced mark calculation utilized in blockchains is the elliptic bend computerized signature calculation (ECDSA) [16].

C. Characteristics Key of Blockchain

In rundown, blockchain has following key attributes:

•**Decentralization**-In traditional unified exchange frameworks, every exchange should be approved through the focal confided in office (e.g., the national bank), definitely coming about to the expense and the exhibition bottlenecks at the focal servers. Difference to the unified mode, outsider is never again required in blockchain. Accord calculations in blockchain are utilized to keep up information consistency in disseminated arrange.

• **Persistency**. Exchanges can be approved rapidly and invalid exchanges would not be conceded by fair excavators. It is about difficult to erase or rollback exchanges once they are remembered for the blockchain. Hinders that contain invalid exchanges could be found right away.

• **Anonymity**. Every client can cooperate with the blockchain with a created address, which doesn't uncover the genuine character of the client. Note that blockchain can't ensure the ideal security.

D. Scientific categorization of blockchain frameworks

Current blockchain frameworks are classified generally into three sorts**: open blockchain, private blockchain and consortium blockchain** [17]. In open blockchain, all records are obvious to the general population and everybody could participate in the accord procedure. In an unexpected way, just a gathering of pre-chosen hubs would take an interest in the accord procedure of a consortium blockchain.

With respect to private blockchain, just those hubs that originate from one specific association would be permitted to join the accord procedure.

A private blockchain is viewed as a brought together system since it is completely constrained by one association. The consortium blockchain built by a few associations is mostly decentralized

since just a little segment of hubs would be chosen to decide the agreement.

•Consensus assurance

In open blockchain, every hub could partake in the agreement procedure. Furthermore, just a chose set of hubs are liable for approving the square in consortium blockchain. Concerning private chain, it is completely constrained by one association and the association could decide the final accord.

•Read authorization

Exchanges in an open blockchain are unmistakable to the general population while it depends with regards to a private blockchain or a consortium blockchain.

•Immutability

Since records are put away on an enormous number of members, it is almost difficult to alter exchanges in an open blockchain. In an unexpected way, exchanges in a private blockchain or a consortium blockchain could be altered effectively as there are just set number of members

.

•Efficiency

It requires some investment to proliferate exchanges and squares as there are countless hubs on open blockchain organize. Subsequently, exchange throughput is constrained and the idleness is high. With less validators, consortium blockchain and private blockchain could be more efficient.

•Centralized

The fundamental contrast among the three kinds of blockchains is that open blockchain is decentralized, consortium blockchain is halfway brought together and private blockchain is completely concentrated as it is constrained by a solitary gathering.

•Consensus process

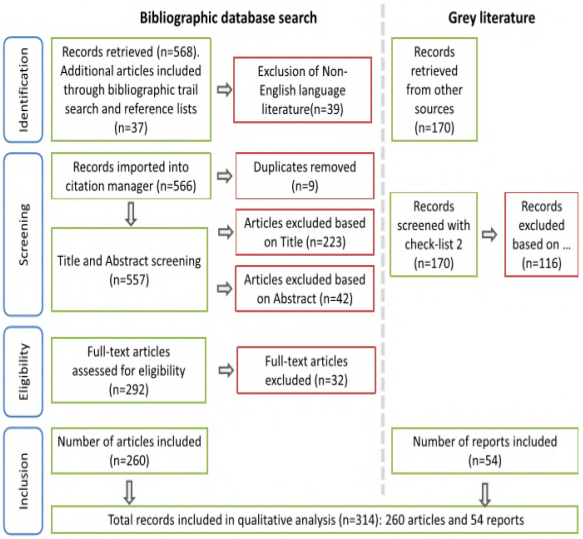
Everybody on the planet could join the accord procedure of the open blockchain. Not quite the same as open blockchain, both consortium blockchain and private blockchain are permissioned. Since open blockchain is available to the world, it can draw in numerous clients and networks are dynamic. Numerous open blockchains rise step by step. With respect to consortium blockchain, it could be applied into numerous business applications. Presently Hyperledger [18] is creating business consortium blockchain structures.

Research methodology

To provide a transparent ,reproducible and scientific literature review of blockchain based applications the process suggested by Briner and Denyer(2012) as well as some features of the PRISMA statement (Moheretal.,2009) have been adopted. The overall methodological approach includes the following steps:

1 .Identify the need for there view,prepare a proposal for there view, and develop the review protocol.

2. Identify the research select the studies ,assess the quality,take notes and extract data, synthesise the data.



. Fig. 2. Flowchart of the search strategy.

Fig .3 Flowchart of search strategy

Descriptive analysis

The study analyzes 260 research papers published between 2014 and April 2018 (for conformity, grey literature has been excluded from the descriptive analysis).The purpose of the descriptive analysis is three fold:

(i)It provides interesting in sights regarding current research trends in blockchain technology, and its applications

(ii) it helps to visualise the multidisciplinary research approaches developeds of the scientific literature**A PRIMER ON BLOCKCHAIN TECHNOLOGY**

The Crypto-economy

Cryptographic techniques draw on the science of cryptography, and allow for the protection of sensitive information (organizational, institutional or personal), either in storage or in communication. Initially devised for information security systems (Saper, 2013, p. 673), they are now moving into other use spaces. The crypto-economy is an "economic system, which is not defined by geographic location, political structure, or legal system, but which uses cryptographic techniques to

Constrain behaviour in place of using trusted third parties" (Babitt and Dietz, 2014). A new subset of economics is hence emerging with the rise of crypto-economics, which may be defined as "a formal discipline that studies protocols that govern the production, distribution and consumption of goods and services in a decentralized digital economy. Crypto economics is a practical science that focuses on the design and characterization of these protocols" (Zamfi, 2015).In the final section, a typology of crypto-economy instruments is provided.

The Blockchain

Blockchain technology ensures the elimination of the double-spend problem, with the help of public-key cryptography, whereby each agent is assigned a private key (kept secret like a password) and a public key shared with all other agents. A transaction is initiated when the future owner of the coins (or digital tokens) sends his/her public key to the original owner.

The coins are transferred by the digital signature of a hash. Public keys are cryptographically generated addresses stored in the blockchain. Every coin is associated with an address, and a transaction in the crypto-economy is simply a trade of coins from one address to another. The

striking feature of the blockchain is that public keys are never tied to a real-world identity.

Transactions, although traceable, are enabled without disclosing one's identity; this is a major difference with transactions in fiat currencies that, with the exception of (non-traceable) cash transactions, are related to specific economic agents endowed with legal personality (whether physical or juridical).

Payment finality is "the discharge of an obligation by a transfer of funds and a transfer of securities that have become irrevocable and unconditional" (Committee on Payment and Settlement Systems, 2003, p. 496). In a world of fiat money, payment finality is conceptualized in relation to bank money within a triangular payment structure involving a payer, a payee, and a bank acting as a 'go between' (Rossi, 2004, p.3). This 'go between' is in fact the trusted third party required in all payments until the advent of cryptocurrencies. Yet, the latter are trustless protocols that dispense with the trusted third party

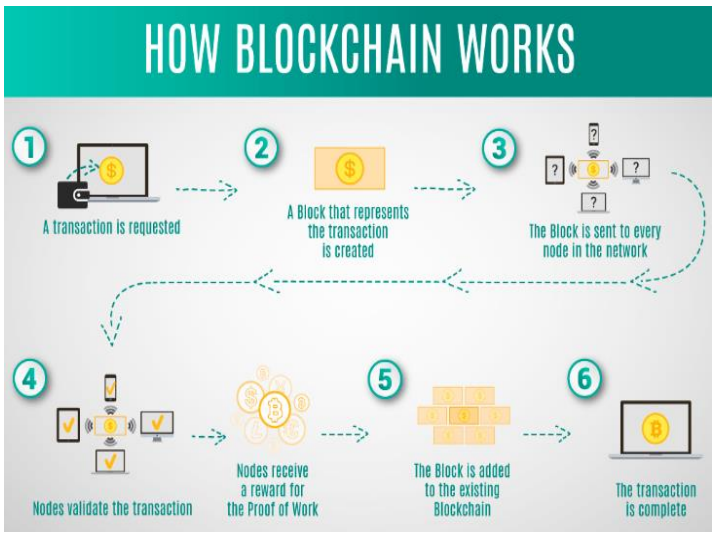


Fig .4: Working of blockchain

Miners and Computational Problem Solving

The blockchain is a chain of transactional records that a subset of network participants (also known as 'miners') enriches by solving difficult computational problems. Miners fiercely (and anonymously) compete on the network to solve the mathematical problem in the most efficient way, thereby adding the next block to the blockchain. The block reward (i.e. newly minted coins) is sent to the miner's public address.

If the miner wants to spend these coins they must sign with the corresponding private key. When mining power increases, so does the difficulty of the computational problems required to mine a new block (Böhme et al, 2015, p. 218). This difficulty level is adjusted to keep the block-generation pace constant, roughly ten minutes (Dwyer, 2014, p. 5). In the early days, mining was primarily done by individuals on home computers through central (or graphics)

processing units BitShare, a mining chip, potentially embedded into millions of Internet devices, works collectively to mine new currency.

These new streams of crypto-currency both solve the problem of bearing the cost of Micropayments, and bring to the fore a new crypto-business model by helping finance the chips themselves (Niccolai, 2015). The technical details remain unclear, but if the latter innovation were to be replicated and widely adopted, it would be a game changer for the whole crypto-economy.

Hashes and Hash Functions

The essence of the blockchain is informational before being economic or monetary, conducive to many emerging and increasingly popular token-free blockchains. It relies extensively on hashes and hash functions. A hash (output) is the result of a transformation of the original information (input). A hash function is a mathematical algorithm that takes an input and transforms it into an output. A cryptographic hash function is characterized by its extreme difficulty to revert, in other words, to recreate the input data from its hash value alone. This is called the collision resistance. Proof-of-work and Proof-of-stake. The hash cash proof-of-work function is at the heart of block generation in the Bitcoin protocol.

Proof-of-stake is a proposed alternative to proof-of-work already implemented for certain altcoins (other than Bitcoin), whereas others rely on a hybrid protocol (Graydon, 2014). Instead of splitting blocks across proportionally to the relative hash rates of miners (i.e. their mining power), proof-of-stake protocols split stake blocks proportionally to the current wealth of miners. Buterin (2014b) argues that proof-of-stake has a number of distinct advantages over proof-of-work (non-wasteful protocol, decreased likelihood of a 51% attack, potentially faster blockchains.)

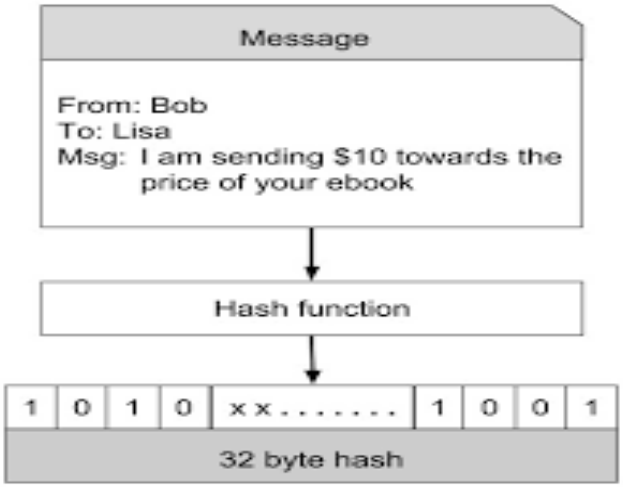


Fig .5: The basic hash function model

A HOLISTIC VIEW OF BLOCKCHAIN TECHNOLOGY

Vitalik Buterin's Definition of the Blockchain

We have previously exposed the core concepts of the blockchain, and alluded to Bitcoin, which is today one blockchain-based platform amongst others, although it still is the most famous worldwide. For Vitalik Buterin (2015a), the blockchain is a magic computer that anyone can upload programs to and leave the programs to self-execute, where the current and all previous states of every program are always publicly visible, and which carries a very strong crypto economically secured guarantee that programs running on the chain will continue to execute in

exactly the way that the blockchain protocol specifies.

The definition arguably lacks scientific rigor (‘a magic computer’ is a debatable term). It is nevertheless useful to discuss, and highlight the features it omits. By not referring to the terms ‘ledger’, ‘money’ or ‘transactions’, Buterin makes the point that the essence of the blockchain is informational and processual, and does not relate directly to the monetary sphere. In this sense, blockchains may exist without an underlying token.

The blockchain is structured around a network, which is evolutionary in essence (Pilkington, 2016, forthcoming). This evolutionary process may be mapped by a state transition function, describing what state to move to, on receiving a given input in a given state.

Again, Buterin rightly refrains from specifying any state transition function.
We find Buterin’s definition useful in the sense that amongst the previously discussed core concepts, ‘crypto-economy’ and ‘payments finality’ are not definitional features per se, but rather fundamental characteristics of major blockchain applications, extended to the monetary and economic sphere.

Fig .6: The symbolic Bitcoin as a cryptocurrency

Private, Public and Hybrid Blockchains

Public decentralized ledgers are accessible to every Internet user. The public nature stems from the free and unconditional participation of everyone in the process of determining what blocks are added to the chain, and what its current state is (Buterin, 2015b). These fully decentralized blockchains rest on a consensus mechanism of proof-of-work (or proof-of-stake) for validation purposes: “in the case of Bitcoin, the “longest chain – the chain with the most proof-of-work – is considered to be the valid ledger” (Swanson, 2015, p.4).

In a fully private ledger, write-permissions are monitored by a central locus of decision-making. Read-permissions are either public or restricted (Buterin, 2015b). A private blockchain amounts to a permissioned ledger, whereby an organizational process of Know-Your-Business (KYB) and Know-Your-Customer (KYC) enables the white listing (or blacklisting) of user identity. The difference between public and private blockchains is the extent to which they are decentralized, or ensure anonymity. Between

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the two extremes, there exists a continuum (Brown, 2015, Allison, 2015) of "partially decentralized" blockchains (Buterin, 2015b), rather than a strict public/private dichotomy. Partially decentralized, also called "consortium blockchains" (Buterin,
2015b), constitute a hybrid between the low-trust (i.e. public blockchains) and the single highly-trusted entity model (i.e. private blockchains).

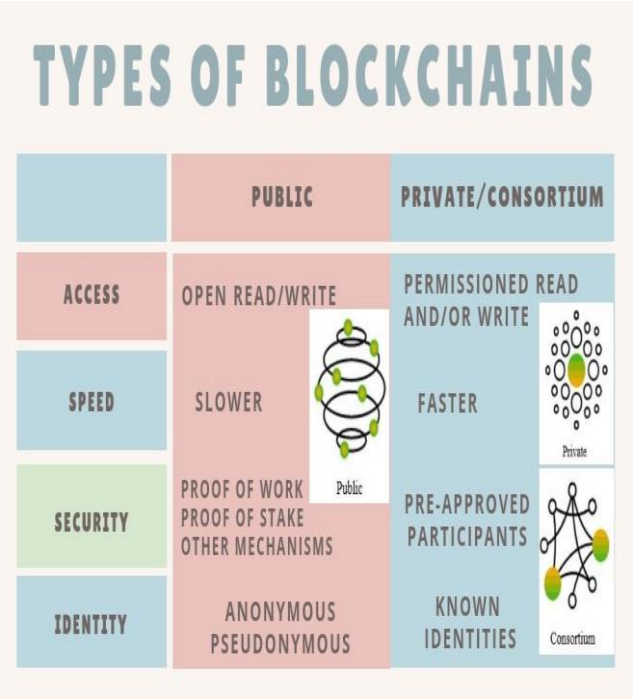

Fig .7: Types of Blockchain

Features of Decentralized Public Ledger Platforms

Bitcoin was the first decentralized public ledger, and has acquired a global status since 2013-2014.Although we are still far away from mass adoption, the success of Bitcoin is to be credited to the underlying innovation called the blockchain.

What is the blockchain?

It is simply a secure public ledger platform shared by all parties through the Internet or an alternative distributed network of computers .With the notable exception of token-free applications, the tour de force of the blockchain is to remove the need for a trusted third party to guarantee a transaction. Here after, we list five important features of public ledgers. Protocol for Sending, Receiving and Recording Value.When extended to the (crypto) monetary sphere, the blockchain is nothing less than the continuation of the value transfer system, a technological innovation patented in the USA in 1998 (Jones & Higgins, 1998). Early value transfer systems embodied the concepts of value storage, encryption, and cryptographic public/private key pairing, at the heart of modern crypto-currencies. The main difference between blockchain technology and these crude predecessors is the level of decentralization of the network.

As defined by Benkler (2006, p.62), "'[d]ecentralization' describes conditions under which the actions of many agents cohere, and are effective despite the fact that they do not rely on reducing the number of people whose will counts to direct effective action". Most payment platforms, such as Visa, rely on private secure communication networks, although "VISANet connects to both wired, wireless and also the Internet for processing"., p.4).

Hence, the blockchain is purely Internet-based, and the Bitcoin's blockchain is decentralized. The level of decentralization is far greater in the blockchain than in the first value transfer systems, thanks to the immense network effect of

the Internet. However, the current level of decentralization is increasingly questioned by the emergence and adoption of private blockchains by organizations.

Internet-based Value Containers: Coins or Tokens

The "crypto-currency" blockchain set (Byrne, 2015), which does not encompass all the "distributed application/ledger" blockchain set (ibid.), is a modern value transfer system, namely a protocol for sending, receiving and recording value on a public ledger. No transmission of value would ever be possible without the existence of a value container.

This is what economists, who emphasize the unit of account function, call money (Schmitt, 1984, Keynes, 1930, Innes, 1913).

The use of money does not necessarily imply the physical presence of a metallic currency, nor even the existence of a metallic standard of value. We are so accustomed to a system in which the dollar or the sovereign of a definite weight of gold corresponds to a dollar or a pound of money that we cannot easily believe that there could exist a pound without a sovereign or a dollar without a gold or silver dollar of a definite known weight (Innes, 1913, p.377).

Today's blockchain model works the same way: the public ledger or database is simply a more modern way to map out the actual transfer and ownership of crypto-currency. The value container is called a coin, a terminology reminiscent of the currency lexical field, and in fact the primary purpose of a coin (whether tangible or virtual) is precisely to carry value between members of a community of payments. However, the value container may contain instead a fiat currency unit or a financial instrument, which would undermine its full-fledged virtual currency status. Strictly speaking, value containers (or tokens) and currencies are thus not synonymous.

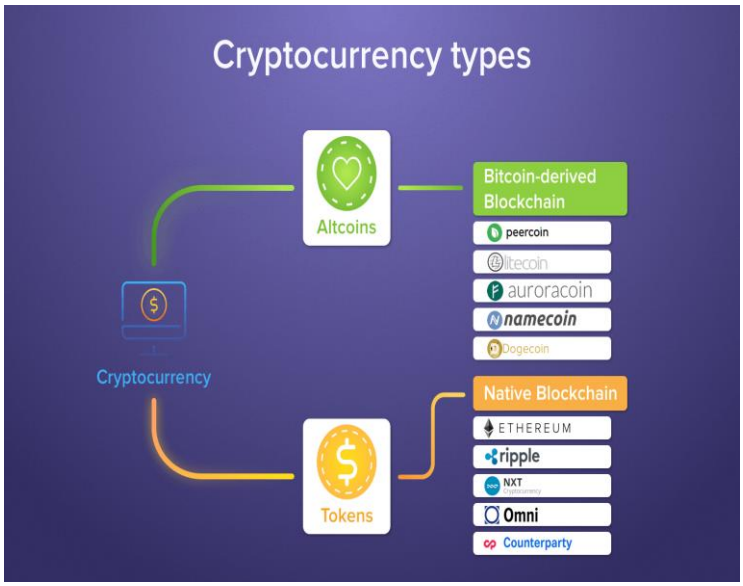

Fig .8: Coins Vs Tokens

Immutability of the System

Immutability is a characteristic of blockchain technology (Coletti, 2015). Derose (2015b) argues that immutability, or resistance to tampering, is what confers its intrinsic value to crypto-currencies, thanks to a revolutionary feature, namely "the ability to declare a truth, globally and without a centre of authority, regardless of what anyone else does to change this truth".

Certain features of the blockchain concept might be relaxed (see infra), but not immutability, which remains crucial: "a blockchain does not need to be a shared ledger, nor does it need to have a distributed consensus. It can be completely centralized as long as its data/state is externally

verifiable and all data is immutable" (anonymous reviewer cited by Swanson, 2015, p.59). So if immutability is what ultimately makes a cryptocurrency intrinsically worth trading, this must be the most essential feature of all. Hasn't the Bitcoin's blockchain ever experienced failure since its inception? On March 11, 2013, the network proved dysfunctional, with the appearance of a fork resulting in two concurrent Bitcoin networks with two distinct blockchains running in parallel, before one of them was eventually abandoned by the community of miners a few hours later
(Buterin, 2013). Buterin (ibid.) describes a more serious bug that shook the network in August 2010, yet without any serious consequence. He explains the technical details of the incident akin to an integer overflow bug3 that required the Bitcoin software to be republished resulting in a fork of the blockchain with a new valid chain overtaking the old one. Notwithstanding these two incidents, the Bitcoin distributed ledger remains immutable to date.

PUBLIC LEDGERS UNDER CRITICISM: TOWARD HYBRID SOLUTIONS?

Broadly available technology has always afforded a way of transferring power from central authorities to the masses (Buterin, ibid.). The same way the determination and communication of time, by means of large and expensive clock towers, was a testimony to the concentration of power in the hands of a minority, the tracking of time by individuals was enabled by early engineering innovations a few centuries ago (ibid.).

The blockchain runs counter to the underlying principles behind traditional banking. A banker has a tendency to centralize all information related to payments, transactions and loans, to store and record the corresponding data in a computer system. This is what the business of the banker is about: storing money and information about money. Blockchain technology might yet prove extremely useful to the banking industry as a whole. We will review potential applications that could improve the efficiency and reduce the costs of financial institutions (see infra).
Derose (2015a) is full of praise for the remarkable capabilities of the blockchain that not only removes the need for trusted third-parties in money value transfers, but also reduces transaction costs to nearly zero, and enables fast transactions.

Is Derose's optimism warranted?
In the global payments industry, a plethora of contingent services are provided by auditors, legal specialists, payment processors, brokers etc. Against the odds, blockchain technology disintermediates third-party transaction verifiers, thereby pushing the disintermediation process into unchartered territory in the modern era.

Swanson (2015, p.12) asks whether there is "a way of using distributed consensus mechanisms to transmit value transparently and securely without expensive proof-of work methods?" A fully decentralized distributed ledger functions with anonymous validators (proof-of-work methods), to create a truthful record. Contrariwise, what would be the performance of a distributed consensus

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ledger with known validators endowed with the power to punish those who do not follow protocol? Using the example of two fictitious agents Bob and Alice, Swanson (ibid.) shows that the second scenario minimizes the need for interpersonal trust even more than the first one.

In Ethereum, “everything is dictated by the code,”, yet “anything that is completely computeroperated is a potentially oppressive system.” (De Filippi cited by Schneider, 2014). This sense of caution is reinforced by a comment of Buterin (2014a) on an article written by Schneider (2014):

Lately I have become much more comfortable with the idea of computer-controlled systems for one simple reason: our world is already computer controlled. The computer in question is the universe with its laws of physics and humans provide the inputs to this great multisig by manipulating their body parts.

At the "base layer", no semblance of compassion really exists: the person who wins is the one who can wield the most violence. This is true even in anarchies; when it comes down to it, it's the guy with the guns who has the final say. And yet humans have managed to take this base layer and build all sorts of other structures on top. The world of programmatic smart contracts is exactly the same; it's just a set of cryptographic "laws of physics" that you can build stuff on, except it's designed to be both much more efficient and at the same time voluntarist at the core - unlike in the "real world".

The Bank of England (cited by Allison, 2015) is currently reflecting on ways to implement "hybrid systems" involving distributed ledger technology, also bearing in mind the idea of a continuum, and raising the issue of remuneration, incentives, and honest participation, so as to ensure socially efficient outcomes. This initiative might come as a surprise following the critical report (Ali et al., 2014, p. 6) issued a few months earlier expressing the institution’s scepticism as regards the claimed ability of cryptocurrencies to sustain high levels of decentralization.

A significant risk to digital currencies' sustained use as payment systems is therefore that they will not be able to compete on cost without degenerating - in the limiting case - to a monopoly miner, thereby defeating their original design goals and exposing them to risk of system-wide fraud (ibid,
2014, p.6).

Finally, another source of pessimism in the long run is the game-theoretic parallel drawn with the Tragedy of Commons (Hardin, 1968; Graydon, 2014).

Sidechain Technology and Smart Contracts

A sidechain functions as a separately managed ledger, with its own software code, that is “pegged” to the main blockchain ledger so as to allow transfers of key information from one chain to the other. It goes hand in hand with the idea of smart contracts (Maxwell, 2015), which are specific programs used by a user of the main blockchain, in order to decide whether a specific operation, say a given payment, should be

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permitted or not. The sidechain ledger indirectly taps the underlying authenticating power of the main blockchain, while simultaneously taking advantage of a more flexible software platform.

The sidechain helps gain both agility and freedom of using multiple networks, without having to create new crypto-currencies (i.e altcoins), which would weaken the network effect (ibid.), and impede their mass adoption. Because of the value attached to cryptocurrency holdings, there is a natural resistance to embrace untested changes. The sidechain and smart contracts offer a way out of this deadlock.

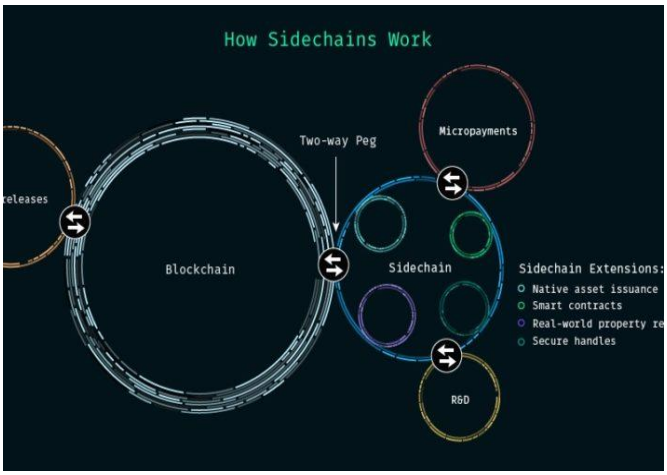

Fig .9: Sidechain Working

A programme called Elements is currently under investigation by Blockstream cryptography experts working on the Alpha sidechain (Maxwell, 2015). We briefly review hereafter two developments of Elements:

Firstly, 'Confidential Transactions' is a new feature of the sidechain that ensures, through the introduction of a confidential address, that the amounts of cryptocurrency transferred are visible on the blockchain only top in the transaction (and/or those they designate). This goes beyond the privacy on Bitcoin's blockchain, which relies purely on pseudonymous, albeit public, identities. Financial privacy is in great demand from the cryptocurrency community in transactions for commercial and personal purposes.

Secondly, 'Segregated Witness' ensures that the specification of a transaction's effects on the ledger is separated from the data necessary to prove its validity, thereby eliminating all possibility of transaction malleability, and strengthening the overall security of the blockchain

.

Ethereum

Ethereum is an innovative blockchain-based virtual machine and Cloud 2.0 platform, featuring stateful user-created digital contracts (see John Newman, this volume). The developers are working on a system allowing the exchange of complex contracts. More sophisticated interaction between users will allow the conclusion of digital contracts according to a distributed ledger model. Ethereum amounts to an extension of the crypto economy, beyond virtual monetary exchanges, toward the establishment of a nexus of digital contracts pertaining to all areas of life (e.g. wage payment or marriage) with a solid technological and legal basis.

Fig .10: Ethereum Coin

According to one of Ethereum's founders:

We have a blockchain that is featureless in a sense and it has embedded within it a programming language that allows people to create all sorts of things that run on top of the blockchain architecture. The building block for Ethereum is a smart contract; it is like a virtual machine or autonomous programme that is maintained by everyone in the network. Inside the contract you canspecify what its purpose is. The contracts are the foundations for a new generation of applications on the internet (Alisie cited in Barnes, 2015).

Gridcoin

Drawing on the Bitcoin protocol and an open source middleware system for volunteer and grid computing, the Berkeley Open Infrastructure Network Computing Grid or BOINC (http://boinc.berkeley.edu/), the blockchain finds an unexpected application with Grid Coin, a peer-to-peer internet-based cryptocurrency that aims to provide real benefits to humanity by compensating miners for participating in BOINC projects, leading to advances in medicine, biology, climatology, and astrophysics by redirecting the computational power towards BOINC research. The blockchain's most famous application generates unnecessary heat and wasted power for the proof-of-work algorithms. A media release (Long Future Foundation, 2015) presents a modelling tool, the Bit currency calculator, showing that Bitcoin could one day consume up to 60% of global electricity production, 13,000 terawatt hours, equal to powering 1.5 billion homes4.

Bitcoins are created in air-conditioned warehouses full of energy-hungry computers using a process known as bitcoin 'mining'. Bitcoin mining 'farms' are popping up all over the world right now and devouring vast amounts of electricity. There are even new plans to embed bitcoin mining chips into everyday objects like DVD players and refrigerators (Long Future Foundation, 2015). The white paper (Halford, 2014) explains the rationale: "Gridcoin is the first cryptocurrency that successfully diverts wasted energy towards useful scientific research, operating as a distributed peer to peer network with no central authority, and provides greater efficiency using normal consumer grade hardware".

Ripple Labs

As in Jones & Higgins (1998), the real potential for cryptocurrencies may be the streamlining of the transfer of value (World Economic Forum, 2015, p.14). Ripple laps, with its Ripple technology, has become since 2012 a major player in the payments revolution with an ambition to build a global payment protocol (Cawrey, 2014).

Ripple enables a peer-to-peer server architecture to facilitate the movement of value among financial institutions. This allows financial

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services companies to make payments directly to each other, whether across different networks, geographic borders or currencies" (Aranda & Zagone, 2015).Ripple stands to break down the walls between financial institutions. Instead of each institution being a silo that works within the confines of its own rules and regulations, the RTXP serves to create a universal set of rules that each institution can abide by (Gehring, 2015).

The elaboration of a single protocol between the building blocks of the financial system is reminiscent of the invention of the Simple Mail Transfer Protocol (SMTP) in the early days of emails (ibid.) Schwartz et al. (2014, p.2) show that the Ripple Protocol achieves consensus at each ledger-close. It consists of a real-time gross settlement system, the Ripple Transaction Protocol (RTXP), securing instant and nearly free payments, currency exchange and remittance, regardless of size. Ripple allows the fast and secure transfer of tokens, whether in fiat, cryptocurrency, commodity or any other unit of value.

Fig .11: Gridcoin

The Ripple technology echoes our previous discussion of the centralization/decentralization continuum, and the emergence of hybrid solutions. It is a smart blend of permissioned and permission less architecture (Kelleher, 2015). While everyone is allowed to enter the game, every participant can select the transaction validators, on the basis of trust, of a contract, or a customized evaluation (ibid.). Ripple's algorithm creates a decentralized market inside its protocol; in a sense, it is closer to a ledger chain than a blockchain, with its decentralized meta-layer of control (ibid.).

Blockchain-based Digital Identity Providers

The problem of online digital identity comprises two interrelated issues, namely access control and personally identifiable information (Daily Fintech, 2015). The centralisation of digital identity-related information is of utmost political, legal, societal (and arguably philosophical) relevance. A pioneer in the field is the Government of India, currently running the world's largest national digital identity scheme, the Unique Identification

Authority of India (UIDAI), with each resident being assigned a 12-digit unique number called Aadhaar (The Times of India, 2015). Blockchain technology confers to digital identity a novel and potentially revolutionary decentralization character in the digital age.

An innovative company in the booming field of digital authentification is One Name, a "passcard identity company building access control on the blockchain". One Name provides a trustless and decentralized service so that one's digital identity

cannot be controlled by a central institution or company.

Blockchain-based Voting Systems

In February 2015, the Bitcoin Foundation (2015) unveiled a new project revolving around a blockchain-based voting system, which "provides even greater transparency into the voting process, with every vote being recorded on the blockchain". Building upon the immutability, transparency and consensus inherent in blockchain technology, voting systems -wherein every vote is recorded under a secure, cryptographic hash- appear as a major technological breakthrough. At the junction between e-democracy and blockchain technology, this type of voting system was first implemented by a Danish political party for internal elections purposes (Millet, 2014).

Blockchain Technology for the Banking/Finance Industry

Our section on Ripple emphasized the potential of Blockchain technology for the harmonisation of payment protocols in the global financial system. Yet, other important applications exist in the banking and finance industry.

Likewise, for Accenture (2015), a digital revolution is on its way in the banking industry, although the consequences on major players are very uncertain. Banks are likely to be reshaped, following a period of turmoil, to better address the needs of individuals and institutions, by providing them with enhanced services.

On 24 March 2015, Nasdaq the leading provider of trading, clearing, exchange technology, listing, information and public company services, signed a deal with the New York-based startup Noble Markets. The latter will provide Nasdaq with core trading technology to help them build a new market for cryptocurrencies (Casey, 2015).

On May 2015, Nasdaq announced its plans to leverage Blockchain technology, through the Open Assets Protocol, a colored coin innovation. Nasdaq will apply blockchain technology, in order to expand the equity management capabilities of ExactEquity™, its Nasdaq Private Market platform, resulting in enhanced integrity, audit ability, governance and transfer of ownership capabilities (Nasdaq.com, 2015)..

Enhancing the Transparency of Supply / Global Commodity Chains

In a globalized world, every commodity we consume corresponds to "a journey of people, places and materials" (Steiner, 2015). Yet, the underlying supply chains are often opaque to the end consumer. How do we recreate transparency and new relationships with consumer goods, so as to enable active participation (Williams, 2015), to verify product authenticity and ethical standards? Blockchain technology provides a groundbreaking solution. A shared, consensus-based and immutable ledger helps track the origin and the transformations undergone in the supply chain. The blockchain will create a formal registry enabling the identification and the tracking of possession of a good throughout the supply chain. One could also resort to connected objects

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installed in fishing boats, shipping trucks and storage coolers that will keep track of the environmental conditions, such as temperature or location, ensuring that a product was safely handled, complying with health and safety norms. Finally, because the blockchain ensures anonymity; promotions and discounts could be sent to users, without disclosing their personal information.

Social Inclusion in the Developing World

One of the most exciting and unforeseen applications pertains to social inclusion in the developing world, most notably, of the unbanked population, that is, all the adults in the world who do not hold an account at a bank, another financial institution or a mobile money service provider. “From 2011 to 2014, 700 million people became account holders at banks, other financial institutions, or mobile money service providers, and the number of “unbanked individuals dropped 20 percent to 2billion adults” (World Bank, 2015a). Thus, the World Bank has set an ambitious goal: universal financial access by 2020 (World Bank, 2015b).

Taxonomy of blockchain

Most authors classify blockchain applications into financial and non-financial ones (Crosbyetal.,2016)since crypto currencies represent a considerable percentage the existing blockchain networks .Others classify them according to blockchain versions. In this work, we propose an application-oriented classification ,similar to the one proposed in Zheng et al. (2016). Our approach, however, differs from other similar works in that it uses a rigorous statistical methodology based on the literature(seeSections3and4),and thus it fits better to current blockchain developments and illustrates with high fidelity the future blockchain trends.

blockchain-based fashion. The Nasdaq-Citi platform (Rizzo, 2017) is a platform that enables functionalities such as relationship management and investments for private companies. Ventures(2014) is coined in the blockchain2.0 platform and uses the Counter party Therefore, taking into account the actual and forth coming heterogeneity of blockchain solutions ,we present a more comprehensive and in-depth classification of blockchain-based applications Blockchain is expected to play an essential role in the sustainable development of the global economy ,bringing benefits to consumers ,to the current banking system and the whole society in general(Nguyen,2016).The global financial system is exploring ways of using blockchain-enabled applications for financial assets, such as securities ,fiat money, and derivative contracts (Peters and Panayi, 2016; Fanning and Centers, 2016; Nijeholt et al., 2017; Paech, 2017).

For example ,blockchain technology offers a massive change to capital markets and a more efficient way for performing operations like securities and derivatives transactionBitShares 2.0 offers a stack of financial services including currency exchange or banking operations in a decentralised protocol , which implements financial instruments as SCs ,to create an oval stock market .Another example is Coin setter , a NYC - based For extra ding platform for bitcoins

(Coinsetter,2012). Plasma (PoonandButerin,2017) is an SC framework which enables the use of SCs to process financial activity, as well as to construct economic incentives for globally persistent data services. Other financial-oriented areas may include commercial property and casualty claims processing, syndicated loans contingent convertible bonds ,automated compliance, proxy voting ,asset re hypo the cation ,and over-the-countermarket(Deloitte,2016a;F.R. Ltd,2016;Infosys Consulting , 2016 ; Mc Watersetal.,2016).Finally ,blockchain adoption by the financial sector will eventually lead to cost savings in areas like central finance reporting, compliance, centralised operations, and business operations (Accenture, 2017a)

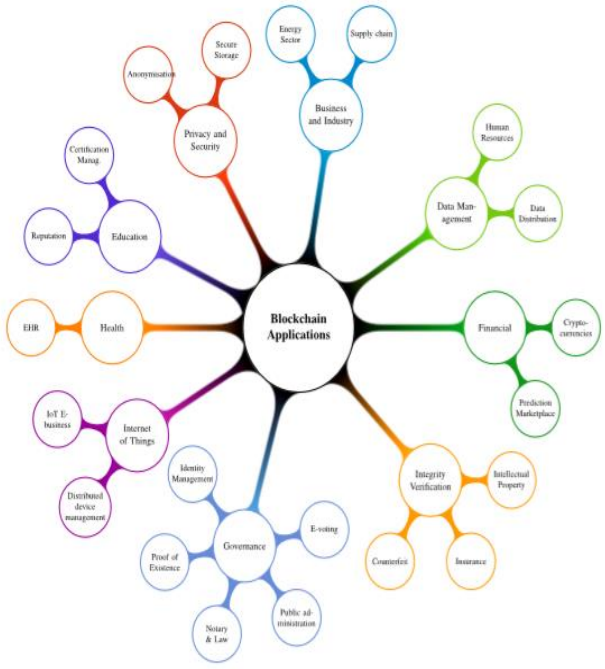

Fig. 5. Mindmap abstraction of the different types of blockchain applications.

Fig .11: Application of Blockchain

POSSIBLE FUTURE DIRECTIONS

Blockchain has shown its potential in industry and academia. We discuss possible future directions with respect to four areas: blockchain testing, stop the tendency to centralization, big data analytics and blockchain application.

A. Blockchain testing

Recently different kinds of blockchains appear and over 700 cryptocurrencies are listed in [52] up to now. However, some developers might falsify their blockchain performance to attract investors driven by the huge profit. Besides that, when users want to

Combine blockchain into business, they have to know which blockchain fits their requirements. So blockchain testing mechanism needs to be in place to test different blockchains. Blockchain testing could be separated into two phases: standardization phase and testing phase. In standardization phase, all criteria have to be made and agreed. When a blockchain is born, it could be tested with the agreed criteria to valid if the blockchain works fine as developers claim. As for testing phase, blockchain testing needs to be performed with different criteria. For example, an user who is in charge of online retail business cares about the throughput of the blockchain, so the examination needs to test the average time from a user send a transaction to the transaction is packed into the blockchain, capacity for a blockchain block and etc.

B. Stop the tendency to centralization

Blockchain is designed as a decentralized system. However, there is a trend that miners are centralized in the mining pool. Up to now, the top 5 mining pools together owns larger than 51% of the total hash power in the Bitcoin network [53].

Apart from that, selfish mining strategy [10] showed that pools with over 25% of total computing power could get more revenue than fair share. Rational miners would be attracted into the selfish pool and finally the pool could easily exceed 51% of the total power. As the blockchain is not intended to serve a few organizations, some methods should be proposed to solve this problem.

C. Big data analytics

Blockchain could be well combined with big data. Here we roughly categorized the combination into two types: data management and data analytics. As for data management, blockchain could be used to store important data as it is distributed and secure. Blockchain could also ensure the data is original. For example, if blockchain is used to store patients health information, the information could not be tampered and it is hard to stole those private information. When it comes to data analytics, transactions on blockchain could be used for big data analytics. For example, user trading patterns might be extracted. Users can predict their potential partners' trading behaviours with the analysis.

D. Blockchain applications

Currently most blockchains are used in the financial domain, more and more applications for different fields are appearing. Traditional industries could take blockchain into consideration and apply blockchain into their fields to enhance their systems. For example, user reputations could be stored on blockchain. At the same time, the up-and-coming industry could make use of blockchain to improve performance. For example, Arcade City [51], a ridesharing startup offers an open marketplace where riders connect directly with drivers by leveraging blockchain technology. A smart contract is a computerized transaction protocol that executes the terms of a contract [54]. It has been proposed for long time and now this concept can be implemented with blockchain. In blockchain, smart contract is a code fragment that could be executed by miners automatically. Smart contract has transformative potential in various fields like financial services and IoT.

CONCLUSION

Blockchain has shown its potential for transforming traditional industry with its key characteristics: decentralization, persistency, anonymity and auditability.

In this paper, we present a comprehensive overview on blockchain. We have exposed the core concepts at the heart of blockchain technology as well as some of the most significant features of public decentralized ledger platforms. After showing why the blockchain is a foundational and disruptive technology, with the potential to revolutionize the nature of the interface between economic agents, we have presented a non-exhaustive list of existing applications of blockchain technology. These applications range from Blockstream sidechains and Ethereum to digital identity providers and blockchain-based voting systems, as well as Ripple. And we have highlighted the societal relevance of these wide-ranging technological

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evolutions, which could effectively contribute to social inclusion in the developing world.

Blockchain enthusiasts, surfing on a wave of euphoria set in motion by scores of innovative start-ups (Shubarth, 2015) currently seem to outnumber the sceptics.

However, the present intellectual landscape still covers a wide spectrum of opinions, ranging from utter fervour (Masters, 2015) to ingrained pessimism (Kaminska, 2014).

The fundamental blockchain question is ultimately that of trust. Yet, as Seabright (cited by Harford 2010), "[f]actors which increase trust in society are not necessarily a good thing, because they can increase the bonds between gang members, whose main economic success comes from extorting or coercing other people". This opinion is corroborated by Kaminska (2014), who thinks that blockchain technology has been mired in paradox from the onset. Without an inbuilt payoff mechanism, the cost of participation is dissuasive, and leaves aside all agents who do not have a direct interest in the projected consensus.

Contrariwise, a payoff mechanism favours the most cost-efficient players and concentration of power; token-free blockchains are no exceptions. Finally, incentives to corrupt the system increase with the value of assets contingent on the eventual outcome of the consensus.

In spite of these important reservations, we believe that more blockchain applications will emerge in the near future in areas as diverse as art, tourism and sports.

While still in their infancy, one should not underestimate the promising socio-economic benefits of these extraordinary technological changes.

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CLUSTER HEAD SELECTION THROUGH GREY WOLF OPTIMIZATION IN WIRELESS SENSOR NETWORK

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Abstract*—Cluster Head selection has become the major issue in WSN. As selecting CH became a major reason for energy consumption of the network. So, in order to recover this problem various energy efficient clustering protocols that are specifically meant to perform the cluster head selection process in an effective way. By implementing these energy efficient protocols, to achieve an energy efficient network is not quite possible therefore the concept of optimization was introduced to optimize the CH selection techniques. In this work, the author has developed a energy efficient cluster head selection approach by using the GWO optimization technique. Cluster Head selection is done on the basis of two parameters energy and distance. The proposed works is evaluated the study in the terms of energy consumption, dead nodes, alive nodes and throughput and find to be quite effective and efficient. We are going to compare our work with the proposed work parameters and on the basis this we will find which technique is best. In our work Grey Wolf Optimization Technique is going to be used to select the CH and to reach to the destination

Keywords*— Wireless Sensor Network, Cluster formation, Cluster Head Selection, Energy Model, Optimization, Grey Wolf Optimization.

I. INTRODUCTION

The energy management and conservation is the major motive of the wireless sensor network (WSN) as the senor nodes operates on the basis of the initially allotted energy [1]. If the nodes run out of energy then, they would not be capable to perform any task in the network [2-3].

Performing clustering of sensor nodes in WSN is an efficient method for conserving and managing the energy consumption of the network. In clustering, the nodes are arranged in group with respect to their nature or features [4,5,6]. Each of these clusters has a representative node named as cluster head (CH). The role of the CH is to collect the data from the member nodes and then to transmit this data to the destination node. The selection of representative node is a quite a tedious task to perform. Since there is a large number of factors that effects the performance of the CH [7]. Some of these factors are energy, distance, packet delivery ratio etc.

In this direction, a large number of researches have been conducted. In [8], the author utilized fuzzy logics based clustering technique to diminish the energy consumption of the network. In this work, the cluster size was optimized by implementing the fuzzy inference system. The proper selection of CHs leads to the reduction in the energy consumption and increases the lifetime of the network. Then [9] developed a routing mechanism namely, Energy efficient Trust-Aware Routing Protocol (ETARP) to decrease the energy consumption and to increase the data security at the time of the communication. The utility theory was implemented for the selection of route among sensor nodes. [10] addressed the problem of mobile sink such as route maintenance in WSN by developing the dynamic layered routing protocols. The distribution frequencies and routing updates are reduced by combination of dynamic anchor selection and dynamic layered voronoi scoping.

In [11], a hybrid particle swarm optimization and harmony search algorithm was implemented to elect the CH in an

efficient manner. Then [12] represented the issue of uneven distribution of CHs, un-equal clustering and the limited scope of application of WSN. The author used fuzzy c-mean clustering algorithm to generate balanced clusters and to select the CH. The rule of fuzzy system was optimized by swarm intelligence based firefly algorithm.

Energy efficiency in sensor network has gained an importance as a primary issue in a WSN [13]. Sensor networks are powered by the battery therefore; the nodes become inactive after a period to time [14]. Hence to enhance the energy dissipation model in an effective way becomes more exigent issue to increase the network lifetime of battery operated sensor network. The clustering and tree based data aggregation is developed as solution to the given problem. Thus in traditional work, a hybrid clustering mechanism was developed that operated by utilizing the clustering, tree based data aggregation approach and hybrid optimization i.e. ant colony optimization (ACO) and particle swarm optimization (PSO). In this approach, the cluster formation was done on the basis of the energy of the nodes then, data aggregation was done by applying the hybrid optimization approach. After analyzing the traditional work, following issues are observed.

The CH selection strategy was quite weak as it considers only energy as a major factor.

The hybrid optimization technique leads to the delay in data transmission. The reason behind increased delay is the large number of iterations that are required for the processing of ACO and PSO.

Therefore, it is necessary to analyze the traditional energy efficient protocol in order to overcome its backlogs.

II. WSN ENERGY CONSUMPTION

WSN sensors, as a rule conveyed in non-available condition, are controlled utilizing little batteries alongside procedures for control collecting; supplanting batteries isn't an alternative. Depending on a battery confines the sensor's lifetime as well as makes productive outline and administration of WSNs a genuine test. The restriction of energy supply, be that as it may, has inspired a large number of research in WSNs. Routing is an extra factor that can truly deplete energy. Specifically, in multi-hop communication, hubs closer to the sink are focused on the grounds that they need to transmit more packets than other nodes. In this manner, their battery drains quicker. In what tails, we talk about the general vitality sparing instruments of various directing ideal models.

Clustering structures compose the system into groups, where each cluster or group of nodes is overseen by a chosen hub known as the cluster head (CH). The CH is in charge of organizing the individuals' activities and communication with different CHs or the base station. Clustering has been proposed to improve energy effectiveness since it helps to confine vitality utilization by means of various means such as by reducing communication range, limiting the transmission of data by using CH, reducing the energy intensive operations like data aggregation, balancing the energy consumption among nodes. Along with energy efficiency, the clustering also helps to enhance the network scalability[2]. Clustering technique assumes an essential part in the wireless sensor network. It is greatly hard to dole out the worldwide ids for an extensive number of deployed sensor nodes. Along these lines, traditional protocols may not be relevant for WSN. Not at all like ordinary wireless correspondence networks (MANET, cell network, and so forth), WSN has inalienable attributes. It is profoundly powerful network and particular to the application, and moreover it has restricted energy, stockpiling, and preparing capacity[12]. These qualities make it an exceptionally difficult errand to build up a clustering protocol. In the greater part of the situations, different sources are required to send their information to a specific base station. The nodes close to the sink drained more energy and thus in the end bite the dust. This causes dividing of the network; subsequently, the lifetime of the network gets the opportunity to decrease. The primary requirement of the sensor node is energy. The sensors are battery-powered figuring gadgets. It's difficult to supplant the batteries in numerous applications. Subsequently, WSN requires an energy-efficient clustering protocol. Because of thick arrangement, the sensor nodes

create the excess information, and the base station may get different duplicates of similar information. Consequently, it superfluously devours the energy of the sensor nodes. WSN does not have any settled framework and is very unique[8]. There are predominantly two reasons in charge of the dynamic framework. The principal reason is the energy; the sensor nodes have restricted energy as batteries. On the off chance that the protocol can't adjust the heap among the nodes, the sensor hub could bite the dust. It prompts the dynamic network structure. The second reason is the mobility; in numerous situations after the sending, sensor nodes are static yet sink can move inside the network. It makes the network dynamic, and the protocol that works for static sink may not be pertinent for versatile sink.

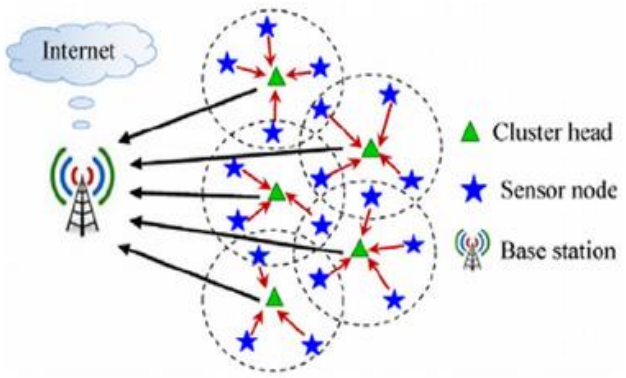

Figure 1: Basic stricter of clustering

A clustering plan separates the sensor nodes in a WSN into various virtual gatherings, as per some arrangement of principles. In a cluster structure, sensor nodes might be doled out an alternate status or capacity, for example, cluster head or cluster member.

In the meantime it expands the network overhead since all the sensor nodes are required to send their area data to BS at once in each set-up stage. In the proposed display, attempt has been made to enhance the execution of LEACH protocol in perspective of choosing a proper Super Cluster Head (SCH) among the CHs by applying appropriate fuzzy descriptors. Just SCH is permitted to send the message to the BS by decreasing the quantity of message retransmissions performed by the CHs.

Energy as a routing metric: Another way for expand the lifetime of sensor systems is to consider energy as a metric in the setup path stage. Thus, routing techniques don't just spotlight on the shortest path however can choose the next node on the basis of the leftover energy of the nodes.

Multipath routing: While single-way routing conventions are more straightforward than multipath routing conventions, they can quickly deplete the energy of nodes on the chose selected paths. Conversely, multipath routing empowers energy to be adjusted among hubs by rotating forwarding hubs.

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Relay node placement: The random energy consumption of hubs in a given area can divide the system or make energy holes. Occasionally, this situation can be maintained by using a strategy of optimal allocation of relay node selection. This enhances vitality adjust between hubs, stay away from sensor problem areas and guarantee scope and k-network. A few works have concentrated on finding the base number of hand-off hubs or setting them ideally to drag out the system lifetime.

PROPOSED WORK

As defined in above section, the traditional work suffers from various issues that need to improve so that the performance of the network could be improved. A large number of authors have done work in this direction. Along with development of the energy efficient clustering protocol the author use to apply optimization techniques. But as discussed in above section, the work done in traditional work suffers from various issues like energy, delay in data delivery etc. Thus, the present work decides to work in this field to enhance the network lifetime. For this purpose, the list of CH selection parameters has been enhanced. The suggested energy efficient protocol elects the CH on the basis of the following parameters:

Energy: The residual energy of the nodes is considered as factor for evaluating the eligibility of the node for becoming a CH.

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Transmission Distance: The distance travelled by the node. The node with the lesser distance has the highest chances to become a candidate for CH.

The factors like energy of the nodes and distance covered by the nodes highly affects the overall performance of the nodes[11]. Since the node with the highest amount of residual energy has the high capability to cover the longer distance and thus in this manner the lifetime of the network can also be enhanced. Along with this CH selection strategy, the grey wolf optimization (GWO) is applied as a data aggregation model. This is done to replace the traditional ACOPSO algorithm. The benefit of using GWO over ACOPSO is as follows:

The GWO follows the easy structure that makes it easy to implement, It requires less storage in comparison to other optimization techniques, Convergence is faster due to continuous reduction of search space and decision variables are very less i.e. $\alpha, \beta, and\ \delta$ .The GWO optimization mechanism is defined as follows:

In this method the optimum spectrum scaling is used. On the basis of hunting method of gray wolf family the GWO is currently generated swarm intelligence. The several steps of GWO are discussed below as:

Initialization of gray wolf positions For multimodal fusion the number of iterations and population values are tested among several values through utilizing trial and error mechanism and fixed the limits as 50 iteration and 50 scale values.

Fitness function In multi scaled medical image fusion for the optimal selection of the scale values the GWO paradigm was utilized. For multimodal fusion the Mutual Information is a quantitative measure that offers the amount of information preserved in the fused image.

Social hierarchy of gray wolf family The gray wolves are better in social leadership naturally and they are being in a pack. There are 5-12 members are contained in the gray wolf-pack. In 4 levels the hierarchical order of pack is alienated that are omega (ω), alpha (α), delta (δ) and beta (β). Generally, the primary level hierarchy, related to hunting the alpha is making decisions, time to wake, sleeping place and so on. The beta is the second level hierarchy that activates the finest subordinates to alpha in pack. In grey wolf omega is the lowest level hierarchy that plays the role of scapegoat. Always the omega wolves have to offer to the rest entire hierarchical wolves. If a wolf is not an alpha, beta, or omega is known as delta wolf in a gray wolf family. Omega is dominated by them but to the alphas and betas they have to be submitted.

Encircling prey

The prey is encircled before attacking throughout the gray wolf hunting the prey. It is illustrated in the mathematical expressions as:

$$\vec{D} = \left|\vec{C}.\overrightarrow{X_P(t)} - \overrightarrow{X(t)}\right| \text{.....(1)}$$

$$\vec{X}(t+1) = \overrightarrow{X_P}(t) - \vec{A}.\vec{D} \text{ ... . (2)}$$

$$\vec{A} = 2\vec{a}.\vec{r}_1 - \vec{a} \text{ ... ... (3)}$$

$$C = 2.\vec{r}_2 \text{ ... ... (4)}$$

Here,

t = current iteration, $\overrightarrow{X_P}$ = position vector of the prey, $\vec{X}$ = the position vector of gray wolf, $\vec{A}$ and $\vec{C}$ = coefficient vectors, $\vec{D}$ = direction vector, $\overrightarrow{r_1}$, $\overrightarrow{r_2}$ = random vectors .

Hunting

After searching the position of prey of grey wolves and also after encircling them generally, through the guidance of alpha the hunt is directed. The delta and beta should also help in a pack. Followed by beta and delta the alpha has the finest information regarding prey location. The present iteration forwards 3 finest search agents delta, beta, and alpha to the next level in the gray wolf optimization, as rest of the entire agents are treated as gamma in gray wolf family. The following equations are illustrated below as:

$$\overrightarrow{D_\alpha} = \left|\overrightarrow{C_1}.\overrightarrow{X_\alpha} - \vec{X}\right|, \overrightarrow{D_\beta} = \left|\overrightarrow{C_2}.\overrightarrow{X_\beta} - \vec{X}\right|, \overrightarrow{D_\delta} = \left|\overrightarrow{C_3}.\overrightarrow{X_\delta}\vec{X}\right| \text{ ... ... (5)}$$

$$\overrightarrow{X_1} = \overrightarrow{X_\alpha} - \overrightarrow{A_1}.\overrightarrow{D_\alpha}, \overrightarrow{X_2} = \overrightarrow{X_\beta} - \overrightarrow{A_2}.\overrightarrow{D_\beta}, \overrightarrow{X_3} = \overrightarrow{X_\delta} - \overrightarrow{A_3}.\overrightarrow{D_\delta} \text{ ... . (6)}$$

$$\vec{X}(t+1) = \frac{\overrightarrow{X_1}+\overrightarrow{X_2}+\overrightarrow{X_3}}{3} \text{ ... . (7)}$$

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Attacking prey

As the moving gray wolves are stopped by prey then through attacking the prey the hunt is finished. The grey wolves required to reduce the value of $\vec{a}$ while approaching the prey.

Search for prey

On the basis of the location of the delta, alpha and beta the grey wolves generally found. In order to find prey they diverge from one another whereas to attack prey they converge. The workflow of the proposed work is defined step wise in this section.

Network Initialization: This is the foremost step to perform for implementing the energy efficient clustering protocol in WSN[1]. In this step, the user have to set the initial parameters for the establishing the network. The parameters like dimensions or area covered by the network, number of sensor nodes in the network, initial energy of the nods, transmission energy, receiver energy, size of data packets etc are the major inputs that user have to define. On the basis of the given dimensions of the parameters the network will be deployed.

CH selection evaluation: After deploying the network, the next step is to perform the nodes evaluation for the purpose of CH selection. For this, the energy and the distance travelled by the nodes are evaluated. The energy evaluation is done by using the standard energy model and the distance is measured by using the following formulation:

$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2})$$

Population Generation and CH selection: In this step, the GWO is initialized for generating the random population. From the basis of the generated the population the CH selection process is done.

Data Transmission: After electing the CH, next step is to perform the data transmission from sender node to BS.

Performance Evaluation: After completing the data transmission, the performance of the proposed work is analyzed in the terms of dead nodes, alive nodes, energy consumption and throughput.

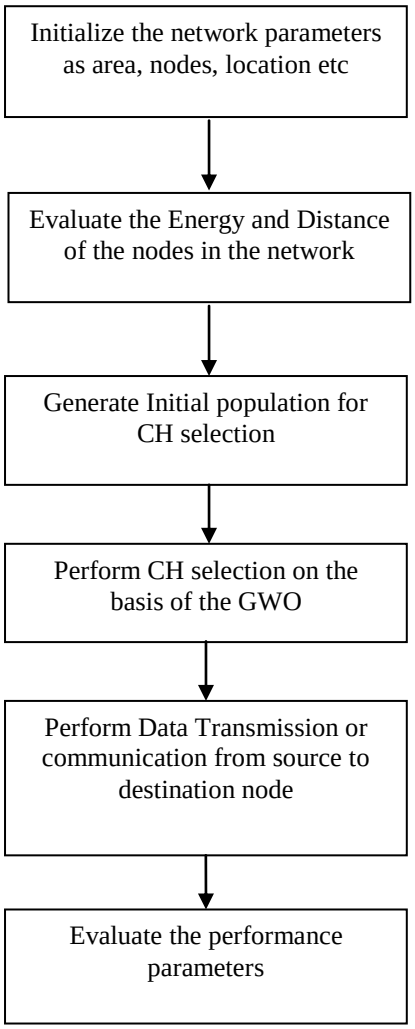

Figure 2: Proposed Framework

PERFORMANCE ANALYSIS

The proposed or suggested work is implemented in MATLAB simulation platform. This is done to evaluate the performance of the clustering method. The network set up parameters of proposed work is defined in given table 1.

Table 1: Proposed Network Setup

Parameters	Value
Network Area	100,100
Base Station (x ,y)	50,50 or 50,150
Number of nodes	100
Probability	0.1
Initial Energy	0.1 joule
Transmitter Energy	50*10-9
Receiver Energy	50*10-9
Free Space (amplifier)	10*10-13
Multipath (amplifier)	0.0013*10-13
Effective Data Aggregation	50*10-9
Maximum Lifetime	2500
Data packets size	4000

The performance of the proposed GWO based energy efficient clustering protocol is analyzed in the following terms.

Number of alive nodes: refers to the nodes in the network that are full of energy and are quite capable enough to perform the data transmission in the network. The network with large number of alive nodes survives for longer.

Number of dead nodes: indicates the nodes that run out of the energy due to the excess consumption of the energy[20]. The number of dead and alive node is considered for evaluating the lifetime of the network. The time from initialization of the network to the first dead node is referred as the network lifetime.

Throughput analysis: Data packets send at the BS is considered to evaluate the success rate of the data delivery at the BS. The higher rate of data transmission leads to the highest success rate of the network in terms of data transmission.

The above defined parameters are also used in traditional work [1]. The factor of energy consumption is introduced in this work and defined as follows.

Energy consumption of the network: Energy consumption is a parameter that measures the amount of energy consumed by the network to perform the data transmission.

The graph in figure 3defines the number of dead nodes in the network[15]. It is evaluated on the basis of the number of communication rounds in the network. The x axis in the graph calibrates the number of communication rounds i.e. 7000 and the y axis shows the number of nodes found dead in the network. The graph says that initially, at the 0 round of communication no node runs out of the energy and the scenario remains similar till the completion of the 2000 rounds but before starting of the 3000 rounds, the nodes starting running out of the energy. Approximately at 5500 round all of the nodes are found dead in the network.

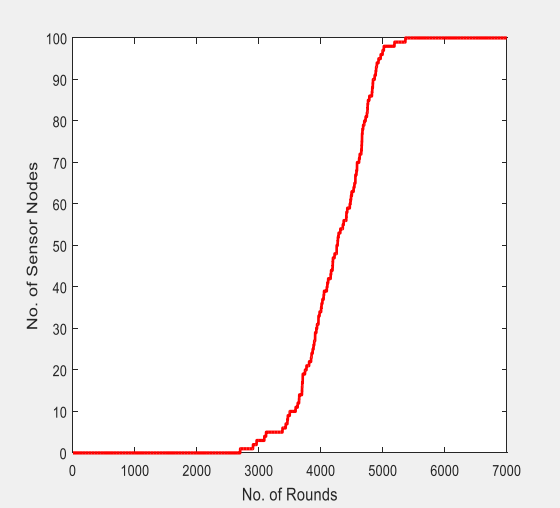

Figure 3: Dead Nodes analysis of the proposed work

The graph in figure 4 elucidates the number of alive nodes in the network. As per the observations from the graph, initially 100 nodes are alive in the network. With the completion of 2000 rounds the count of alive nodes started falling and after the initialization of 5000 round, the full network comprised of 0 alive nodes.

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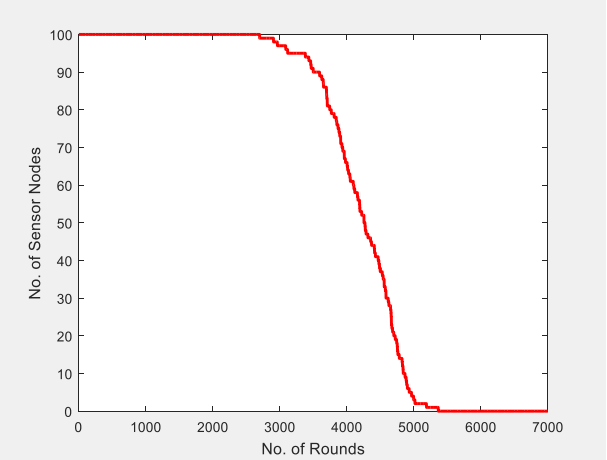

Figure 4:Alive nodes analysis of the proposed work

The graph in figure 5 explains the throughput of the proposed work. The throughput is evaluated in the terms of data packets received successfully at the base station. If the number of packets received is higher, the throughput is higher and if the number of packets received is lower, the throughput is lower. Therefore, in order to achieve an ideal network, it is mandatory to have a high throughput. The graph proves that the number of packets received at BS is quite higher till the completion of 7000 rounds of communications.

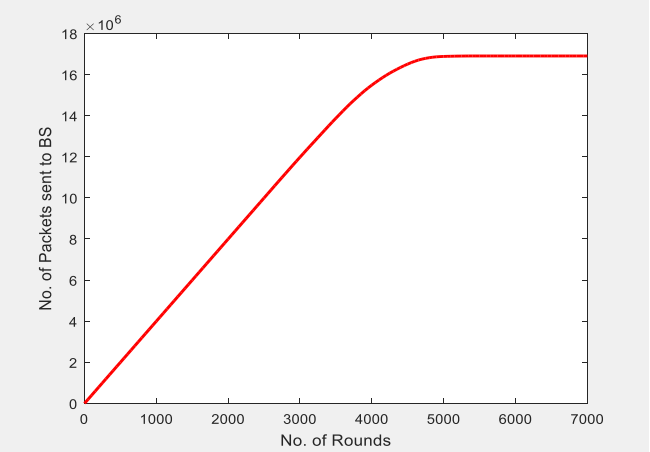

Figure 5: Throughput analysis of the proposed work

The graph in figure 6 defines the energy consumption of the proposed work. The energy consumption is also evaluated with respect to the communication rounds. The graph proves that the energy consumption of the proposed work is quite lower.

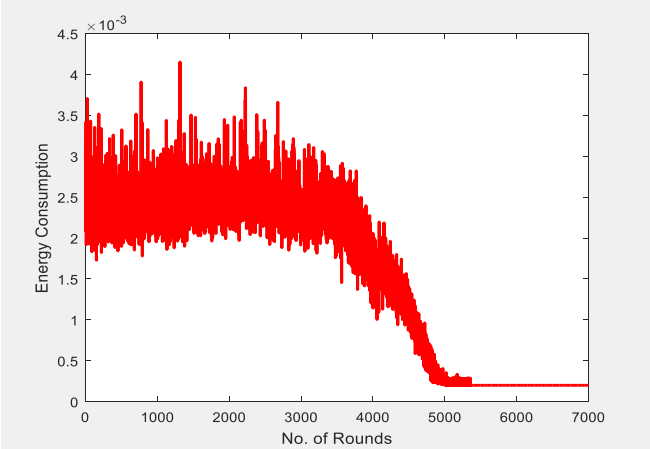

Figure 6: Energy Consumption analysis of proposed work

CONCLUSION

This study drew to a conclusion that on the basis of the energy and distance factor of the nodes the effective energy efficient clustering protocol can be developed. In this work an energy efficient clustering protocol has been proposed by using energy model, distance of nodes and GWO optimization algorithm. After implementation, the obtained results proved that the proposed protocol has consumed less energy and also leads to enhancement of the network lifetime. The performance measurement is done in the terms of energy consumption rate, throughput, dead nodes and alive nodes in the network. In future to ensure the qualitative performance of the proposed work, the traditional protocols can be analyzed and compared with it.

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Prediction of Heart Disease: Case Study of Supervised Classification

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Abstract— The amount of data being generated and stored is growing exponentially, due to in the large part to the continuing advances in computer technology .This presents tremendous opportunities for those who can unlock the information embedded within this data , but also introduces new challenges .In this paper we discuss how the modern field of machine learning can be used to extract useful knowledge from the data that surround us. Those that can master this technology and its methods can derive great benefits and gain a competitive advantage .This paper implements a Case study of supervised classification problem for prediction of heart disease on the basis of vital data of a person like BP , Cholesterol, Sugar etc.

Keywords— Data; Data Analytics; Machine Learning; Deep Learning; Artificial Intelligence; Statistics; Mathematics; Feature Engineering; Data Preprocessing; Data mining.

I.INTRODUCTION TO MACHINE LEARNING

As the name suggest machine is learning, machine learning is also known as adaptive machine learning which learns from the environment and giving us the feedbacks that is why it is known as the adaptive machine learning .So, the question arises that why we need machine learning? So the answer is that when we didn't have any machine learning ,the organizations or IT industries they all rely on the input and the corresponding output. We are just giving the input and system is giving us the output so in this case this is known as the non- adaptive or classic machines , the machines are not trained to solve the real world problems because in today's scenario problems are increasing so with the non-adaptive machines, we cannot able to solve the real world problems. So the adaptive machine learning solves all the real world problems. Training the machine it is tested that if the machine is giving us the proper outcomes or it is giving us the bad results. So, that is how machine learning takes place a very important role in today real world scenario.

II.MACHINE LEARNING CAN BE CATEGORIZED INTO THREE CATEGORIES

A Supervised learning -Supervised Learning is the machine learning task of learning a function that maps an input to an output based on example input -output pairs .In supervised learning ,each example is a pair consisting of an input object and a desired output value[1].Supervised learning problems are divided into two categories:

1. *Regression* -Regression is a type of problem when we have a target variable is continuous in nature .It has various regression algorithms like linear regression ,Polynomial regression , Multiple Regression , Decision tree or Random forest regression

2. *Classification* -Classification is a type of problem when we have a target variable is categorical in nature. It has various classification algorithms like linear regression, Polynomial regression, Multiple Regression, Decision tree or Random forest regression.

B.Unsupervised Learning -Unsupervised Learning is a type of self - organized learning that helps find previously unknown patterns in dataset without pre-existing labels .It is also known as self- organization and allows modeling probability densities of given inputs.[1]

Unsupervised learning problems are divided into two categories:

1. *Clustering*- Clustering is the task of dividing the population or data points into a number of groups such that datapoints in the same groups are more similar to other data points in the same group and dissimilar to the data points in other groups. Algorithms like K-means clustering and hierarchical clustering are associated with this. [1]

2. *Association* -This unsupervised learning technique is about discovering interesting relationships between variables in large databases. For example-people that buy a new home most likely to buy new furniture .Algorithms like Apriority algorithm , Éclat Algorithm etc are associated with this.[1]

C.Re-inforcement Learning-Re-inforcement Learning is an area of machine learning concerned with how software agents ought to take actions in an environment in order to maximize some rewards .At every step taken by an agent will be checked that whether the step which is taken by an agent is the right step towards goal .Some reward will be given to the agent while taking the right step .So ,this is known as the re-enforcement learning .Algorithms like Upper bound Confidence , Thomson Sampling and Markov Decision process are involved in this.

III.TASKS INVOLVED IN MACHINE LEARNING

There are basically two types of tasks are involved in machine learning:

1. *Descriptive takes or Statistics*- In Descriptive tasks we will ask the question what has happened in the past? Like what are the incidents happened in the past, from that we can determine the relationship between different variables or we can analyze the results for the future perspectives.

2. *Predictive tasks or Statistics*- In Predictive tasks we will ask the question what will happen in the future. We can apply various data mining techniques like Classification, Regression, Clustering, Association etc.

IV.APPLICATIONS OF MACHINE LEARNING

1. *Customer Segmentation*- Identify the common characteristics of customers who buy the same product from your company.

2. *Fraud Detection*- Identify transactions that is most likely to be a fraudulent.

3. *Cancer detection*- Identify the cancer that person has a cancer or not.

4. *Spam Filtering*- Able to classify the mails as a spam or not spam.

5. *Sentimental Analysis*- With the help of Natural Language processing, we can easily able to classify the most positive reviews and Critical reviews from the customers.

6. *Market Basket Analysis*- Understand what products are commonly purchased together? Example: Beer and Wine.

7. *Recommendation Systems*- If the customer has an interest in purchasing a type of item, then a similar product is shown to the customer by using the collaborating filtering in recommendation system.

8. *House Prices predictions*- Using regression techniques, we can easily able to determine the Sale of house.

9. *Image Classification*- Machine can able to classify the image whether it is a cat or dog.

10. *Object Detection*- The different objects can be identified by the machine using computer vision.

So, till now we have studied about the machine learning and its basic concepts. So, many people have confusion about the differences between machine Learning, Deep Learning and Artificial Intelligence.

V.DIFFERENCE BETWEEN ARTIFICIAL INTELLIGENCE, MACHINE LEARNING AND DEEP LEARNING

Artificial Intelligence: It is a human intelligence which is exhibited by machines. The main goal of Artificial Intelligence is that to think like humans, to solve the problems like humans, to act like humans. The activities which is done by the humans Can a machine do things same like a human does in a daily routine? So, this is the main goal of AI.

Machine Learning: It is an approach to achieve Artificial Intelligence. It is all about statistical methods like data preprocessing, data mining and doing predictive modeling to achieve a good results .It is a subset of Intelligence.

Deep Learning: It is a technique to implement Machine Learning .Soothe question arises that why scientists introduce the concept of Deep learning. They have introduced it because they want to test that in humans it has neurons. Can we teach to a machine which mainly acts as humans as a neurons .In today's scenario the problems are increasing which is very complex to solve .So, with the help of deep learning we can solve the complex or real world problems.

VI.IMPLEMENTATION:

As the Health Problem is a very serious issue in today's scenario for the doctors .They need to determine the patients that whether the patient has this particular disease or not.So, it is difficult for the doctors to say that whether this patient has a heart disease or not, whether this patient has a cancer or not. So here the machine will take care of that problem. It reduces the work or effort of doctors. So that why I have build a machine learning project with supervised learning technique known as classification on case study heart disease prediction with python language. Here are the steps to implement a machine learning project on heart disease prediction:

1.*Data Collection*- The very first step in machine learning project is that data collection .In this work data set has been used from the kaggle.com website of data science in which thousands of datasets has been uploaded.

2. *Read the data set*- The next step is reading the data set. Use the pandas library of python and with the help of pandas library read the data set using the function known as read_csv method incase if it has the csv file resides on the internet.

3.*Checking the null values*-This is one of the most important step in machine learning. Handling the null values is very important incase if the null values does not handle it will be impacted on the accuracy of the model. So , there are various ways of handling the null values , with the help of pandas library use the functions dropna, fillna or by using the imputer library using sickest learn, the null values can be handled. use the method film , fill any value in the parameter numerical , categorical so that null values can be handled.

4.*Converting categorical data into numerical data*- In the data set ,you will find many categorical data like Gender columns, gender column consists of two categories male and female , Country column contains categories like Spain , Germany ,Italy etc. The Machine understand only numerical data it does 't understand the language of human .So, it is necessary to convert the categorical data into numerical data. With using two

libraries of sklearn i.e. Label Encoder and One Hot Encoder .Label Encoder is used when it has only two categories in a single feature. One hot Encoder is used when it has more than two categories in a single feature.

5. *Feature Selection*- This is one of the most important step in machine learning .Why there is a need of feature selection? In the data set, there is a problem of curse of dimensionality. Curse of dimensionality says that when the data set contains a large number of features it may causes the problem of over fitting. . In over fitting the model fits the data so well that it creates a random noise in the dataset. That's why there is need to do feature selection. Feature Selection is the technique in machine learning which selects the features from the dataset which has a certain kind of relationship with the target variable. Feature selection has the various techniques like Person 's Correlation , Hypothesis Testing (p value) etc. Used scipy library. In scipy library it has a pearsonr class. Pearson method or functions tells the Co - relation value between independent feature and dependent feature along with its value.

6.*Training and testing*- When the data set is finalized with independent features and the dependent features ,the next step is to train the model and test the model that whether the model is giving us the good results or not. Used train _ test _ split class from sklearn library and prepare the training and testing split . Remember that training must be 70-80% and rest of for testing purpose.

7.*Data Mining*- This is the step where we implement our model .It has a different types of machine learning algorithms like for regression problems it has algorithms like Linear Regression ,Polynomial Linear Regression , Multiple Linear regression , decision tree and random forest algorithm .For Classification problems it has algorithms like Logistic regression , Support Vector Machines , Nearest neighbors , Decision tree and random forest classification and ensemble models like Adaboost ,Gradient Boosting , XGB classifier Now the again question arises that which algorithm to choose because we have a different algorithms for classification problems !!?.So the answer is that use pair plot which is found in python seaborn library . With the help of pair plot function we can easily determine from the graphs like which algorithm we have to choose . In case if my data points are overlapped with each other ,then we cannot go for the logistic regression because logistic regression is a linear type of model .We can choose either decision tree or nearest neighbor because they are all non- linear type of models .So the non- linear type of models fits the data so well that it can achieve good results .I have used Adaboost Classifier from sklearn library.

8.*Performance of a model* -After our results get ready , now it is time to assess the performance of the model . Check the performance of the model by using confusion matrix. With the help of confusion matrix it will be easily to determine when actual value is yes , how much percentage that machine is giving the predicted results yes . The Performance of a model does not depend on the Accuracy of the model .It also depends upon the other factors like True positive rate ,false positive rate ,true negative rate , false negative rate and precision.

9.*Visualizing the results*- When all the things are done, the final step is we have to visualize the results for the business purposes .We can easily tell to our stakeholders that this data set is giving us this results , from that we can easily take decisions in future.

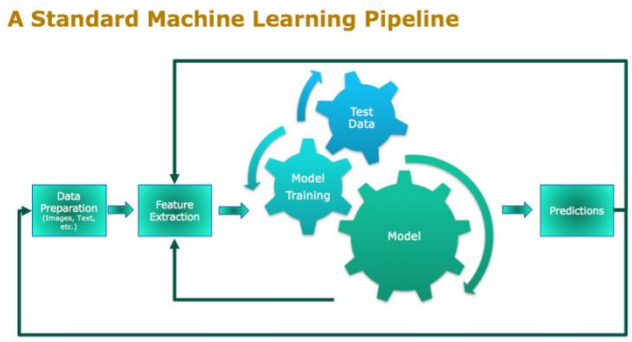

Fig. 1 Standard Machine Learning Pipeline

VII.FUTURE SCOPE OF MACHINE LEARNING

Can we make a model better than this model? Yes the answer is yes. In machine Learning it has various techniques to improve the accuracy of the model better than the previous accuracy? The techniques like cross validation, Hyper parameter tuning techniques like Grid Search cross- validation , Randomized Search Cross Validation etc. How do we know the parameters of different algorithms? how do we know that which parameters are required to make a model better. By using Grid Search cross- validation techniques we can do that easily.

VIII.CONCLUSION

Machine Learning can be Supervised or Unsupervised. If you have lesser amount of data and clearly labeled data for training, opt for Supervised Learning. Unsupervised Learning would generally give better performance and results for large data sets. If you have huge data set easily available. Go for deep learning techniques. Next thing you need to do is start learning and practicing each machine learning technique. The subject is vast, it means that there is width, but if you consider the depth, each topic can be learned in few hours. Each topic is independent of each other. You need to take into consideration one topic at a time, learn it, practice it and implement the algorithms in it using a language choice of yours. This is the best way to start studying Machine learning.

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Power of deep learning in wireless communication

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***Abstract*—Deep learning has gained a significant interest in every research field during thelast few years. Wireless communication systems require a significant improvement to meet the targets set by 5G. Bythe integration of deep learning and wireless communication system the overall throughput of wireless communication systems can remarkably be improved.Also, the communication system can be trained in such a manner that it can battle with the attacks and also works well in relatively worse channel conditions. The benefits of deep learning on the wireless communication area are investigated thoroughly in this paper.**

Keywords—deep learning, keras, neural networks, tensorflow,wireless communications.

I. INTRODUCTION

It is of supreme importance to quickly transmit information from one point to another by means of wireless medium securely and reliably. Wireless communications field involves a proficient knowledge for designing communication chain systems between transmitter and receiver, modelling channels, mitigatinginterferences, handling trafficcongestions and supporting wireless security [1,2].

The design and implementation of ongoing and conventional wireless communication systems are analytically model based systems which suffer the severe limitations to accommodate the order of complexity of optimization for emerging wireless applications. There is an era of demanding high data, massive connectivity and bandwidth applications under the area of (fifth generation)5G such as IoT, cloud computing, virtual and augmented reality, machine intelligence etc [3]. To achieve the tasks targeted in 5G, deep learning is powerful technique to design, optimize and secure wireless communications.Deep learning wireless systems which are data and model driven automated systems have a potential to eradicate the challenges encountered by the conventional wireless systems [4].

The data utilized in 5G wireless communications possesses extremely large volumes and is transferred at a very high data rate i.e. various Gbps. This complex data can be originated from channel, traffic, interference, etc. which is rapidly changing over time. Conventional machine learning and modelling methods are incapable to capture and diagnose the highly complex data while deep learning has proficiency to handle this type of complex data with meeting its data rate and capacity requirements [1,4].

In this paper the applications of deep learning on wireless communications are discussed by categorising into three main areas:

1. Deep learning for formulating end-to-end communication chain system between transmitter and receiver
2. Deep learning for spectrum awareness applications
3. Deep learning in wireless security to create wireless attacks defence

II. DEEP LEARNING FOR DESIGNING END-TO-END COMMUNICATION CHAIN SYSTEM BETWEEN TRANSMITTER AND RECEIVER

The general problem in wireless communication system is to transmit message from transmitter using radio waves and receive same message in original or approximated form at the receiver. In conventional wireless communication systems, the signal processing between transmitter and receiver are separated by independent blocks such as source encoder, channel encoder, modulator etc. at transmitter side and demodulator, channel decoder, source decoder at receiver side. Each block is optimized individually for a specific functionality. This individual optimization is not well sufficient to optimize overall wireless system, because these blocks are connected to different layers of open systems interconnection (OSI) model [3,5]. For example, source and channel coding block are shared between physical layer, medium access control at link layer and routing at network layer.

So, for flexible design paradigm, deep learning treats multiple communication blocks at transmitter and receiver jointly in single module by training them using the combinations of multiple deep neural networks.

a. Single antenna system

A wireless communication system design is formulated jointly by optimizing both transmitter and receiver in a single process using auto encoders. Keras withTensorflow backend is used for autoencoder implementation based on deep learning [6,7]. As shown in fig. 1, the transmitter communicates s information to the receiver, it includes

modulation process mapping the signal into constellation points i.e., complex numbers. The transmitter consists of feed forward neural networks (FNN) with multiple dense layers [8]. The last dense layer output is reshaped into complex number mapped with constellation diagram. The normalization layer implies the physical constraints on x.

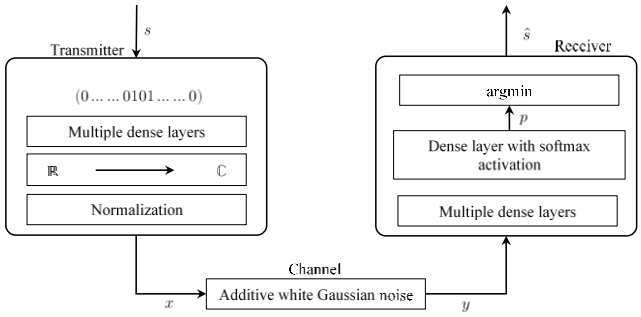

Fig. 1 Transmitter and Receiver in a single antenna system

The last dense layer at the receiver side uses `'softmax'` activation function whose output $p \in (0,1)$.

b. Multiple antenna system

In multiple antennas i.e. (multiple input multiple output) MIMO system, the autoencoder concept combines the various MIMO tasks into a single end to end transmission and reception process which are jointly optimized to achieve minimum bit error rate (BER). MIMO auto encoder system with N_t transmit antennas and N_r receive antennas is shown in fig. 2. The transmitter consists of FNN architecture having an embedding layer followed by multiple dense layers [9]. The output of embedding layer transforms to one dimensional tensor before going into denser layer by using flatten layer. The output of last dense layer is reshaped into complex numbers mapped with constellation diagram. The normalization layer includes the average power constrains of the transmitter. A multiplication layer is formed to achieve hx and a noise layer is added for n.

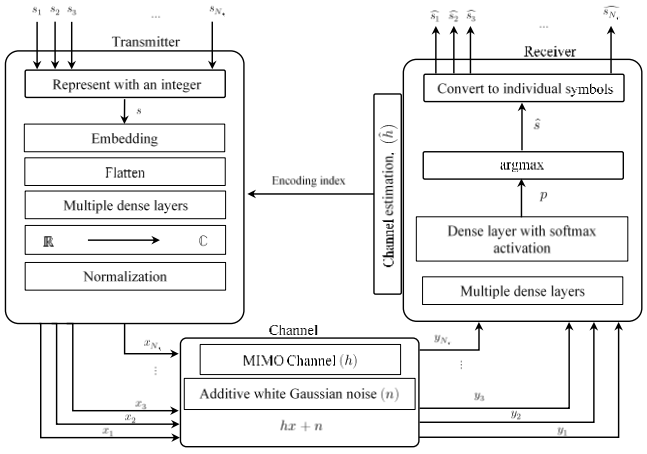

Fig. 2 Transmitter and Receiver in multiple transmit (N_t) and multiple receive (N_r) antenna system

Channel estimation can be performed by either using conventional or machine learning based methods during test phase as shown in fig. 2.

III. Deep Learning For Spectrum Awareness Applications

Channel estimation is most common requirement for wireless communication system to recover the transmitted data. Here a known training channel sequence is often transmitted to the receiver to the transmitter and various channel estimation techniques are adopted to estimate the channel. As shown in fig. 3 the autoencoder does not consist of channel model with an analytical expression instead of single two form of channel $h(x)$ are included: $h_0(x)$ is for physical channel response and $h_1(x, \theta_h)$ is a deep learning neural network which acts to mimic the channel response $h_0(x)$. θ_h is the channel approximation of deep learning neural network parameters [10].

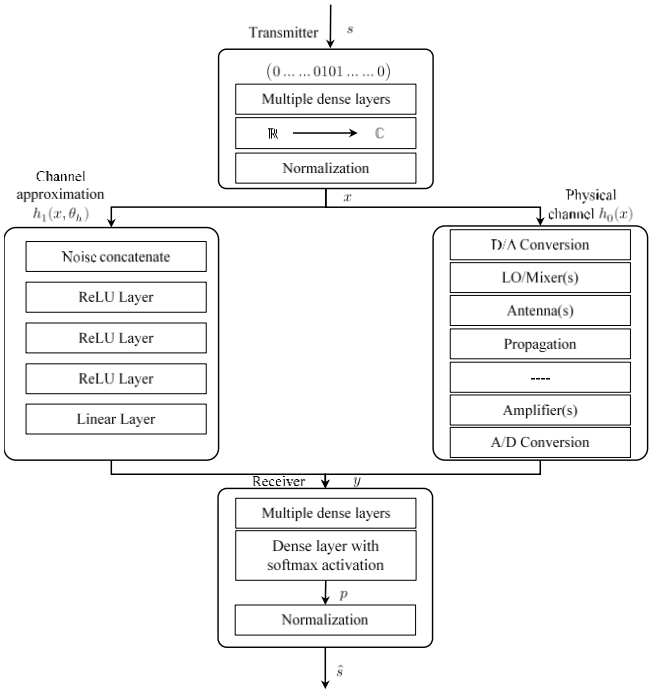

Fig. 3 Channel approximation communication system over a physical channel

IV. Deep Learning InWireless Security to Create WirelessAttacks Defence

Wireless communication possesses huge threat to its connectivity, as the medium for communication for wireless is air interface. The most basic attack to the wireless communication is denial of service attack that is caused by jamming. It disrupts the wireless signal to reach their respective receivers [11]. There is an adversary who does not know transmitter T but tries to learn it by sensing the channel. Adversarial deep learning is an emerging filed in which learning is carried out in presence of an adversary.

This deep learning offers various optimization mechanisms to launch and defend attacks on wireless deep learning network. The popular types of attacks are exploratory, evasion and causative attacks.

In exploratory attack, adversary tries to learn the architecture of deep learning classifier by querying it with some data and build an equivalent classifier. In evasion attack the adversary generates data to query deep learning classifier and make it fool by giving wrong decisions. In causative attack the adversary tempers training data and modify the layers of deep learning neural network so that it does not get trained adequately.

V. CONCLUSIONS

Deep learning shows the significant improvement of performance where model-based methods becomes incapable. It addresses all the challenges encountered in the wireless communication system. Firstly, the formulation of transmitter and receiver design at physical layer as in the form of autoencoder deep learning neural network is discussed. Secondly, the capability of deep learning for channel modelling and estimation is also explained. Lastly, the application of adversarial deep learning to enhance the security in wireless communication is discussed. So, numerous deep learning applications in wireless communication will potentially shift the new generation of wireless system.

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Performance comparison of various diversity techniques in wireless communications

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***Abstract*—Spatial diversity techniques are well exploited to yield a better improvement in bit error rate (BER) as compared to conventional single input single output systems in wireless communication systems. An analytical framework using most popular detection techniques for realizing multiple antenna receive diversity, multiple antenna transmit diversity and multiple antennas at both ends exploring transmit and receive diversity systems together for a Rayleigh fading channel are expressed and compared in this paper.**

***Keywords*—SIMO, MISO, MIMO, Alamouti, MRC, ML**

I. INTRODUCTION

The bit error rate (BER) in wireless communication system is extremely high as compared to wireline communication system, because of its time varying multipath fading environment which may leads to destructive interference of the signal[1-4].The average BER using a single link wireless channel between transmitter and receiver known as single input single output (SISO) system at high signal to noise ratio (SNR) [2] can be given as

$$BER_1 \approx \frac{1}{2}\left(1 - \sqrt{\frac{\delta}{2+\delta}}\right) \qquad (1)$$

where δ is SNR at receiver

In multipath propagation, due to destructive interference of signal, the signal power may become lesser than the noise power making link intermittent. This is known as deep fade event which is primarily responsible for the poor performance of wireless communication system.

To combat the effect of multipath fading without increasing transmit power, diverse number of links are required over which the signal can be transmitted instead of a single link. If a signal at a link undergoes deep fading at one instant of time, then other links having strong signal can propagate the signal at the receiver. The chances of all links being in deep fade are minimal because channel fading and interference of each link is independently different from each other [2-4,6].

The multiple links can be acquired by employing spatial diversity techniques wheretransmission or reception, or both transmission and reception of signal is done over independent links through multiple antennas [5]. These antennas are physically separated by half or more signal wavelength. Diversity in spatial domain (antenna diversity) can be realized by any of the following ways:

- Transmission of signal by a single transmit antenna and reception by multiple receive antennas known as receive diversity or single input multiple output (SIMO) system.
- Transmission by multiple transmit antennas and reception by a single receive antenna known as transmit diversity or multiple input single output (MISO) system.
- Transmission by multiple transmit antennas and reception by multiple receive antennas known as transmit-receive diversity or multiple input multiple output (MIMO) system.

II. RECEIVE DIVERSITY (SIMO)

As the size of antenna is inversely proportional to operating signal frequency, the increase in frequency lessens the size of antenna. In global system for mobile communication (GSM) system, the size of antenna is large and the utilization of multiple antennas is limited to base stations only. In third generation (3G)/4G or higher system, the size of antenna is small and the use of multiple antennas are feasible both at base station (BS) and at user equipment (UE). So, receive diversity is usually employed at high frequency band systems [4,5].

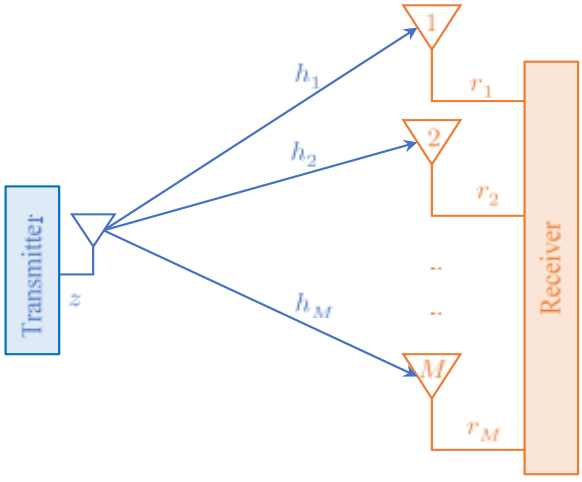

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Fig. 1 System model of receive diversity system (SIMO)

The SIMO system with single antenna for transmission at BS side and M antennas at receiver, i.e., M receive antennas at a UE is shown in Fig. 1. The matrix equations for SIMO system can be represented as

$$\begin{bmatrix} r_1 \\ r_2 \\ \vdots \\ r_M \end{bmatrix} = \begin{bmatrix} h_1 \\ h_2 \\ \vdots \\ h_M \end{bmatrix} z + \begin{bmatrix} n_1 \\ n_2 \\ \vdots \\ n_M \end{bmatrix} \quad (2)$$

$$\boldsymbol{r} = \boldsymbol{h}z + \boldsymbol{n} \quad (3)$$

where $\boldsymbol{r} = [r_1, r_2, \dots, r_M$ is received signal vector of size $(M \times 1)$, $\boldsymbol{h} = [h_1, h_2, \dots, h_M$ is channel vector of dimension $(M \times 1)$ is transmitted symbol from single transmit antenna, $\boldsymbol{n} = [n_1, n_2, \dots, n_M]^T \sim \mathcal{N}_c(0, \sigma$ is ($M \gg$) additive white Gaussian noise (AWGN) vector and $n_1, n_2, \dots, n$ are independent identically distributed (i.i.d.) Gaussian complex random variables , with mean and variance

a. Maximal ratio combining (MRC)

Maximal ratio combining (MRC)is the optimal combining technique in which signals from all links are summed together and channel gain of each branch is made proportional to the strength of signal and inversely proportional to the mean square noise level of that branch. The links with strong signal is further boosted up and the links with weak signals are further attenuated [2-4,7].

The received signal vector $\boldsymbol{r}$is combined with the receive beamforming vector $\boldsymbol{w}$ to estimate the transmitted symbol $\hat{z}$ at receiver to maximize SNR as shown below

$$[w_1^* w_2^* \dots w_M^*] \begin{bmatrix} r_1 \\ r_2 \\ \vdots \\ r_M \end{bmatrix} = [\boldsymbol{w}^H][\boldsymbol{r}] \quad (4)$$

The signal power is $|\boldsymbol{w}^H \boldsymbol{h}|^2$ and the noise power is $\boldsymbol{E}\{|\boldsymbol{w}^H \boldsymbol{n}|^2\}$ which is further simplified to $\sigma^2 \|\boldsymbol{w}\|^2$. The instantaneous SNR at receiver is given as

$$\delta = \frac{[\boldsymbol{w}^H \boldsymbol{h}]^2}{\sigma^2 \|\boldsymbol{w}\|^2} \quad (5)$$

To maximize SNR in (5), $\|\boldsymbol{w}\|^2$ should be unity and in numerator for maximizing the dot product of $\boldsymbol{w}$ and $\boldsymbol{h}$, their direction should be same, i.e., $\boldsymbol{w} = c\boldsymbol{h}$, resulting $c = \frac{1}{\|\boldsymbol{h}\|}$.

Thus, the receive beamforming vector $\boldsymbol{w}$ is given as

$$\boldsymbol{w} = \frac{\boldsymbol{h}}{\|\boldsymbol{h}\|} \quad (6)$$

The received SNR at output of MRC is given as

$$\delta = \frac{\|\boldsymbol{h}\|^2}{\sigma^2} = \sum_{m=1}^{M} \frac{|h_m|^2}{\sigma^2} = \sum_{m=1}^{M} \delta_m \quad (7)$$

The average output SNR $\mathbb{E}\{\delta\}$ of MRC improves by a factor of M and is given by

$$\mathbb{E}\{\delta\} = M\delta_m = M \frac{|h_m|^2}{\sigma^2} \quad (8)$$

The estimated transmitted symbol $\hat{z}$ at receiver is given as

$$\hat{z} = \frac{\boldsymbol{h}^H \boldsymbol{r}}{\|\boldsymbol{h}\|^2} \quad (9)$$

Therefore, filter at receiver is required to match with the impulse response of the channel. It is also known as multi antenna matched filter or spatial matching filter.

III. TRANSMIT DIVERSITY (MISO)

In wireless communication systems, UE has restricted battery life and compact size as compared to BS, whereas transmitted power and physical size of BS are not limited. Therefore, employing multiple antennas at BS are more feasible and economical in real time scenarios. So, in contrast to receive diversity, transmit diversity becomes more practical, economical and attractive as well [2]. The transmit diversity can be realized with or without knowledge of CSI at transmitter.

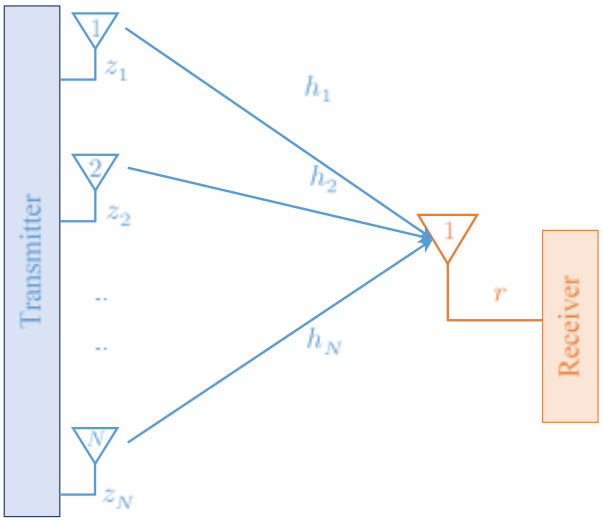

Fig. 2 System model of transmit diversity system (MISO)

Alamouti presented first OSTBC scheme that utilized two transmit antennas [3]. The Alamouti code provides full diversity and unity code rate since it transmits two symbols in every two time intervals.

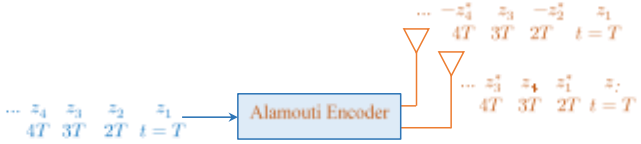

Fig. 3Alamouti encoder at transmitter

An illustration of Alamouti encoder shown in Fig. 3 is modelled 1 receive antennas in following subsection

a. Alamouti with one receive antenna

In transmitter, two symbols $z_1$and $z_2$are interleaved between two time instants. The design of code matrix $\boldsymbol{G}_{c2}$ is given as

$$\boldsymbol{G}_{c2} = \begin{bmatrix} z_1 & z_2 \\ -z_2^* & z_1^* \end{bmatrix} \quad (10)$$

At 1st instant, $z_1$is transmitted via transmit antenna 1 and z_2 is transmitted via transmit antenna 2. The received vector at 1st instant r_1 is given by

$$r_1 = [h_1 \quad h_2]\begin{bmatrix} z_1 \\ z_2 \end{bmatrix} + n_1 \quad (11)$$

At 2ndinstant, $-z_2^*$ is transmitted from transmit antenna 1 andz_1^* is transmitted from transmit antenna 2. The received vector at 2ndinstant r_2 is given by

$$r_2 = [h_1 \quad h_2]\begin{bmatrix} -z_2^* \\ z_1^* \end{bmatrix} + n_2 \quad (12)$$

Hence, it transmits two symbols z_1 and $z_2$in two time instants. By stacking (11) and (12) into a single matrix equation

$$\begin{bmatrix} r_1 \\ r_2^* \end{bmatrix} = \begin{bmatrix} h_1 & h_2 \\ h_2^* & -h_1^* \end{bmatrix}\begin{bmatrix} z_1 \\ z_2 \end{bmatrix} + \begin{bmatrix} n_1 \\ n_2^* \end{bmatrix} \quad (13)$$

$$(r_1, r_2^*) = (z_1, z_2)\boldsymbol{H}_{c2} + \boldsymbol{n} \quad (14)$$

where $\boldsymbol{n}$ is AWGN vector and $\boldsymbol{H}_{c2} = \begin{bmatrix} h_1 & h_2^* \\ h_2 & -h_1^* \end{bmatrix}$

$$\boldsymbol{G}_{c2}^H . \boldsymbol{G}_{c2} = (|z_1|^2 + |z_2|^2)\boldsymbol{I}_2 \quad (15)$$

$$\boldsymbol{H}_{c2} . \boldsymbol{H}_{c2}^H = (|h_1|^2 + |h_2|^2)\boldsymbol{I}_2 \quad (16)$$

By multiplying both sides of (14) by $\boldsymbol{H}_{c2}^H$, resulting into a simple equation

$$(\hat{z}_1, \hat{z}_2) = (r_1, r_2^*)\boldsymbol{H}_{c2}^H = (|h_1|^2 + |h_2|^2)(z_1, z_2) + \boldsymbol{n} \quad (17)$$

The orthogonality of Alamouti code is proved in (15) and ((16), which results in simple ML decoding with full diversity shown in (17).

Alamouti2×1 system forms equivalent structure of 2×2 MIMO system. It can also be seen that the column $c_1 = \begin{bmatrix} h_1 \\ h_2^* \end{bmatrix}$and the column $c_2 = \begin{bmatrix} h_2 \\ -h_1^* \end{bmatrix}$are orthogonal to each other[3,5].

IV. TRANSMIT-RECEIVE DIVERSITY (MIMO)

The most favourable technology in wireless communications is multiple input multiple output (MIMO) system in which space time signal processing is carried out by exploiting spatial dimension of the wireless channel with the usage of multiple and spatially spaced antennas at both transmitter and receiver side.

The MIMO $(M \times N)$ system model for M receive antennas and N transmit antennas is shown in Fig.4

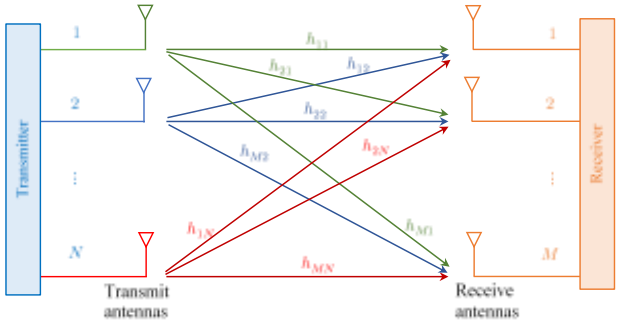

Fig.4 System model of MIMO for transmit antennas and receive antennas

The matrix equations for MIMO system can be represented as

$$r_1 = h_{11}z_1 + h_{12}z_2 + \cdots + h_{1N}z_N$$

$$r_2 = h_{21}z_1 + h_{22}z_2 + \cdots + h_{2N}z_N$$

$$\vdots$$

$$r_M = h_{M1}z_1 + h_{M2}z_2 + \cdots + h_{MN}z_N \quad (18)$$

$$\begin{bmatrix} r_1 \\ r_2 \\ \vdots \\ r_M \end{bmatrix} = \begin{bmatrix} h_{11} & h_{12} & \cdots & h_{1N} \\ h_{21} & h_{22} & \cdots & h_{2N} \\ \vdots & \vdots & \ddots & \vdots \\ h_{M1} & h_{M2} & \cdots & h_{MN} \end{bmatrix} \begin{bmatrix} z_1 \\ z_2 \\ \vdots \\ z_N \end{bmatrix} + \begin{bmatrix} n_1 \\ n_2 \\ \vdots \\ n_M \end{bmatrix} \quad (19)$$

$$\boldsymbol{r} = \boldsymbol{Hz} + \boldsymbol{n} \quad (20)$$

where h_{mn} is channel coefficient between mth receive antenna and nth transmit antenna and these are i.i.d. complex circular Gaussian random variables, i.e., $h_{nm} \sim \mathcal{N}_c(0,1)$, $\boldsymbol{z} = [z_1, z_2, \ldots, z_N]^T$ is transmitted symbols vector of size$(N \times 1)$,$\boldsymbol{H}$ is channel matrix of dimension $(M \times N)$ and noise $\boldsymbol{n} \sim \mathcal{N}_c(0, \sigma^2)$ is uncorrelated between the links, i.e., $E\{\boldsymbol{n}\boldsymbol{n}^H\} = \sigma^2 \boldsymbol{I}_M$

a. Maximum likelihood

Maximum likelihood (ML) performs an exhaustive search over all possible data sequences and choses a data sequence with maximum probability from the set.

$$\hat{z} = \min_{z \in Q^N} \|\boldsymbol{r} - \boldsymbol{Hz}\|^2 \quad (21)$$

where Q^N is set of all possible N transmitted symbols vectors for constellation Q and $\hat{z}$ is an element in set Q^N, whose $\|\boldsymbol{r} - \boldsymbol{Hz}\|^2$ value comes least as compared to other elements in set Q^N

With increase of constellation order or/and increase in number of transmit antennas, complexity in ML computation grows exponentially [9-11]

V. COMPARISON OF SISO, SIMO, MISO AND MIMO

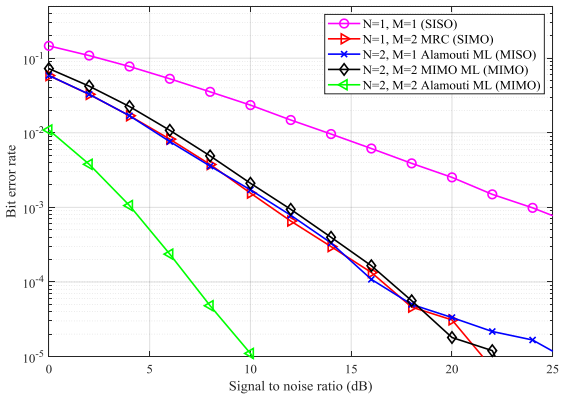

Fig. 5Bit error rate comparison in SISO, SIMO, MISO and MIMO

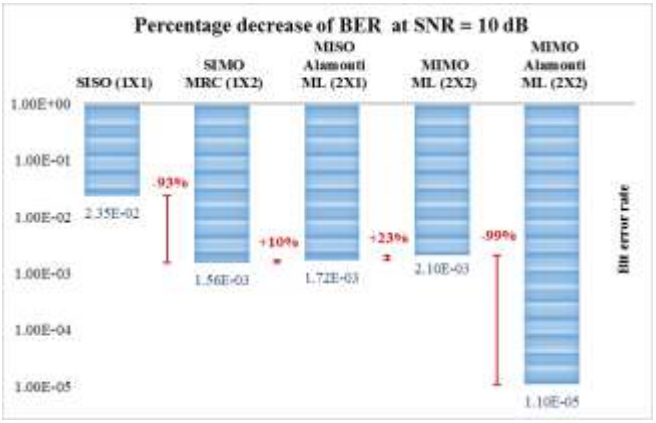

Fig.6 Percentage decrease of BER at SNR 10 dB for different diversity techniques

Fig. 5and Fig. 6 compare different types of diversity, i.e., SISO, SIMO, MISO and MIMO using BPSK, where MIMO system with Alamouti shows better improvement than all other considered systems. The simulations are performed with the assumption that in all cases, each transmit antenna radiates same energy. Alamouti with ML using 2 transmit antennas and 1 receive antenna provides identical performance as MRC with 1 transmit antenna and 2 receive antennas, and same results are achieved by 2×2 MIMO with ML also. It is found that Alamouti 2×2 system delivers 99% decrease in BER than MIMO 2×2 system. Therefore, orthogonal coded MIMO system yields better BER than conventional MIMO system having same number of antennas.

VI. CONCLUSION

The orthogonal design coded MIMO system provides better BER as compared to the conventional MIMO system having same number of antennas. So Alamouti diversity with same number of multiple transmit antennas is better than multiple input multiple output diversity with same number of antennas.

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Study of Various Bio-Inspired Algorithms in the Cloud Computing

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***ABSTRACT*: Cloud computing has emerged as a new paradigm and the latest development in distributed computing, in which processing and data are being moved from desktops and portable PCs to huge data centers. In order to adapt the capacity of the data centers quickly and easily, the scalable IT (Information Technology) resources and the underlying infrastructure are offered on a pay-per-use basis via the Internet. In this way, the different demand is taken into account and each organization is helped to avoid the additional financial burden. Problems with high energy consumption have increased since advances in the computer industry, and consequently high energy requirements have been identified. After analyzing various bio-inspired methods, this paper focuses on the advantages of bio-inspired approaches to energy conservation. The dilemma of the energy crisis makes cloud computing indispensable as it turns out to be the most preferred paradigm for realizing energy efficiency.**

Keywords: Cloud Computing, Task Scheduling, Power Consumption, Quality of Service(QoS), Virtual Machine(VM).

I. INTRODUCTION

In simple language Cloud computing is the facility of multi-services over the Internet, related to data storage, servers, databases, networks and software. In this way files can be stored in remote database using cloud based storage. The utility lies in its execution. The access to data and software program which runs it, depends on the electronic device's access to the web. The scenario as it is, Cloud computing is preferred by people and businesses ventures as it is cost effective and increases productivity. It is efficient, prompt and quite secure.

To be more elaborative, the access information is located far away in the clouds, sometimes referred to as a virtual room. Thus it has become convenient for cloud computing organization to provide services and facilities to retain and preserve applications on distant servers and later on, when needed procure the required data. The consumer can avail of such a usage remotely. Another important feature is that Cloud computing does away with the weight of crunching and processing data on the device one carries. It happens as cloud computing moves all of this work in massive computer clusters which are operative in cyber space. Thus internet is becoming the cloud. If a user is able to connect the internet world wide, it becomes easy to have the availability of the same, his work and his applications.

II. EXISTING BIO-INSPIRED TECHNIQUES

Bio-inspired methods are the most effective methods for solving combustion optimization problems. However, the mechanisms inherent to these methods can be used to maximize the convergence of the method when it comes to finding the best quality solutions that can work in the short run, when planning cloud resources Saffre et al. (2009).

A. Genetic Algorithms (GA)

Holland and others have developed popular stochastic optimization algorithms that use biologically induced methods such as genetic inheritance, natural selection, mutation, and sexual reproduction. Proposed H. Holland et al. (1975) this is a useful predictor for finding nearly optimal solutions on large search sites D. Theys et al. (2001). In GA, a point in the search space is represented by a series of parameters called genes. Most genes are called strings or chromosomes, but most chromosomes are called populations. The fitness function must be invented to solve every problem. Each chromosome is assigned a fitness value to indicate its close association with the desired target. The fitness function provides a single numerical fitness for determining an individual's ability through a specific chromosome Abraham et al. (2000). Another key feature of GA is reproduction, which allows two individuals selected from the population to produce offspring that will be born to the next generation. After the choice of both parents, crossover and mutation mechanisms are used to link their chromosomes. A small amount of random search is provided by mutations to ensure that no point in the search

space is examined with zero probability. If the GA is properly managed, the population will evolve over several generations, so that the fitness of the best and average person in each generation will grow to the global optimum. GAs have proven to be very powerful in determining the global minimum D. Braun et al. (2001)T. Kokilavani et al. (2010) and have been applied to many classification and performance optimization applications in the knowledge search area of databases M. Judy et al. (2012).

The main advantages of GA are: (i) No analytical knowledge is required. (ii) Simple parallelism. (iii) No derivatives required. The disadvantages of GA are as follows: (i) much more developmental work is required than simplified ways (ii) local minima Convergence and (v) cannot use feedback from the system.

B. Memetic Algorithm (MA)

MA, an extension of GA, is an evolutionary algorithm applied to the local search process to improve solutions to complex problems. This has been the subject of intense scientific research and have been successfully functional to a number of real world problems, from the evaluation of protein structures, to the creation of time for university exams, to the proper design of spacecraft trajectories E. Hart et al. (2004). MA fulfills complex objective functions and combines the benefits of local search for optimization problems with GA. It can also be used for global searches. It is based on GA and is enhanced by a search technology to improve individual diversity, accelerate population diversity and reduce the chance of premature aggregation. MA requires a lot of time and memory to improve performance. It can only be used for non-continuous combustion optimization problems with multiple lenses.

C. Ant colony optimization (ACO)

The meta-heuristic ACO was proposed by Colorniet al. (1991) to determine an almost optimal solution using potential technology. It can be utilized for problems related to the NP class. The ACO algorithm is found by watching their natural behavior when hunting real ants. Ants connects indirectly through their environment. They accumulate a chemical called pheromone, which regulates their behavior when confronted by ants. Such a conversation is called stigma. Ants use their probability options when they search for food. They generally choose a path with greater amounts of pheromones. When the ants receive food, they return to the pheromone when they follow the path until the other ants reach the source of the food. Pheromone evaporation corresponds to the natural evaporation of chemical substances deposited by ants. It can be used to lower the amount of pheromone over time, so that only the spots that are used in routine are preserved. The purpose of this system is to promote methods that lead to better solutions. In inflammatory problems such as BPP, artificial ants act as a multi-agent system and form a complex solution based on indirect, low-level communication M. Dorigo et al. (1996), M. Dorigo et al. (1997), Feller et al. (2012). The true power of the ants lies in the brain of their colony. The self-organization of these individuals is similar to the organization in the brain-like structures. Ants, like neurons, mainly use chemical means to communicate. An ant releases a pheromone molecule that affects the behavior of other ants E. Merloti (2004). Ant algorithms are not deterministic and rely on combinations when the number of combinations is large and cannot be calculated with the deterministic algorithm M. Dorigo et al. (1996), M. Dorigo et al. (1997).

The following benefits of ACO are noted in M. Dorigo et al. (1996), M. Dorigo et al. (1997), Feller et al. (2012): (i) versatile and applicable to similar versions of the same problem. (ii) Prioritization and application of other combustion optimization problems with minimal changes. (iii) Can be used for static and dynamic combinatorial optimization problems. (iv) used to solve finite discrete problems. Can be implemented continuously and adapted to real-time changes. Some disadvantages of ACO are: (i) convergence rate is slow. (ii) Performance is low for large cities in TSP. (iii) There is no central control to find good solutions. (iv) may apply only to discrete issues. And (v) theoretical analysis is difficult.

D. Particle Swarm Optimization (PSO)

PSO is one of the latest, nature-inspired adaptation methods, and was introduced in 1995 by Kennedy and Elberhart. It follows the process of hunting down herds of birds. Due to its ability to search worldwide, it has been used successfully in many fields. The volume of a cell is generated randomly, so that the position of each cell represents the possible solution point in the problem area. The goal of optimizing the fitness value of each cell is to optimize it. Each cell stores the coordinates of the best solution (pbest) and the global Best Solution (gbest).

The main advantages of PSO are: (i) strong spontaneous adaptation based on the mobility and intelligence of the swarm. (ii) There are no selection and crossover parameters such as GA. (iii) Easy implementation. (iv) Some parameters for adjustment. (v) Effective for global search algorithms. Some disadvantages of PSO are: (i) impaired local search. (ii) Slow Convergence Rate.

E. Bacterial foraging optimization (BFO)

The BFO algorithm is a population-based numerical optimization algorithm based on the behavior of Escherichia coli bacteria and proposed by Pacino M. Passino et al. (2002).

In distance theory, the goal is to find and maintain high quality nutrients to increase energy consumption per unit time (E / T). The bacterial distal process has three main mechanisms: chemotaxis, bulk, and diffusion and elimination dispersion phenomena. In chemotaxis, the circulation of coli bacteria that spread to the flagella is triggered by swimming and falling. The cell rejects the adjacent cell, which takes in nearby nutrients, making it physically impossible for both cells to be in one place. In times of stress, a bacterium attracts bacteria into a group to signal it. After the chemotoxic stages the regeneration phase takes place. The fitness values of the bacteria are sorted in ascending order. The less healthy bacteria eventually die, but each healthy bacterium (which gives it a lower objective value) is individually divided into two bacteria, which are then placed in one place. This keeps the herd size constant. Elimination event may be caused by sudden changes, such as a significant increase in the local temperature, or part of it may migrate to other parts of the environment, which can have a major impact on bacterial behavior. Elimination and outbreak events can damage the function of the chemotaxis phenomenon, but spreading can cause bacteria to come close to good food sources S. Dasgupta et al. (2009). The main advantages of a BFO are: (i) it is easy to implement, some parameters need to be adjusted, computationally efficient. (ii) More compatibility, can be easily applied to optimization problems in practice, and is effective for global searches. (iii) Prevents the possibility of initial search convergence (iv) flexible to implement (v) Achievement is high in terms of speed, solution quality and success rate.

F. Artificial bee colony optimization (ABC)

ABC set of rules is group intelligence based optimization procedure, introduced in 2005 as Min et al. (2012), S. Omkar et al. (2011). It mimics the mild behavior of real bees and can be used to optimize multiple tasks. The bees are divided into the following groups: salaried bees (bees that cause the exploitation of honey source and send quality information to the bees of the food source), spectator bees (bees waiting on the dance floor). Select a source of food based on the information shared by the bees employed and the educational bees (to find new food they do random search). Half of the colony is made up of artificial bees and the other half is made up of spectators. Each food source has a single busy bee, namely h. The quantity of busy bees relates to the amount of food sources around the hive. Initially, the foraging process begins with the scattering of bees, i.e. h. All the locations of the source are searched by them. Upon their return to hive, they dance a cart to give the audience information about the source of the food (the size of the honey, what direction they are in and the distance to the hive). Based on this information, audience bees take advantage of food sources. When scouts search for great food sources, scout bees are selected and classified as a busy bee. After a moving dance, these bees leave the hive in the crowd to gather nectar with the audience bees. The number of bees in the audience used to collect honey depends on the overall quality of the nectar. Bees arriving at food sources carry the weight of honey and return to the hive. Here they leave the honey for a bee, which acts as a keeper. In this way, the elixir of food sources is exploited by busy bees and bystanders, and this persistent manipulation will eventually end them. The employed bee, whose food source is depleted by bees, is again to go for search of more food sources. Possible solution and supplemental quality (fitness) is indicated by the location of the food source or the quantity of honey. This algorithm considers and optimizes many food sources. The ABC algorithm consists mainly of four selection mechanisms Karaboga et al. (2005), M. Sharifi et al. (2012), M. Dorigo et al. (1997).

The main advantages of ABC are: (i) easy implementation due to very low control parameters. (ii) Using answers with greater fitness values than little fitness values for the preparation of test solutions. This leads to shorter search times and overrides the memory limit for computing effort and problems (this means that the ABC algorithm decides on a fitness value). Each time a lower fitness value is replaced by a solution of higher fitness value, so all the solution candidates need not to be analyzed from beginning till end. (iii) high convergence speed Karaboga (2005).

G. Firefly Optimization (FFO)

The FFO algorithm was developed by Shin-Ji Yang at the University of Cambridge in late 2007 and 2008 X.-S. Yang et al. (2009), X.-S. Yang et al. (2010), X.-S. Yang et al. (2013). It focuses on the glazing properties of fireflies and uses the following three ideal methods:

(i) Since all fireflies are unisex, Firefly attracts other fireflies regardless of their gender. (ii) gravity is proportional to the radiance, so both decrease with distance and the two glow-worms travel less brightly, making the eyeliner shorter. If a firefly is not brighter than a certain firefly, it moves arbitrarily. (iii) the scenario of the target function, the brightness of the Firefly is controlled.

The main advantages of FFO are: (i) it provides the ability to perform regular partitioning and multiple modes. (ii) The computation time is limited because it is possible to find optimized answers globally. (iii) high convergence speed, which can be attributed to quality standards. (iv) through targeted exploitation and investigation of the problem search field, a balanced and optimal solution is achieved. (v) a small number of function evaluations are involved, (vi) on the other hand their position can be changed by the optimization point. (vii) Random variables are used and the response has a possible role X.-S. Yang et al. (2009), X.-S. Yang et al. (2013), R. Khazeet al. (2013), Basu et al. 2011).

III. PLANNING PARAMETERS

In this context it is judicious to dwell upon the most important planning parameters in the methods stated above. These are given below

- Makespan: It refers to the overall time to complete all jobs in a queue. The use of a reliable planning methods helpful in reducing the completion time.
- Deadline: It means the submission of a given task on a stipulated time period. It requires the ability to use a good planning algorithm.
- Execution time: It speaks of exact time needed to complete the specified tasks. The ultimate goal of a good planning algorithm is to minimize execution period.
- Completion time: It means the time it takes to do the total calculation of a given task. Taking into consideration even the bottlenecks caused by the cloud system. Many planning algorithms are helpful to minimizing the execution time.
- Energy Consumption: This needs greater consideration. Many developed planning algorithm aim in reducing power consumption, improve performance and thus make cloud services more eco-friendly.
- Performance: Its pointer to the comprehensive efficiency which planning algorithms offers to give the users good services as expected. A good planning algorithm considers performance on both the user side and the service provider side.
- Quality of Service: It comprises of various user input restrictions as execution costs, performance, dates, costs, duration, and other factors, which are properly defined in SLAs. These SLAs are a agreement document among the user and the service provider.
- Load balancing: In this method the total load in a network is distributed to distinct nodes and connections. In this way at one point a no. of nodes and connections are under load although other nodes or connections are overloaded. Thus majority planning algorithms wants to balance the load on a cloud network so as to improve the efficiency of the system.

IV. BIO-INSPIRED APPROACHES TO ENERGY CONSERVATION

After analyzing various bio-inspired methods, this section focuses on the advantages of bio-inspired approaches to energy conservation. The optimal use of resources by controlling the workload at individual nodes, and energy optimization through VM migration is a very difficult problem Ghribi et al. (2013), Zhou et al. (2014), so a viable algorithm (due to the exponential cost found) to find a best solution used in large systems like the cloud. This measure is heuristic to calculate the most optimal solutions using the greedy or bio-inspired algorithm. Local statistics may not be enough to find the right solution. Therefore, meta-heuristic approaches are suitable for effectively addressing these types of problems. Meta-heuristic is a recurring primary process S. Voss (2001) to control and modify the functions of secondary statistics to obtain high-quality results.

Many researchers are currently focused on implementing biologically motivated computing as a preferred example of versatility and increasing energy crisis, and without major problems. They have worked to use the role of biological systems to solve energy problems.

The SSO method ("Simplified Swarm Optimization") of PSO variation, as described by Bergmann et al (2013). It relies on various parameters to reduce energy consumption in cloud computing systems. Energy consumption is optimized using DVS technology without affecting performance. The SSO method reduces maxspan time and power consumption.

X. Wang et al. (2012) Google has proposed a multi-tasking scheme that uses GA to benefit the large processing capacity of the advertising network. This technique uses some training and interpreter techniques for networked units and then builds appropriate power performance based on the visibility of each unit. The main purpose of this approach is to optimize CPU utilization, since power consumption for each task depends on the server's CPU usage, making maintenance difficult.

Dressler et al. (2010) proposed a technology based on "Low Carbon Virtual Private Cloud (LCVPC)". This technology reduces CO2 emissions from remote data centers operating in multiple locations, but can connect to each other through private WANs (wide area networks) or the Internet. Intelligent Live VM Migration is used in WAN. The first method calculates the carbon footprint and power consumption of the entire network and is calculated by the VPC manager before implementing the transformed GA. CO2 emissions are further optimized by dynamic VM integration.

N. Quang-Hung et al. (2013) developed another GA-based technique called the "Genetic Resource-Active Planning Algorithm (GAPA)" for resource, which finds the optimal VM allocation strategy to solve the static VM allocation problem.

A parallel bi-target hybrid genetic algorithm (GA) was developed by Y. Kessaci et al. (2011). This algorithm uses a hybrid scheduling algorithm based on "Energy Conscious Scheduling (ECS)" heuristics and parallel general-purpose GAs to achieve energy completion and energy consumption goals. The planning process decrease makespan and reduces energy consumption by delivering K tasks to the n processor.

Chimakurthi et al. (2011) proposed a technique to provide a mechanism for energy efficient resource allocation. This

technique uses an adaptive allocation approach to allocate resources for different applications to meet its QoS needs. It is based on ACO technology, to reduce the use of data center resources, ant agents can be designed with different server loads.

Feller et al. (2012) presented a bio-inspired workload integration method based on the ACO meta-heuristic. The proposed algorithm makes dynamic decisions about workload planning and eliminates the problem of workload integration related to individual resources. The difficulty of assigning workloads when packing containers is portrayed as a multi-dimensional problem.

V. CLOUD COMPUTING AND ENERGY EFFICIENCY

Cloud computing is growing exponentially, resulting in a rapid expansion of data centers, which triggers energy consumption and questions the need of improvement in its consumption in data centers. This part dwells on the relevance and requirement of achieving energy efficiency with reference to the effects of a cloud on minimizing energy consumption.

A. Cloud Data Center

It offers cloud users a sophisticate highly network, scalable and virtualized environment without owning and managing the systems. Instead, cloud users trust the enormous storage space and processing capacity provided by various service providers. Numerous data centers have been set up to provide variable, flexible and effective services. They give customers instant access to the available services by generating virtual instances. There is permanently availability of the data and services without being location-dependent. A variety of IT companies, including Google, Amazon, Salesforce, Yahoo, Microsoft and Facebook, provide cloud services by setting up their own data centers.

B. Increase in Energy usage in Data Centers

With the growth development and expansion of the Information and Communication Technology (ICT) sector, the demands on the infrastructure have changed and specialization has been achieved. As a result, Internet data centers (IDCs) were set up to streamline in one center and implement calculations in specialized centers, which led to a sudden increase in power consumption. Thus numerous peer review studies have been conducted to analyze the problems and energy consumption in the data centers.

Based on the analysis included in various reports, the ICT industry has been identified as the largest energy consumer and the rise in energy consumption has become a problematic. The International Energy Outlook conducted a survey and predicted that global energy consumption will increase up to 56 percent during the period from 2010 to 2040. It has also upheld the ICT industry will be the main cause.

1) Increasing Energy Consumption and Its Effects

Increasing energy consumption is supplemented by alarmingly high emissions of carbon and greenhouse gases (GHG) (millions of tons) into the environment, which pose a danger to the environment. Fig1 shows the leading perpetrators in various industrial sectors worldwide who subsidize the amount and percentage of greenhouse gas emissions.

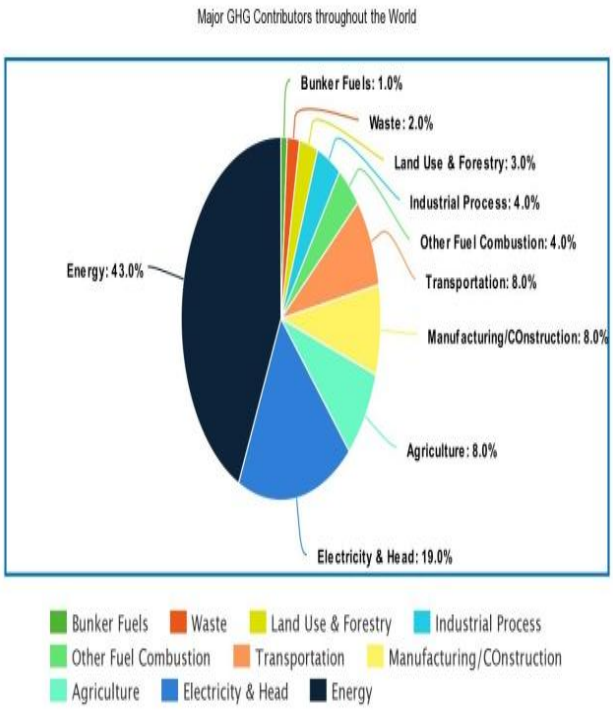

Fig1: Percentage contribution of various industrial divisions towards GHG emissions throughout the globe.

It is obvious that the energy sector has become the largest greenhouse gas emitter in the world. Smart2020 report observed that there will be an increase of 30 percent in total emissions from all sources whereas emissions from the ICT sector will specifically go up by 180 percent during the period from 2002 - 2020. The increasing energy usage increases the total cost of acquisition (TCA) and the total cost of ownership (TCO), which further influences the economic budget of the service providers. Here it needs to be pointed out that Google also has to apply both real and virtual results in its data centers in order to reduce operational costs.

Energy-saving measures such as energy efficiency technologies are the order of the day to meet the increasing energy requirements and reduce costs.

2) Measures to Implement Energy Efficiency in Data Center

Various endeavours have made to advocate energy awareness in ICT centers. An attempt has been made to control the distribution of power between the devices in order to avoid unwanted energy losses and wasted power. The application of energy efficient devices in data centers has also been emphasized highlighted. The construction of environment friendly buildings and the placement of high-performance servers were been emphasized in order to minimize energy consumption in data center. Major ICT giants like Microsoft, IBM, and Google have recently made efforts to optimize energy by installing their data centers near locations where low-cost hydropower is readily available in complementary weather conditions.

Despite all these measures, the energy usage has not come down to the expected level. As a result, the focus shifted to the application of many hardware-based energy optimizations, like circuit-level optimization, using energy efficient servers, logic-level optimization and architecture-level optimization.

The use of ideal hardware and hardware based energy efficiency systems has not increased energy efficiency. This was due to the use of poor software designs and programs. As a result, attention has been drawn to energy efficient software technologies. It later emerged that energy consumption also depended on resource management strategies. Therefore, a trend towards the development of energy-efficient algorithms for the effective provision of resources taking into account the available workload and the performance requirements was initiated.

Although the technological platforms continued to evolve, attempts to reduce energy consumption involved different levels of optimization. The energy efficiency mechanisms continued to be implemented in several areas. However, cloud computing became particularly attractive due to the server load and the efficient organization of the infrastructure as a result of cloud implementations.

VI. Conclusion

Based on the study of various bio-inspired methods, it can be concluded that these methods provide nearly optimal solutions to realize energy efficiency. As a result, lower energy consumption has led to the growth of energy efficient technologies via clouds. The various energy optimizations in cloud computing at many grades has proved to be useful to minimizing energy consumption. The problem of the energy crisis makes it imperative to seek out and eliminate the reasons for the increase in energy consumption.

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REVIEW: A PAPER ON CLOUD COMPUTING, INTRODUCTION

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***Abstract*— Cloud computing is a rapidly developing and excellent promising technology. It has aroused the concern of the computer society of whole world. Cloud computing is Internet-based computing, whereby shared information, resources, and software, are provided to terminals and portable devices on-demand, like the energy grid. Cloud computing is the product of the combination of grid computing, distributed computing, parallel computing, and ubiquitous computing. It aims to build and forecast sophisticated service environment with powerful computing capabilities through an array of relatively low-cost computing entity, and using the advanced deployment models like SaaS (Software as a Service), PaaS (Platform as a Service), IaaS (Infrastructure as a Service),HaaS (Hardware as a Service) to distribute the powerful computing capacity to end-users.**

***Keywords* — Cloud, SaaS, PaaS, IaaS, Cloud Computing.**

I. INTRODUCTION

Cloud Computing is not a new concept; it is originated from the earlier large-scale distributed computing technology. However, it will be a subversion technology and cloud computing will be the rapid revolution in the Computer Science and Information Technology field. Like real clouds which are the collection of water molecules, the term 'cloud' in cloud computing is the collection of networks. The user can use the modalities of cloud computing boundlessly whenever demanded. Instead of setting up their own physical infrastructure, the users ordinarily prefer a mediator provider for the service of the internet in cloud computing. Which represent the development trend in the IT industry from hardware to software, software to services, and distributed service to centralized service. Cloud computing is also a new mode of business computing is virtualization.

It will be widely used in the near future. The core concept of cloud computing is reducing the processing burden on the users. An advantage of the cloud computing technology includes cost savings, high availability, and easy scalability. The users have to pay only for the services they had used [2]. All we need to have a web browser to use cloud computing. All we need to have a web browser like chrome to use cloud computing.

Cloud computing is the combination of many pre-existing technologies that have matured at different rates and in different contexts. The goal of cloud computing is to allow users to take benefit from all these technologies. Many organizations are moving into cloud because it allows the users to store their data on clouds and can access at anytime from anywhere. Data

breaching is possible in cloud environment, since data from various users and business organizations lie together in cloud. By sending the data to the cloud, the data owners transfer the control of their data to a third person that may raise security problems. Sometimes the Cloud Service Provider (CSP) itself will use/corrupt the data illegally. Cloud Computing has become one of the most talked about technologies in recent times and has got lots of attention from media as well as analysts because of the opportunities it is offering.

II. CLOUD STORAGE

Cloud storage is one of the primary use of cloud computing. We can define cloud storage as storage of the data online in the cloud. A cloud storage system is considered as a distributed data centers, which typically use cloud-computing technologies and offers some kind of interface for storing and accessing data. When storing data on cloud, it appears as if the data is stored in a particular place with specific name.

There are four main types of cloud storage:

A. Personal Cloud Storage: It is also known as mobile cloud storage. In this type storage, individual's data is stored in the cloud, and he/she may access the data from anywhere.

B. Public Cloud Storage: In Public cloud storage the enterprise and storage service provider are separate and there aren't any cloud resources stored in the enterprise's data centre. The cloud storage provider fully manages the enterprise's public cloud storage.

C. Private Cloud Storage: In Private Cloud Storage the enterprise and cloud storage provider are integrated in the enterprise's data centre. In private cloud storage, the storage provider has infrastructure in the enterprise's data centre that is typically managed by the storage provider. Private cloud storage helps resolve the potential for security and performance concerns while still offering the advantages of cloud storage.

D. Hybrid cloud storage: It is a combination of public and private cloud storage where some critical data resides in the enterprise's private cloud while other data is stored and accessible from a public cloud storage provider.

Fig. 1 Network of Cloud

III. ARCHITECTURAL COMPONENTS

Cloud service models are commonly divided into SaaS, PaaS, IaaS and DaaS that exhibited by a given cloud infrastructure. It's helpful to add more structure to the service model stacks:

Fig. 2 shows a cloud reference architecture [13] that makes the most important security-relevant cloud components explicit and provides an abstract overview of cloud computing for security issue analysis.

Software as a Service (SaaS)

Cloud consumers release their applications in a hosting environment, which can be accessed through networks from various clients (e.g. Web browser, PDA, etc.) by application users. Cloud consumers do not have control over the cloud infrastructure that often employs multi-tenancy system architecture, namely, different cloud consumers' applications are organized in a single logical environment in the SaaS Cloud to achieve economies of scale and optimization in terms of speed, security,

availability, disaster recovery and maintenance. Examples of SaaS include SalesForce.com, Google Mail, Google Docs, and so forth.

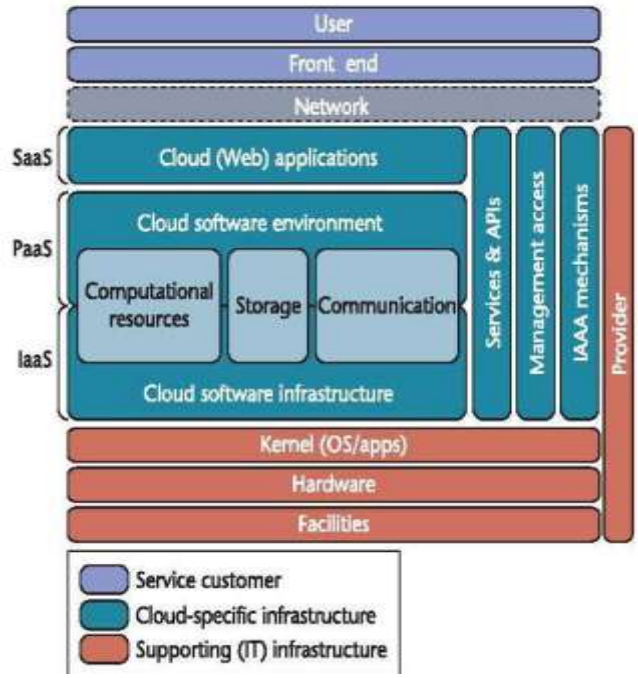

Fig. 2 the Cloud Reference Architecture.

Platform as a Service (PaaS)

PaaS is a development platform supporting the full "Software Lifecycle" which allows cloud consumers to develop cloud services and applications (e.g. SaaS) directly on the PaaS cloud. Hence, the difference between SaaS and PaaS is that SaaS only hosts completed cloud applications whereas PaaS offers a development platform that hosts both completed and in-progress cloud applications. This requires PaaS, in addition to supporting application hosting environment, to possess development infrastructure including programming environment, tools, configuration management, and so forth. An example of PaaS is Google AppEngine.

Infrastructure as a Service (IaaS)

Cloud consumers directly use IT infrastructures (processing, storage, networks and other fundamental computing resources) provided in the IaaS cloud. Virtualization is extensively used in IaaS cloud in order to integrate/decompose physical resources in an ad-hoc manner to meet growing or shrinking resource demand from cloud consumers.

The basic strategy of virtualization is to set up independent virtual machines (VM) that are isolated from both the underlying hardware and other VMs. Notice that this strategy is different from the multi-tenancy model, which aims to transform the application software architecture so that multiple instances (from multiple cloud consumers) can run on a single application (i.e. the same logic machine). An example of IaaS is Amazon's EC2.

Data as a Service (DaaS)

The delivery of virtualized storage on demand becomes a separate Cloud service - data storage service. Notice that DaaS could be seen as a special type IaaS. The motivation is that on-premise enterprise database systems are often tied in a prohibitive upfront cost in dedicated server, software license, post-delivery services and in-house IT maintenance.

DaaS allows consumers to pay for what they are actually using rather than the site license for the entire database. In addition to traditional storage interfaces such as RDBMS and file systems, some DaaS offerings provide table-style abstractions that are designed to scale out to store and retrieve a huge amount of data within a very compressed timeframe, often too large, too expensive or too slow for most commercial RDBMS to cope with. Examples of this kind of DaaS include Amazon S3, Google BigTable, and Apache HBase, etc.

IV. EVOLUTION OF CLOUD COMPUTING

One day in a speech at MIT around in 1960 John McCarthy indicated that like water and electricity, computing can also be sold like a utility. And in 1999, the Sales force Company started distributing the applications to the customer through a convenient website [3].

Amazon Web Services were started by Amazon in 2002 and they were providing the services of storage and computation.

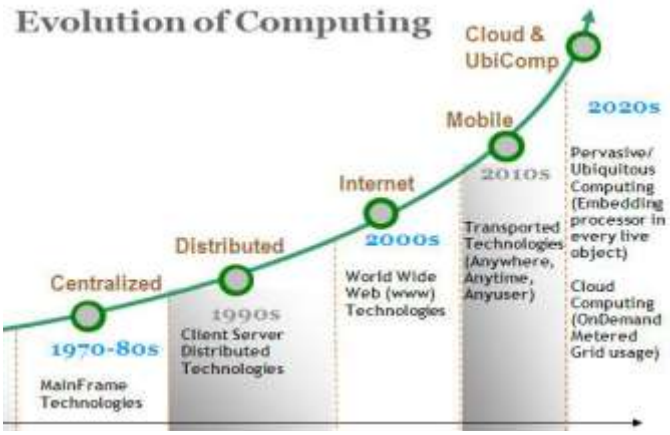

Fig.3 Evolution of Cloud Computing

In around 2009 big companies like Google, Microsoft, HP, Oracle had started to provide cloud computing services [4]. Nowadays each and every person is using the services of cloud computing in their daily life. For example Google Photos, Google Drive, and iCloud etc. In future cloud computing will become the basic need of IT Industries.

V. CLOUD COMPUTING FEATURES

Cloud computing brings an array of new features and advantages compared to any other computing paradigms. There are briefly described in this section.

Scalability and On-Demand Services: - Cloud computing provides resources and services for users on demand. The resources are scalable over several data centers.

Quality of Service (QoS): - Cloud computing can guarantee QoS for users in terms of hardware or CPU performance, bandwidth, and memory capacity.

User-Centric Interface: - Cloud interfaces are location independent and they can be accessed by well established interfaces such as Web services and Web browsers.

Autonomous System: - Cloud computing systems are autonomous systems managed transparently to users. However, software and data inside clouds can be automatically reconfigured and consolidated to a simple platform depending on user's needs.

Pricing: - Cloud computing does not require upfront investment. No capital expenditure is required. Users may pay and use or pay for services and capacity as they need them.

VI. SECURITY AND PRIVACY ISSUES IN DATA STORAGE IN CLOUD COMPUTING

Cloud Computing allows the users to store their data on the storage location maintained by a third party. Once the data is uploaded into the cloud the user loses its control over the data and the data can be tampered by the attackers. The attacker may be an internal (CSP) or external. Unauthorized access is also a common practice due to weak access control. The protection of information arises the following challenges:

The security and privacy issues related to data storage are confidentiality, integrity and availability.

Confidentiality: - The major dispute in cloud computing is confidentiality. Data confidentiality means accessing the data only by authorized users and is strongly related to authentication. In another way confidentiality means keeping users data secret in the cloud systems. As we are storing the data on a remote server and transferring the control over the data to the provider here arises the questions such as:

For ensuring confidentiality, cryptographic encryption algorithms and strong authentication mechanisms can be used. Encryption is the process of converting the data into a form called cipher text that can be understood only by the authorized users. Encryption is an efficient technique for protecting the data but have the obstacle that data will be lost once the encryption key is stealed. Algorithms Blowfish is a fat and simple encryption algorithm.

It is a time consuming process and thus searchable encryption was introduced. Searchable encryption allows build an index for the file containing the keywords and is encrypted and stored along with the file, so that while searching the data only the keywords are decrypted rather than the entire file and search is made on it.

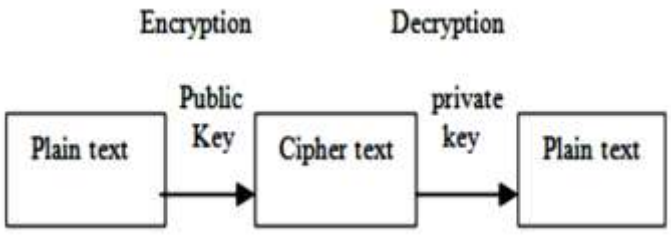

Fig. 4 Asymmetric encryption

Integrity

Another serious problem faced by cloud computing is integrity. Integrity of data means to make sure that the data has not been changed by an unauthorized person or in an unauthorized way. It is a method for ensuring that the data is real, accurate and safeguarded from unauthorized users. As cloud computing supports resource sharing, there is a possibility of data being corrupted by unauthorized users. Digital Signatures can be used for preserving the integrity of data. The simple way for providing integrity is using Message Authentication Code (MAC).

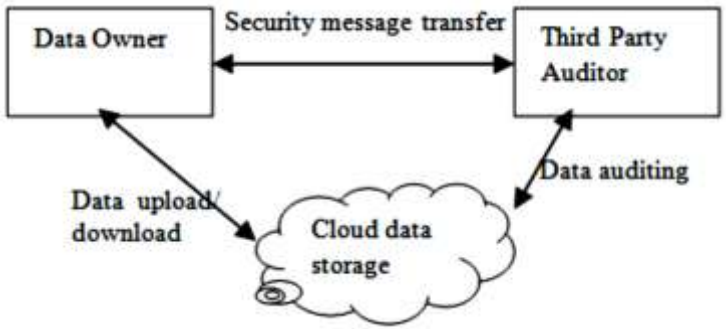

Fig.5 Remote auditing mechanism

Availability

Availability refers to being available and accessible to authorized users on demand. The aim of availability in cloud computing systems is to ensure that its users can use them at any place and at any time

VII. CHARACTERISTIC OF CLOUD COMPUTING

There are five characteristics of cloud computing. The first one is on-demand self-service, where a consumer of services is provided the needed resources without

human intervention and interaction with cloud provider. The second characteristic is broad network access, which means resources can be accessed from anywhere through a standard mechanism by thin or thick client platforms such mobile phone, laptop, and desktop computer. Resource pooling is another characteristic, which means the resources are pooled in order for multi-tenants to share the resources. In the multi-tenant model, resources are assigned dynamically to a consumer and after the consumer finishes it, it can be assigned to another one to respond to high resource demand. Even if the resources are assigned to customers on demand, they do not know the location of these assigned resources.

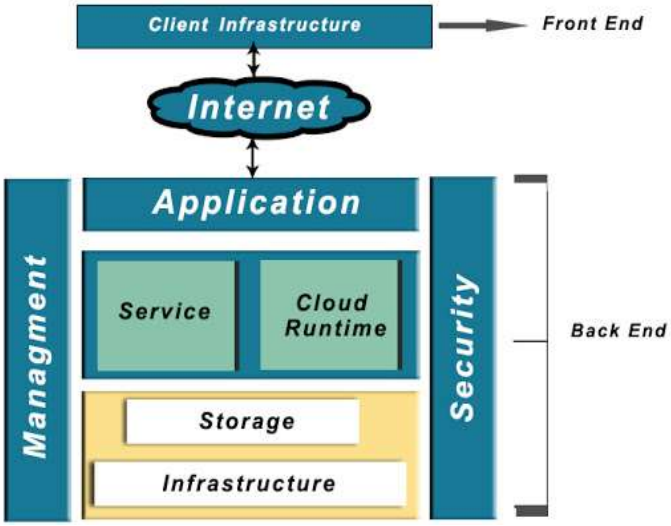

Fig.6: Cloud environment architecture

Sometimes they know the location at a high-level abstraction, such as country, state, and data centre. Storage, processing, memory, and network are the kind of resources that are assigned. Rapid elasticity is another characteristic, which means that resources are dynamically increased when needed and decreased when there is no need. Also, one of characteristics that a consumer needs is measured service in order to know how much is consumed.

Encrypted Data Storage for Cloud

Since data in the cloud is placed anywhere, it is important that the data be encrypted. We are using secure co-processor as part of the cloud infrastructure to enable efficient encrypted storage of sensitive data. By embedding a secure co-processor (SCP) into the cloud infrastructure, the system can handle encrypted data efficiently. Parts of the proposed instrument (see Figure 2). Basically, SCP is a tamper-resistant hardware capable of limited general-purpose computation. For example, IBM 4758 Cryptographic Coprocessor (IBM) is a single-board computer consisting of a CPU, memory and special-purpose cryptographic hardware contained in a tamper-resistant shell, certified to level 4 under FIPS.

When installed on the server, it is capable of performing local computations that are completely hidden from the server. If tampering is detected, then the secure co-processor clears the internal memory. Since the secure coprocessor is tamper-resistant, one could be tempted to run the entire sensitive data storage server on the secure coprocessor. Pushing the entire data storage functionality into a secure co-processor is not feasible due to many reasons. First of all, due to the tamper-resistant shell, secure co-processors have usually limited memory (only a few megabytes of RAM and a few kilobytes of non-volatile memory) and computational power (Smith, 1999). Performance will improve over time, but problems such as heat dissipation/power use (which must be controlled to avoid disclosing processing) will force a gap between general purposes and secure computing. Another issue is that the software running on the SCP must be totally trusted and verified.

This security requirement implies that the software running on the SCP should be kept as simple as possible. We can encrypt the sensitive data sets using random private keys and to alleviate the risk of key disclosure, we can use tamper-resistant hardware to store some of the encryption/decryption keys (i.e., a master key that encrypts all other keys).

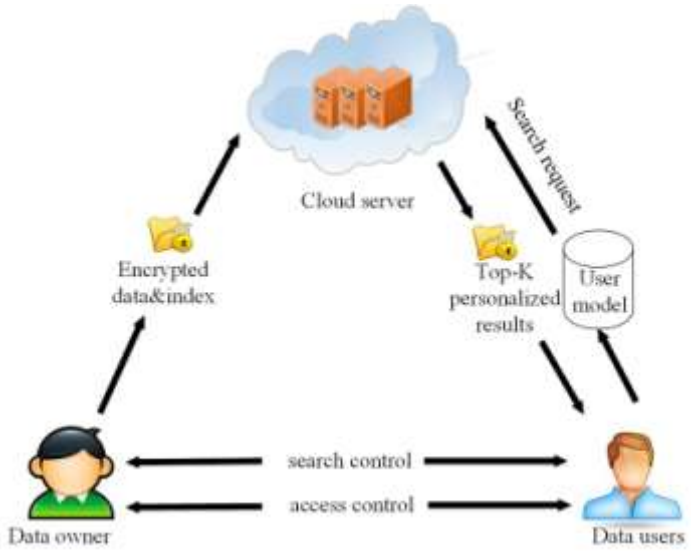

Fig.7: Encrypted cloud computing

VIII. TYPES OF CLOUD COMPUTING

Public Cloud: In this model, computing resources are dynamically provisioned over the Internet via Web applications or Web services from trusted third party provider. Public clouds are run by third parties, and applications from different customers are likely to be mixed together on the cloud's servers, storage systems, and networks. These services are available for any user who wants to use them and they have to pay only for the services they consumed.

Private Cloud: In the private cloud deployment, computing resources are used and controlled by a private enterprise. It is generally deployed in the enterprises data center and managed by internal personnel or service provider. The main advantage of this model is that the security, compliance, and QoS are under the control of the enterprises the computing services provided over the internet or private network come under the private cloud and these services are offered only to the selected users in place of common people. A higher security and privacy is delegated by private clouds through the firewall and internal hosting.

Hybrid Cloud: - The Hybrid Cloud environment intersects and combines multiple Public and private cloud models. It enables the enterprise applications to running state-steady workload in the private cloud, and requesting the public cloud for intensive computing resources when peak workload occurs. Hybrid clouds introduce the complexity of determining how to distribute applications across both a public and private cloud. Hybrid cloud is the combination of public cloud and private cloud.

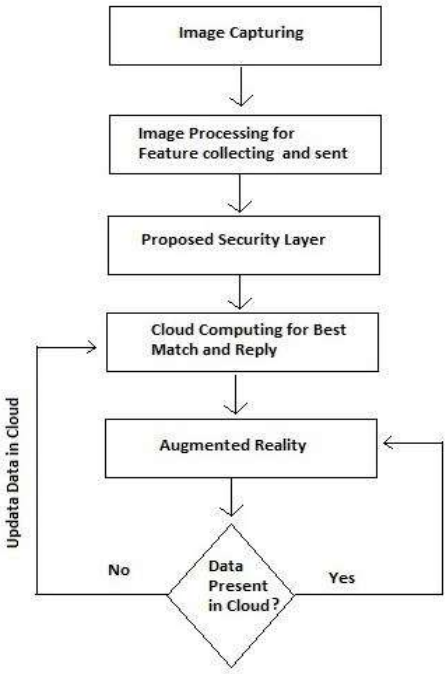

Fig.8: - Flow chart of Cloud Computing

IX. COMPONENTS OF CLOUD COMPUTING

Cloud computing has three basic components as follows-

Client Computers: - Clients on cloud computing architecture are said to be the exact same things that are plain, old, everyday local area networks (LANs). They are, typically, the computers that just sit on your desk. But they might also be laptops, tablet computers, mobile phones, or PDAs - all big drivers for cloud computing because of their mobility. Clients are interacting with to manage their information on the cloud.

Distributed Servers: - is a server placement in a different location. But the servers don't have to be housed in the same location. Often, servers are in geographically disparate locations. But to you, the cloud subscribers, these servers act as if they're humming away right next to each other.

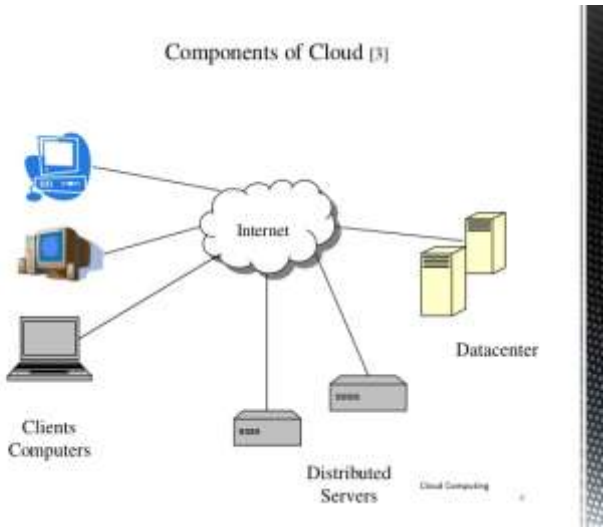

Fig.9: - Components of Cloud Computing

Data Centers: - Datacenter is collection of servers where the application to which you subscribe is housed. It could be a large room in the basement of your building full of servers on the other side of the world that you access via the Internet. A growing trend in the IT world is virtualizing servers. That is, software can be installed allowing multiple instances of virtual servers to be used. In this way, you can have half a dozen virtual servers running on one physical server.

X. COMPARISION BETWEEN CLOUD AND GRID COMPUTING

A comparison can be summaries as follows:-

1) Construction of the grid is to complete a specified task, such as biology grid, Geography grid, national educational grid, while Cloud computing is designed to meet general application and there are not grid for a special field.

2) Grid emphasizes the "resource sharing" to form a virtual organization. Cloud is often owned by a single physical organization (except the community Cloud, in this case, it is owned by the community), who allocates resources to different running instances.

3) Grid aims to provide the maximum computing capacity for a huge task through resource sharing. Cloud aims to suffice as many small-to-medium tasks as possible based on users' real-time requirements. Therefore, multi-tenancy is a very important concept for Cloud computing.

4) Grid trades re-usability for (scientific) high performance computing. Cloud computing is directly pulled by immediate user needs driven by various business requirements.

5) Grid strives to achieve maximum computing. Cloud is after on-demand computing – Scale up and down, in and out at the same time optimizing the overall computing capacity.

XI. ISSUES IN CLOUD COMPUTING

More and more information on individuals and companies is placed in the cloud; concerns are beginning to grow about just how safe an environment it is? Issues of cloud computing [3] can summarize as follows:

Privacy: -

Cloud computing utilizes the virtual computing technology, users' personal data may be scattered in various virtual data centers rather than stay in the same physical location, users may leak hidden information when they are accessed cloud computing services. Attackers can analyze the critical task depend on the computing task submitted by the users.

Reliability: -

The cloud servers also experience downtimes and slowdowns as our local server.

Legal Issues: -

Worries stick with safety measures and confidentiality of individual all the way through legislative levels.

Compliance: -

Numerous regulations pertain to the storage and use of data requires regular reporting and audit trails. In addition to the requirements to which customers are subject, the data centers maintained by cloud providers may also be subject to compliance requirements.

Freedom: -

Cloud computing does not allow users to physically possess the storage of the data, leaving the data storage and control in the hands of cloud providers.

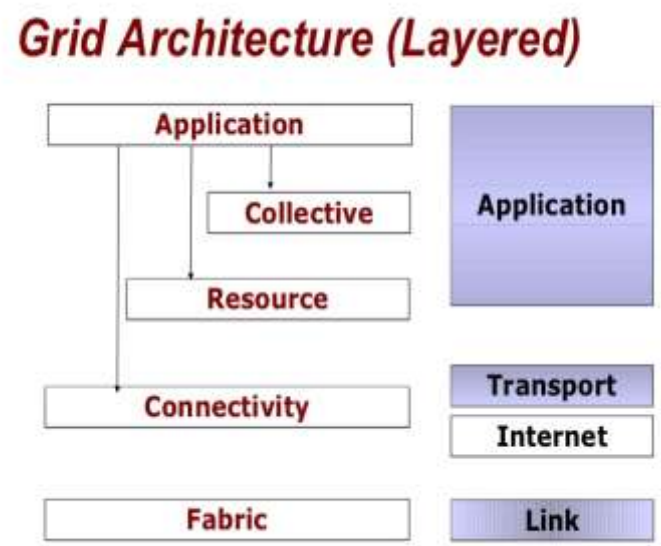

Fig.10: -Grid computing architecture

XII. CONCLUSION

In this review paper we described in short the introduction, evolution, types and components of cloud computing and also different services of cloud computing and some of its advantages. Cloud computing is the newest technology that is becoming very popular now-a-days. This is a developing technology due to its applications in various fields like testing & development, big data analytics, file storage etc. Cloud Computing and their services are new but many new organizations are implementing the cloud services but there is always a risk of data breaching. The application area of cloud computing will continuously be increasing. Today approximately all small and big industries are using cloud computing to manage storage, traffic, hardware requirements. So, it is clear that there is major impact of cloud computing on society and business.

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Development & Analysis of Data Hiding Security Using Image Processing Technique.

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Abstract— ***This paper incorporates a process we hide any text data and material in the image by using MATLAB programming. Stegano-graphy is the most common and useful techniques to hide any kind of data from robbery or unapproved individual. In spite of the extensive number of stegano-graphy transporters and strategies given by pictures, sound, and video are as yet the most widely recognized computerized bearers, and there is the gigantic number of steganography methods created.***

***Keywords*— Stegano-graphy, Data Hiding, Image Processing, Data security, Cryptography.**

I. INTRODUCTION

There are countless strategies through which instant messages is cover up with-in Advanced pictures (RGB, Dark scale and BW). The best way is abusing of useless parts of any documents or undefined memory for putting away mystery information which is likewise be straightforwardly gotten to. Small amount of data might be cover up with-in the free parts of the header documents [1]. In the event that segment isn't obvious in standard conditions, there are a few instruments which in the meantime permit full access. In spite of the fact that there are numerous stegano-graphy holders and the most prominent technique will be depicted in whatever remains of this paper. The fundamental standard of the framework dependent on the substitution is the substitution of excess parts of the picture with mystery information. For comprehension of this rule it is essential information of stegano-graphical holder structure, and we give a concise portrayal of the RGB (Red-Green-Blue) frameworks. With-in the RGB framework, each shading is spoken to by the general forces of every one of the three existing parts red, green & blue. Every RGB segment is dictated by a solitary octet, Since the RGB framework contains three segments, this technique for introduction, we get the 24-bit conspire which underpins 14,77,216 one of a kind hue. A large portion of the present applications for handling and showing pictures portrayed backings 24-bit conspire, yet permits the utilization of 8-bit plan to spare the picture measure. Such a plan entirely utilizes 24-bit shading pixels, yet furthermore has a palette that determines shading utilized in the picture. Pixels is coded with 8 bits, where is that esteem shown by the records wanted shading in the palette. Subsequently, this strategy confines the quantity of utilized hues in the picture at 256 for 8-bit. 8-bit design is run of the mill for GIF (Illustrations Exchange Arrangement) picture groups which are commonly viewed as a lossless picture pressure.

II. RELATED WORKS

A. Sorting Pallets

Countless pictures use shading palettes used in the image. Beds, clearly, contain only a subset of the entire shading space in 24-bit appear, and each shading in the palette is given a 24-bit vector that portrays the hued picture estimations of the shading record, ie the region of the bed. This rundown is secured with-in each pixel pictures and use it to choose the fitting shading pixels. The underlying stage in the execution of this stegano-graphical frameworks is making copies of the primary shading palette and change of territory in the new shading palette. The new shading arrangement is controlled by the tones that are close to the color structure, are in short proximity. By then applies a standard Lower significant bit substitution, that will at any rate criticalness with-in each pixel is superseded by bit riddle texts. Around the complete of the individual RGB shades perceived in the main bed, so its record in the primary group is used as the new estimation of the pixel.

B. Domain Transfer

The Change area in stegano-graphy procedure depends on concealing information utilizing scientific capacities. Numerical

capacities are utilized in pressure calculations. The essential standard is to inclusion bits of mystery instant messages to put the minimum significance coefficients. In particular, the JPEG picture organize utilized discrete cosine change coding rather than individual pixels. Photograph split into 16x16 squares for every part of the Colored image framework. The objective is to discover hinders in which the measure of changes of the low pixels to the whole square is supplanted by a discrete cosine change coefficient. On the off chance that the measure of progress is excessively high, the square is isolated into 8x8 littler squares until the measure of the change isn't low enough [2]. JPG design is viewed as a picture pressure with misfortunes. The Image isn't exactly indistinguishable to its unique picture which is gotten with change. JPG stegano-graphy as carrier performed change the connection of these coefficients rather than bits in the LSB substitution.

C. Substitution of Important Bit

Substitution of least imperative bits is the most widely recognized stegano-graphy method utilized in stegano-graphy work with mixed media documents. The expression "least essential piece" is related with the numerical significance of the bits in the octet. The bit of greatest significance is with the most noteworthy number juggling esteem (12710), and the bit of least significance is with the least number-crunching esteem (120). Change of least bits has significance impact in all octets that make up a mixed media record. The depicted guideline is much progressively successful because of the way that the human optical arrangement isn't sufficiently touchy for Recognizing these adjustments in shading[3]. The thought stegano-graphical procedures substitution bits' slightest significance depends on breaking the mystery instant messages on bits which are then kept set up for at any rate essential bits in chose octets. As a basic case of LSB substitution is demonstrated concealing the letter 'G' in the following arrangement of bytes:

10001101 00011101 110101111 10110100
00001111 11000001 100011011 110110110

The letter 'A' is the ASCII (American Standard Code for Information Interchange) standard recorded as a parallel string 0100011101. These 8 bits are kept in touch with the situation of the minimum vital bits in the first arrangement of bytes:

10001101 00011101 110101111 10110100
00001111 11000001 100011011 110110110

In the referenced model really changed just a large portion of the bits of the minimum significance. LSB substitution is stegano-graphical systems whose application is frequently not all that basic. Truth be told, if a lot of bytes into which is embedded through mystery instant messages will pick the easy way, for instance, a progression of contiguous bytes in the start of the document, all things considered, this piece of the pictures have diverse measurements from whatever remains of the picture, and in that capacity will attract regard for themselves and trade off the mystery of the shrouded instant messages. In this way, the set target octet frequently characterized by a technique for arbitrary choice as one of the elements that make discovery stegano instant messages greatly entangled. Pursued a case of concealing one picture to another, utilizing the given calculation.

III. ALGORITHM

The best strategy of advancing pixels. This technique changes the esteem estimation of an explicit number of pixels. Each pixel has its very own 3 octets, for every one of the 3 segments on the double. In case rather a part of the shading sections ASCII estimation of the characters in this pixel [4], the substance of the picture change, yet the human eye can't have challenged if using fitting picture. Sought after introduction of MATLAB limits that stow away and later scrutinizing the string from the image, as demonstrated by a key agreed. The basic flow chart of our work are as follow:

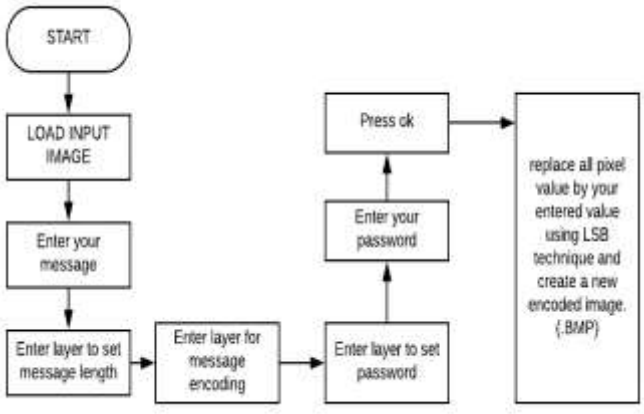

Figure 1. Flow chart encoding part

In encoding part, firstly we have to load or browse the stegano image in which you want to embedded the data by using UIGETFILE function. Then enter your message which you want to

embed. We know that RGB image have 3 layers (Red, Green and blue), so we embed our information in any layer. We enter 4 main values to hide the message i.e. Message layer, Length layer, password layer and Password. Password should ne the number and between 0-255 (unsigned integer range) [5]. Hit the ok pushbutton and by using LSB technique, pixels are being replaced by our data and then system recreate the new image i.e. Encoded image. The new created image is in BMP format. Because BMP is high level image. [6]

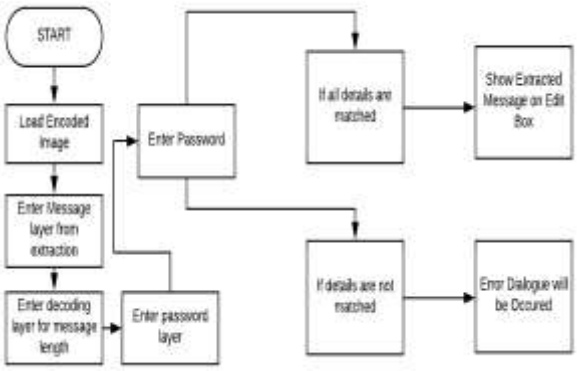

Figure 2. Flow chart decoding part

Figure 2, represents the decoding part. Again we browse the encoded image in which we encoded the data. For extraction we have all information regarding message layer, length of message layer, password that is created by user and password length. If we have all info regarding the layers then only we have extract the data, otherwise an error dialogue will be occurred [7-8]. And we unable to extract the original message from the encoded image.

Figure 3. Normal Image

```
global img
[File,Path] =
uigetfile({'*.jpg';'*.png';'*.gif';'*.bmp'},'Select
"IMAGE" to Hide Message.');
img = imread([Path,File]);
imshow(img);
```

Figure 4. Encoded Image

```
global img
global Message
global len
global Msglayer

global passlayer
global password



for i=1:len;
if Msglayer==1;
img(2,i,1)=Message(i);
elseif Msglayer==2;
img(2,i,2)=Message(i);
else
img(2,i,3)=Message(i);
end
end
if passlayer==1;
```

 ISBN 978-81-945285-0-0

```
img(3,1,1)=password;
elseif passlayer==2;
img(3,1,2)=password;
else
img(3,1,3)=password;
end

imwrite(img,'encoded_Image.png')
```

IV. RESULTS AND DISCUSSION

Here is the proper GUI of our system. The project is based upon the image processing and interface with guide toolbox. That is easy to use. The systems look are as follows:

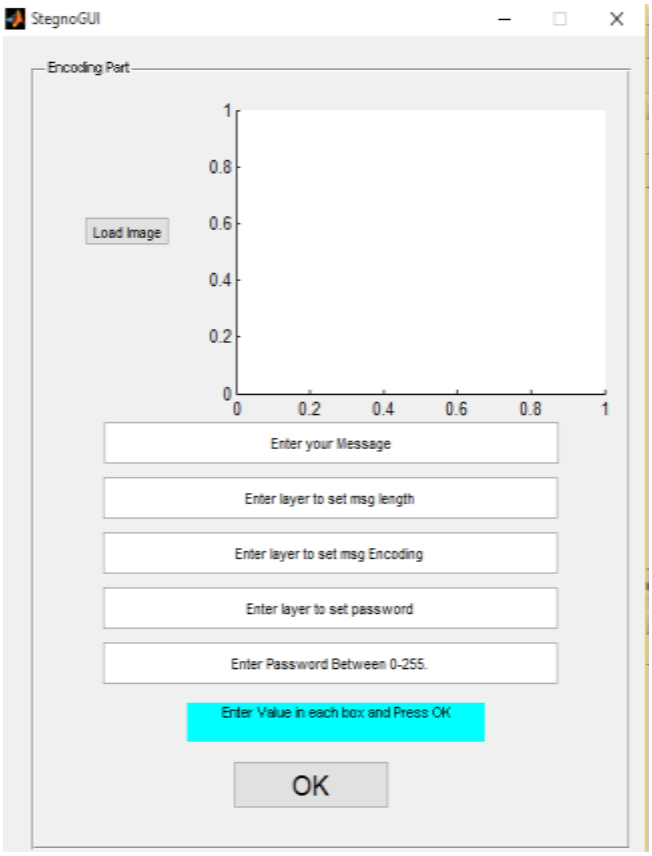

Figure 5. Encoding part

Figure 5, represents the encoding system interface. In algorithm the fig. 1 shows the complete working and flow chart of the encoding part. LSB technique is widely used technique in data hiding programs.

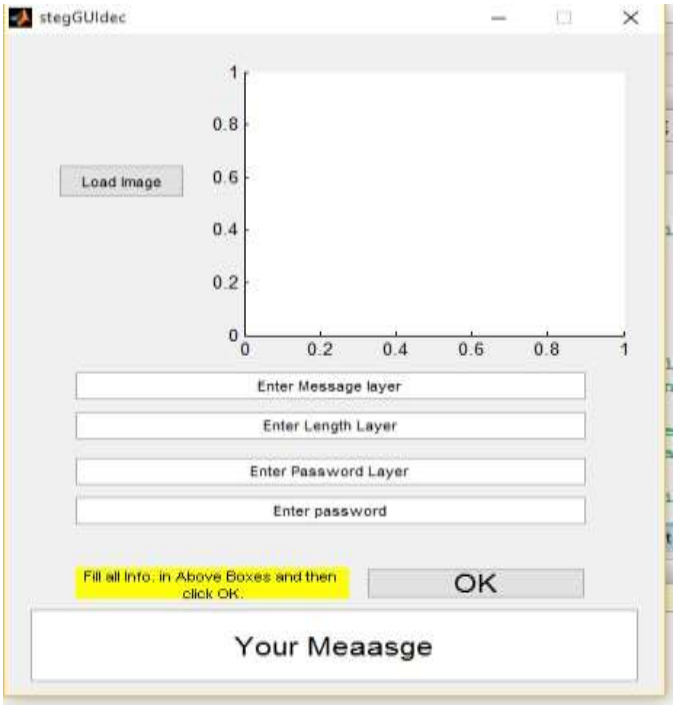

Figure 6. Decoding part

The decoding interface shows in fig. 6 and the algorithm of decoding part shows in figure 2. The extracted text will be shown on edit text (your message).

V. CONCLUSION

Stegano-graphy is an exceedingly amazing systems that enable individuals to ensured and shroud correspondence. steganography is the mostly used technique to hide important information. By using Image steganography in matlab we can hide any information like simple text message, or other text files in a single image without changing image properties. Steganography plays an important role since so far.

steganography has multiple types like Image, Video, Audio etc.

In our project we used image steganography and create a high defination BMP format image. The main advantage of BMP format image is that our secret data cannot lost. By using BMP format the decodiing efficiency will 90-95%. Apart from this if we using low quality images like jpg or jpeg then high chances to loose the data.

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COMPARATIVE ANALYSIS OF FUZZY AMGRP AND AMGRP

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Abstract— The Vehicular Ad hoc Networks (VANETs) has gained a lot of popularity in research field from last few years. Due to its various features like high mobility etc., it has preferred to deployed in different real time applications to analyze and operate the traffic on highways and urban areas. A large number of research has been conducted in this domain in order to develop the efficient and secure route selection approach for it. The present study also added a contribution to the research by developing the Fuzzy AMGRP (AHP based Multimetric Geographical Routing Protocol) for VANETs. The proposed work elects the nodes on the basis of evaluated weight function and the weight function is measured automatically by using the fuzzy inference system. The major factors like Mobility, Link Lifetime, Node Status, Node Density and PDR are considered as an input to the fuzzy inference system and then the node with the more effective weight value is selected. A comparative analysis of Fuzzy AMGRP and traditional AMGRP is also drawn in the terms of packet delivery ratio, end to end delay, average hop count and normalized routing overhead. On the basis of the simulated results and comparative analysis the fuzzy AMGRP is found to be more efficient and reliable then the AMGRP routing approach.

Keywords—Communication networks, Vehicular Ad hoc networks, Routing.

I. INTRODUCTION

VANETs are the wireless communication networks with high node mobility[2]. Thus to perform routing and data transmission in VANETs is one of the most tedious tasks. A large number of routing protocols are available to perform the data transmission and routing in an effective way. While performing routing, the nodes are selected to create a dedicated path from source to destination node[3]. The selection of the nodes should be done effectively and efficiently so that the data could be transferred successfully. The node selection criteria relies upon various factors such as energy of the nodes, distance from node to adjacent nodes, distance from node to base station, mobility of the nodes etc. Future scope of this system is visualized as there would be smart vehicles equipped with information collection devices (on-board sensors) [15], on-board display devices, information processing devices (on-board CPU) as well as wireless communication devices.The ad hoc network is the most popular sensor network based communication domain [21].In [1], author had developed an efficient routing protocol for VANETs and named as AHP based Multi geographical routing protocol (AMGRP). The existing work adopted the Analytical Hierarchical Process along with this the author had also considered the multiple routing factors like mobility, connection lifetime, node density and node status etc for better output quality of the network. The next hop selection was done on the basis of the single weight value function within the defined region to ensure the data forwarding process. The obtained simulated results of the existing work were compared to the GPSR and SLD-GEDIR protocol and the existing work was found to be more efficient and effective.

With inspiration from [1], of this study and research work had presented a routing approach. The present work is developed to overcome the flaws of traditional work. This protocol [1] basically works on the computed single weighing function to identify a next hop node within a defined range which can ensure an enhanced forwarding process. The major problem that is faced in this work[1] is to define the weight value. It is hard to define that which weight value will be best to achieve the best results. It is deriving good results in the scenario they are focusing but it was a hard problem to find best weight value so there is a need to update the weight value concept.

Thus in present work, the weight function is evaluated automatically by using the fuzzy inference system. The node selection is performed on the basis of the various factors such as node mobility, link lifetime, node status, node density and Next Hop Selection. This study is the second part of the previous paper and is organized to analyze the efficiency of the proposed work over traditional AMGRP routing protocol.

The methodology of the present work is as follows;

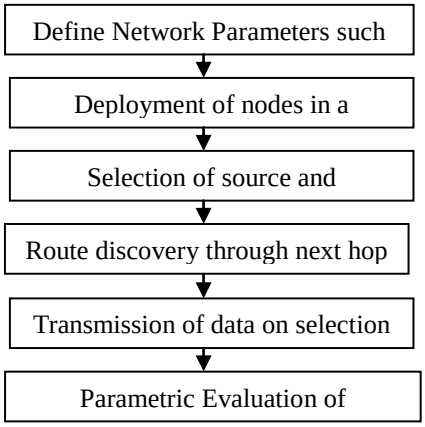

Figure 1 Framework of Fuzzy AMGRP

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Step 1. The first step is to define the initial network parameters such as simulation time, data packet length, carrier frequency, propagation model, traffic type, physical layer etc. The initial network parameters required to set up the network are recorded in the following tabular chart (Table 1).

Table 1 Simulation Setup

Parameters	**Value**
Simulation Time	400
Number of traffic	10
Data Packet Length	512 bytes
Carrier Frequency	5.8 GHz
Propagation Model	Two-Ray ground model
Physical Layer	IEE802.11p(11Mbps)
Transmission Power	10mW
Traffic Type	UDP

Step 2. Followed by the selection of the parameters, the network is finally set up. For the present work , the area of the network is 100 m X 100 m. the nodes are deployed into the network based on random localization model i.e. the nodes are distributed arbitrarily in the network.

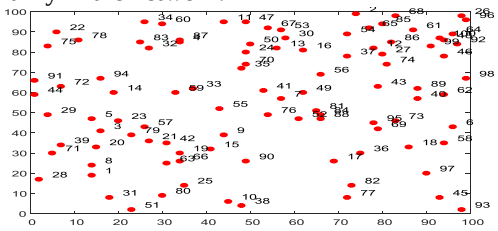

Figure 2: Deployment of Nodes into 100m x 100m

Figure 2 demonstrates the view of the network which is set up for the purpose of communication. It can be seen that the each node is assigned with a number in order to easily identify the particular node. As the network is set up to forward the data packets from one node to another, thus, in this step the selection of the source (from where the data has to be sent) and the destination (the node to whom the data has to be forwarded) is performed. This selection process can be carried out by using two ways: manually or fixed selection.

Step 3. In the research work, the selection criteria used is user defined. The user itself chooses the source and the destination. Figure 3 demonstrates the chosen source and destination nodes. The graphical representation of the network in figure shows that two green nodes with the tags of source and destination are elected to transmit the data. The source node is further utilized to perform the routing process to reach the destination node.

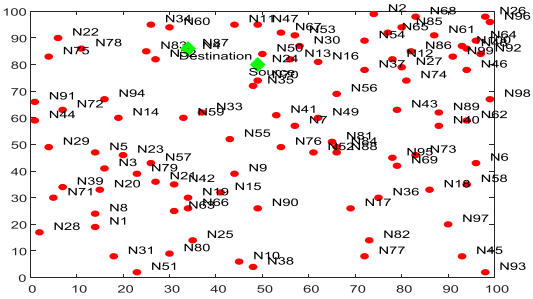

Figure 3: Selection of Source and Destination Node in 100m x 100m area

Step 4. Subsequently, for route discovery, the source node will compute the different parameter for all its neighbor nodes. These parameters include Packet Delivery Ratio, Mobility, Link life time, density and status of the node. As the research work introduced novel parameter of PDR for the security concerns, it is calculated by sending Hello" messages to the neighbor nodes. Those neighbor nodes send the acknowledgement to the source node. The source nodes measures the distance of the neighbor nodes from its self. If the distance of neighbor nodes is less than the coverage area of the node; the source node selects those nodes and stores the computed values of the parameters into its own routing table. The matrix containing the routing information of the neighbor nodes is sent to the fuzzy logic. In the present work, the each node is accessible to the fuzzy system, taking the input from the source node, fuzzy logic gives the output in terms of the selection factor which is reverted to the source node. Finally the source node analyzes the selection factor for each neighbor node computed by fuzzy. The neighbor node with the highest value of selection factor is thus selected as the node to which the source node forward the data packets. Fuzzy system is implemented in the present system to enhance the decision making ability for the nodes.

Step 5. The chosen neighbor node then act as the source node, the same procedure will be performed for this source node so that next hop can be determined. This process is continued until unless the destination or the target node is discovered by the nodes in the network. All this procedure is carried out on the basis of the packet delivery ratio obtained of each neighbor node. Finally, the route is observed through which the data is transmitted from the source node to the destination node.

Figure 4 shows the route obtained after following the procedure of next hop selection of the nodes. Thus, optimum route is obtained with the decision of the fuzzy system and this figure reveals that many nodes are utilized to transmit the data packets including source and the destination nodes.

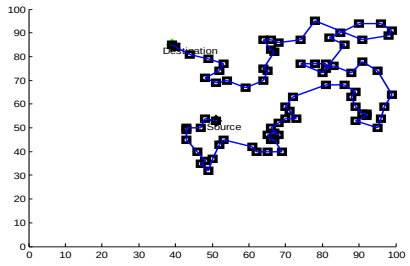

Figure 4 : Route obtained to forward the data packets from source to destination node in 100m x 100m area

Step 6. Eventually, the destination node received the data packets sent by the source. The present system is then evaluated to check the effectiveness in terms of packet delivery ratio, end-to-end delay, Normalized Routing overhead and Average hop count.

The work implements the Fuzzy-AMGRP routing protocol for VANETs. The fuzzy inference system is implemented for electing the CH nodes and the CH is elected on the basis of the major factors as follows:

- Mobility
- Link Lifetime
- Node Status
- Node Density
- Next Hop Selection

This section of the study is organized to represent the simulated results of the work. The MATLAB simulation platform is used for experimental analysis. The performance of the work is evaluated in the terms of following factors.

- Packet Delivery ratio: the packet delivery ratio is a performance evaluation metrics that is specifically used to measure the rate of data packets delivered to the destination successfully. It is evaluated as follows:

$$PDR = \sum_{i=1}^{n} \frac{R_i}{S_i} \dots\dots\dots (1)$$

Where, n defines the number of source nodes, depicts the number of data packets received at the destination node, is used to define the number of data packets transmitted by the source node.

- End to End Delay: this parameter is used to measure the average delay taken by the data packets to reach the destination node. The end to end delay in the work is evaluated as follows:

$$End\ to\ End\ Delay = \frac{1}{\sum_{i=1}^{n} R_i}\left(\sum_{i=1}^{n}\sum_{j=1}^{R_i} TR_{ij} - TS_{ij}\right) \dots\dots\dots (2)$$

Where, the is used for receiving time of data packet transmitted by the source at the destination and denotes the data packet sending time of the packet by the ith source node.

- Normalized Routing Overhead: it depicts the ratio of total control packets corresponding to the total delivered packets in the network. It is measured by using the following formulation:

$$NRL = \frac{1}{n}\left(\sum_{i=1}^{n} \frac{1}{R_i}\left(\sum_{j=1}^{R_i}\sum_{k=1}^{P_{ij}} C_{ijk}\right)\right) \dots\dots\dots\dots (3)$$

The variable denotes the count of control bytes at hop by packet sent at source node.

- Average Hope Count: It is average number of hops required to transmit the data to the base station.

$$AHC = \frac{1}{n}\left(\sum_{i=1}^{n} \frac{1}{R_i}\left(\sum_{j=1}^{R_i}\sum_{k=1}^{P_{ij}} H_{ijk}\right)\right) \dots\dots\dots\dots (4)$$

Where, denotes the number of hop traversed by the data packet to reach the source.

II. COMPARISON ANALYSIS

The comparison of work is done with the traditional AMGRP routing protocol. The comparison is also drawn on the basis of above defined parameters.

The graph in figure 5depicts the comparison analysis of PDR in case of present and traditional work. The bar in blue depicts the PDR of traditional AMGRP mechanism and the bar in red defines the PDR of Fuzzy-AMGRP protocol. The comparison analysis of PDR is drawn on the basis variable number of nodes in the network. On the basis of the comparison graph, it is observed that the PDR of present work in each and every case is efficient and higher than the PDR of traditional AMGRP routing protocol. The facts and figures observed from the comparison graph is represented in table 2.

Table 2 Analysis of PDR for AMGRP and Fuzzy-AMGRP protocol

Number of Nodes	AMGRP	Fuzzy AMGRP
1	0.48	0.5
2	0.52	0.56
3	0.55	0.67
4	0.6	0.69
5	0.65	0.78
6	0.67	0.80
7	0.69	0.80
8	0.71	0.81
9	0.73	0.91

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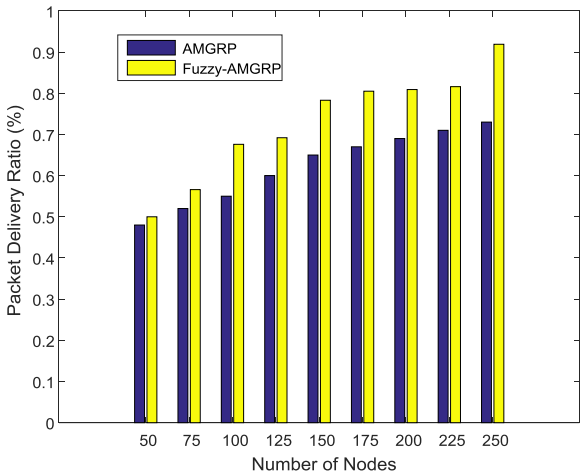

Figure 5 Comparison Analysis of AMGRP and Fuzzy AMGRP with respect to the PDR

Similarly, the comparison analysis for end to end delay is shown in graph in Figure 6. The graph proves that the end to end delay of the work done is lesser than the end to end delay of traditional AMGRP routing protocol for each and every defined scenarios. The observed facts corresponding to the end to end delay for AMGRP and Fuzzy AMGRP is calibrated in table 3.

Table 3 Analysis of End to End Delay for AMGRP and Fuzzy-AMGRP protocol

Number of Nodes	AMGRP	Fuzzy AMGRP
1	1.05	0.6259
2	0.9	0.4358
3	0.81	0.3188
4	0.72	0.2834
5	0.62	0.2218
6	0.50	0.1717
7	0.48	0.1691
8	0.45	0.1608
9	0.35	0.0710

Table3 Comparison Analysis of AMGRP and Fuzzy AMGRP with respect to the End to End Delay

The comparison graph shown in figure 4 depicts the comparison of AMGRP and Fuzzy AMGRP on the basis of the normalized Routing Overhead. The Normalized routing overhead in case of fuzzy AMGRP is higher in contrast to the normalized routing overhead of traditional AMGRP protocol. The minimum NRL in case of Fuzzy AMGRP is 0.9440 and the maximum is 5.0526.

Table 4 Analysis of Normalized Routing Overhead for AMGRP and Fuzzy-AMGRP protocol

Number of Nodes	AMGRP	Fuzzy AMGRP
1	0.32	0.9440
2	0.5	1.1152
3	0.52	1.2949
4	0.72	1.3202
5	0.88	1.6976
6	1.55	2.2603
7	1.65	2.3544
8	1.71	2.7989
9	2.1	5.0526

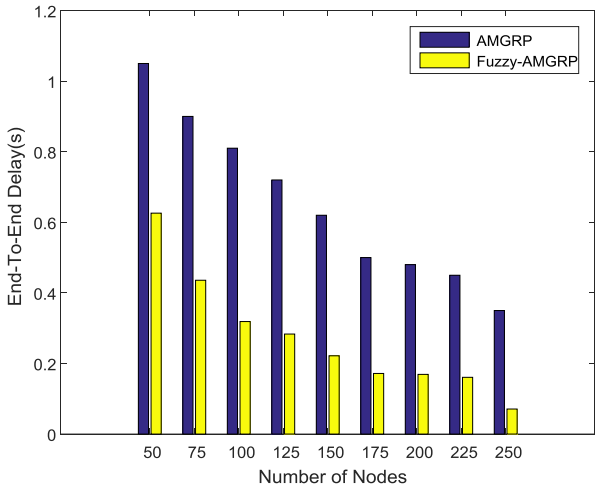

Figure 6 Comparison Analysis of AMGRP and Fuzzy AMGRP with respect to End to End delay

The average hope count of fuzzy AMGRP is lower than the average hop count of traditional AMGRP protocol as shown in graph of figure 7. The network with lesser average hop count is considered to be an ideal network. The average hop count is also evaluated on the basis of the number of nodes in the network.

Table 5 Analysis of Average Hop Count for AMGRP and Fuzzy-AMGRP protocol

Number of Nodes	AMGRP	Fuzzy AMGRP
1	2.25	2.0000
2	2.1	0.9511
3	1.75	0.9392
4	1.55	0.8766
5	1.4	0.5090
6	1.3	0.3140
7	1	0.2243
8	0.95	0.1493
9	0.9	0.1029

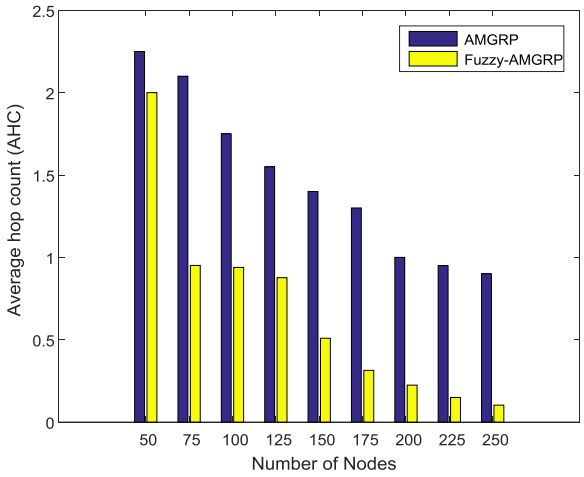

Figure 7 Comparison Analysis of AMGRP and Fuzzy AMGRP with respect to the Average Hop Count

III. CONCLUSION

On the basis of the simulated results, it is concluded that the fuzzy AMGRP approach has more enhanced and reliable outcome in comparison to the traditional AMGRP routing approach in terms of packet delivery ratio, normalized routing overhead, end to end delay and hop count. The packet delivery ratio of the fuzzy AMGRP is 10.2% higher than the traditional AMGRP approach, the average hop count and end to end delay is approximately 35% and 38% reduced than the AMGRP respectively. Thus on the basis of facts and figures obtained from the performance of the fuzzy AMGRP it is proved that it has more efficiency and reliability than the traditional AMGRP approach.

The performance of the presented work is found to be quite effective but still more amendments could be done in order to achieve the more accurate and appropriate outcomes. For this purpose, the type 2 fuzzy inference system could be considered to replace the currently employed fuzzy inference system. Following are the advantages of T2FL over T1FL:

- T2FL is considered as an efficient and effective method for handling the high level of uncertainties that are available in real world based complex applications.
- T2FL model is mostly preferred and suitable to process the applications where to determine the exact numeric membership functions is a tedious task and the evaluations are also uncertain.
- T2FL rationalized that the fuzzy logic models can operate more accurately in comparison to other probabilistic models.

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AN APPROACH FOR SENTIMENT ANALYSIS USING GINI INDEX WITH RANDOM FOREST CLASSIFICATION

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Abstract *– **Person to person communication locales have turned out to be famous and basic spots for sharing wide scope of feelings through short messages. These feelings incorporate joy, pity, tension, dread, and so forth. Dissecting short messages helps in distinguishing the sentiment expressed by the group. Sentiment Analysis on movie reviews recognizes the general estimation or sentiment communicated by a commentator towards a movie. Numerous analysts are dealing with pruning the sentiment analysis model that plainly recognizes and distinguishes between a positive review and a negative review. In the proposed work, demonstrate that the utilization of features optimized by Gini index feature selection are then concatenating with Machine Learning classification gives better results both in terms of accuracy and class details parameters when tested against classifiers like Gini index with SVM, correlation with random forest and information with random forest. The proposed model unmistakably separates between a positive reviews and negative reviews. Since understanding the context of the reviews plays a significant job in classification, using hybrid features helps in capturing the context of the movie reviews and hence increases the accuracy of classification.***

Keywords *– **sentiment analysis, opinion mining, random forest, SVM, Correlation, information gain, Gini index.***

I. INTRODUCTION

Sentiments denote the feelings, emotions, views, ideas of individuals for the specific product. Sentiment analysis of opinion mining is very difficult. There are many complications like natural language processing for computerized extracting, categorizing and summarizing opinions which are expressed in online. Sentiment analysis is a study that is accomplished by various organizations for identifying user feedback about the products. This makes the other users for knowing the perfect selection of their favoured product.

Sentiment analysis is commonly employed in opinion mining for knowing sentiments, subjectivities moreover sensitive states in online texts. The process was accomplished on product evaluation by organizing the products attributes. At the present time, sentiment polarity analysis is utilized in an extensive range of domains like finance.

This concentrates on examining the direction-based text that involves text containing statements or opinions. The process of sentiment classification investigates whether the specific text is subjective or objective or if the text constitutes both the feelings of positive or negative. This classification method has many numbers of essential qualities that may include various process, jobs, techniques, attributes and also application domains.

There exist many numbers of jobs in the classification of sentiment polarity. There are three major characteristics of classification are a class, level besides assumption with respect to sentiment sources as well as targets. The distinctive two class problem incorporates the categorization of sentiments as

positive or negative. Furthermore, changes include organizing messages as subjective / objective.

Sentiment analysis concentrates on the specification of user's point of view with respect to specific area. The point of view involves assessment, perception or even emotional stages. The most prime job in sentiment or opinion analysis is the categorization of the polarity of specific text at the levels of features, document, sentences etc. After polarities are classified, emotional stages like „happy", „angry" and „sad" are also identified.

The classifications of polarities are the main task in opinion mining and it happens at the time of a portion of text stating an opinion on a single issue is categorized as one among the two conflicting sentiments. Few examples for polarity classification are „like" vs. „dislike" or „thumbs up" vs. „thumbs down". This classification also finds the advantages and disadvantages of statements in online reviews and assists in making the assessment of products more reliable. Another form of binary sentiment classification is agreement detection.

Agreement detection decides whether two text documents should obtain the similar or dissimilar sentiment associated labels. By identifying the classification of polarity this may allocate positivity degree to the polarity. It may place the opinion on a sequence in between positive and negative. This can also categorize the multimedia resources as stated by emotional or mood contents for intention like troll filtering, emotional human-machine communication and cyber-issue detection.

In order to construct an outline of these features, initially, features are found out and the opinions of positive and negative on those features are accumulated. The features of a product may include components, attributes and some other characteristics of a product. The summarization of opinion does not outline the reviews by choosing the subgroup or revises few of the unique statements from the reviews to catch the most important points as the classic text characterization.

Sentiment analysis aims at determining opinions, attitude and emotions in various sources such as news, documents, blogs, customer's reviews, social networking sites such as Twitter, Facebook and so on. Sentiment analysis is basically a classification problem that aims at classifying text on the basis of polarity that is positive, negative or neutral. Due to the emerging Internet technology, many people put forward their opinions, views and attitude towards government policies, products, movie reviews, sports and much more (Pang, Lee et al. 2002; Blitzer et al. 2007). Moreover, social media acts as a platform for users to give opinions and share their views. Nevertheless, Social Media Online Sites can provide valuable data and hidden inferences in real time that can be processed for decision making. Henceforth, this data can be utilized to perform sentiment analysis. The field of sentiment computing has grabbed the attention of various business-oriented organizations to track the sentiments of a user towards products so that they can make further enhancements according to the view of the user. Moreover, it can be useful for election prediction and detecting liking towards a particular election candidate. Therefore, it acts as a very effective decision-making technique.

It is a kind of mode of communication that can be utilized by any individual lives in any area of the world. With such all-inclusiveness and high-speed information, sentimental analysis on such systems has been most focused on research subjects in NLP in the previous decade. The fundamental point of sentimental analysis is to identify the extremity of the content. The web has drastically changed the manner in which individuals express their perspectives and sentiments [1]. Big information is trending analysis space in engineering science and sentiment analysis is one amongst the foremost necessary a part of this analysis space. Big information is taken into account as terribly great amount of information which might be found simply on internet. Social media communication, remote

detecting data and medical records etc. in form of structured, semi-structured or unstructured data and we can utilize these data for sentiment analysis. Sentimental Analysis is all on the brink of get the $64000 voice of individuals towards specific product, services, organization, movies, news, events, issues and their attributes. Sentiment Analysis includes branches of engineering science like linguistic communication process, Machine Learning, Text Mining and Information Theory and Coding. By using approaches, methods, techniques and models of defined branches, we can be order(classify) our information might be in type of news stories, online journals, tweets, film surveys, item audits and so on into positive, negative or neutral sentiment according to the sentiment is expressed in them

II. BACKGROUND

Kumar et al. (2018) demonstrated that the utilization of Hybrid features acquired by connecting Machine Learning features (TF, TF-IDF) with Lexicon features (Positive-Negative word count, Connotation) gives better outcomes both in terms of accuracy and complexity when tested against classifiers like SVM, Naïve Bayes, KNN and Maximum Entropy. The proposed model unmistakably separates between a positive review and negative reviews. Since understanding the context of the reviews plays an important role in classification, using hybrid features helps in capturing the context of the movie reviews and hence increases the accuracy of classification. Utilization of Hybrid Feature Extraction Method (HFEM) makes the model increasingly effective in terms of accurate classification by adding the advantages of individual feature extraction method. HFEM improves the space unpredictability by decreasing the input space to negligible number of features that are adequate to represent the review content. Subsequently, the results got are highly promising both in terms of space complexity and classification accuracy [2]. Anand et al. (2018) attempted to perform ABSA survey on motion picture review data. Dissimilar to different spaces, for example, camera, PCs cafés and so forth, a noteworthy piece of film surveys is committed to portraying the plot and contains no data about client interests. The proximity of such story substance may possibly delude the review analysis. The dedication of this paper is two- crease: a two class classification scheme for plots and reviews without the requirement for classify labeled data is proposed. The overhead of growing physically labeled data to assemble the classifier is stayed away from and the subsequent classifier is demonstrated to be powerful utilizing a little physically constructed test set. Furthermore, they proposed a scheme to identify aspects and the corresponding opinions utilizing a lot of hand created guidelines and viewpoint i.e rules and aspect clue words.Three schemes for choice of perspective clue information words are investigated - manual labeling (M), clustering(C) and review guided clustering (RC). The aspect and sentiment detection utilizing all the three schemes is empirically evaluated or observationally assessed against a manually built test set. The experiments build up the effectivenessor viability of manual labeling over cluster based methodologies however among the cluster based approaches, the ones utilizing the review guided clue words performed better [3]. Cagatay et al. (2017) exploit a sentiment classification model on basis of Vote troupe classifier utilizes from three individual classifiers: Bagging, Naïve Bayes & Support Vector Machines. Moreover, in bagging they utilized SVM as base classifier. The main focus of this research is to enhance the execution of machine learning classifiers for feeling grouping of Turkish audits and documents. Their experimental results show that multiple classifier system based approaches are much better for sentiment classification of Turkish documents. They performed experiments on three different domains such as book review, movie reviews and shopping reviews. The authors concluded that this approach is not restricted to just one domain and can be extended to several other domains as well [4]. Pannala et al. (2016) explained aspect based sentiment analysis concept in machine learning era. This paper mainly explored sentiment analysis in light of the prepared informational collection to give the positive, negative

and unbiased surveys for various items in the advertising scene. In angle based estimation examination (ABSA) the point is to recognize the parts of substances and the notion communicated for every perspective. A definitive objective is to have the capacity to produce rundowns posting every one of the angles and their general extremity. To prepare the application for the given informational collections SVM (bolster vector machine) and ME (Maximum Entropy) arrangement calculations have been utilized. Performance of algorithms is analyzed based on precision, recall and F Measure [5]. Guha et al. (2015) presented a detailed description of our system, that stood 4th in Aspect Category subtask. experimented with Ensemble Learning technique for slot 3, which we want to explore and improve further. They submitted unconstrained systems for the Restaurants dataset [6]. Jun Yang et al. (2014) exploit a novel approach for extracting emotions. They used graphical emoticons, punctuation expressions along with a compact lexicon to label data. They provided a multi-label emotion classification algorithm (MEC) for analyzing emotions in short text of Weibo, which is a very famous online social networking site in china (just like Twitter). The approach they used is phycology independent for it worked well on different phycology theories for emotion classification. In the proposed approach they exploit K-nearest neighbors (KNN) for tweet level analysis and Naïve Bayes for Word level analysis of emotion. Moreover, their approach outperformed various state-of-art methods as discussed in experiment and results. The dataset contained tweets about Malaysia 370 missing flight and they concluded from their approach that the episode of Anger has a postponement subsequent to limit of Sadness [7].

R. Nithya, (2014), this paper represents Sentiment analysis that mainly on subjective and polarity detection. A proposed work include: (i) Feature Extract- Commonly, Sentiment analysis uses AI calculation machine learning algorithm and a technique to extract features from written texts and and after that train the classifier. (ii) Preprocessing- stemming refers reducing words to their roots. Porter's stemming algorithm used for removing stop words. Mostly, adjective words have sentiment. (iii) Product aspects- Textstat is a freely available that can be used for extracting pattern. (iv) Find polarity of opinionated sentence- here SentiStrength lexicon-based classifier used to detect sentiment strength. Here, 575 reviews have been taken from shopping sites. Tanagra1.4 tool used for data mining. Naïve bayes classification done through this tool based on each individual features such as display, accessories, battery life, weight and cost. Results shows that 'battery life' have most positive value so it improves branding and 'cost' have very low positive value that indicate seller to concentrate more on reputation and product quality [8]. Javier et al. (2013), paper introduces a COSMOS stage for sentiment and tension analysis(investigation)on twitter dataset. Tool utilized for sentiment analysis is SentiStrength. To flow application dependent on cloud environment, it utilizes virtualized Hadoop Clusters in Open Nebula. This system configuration utilized for execution or performance aspects should be dispersed as to lessen fluctuation in the analysis performance. It likewise shows the design or architecture for information preparing of COSMOS using OpenNebula and Hadoop. Handling execution correlation is done over Cardiff Cloud Tweet and UCLM Cloud Tweet which shows Cardiff Cloud have better execution because of its compute node has been more dominant than UCLM Cloud process hub. This paper includes future work to assess on greater cloud environment and increment number of virtual cluster and Twitter message and improve execution (performance) with various simultaneous clients utilizing a similar cloud service. As utilizing COSMOS, we can add more nodes and workers i.e hubs and laborers to the issue and cut processing time down further [9].

Abdur Rehman, (2012) Text classification is thought to be one of the tremendous zones of research in data mining and machine learning. It can be viewed as normal machine learning issue in which reports must be recognized into different known classes. Specialists have paid very concentration especially to some particular issues in content order. We utilized Machine learning

calculations like Nearest Neighbors, k-Means, Support Vector Machines and Naïve Bayes to recognize content records. The Performance of a content grouping undertaking is straightforwardly influenced by portrayal of information. When highlights are chosen fittingly straightforward classifiers may deliver great arrangement comes about even. The most ordinarily utilized elements to speak to words, Term Frequency (TF) and Inverse Document Frequency (IDF), may not be constantly suitable. In this paper our concentration is to enhance portrayal of content archives by characterizing new term weights for terms in content reports with the goal that both precision and execution can be made strides [10].

III. EXISTING APPROACH

The existing approach utilizes random forest as an ensemble classification technique. It is an unpruned classification arrangement or regression trees, start from bootstrap tests of the training data, using irregular element choice (random feature selection) in the tree introduction (presentation) process.Expectation(Prediction) is made by accumulate(majority vote in favor of classification or averaging for regression) the forecasts of the troupe. Random forest generally illustrate the most part represent significant execution improvement over the single tree classifier, for example, CART and C4.5.It requests generalization blunder rate i.e. error rate that differentiates positively to Ada boost, yet is increasingly vigorous to commotion. Notwithstanding, similarly to most classifiers, RF can also likewise experience the ill effects of the scourge of gaining from an incredibly imbalanced training data set. As it is formed to limit the overall error rate, it will in general spotlight more on the forecast accuracy of the larger part class, which regularly brings about poor accuracy for the minority class.

To beat the issue, balanced random forest is proposed

IV. PROPOSED WORK

The proposed work consists of hybrid model comprising Gini index-based feature selection with balanced random forest as a classification technique for predicting the sentiments of movie reviews.The proposed Gini index feature selection include the issues of movement of prior class probability and worldwide decency of a component in two phases. In the first place, it changes the examples space into a component explicit standardized examples space without bargaining the intra-class include circulation. In the second phase of the system, it distinguishes the highlights that segregates the classes most by applying gini coefficient of disparity. Also, Balanced **Random Forest Algorithm** is used for classification which handle missing values using median for numerical values or mode for categorical values. The proposed work leads to the selection of relevant attributes for prediction and less error rate and accuracy in the result

Firstly, the gathering of raw data from Imdb movies review site and afterward separate filtering techniques are applied to create that raw data into organized structured format. Filtration of textual movie reviews consist of following phases:

- Word parsing and tokenization: In this stage, every client survey parts into words of any natural processing language.As motion picture audit contains block of character which are alluded to as token.
- Removal of stop words: Stop words are the words that contain little dataset should have been evacuated. As by evacuating them, performance increments. Here, we made a rundown of around 320 words and made a content document for it. So, at the time of pre-processing we have finished up this stop word so every one of the expressions are expelled from our dataset for example separated-filtered.
- Stemming: It is described as a technique to decrease the induced words to their one of a kind word stem. For example, “talked”, “talking”, “talks” as dependent on the root word “talk”. We have utilized Snowball stemmer to inferred word to their starting point.

After pre-processing and filtration feature selection using Gini Index is done to rank the words according to the gini index

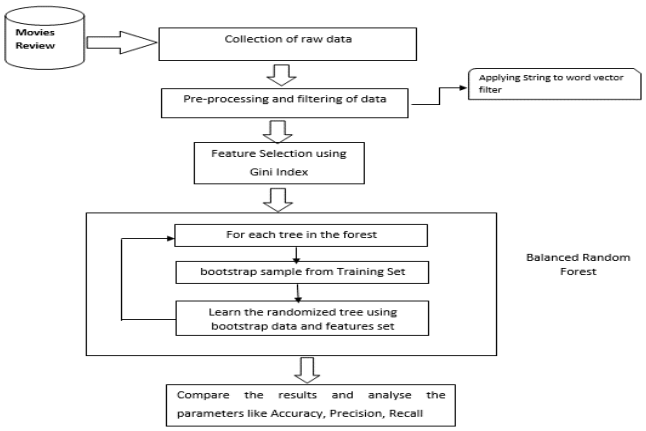

Figure 1: Flowchart of proposed methodology

Selected features data is then classified by using Balanced Random Forest

- For every cycle in random forest, draw a bootstrap test from the minority class. Arbitrarily draw a similar number of cases, with substitution, from the dominant part class.
- Induce a classification tree from the information to most extreme size, without pruning. The tree is prompted with the Random Tree algorithm, with the accompanying adjustment: At every hub, rather than scanning through all factors for the ideal split, just hunt through a lot of m-try randomly chosen variables.
- Repeat the two stages above for the occasions wanted. Total the expectations of the gathering and make the last forecast.

Evaluate and analyze the performance using k cross validation model on the basis of Recall and Precision of existing algorithms and new proposed algorithm.

The proposed methodology follows the below steps:

Preprocessing and Filtration

Preprocessing and Filtration is performed to normalize the data. Filtering techniques like StringToWordVector filter, which converts the string qualities into a lot of characteristics speaking to word event data from the content contained in the strings, has been utilized.

Feature Selection

It is utilized to as a splitting method.In this algorithm we accumulate informational data sets for testing. Let A be the sampling , m be the isolated no of subsets, P be the probability and Ci be the various classes then$GiniIndex(A) = 1 - \sum_{i=1}^{m} P_i^2$

Right when the base of GiniIndex (A) is zero then it implies that every one of the records have a spot with a alike classification at this gathering; it shows that the best accommodating information can be procured . At that point exactly when all of the instances of accumulation have a standard flow to a particular specific classification, GiniIndex(A) accomplishes most prominent, exhibiting the base profitable data got.for gini index the little contaminating impact is the higher the quality.Then again,

$$GiniIndex(A) = \sum_{i=1}^{m} P_i^2$$

measuring the contaminating influence of characteristic classify method, the more prominent is the contaminating influence the higher is the quality of attribute.

Classification

The classification process is the most important process in sentiment analysis. The classification algorithms if used in cohesion work better than if they are used as single because every algorithm has its disadvantages and when different algorithms are used together their disadvantages is reduced. To further improve the design bagging technique can be used for a chosen algorithm. By using different algorithms in an ensemble learner method, the performance increases but at the same time a lot of time is utilized for training. But since the main purpose is to build a better performing design as compared to single

performing algorithms. Selected features data is then classified by using Balanced Random Forest. Random forest persuades every constituent tree from a bootstrap test of the preparation information. In seeing (learning)exceedingly over-burden unbalanced data, there is a huge likelihood that a bootstrap test contains few or even none of the minority class, bringing about a tree with horrible showing for foreseeing the minority class. A decent method for fixing this issue is to utilize a stratified bootstrap; i.e., sample with replacement from inside each class. This still yet does not tackle the imbalance issue completely. For the tree classifier, misleadingly making class priors equivalent equal either by down-examining the majority class or oversampling the minority class is typically increasingly successful as for a given exhibition estimation, and that down inspecting appears to have an edge over over-testing. In any case, down-examining the majority class may bring about loss of data, as a huge piece of the dominant part class isn't utilized. Random forest inspired us gathering trees initiated from balanced down-tested information. Balanced Random Forest consolidates the down inspecting greater part class strategy and the gathering learning thought, misleadingly modifying the class dissemination so classes are spoken to similarly in each tree.

Algorithm: Each tree is grown as following algorithmic steps.

Step 1: Consider M and N which represents the number of training cases and number of variables in classifier.

Step 2: To find a decision at node of tree, n of input variables are to be used and n<N.

Step 3: Training set for tree is to be picked m times with substitution from M training cases that are accessible. By estimating their classes, we can use utilize whatever is left of the cases to approximate the error of the tree

Step 4: *n* factors are to be picked arbitrarily for every node of tree on which we make choice at that node. On the basis of *n* variables present in training data, calculate the superlative split.

Step 5: Every tree is developed to the greatest degree and there is no pruning.

Building and Evaluating model

Model is built and tested using cross validation 10 folds techniques. In this method, the full informational data set is taken as an input,at that point separate it into k no's of proportionate sets (k1, k2, ..., k10 for instance for 10-overlap CV) without spreads. By then at the essential run, take k1 to k9 as preparing set and develop a model. Utilize that model on k10 to get the presentation. Next comes k1 to k8 and k10 as preparing set. Build up a model from them and apply it to k9 to get the presentation. Along these lines,utilize every one of the folds where each crease all things considered 1 time is utilized as test set. At that point midpoints the performances of the considerable number of models in type of exactness(accuracy). This will be the final performance of an algorithm using k cross validation model and the parameter Recall, Precision, accuracy etc. are calculated and compared with the existing algorithm.

V. RESULTS AND DISCUSSION

The proposed technique is simulated in java netbeans using weka as an external library. The evaluation parameters of the proposed procedure technique are compared with the existing techniques.

Evaluation parameters are:

F-measure

F-Measure is the harmonic mean of precision and recall. The value calculated using F-measure is a balance between precision and recall.

$$\text{F measure} = \frac{2*recall*precision}{precision+recall}$$

Accuracy

Accuracy is the common measure for classification performance. Accuracy can be measured as correctly classified **instances** to

the total number of **instances**, while error rate uses incorrectly classified instances instead of correctly classified instances.

$$\text{Accuracy}=\frac{True\ Positive+True\ Negative}{True\ Positive+False\ Positive+True\ Negative+False\ Negative}$$

Precision and Recall:

Precision and recall are the two measurements that are generally to evaluate execution in content mining, and in content examination field like data recovery. These parameters are utilized for estimating exactness and completeness respectively.

$$\text{Precision} = \frac{True\ Positive}{True\ Positive+False\ Positive}$$

$$\text{Recall} = \frac{True\ Positive}{True\ Positive+False\ Negative}$$

Table 1: Accuracy Comparison of Proposed Technique with the Existing Technique

Algorithms	Accuracy
IG with Random Forest	**81.63**
Correlation with Random Forest	**79.37**
Gini Index with SVM	**76.22**
Gini Index with BRF	**90.69**

The table above demonstrates the comparison of accuracy of the proposed procedure with the current method or existing technique. The technique with more accuracy is superior than the other technique. Accuracy of the proposed technique is 90.69 whereas accuracy of the Gini index with SVM is 76.22, Correlation with Random Forest is 79.37 and that of Information gain with Random Forest is 81.63.

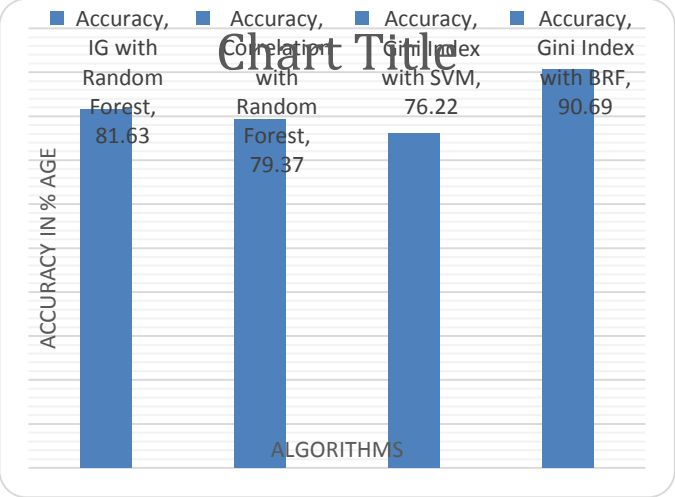

Figure 1: Showing the accuracy comparison of existing with the proposed algorithm

The figure above shows the accuracy comparison of the existing technique and proposed techniqueThe chart obviously demonstrates that the proposed calculation performs better as its accuracy is 90.69.

Precision Comparison

Table 2: Precision Comparison of Proposed Technique with the Existing Technique

Algorithms	Precision
IG with Random Forest	**0.777**
Correlation with Random Forest	**0.779**
Gini Index with SVM	**0.724**
Gini Index with BRF	**0.909**

The table above shows the comparison of precision of the proposed technique with the existing technique. The technique with more precision is superior to the other technique. Precision of the proposed technique is 0.909 whereas precision of the Gini

index with SVM is 0.724, Correlation with Random Forest is 0.779 and that of Information gain with Random Forest is 0.777.

The figure 2 below shows the precision comparison of the existing technique and proposed technique. The graph clearly shows that the proposed algorithm performs better as its precision is 0.909.

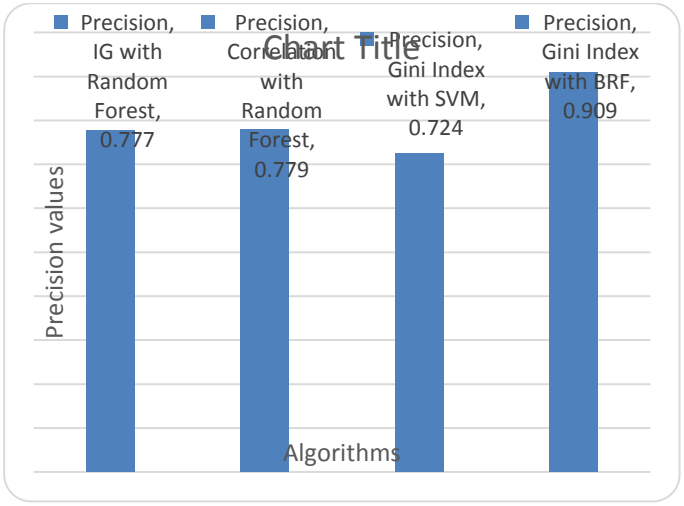

Figure 2: Showing the precision comparison of existing with the proposed algorithm

5.2.3 Recall Comparison

Table 3: Recall Comparison of Proposed Technique with the Existing Technique

Algorithms	Recall
IG with Random Forest	0.816
Correlation with Random Forest	0.794
Gini Index with SVM	0.762
Gini Index with BRF	0.907

The table above shows the examination of recall of the proposed technique strategy with the existing technique. The technique with more recall is better than the other technique. Recall of the proposed technique is 0.907 whereas recall of the Gini index with SVM is 0.762, Correlation with Random Forest is 0.794 and that of Information gain with Random Forest is 0.816.

The figure above shows the recall comparison of the existing technique and proposed technique. The chart obviously demonstrates that the proposed calculation performs better as its recall is 0.907.

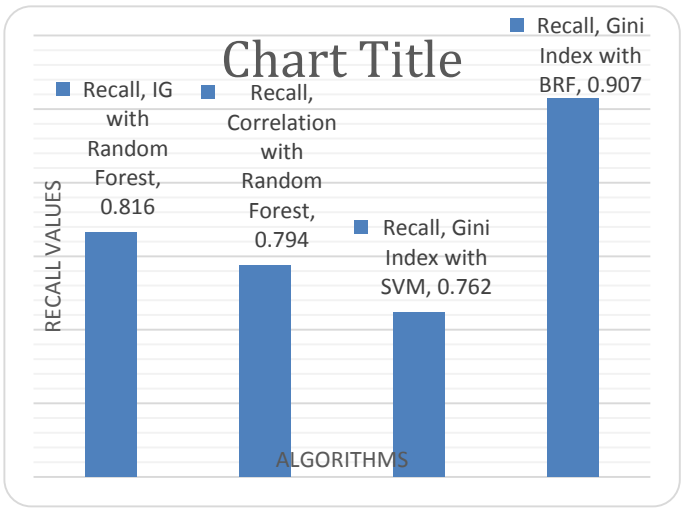

Figure 3: Showing the recall comparison of existing with the proposed algorithm

5.2.4 F-Measure Comparison

Table 5.4: F-measure Comparison of Proposed Technique with the Existing Technique

Algorithms	F-Measure
IG with Random Forest	0.785

Correlation with Random Forest	**0.785**
Gini Index with SVM	**0.715**
Gini Index with BRF	**0.902**

The table above shows the comparison of f-measure of the proposed technique with the existing technique. The technique with more f-measure is better than the other technique. F-measure of the proposed technique is 0.902 whereas f-measure of the Gini index with SVM is 0.715, Correlation with Random Forest is 0.785 and that of Information gain with Random Forest is 0.785.

The figure 4 below shows the f-measure comparison of the existing technique and proposed technique. The chart obviously demonstrates that the proposed calculation performs better as its f-measure is 0.902.

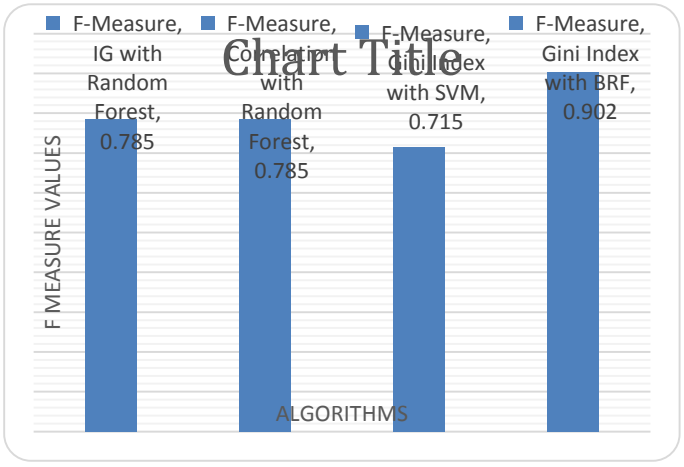

Figure 4: Showing the f-measure comparison of existing with the proposed algorithm

V. CONCLUSION

Sentiment analysis aims at conclusive opinions, attitude and emotions in various sources such as news, documents, blogs, customer's reviews, social networking sites such as Twitter, Face book and so on. This proposed work has implemented Gini Index feature selection based Balanced Random Forest Classification of movies reviews collected from ImDb site. Further the proposed classification model is compared with three existing techniques including Information gain with random forest, correlation with random forest and Gini Index with random forest, The results shown in the above results and discussion section clearly represents the proposed sentiments prediction model is better than the all the three existing techniques with respect to accuracy, precision, recall and f-measure. The proposed work is more efficient than previous algorithms.

In future, any other more efficient artificial intelligence technique can be used for more optimized results like as (ACO) ant colony optimization, particle swarm optimization etc to improve the features set.

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Optimization of 6R Industrial Robot using Bee Algorithm

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***Abstract*— In this paper, a metaheuristic technique for the optimization of five degrees of freedom (DOF) manipulator has been presented. The forward kinematics equations have been derived using Denavit-Hartenberg parameters. Joint variables for the Inverse kinematics solution have been found using pre-multiply or post–multiply matrix criterion. Simulations are performed on the MATLAB software with Adaptive neuro-fuzzy inference system (ANFIS) to derive the desired objective function. Artificial bee colony (ABC) algorithm has been proposed for the minimization of different errors. The errors have been optimized with computational time at different Iterations.**

***Keywords*— ANFIS, Artificial bee colony, Error, MATLAB, Robotic arm.**

I. INTRODUCTION

Today's Robotics has been used in every aspect of life from entertainment to manufacturing. Even self-driving transportation will be available in the near future in remote areas where manual driving is not possible. Industrial manipulators have been used in military and security agencies for patrolling and surveillance in the night for continuous monitoring without using manual input [1], [2].

An Industrial robot is a general purpose programmable machine that possesses certain anthropomorphic, or human-arm like characteristics [3], [4].

Different tools can be used at end-effecter for different industrial applications such as cutting tool, welding tool, spray painting toll, etc. [5].

Some researchers proposed optimization algorithms to find the inverse kinematics solutions of more than four DOF robotic arms using analytical, geometric or numerical methods [6].

Researchers proposed different optimization techniques for inverse kinematics solution, such as fuzzy logic, artificial neural network (ANN), genetic algorithm (GA), [8], [9], [12], particle swarm optimization (PSO), Ant colony optimization (ACO), firefly algorithm (FA), grey wolf optimization (GWO) [10], [14], [15], [18], [19], [21], [24] to optimized the results.

II. PROBLEM FORMULATION

Robot manipulators are articulated mechanical systems composed of links connected by joints [17]. Basic configurations proposed for the Industrial manipulators are as follows:

1. Polar Configuration
2. Cylindrical Configuration
3. Cartesian coordinate
4. Articulated configuration
5. Jointed arm configuration

Denavit-Hartenberg defined the lower-pair mechanism to find the general parameters of different DOF manipulators. The four parameters defined were d_i, a_i, θ_i,

and α_i, known as link offset, link length, joint angle, and link twist respectively [9], [11].

Homogeneous matrix (T) for the rotation and position elements was written in the equation (1).

$$T = ¿ \quad (1)$$

Here n_x, s_x, a_x, and P_x are the elements of rotation and position matrices for x only [18]. Similarly elements for y and z-axis are shown in the equation (1). The transformation matrix (A) for any angle theta (t) has been written in the equation (2).

$$A = ¿ \quad (2)$$

$$A = A\ A\ A\ A\ \ldots\ \ldots\ \ldots\ A \quad (3)$$

The final values of Forward and Inverse kinematics for different DH parameters can be calculated using DH frames by multiplying the individual matrix values as shown in the equation (3).

Pioneer Arm (PArm) has pivoting and rotating joints for the firm gripping [18]. The PArm 5-DOF manipulator is shown in Fig. 1.

Fig. 1
Parm manipulator [13]

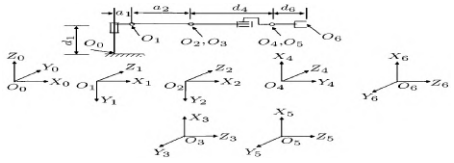

Fig. 2 D-H Frames [6]

The DH frames for the 6R end-effecter have been shown in Fig.2 with Cartesian coordinates [18].

The frames for the joint axis are shown in Fig. 2. These frames have been used to find the DH parameters as shown in TABLE I.

TABLE I
D-H PARAMETERS [6], [12]

S. No.	t_i	a_i	α_i (degree)	d_i
1	t_1	a_1	- 90	d_1
2	t_2	a_2	0	0
3	- pi/2 + t_3	0	- 90	0
4	t_4	0	90	d_4
5	t_5	0	- 90	0
6	0	0	0	d_6

The homogeneous matrices can be obtained by substituting the values of DH parameters in the equation (2).

Homogeneous matrix equations from the base frame to the end-effecter can be calculated by multiplying the matrix as shown in the equation (3). From the matrix forward kinematics equations can be equated in the form of P_x, P_y and P_z respectively [18], [21].

Inverse kinematics equations for the joint angles t_1 to t_5 can be calculated using pre-multiplying and post multiplying with the T matrix using identity matrix (I) [18]. After equating and comparing both sides of the elements of matrices, the joint angles can be calculated.

The joint angles have multiple solutions. The angles obtained have particular solution if the end-effecter will reach to the desired goal. As the DOFs increases the complexity of the robotic arm structure also increases and it becomes very difficult to find the solution using classical methods.

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III. Optimization

The small errors present during the movement of the manipulator, changes the values of joint variables, which was required to achieve the desired target position.

The objective function for the minimization of errors has been defined as shown in the equation (4).

$$Fitness = l \bullet f1 + l \bullet f2; \quad (4)$$

In the equation (4), f1 and f2 are the fitness functions for the Euclidean distance and error. Error is the difference between the predicted and deduced values of joint angles t_1 to t_5. Here l_1 and l_2 are the weights. The sum of values of l_1 {0 to 1} and l_2 {0 to 1} is one and depends on the priority of using functions f_1 and f_2.

ABC algorithm is based on the principle of information shared by honey bees with other bees [7]. The values of the predetermined number of cycles is called abandonment limit [8], [10]. Another variable is acceleration coefficient (w), having the maximum value to be 1. The probability value of the nectar source can be calculated with the equation (5).

$$p = (fitness) / \sum_{m-1}^{pop} (fitness) \quad (5)$$

Here $(fitness)_k$ is the k^{th} solution of fitness and m is the population of the source [10]. The population (pop) represents the number of food sources.

The final values of abandonment limit and acceleration coefficient have been assumed using different combinations of their random values at different iterations.

IV. Results

The values of basic parameters of PArm manipulator considered are a_1=7cm, a_2=16cm, d_1=13cm, d_4=14cm, and d_6=12cm [2]. The value of acceleration coefficient (w) considered is 0.8.

Suppose (P_x P_y P_z) at (5, -15, 12) cm is the desired target position with the joint angles range (-185° to 185°, -150° to 30°, -210° to 60°, 0° to 360° and -90° to 60°) in degrees. Considering the population size (pop) to be forty [6].

The simulated results for the functions f1 (distance) and f2 (Error) using ABC algorithm at different iterations are shown in TABLE II. Also the results for the objective function with time in seconds (s) and joint angles for the equation (4) are shown in TABLE III and TABLE IV.

TABLE II
Comparative Results of Fitness's at Different Iterations

S. No.	Iterations	f1 (Distance)	f2 (Error)
1	200	2.40	$8.98E^{-02}$
2	400	1.60	$1.42E^{-14}$
3	600	1.48	$7.11E^{-15}$
4	800	0.91	$7.11E^{-15}$
5	1000	0.74	$2.13E^{-14}$

TABLE III
Comparative Results of Fitness with Time at Different Iterations

S. No.	Iterations	Fitness	Time(s)
1	200	1.01	2.06
2	400	0.64	4.14
3	600	0.59	5.86
4	800	0.36	7.71
5	1000	0.29	11.02

TABLE IV
Comparative Results of the Joint Angles for Fitness at Different Iterations

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S. No.	Iterations	t_1	t_2	t_3	t_4	t_5
1	200	-24	-36	-117	177	-1.0
2	400	12	-73	-78	114	24.0
3	600	12	-83	40	43.0	-11
4	800	130	0.0	-116	5.0	-27
5	1000	-32	-8	-98	134	5.0

The fitness of 0.29 has been obtained at 2000 Iterations with joint angles (-57, -31, -91, 168, 8) in degrees. The graph plotted between fitness and Iteration is shown in Fig. 3.

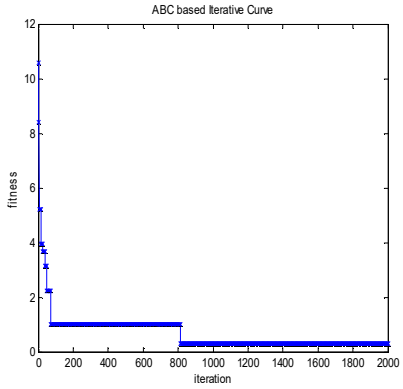

Fig. 3 Graph between Fitness and Iteration using ABC algorithm at 2000 Iterations

As shown in TABLE II and TABLE III, combined Fitness as in the equation (4) shows value to be equal to 0.29, which is less than the individual values of f1(Distance) and f2 (Error) at 1000 iterations. So it is clear that the objective function shows better results than f1 (distance) and f2 (Error) for the combined fitness function.

In the equation (4), if one of the weight has priority over the other, then fitness function f1 (Distance) or f2 (Error) will give results separately.

Suppose if weight l_2 is zero, then distance will be the only criterion, so f1 (distance) will be the fitness function as shown in the equation (4). The results obtained for the fitness functions with joint angles and time is shown in TABLE V, TABLE VI and TABLE VII.

TABLE V

COMPARATIVE RESULTS of FITNESS'S at DIFFERENT ITERATIONS

S. No.	Iterations	f1 (Distance)	f2 (Error)
1	200	0.56	238.76
2	400	0.30	31.42
3	600	0.25	100.53
4	800	$6.31E^{-02}$	149.68
5	1000	0.16	62.83

TABLE VI

COMPARATIVE RESULTS of FITNESS (when l_2=0) with TIME at DIFFERENT ITERATIONS

S. No.	Iterations	Fitness (f1)	Time (s)
1	200	0.56	2.36
2	400	0.30	4.06
3	600	0.25	6.03
4	800	$6.31E^{-02}$	7.92
5	1000	0.16	10.27

TABLE VII

COMPARATIVE RESULTS of the JOINT ANGLES for FITNESS (f1) at DIFFERENT ITERATIONS

S. No.	Iterations	t_1	t_2	t_3	t_4	t_5
1	200	-178	-44	-66	55	-8
2	400	55	-40	-3	59	-37
3	600	-76	-65	-66	152	-45
4	800	-79	-135	-96	146	20.76
5	1000	-64	-47	-72	129	-12

The fitness of 0.15 has been obtained at 2000 Iterations at joint angles (-90, -118, -34, 126.86, 11) in degrees. The comparison graph for the fitness (f1) and Iteration is shown in Fig. 4

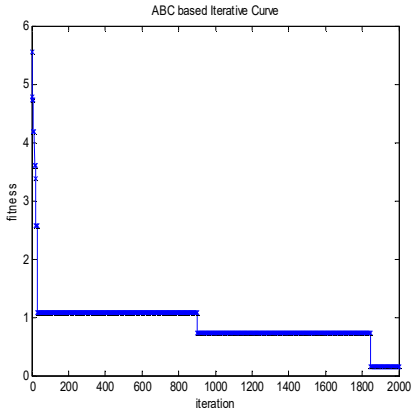

Fig. 4 Fitness (f1) vs. Iteration using ABC algorithm at 2000 Iterations

As shown in TABLE V and TABLE VI, the values of f1 are decreasing with the increase in number of iterations, but the values of f2 increases abruptly. So if we have to control the f1 (Distance), then f2 (Error) values can be ignored.

When the weight l_1 is zero, then only absolute error will be there and f2 (error) will become the fitness function as written in the equation (4) then results obtained have been shown in TABLE VIII, TABLE IX and TABLE X.

TABLE VIII

COMPARATIVE RESULTS of FITNESS'S at DIFFERENT ITERATIONS

S. No.	Iterations	f1 (Distance)	f2 (Error)
1	200	43.11	$0.00E^{+00}$
2	400	17.25	$0.00E^{+00}$
3	600	38.76	$0.00E^{+00}$
4	800	41.65	$0.00E^{+00}$
5	1000	40.85	$0.00E^{+00}$

TABLE IX

COMPARATIVE RESULTS of FITNESS with TIME at DIFFERENT ITERATIONS

S. No.	Iterations	Fitness (f2)	Time (s)
1	200	$0.00E^{+00}$	2.02
2	400	$0.00E^{+00}$	3.87
3	600	$0.00E^{+00}$	5.86
4	800	$0.00E^{+00}$	7.65
5	1000	$0.00E^{+00}$	9.53

COMPARATIVE RESULTS of the JOINT ANGLES for FITNESS (f2) at DIFFERENT ITERATIONS

S. No.	Iterations	t_1	t_2	t_3	t_4	t_5
1	200	54	25	-62	27	-45
2	400	23	-26	-125	114	15
3	600	-49	-33	-54	138	-2
4	800	29	-38	-100	118	-13
5	1000	-104	26	-5	149	-62

Fitness (f2) shows almost zero error at 2000 Iterations, but due to the change in the distance exact target position cannot be obtained as shown in TABLE IX. The comparison graph for the fitness (f2) and Iteration is shown in Fig. 5.

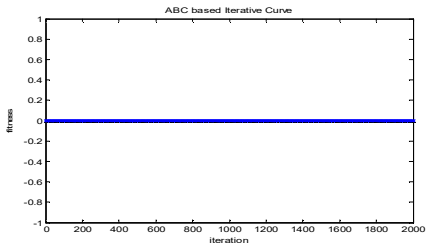

Fig. 5 Fitness (f2) vs. Iteration using ABC algorithm at 2000 Iterations

As shown in TABLE IX, the value of fitness (f2) is almost nearest to zero, but the values of f1 increases sharply and shows very high fitness (f1) values. So it is clear that, if we have to consider only the function f2 it shows very good results at different iterations.

Comparison graph for the Fitness, f1 (Distance) and f2 (Error) for the results as shown in TABLE III, TABLE VI and TABLE IX have been plotted in Fig. 6.

TABLE X

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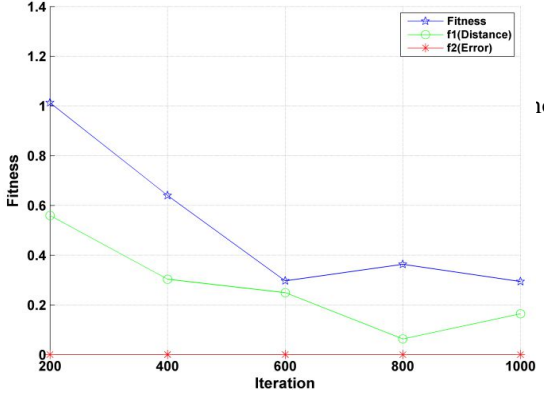

Fig. 6 Comparison graph between Fitness, f1 (distance) and f2 (Error) at 1000 Iterations using ABC Algorithm

As shown in Fig. 6, Upper line (blue color) shows the combined fitness, middle line (green color) for f1 (Distance) and bottom line (red color) is for f2 (Error).

V. Conclusion

This paper presents the optimization and inverse kinematics solution of 5-DOF robotic arm using DH parameters and matrix inversion. The position and displacement errors for 5-DOF manipulator have been optimized using ABC algorithm simultaneously. It has been concluded that the errors with computation time for the fitness function have been minimized. If Euclidean distance or error is considered separately, the results may be better than the combined objective function. ABC algorithm can be proposed for other higher DOF manipulators.

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Non-dominated sorting genetic algorithm-based query optimization for distributed databases

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Abstract—Due to the increasing number of joins and the number of query execution plans, the query optimization problem is an NP-hard problem. Therefore, many heuristics and Meta heuristic approaches are proposed to solve this problem. To overcome the issues associated with the existing techniques, a new multi-objective non-dominated sorting genetic algorithm-based query optimization technique is proposed. The effect of communication overheads and execution time along with query cost and communication overheads will also be considered. The use of non-dominated sorting genetic algorithm can find optimistic query in order to reduce the query cost. To evaluate the effectiveness of the proposed technique comparisons are drawn between the proposed and the existing techniques based upon certain performance metrics. It is found that the proposed technique outperforms the existing techniques in terms of various performance metrics.

Keywords—**Query, Optimization, Distributed databases, Multi-objective, Non-dominated.**

I. INTRODUCTION

Distributed database is a set of several databases dispersed across computer network that are related to one another logically. This is also defined as single database broken into fragments and dispersed across multiple sites. Entire database is dispersed across several locations that allow data to be accessed locally thereby decreasing the total cost of communication and increasing availability of data.

The data in distributed database may be replicated at several locations in accordance to distribution allocation plan. Therefore, to provide answers to a query, association among different sites is required. Thus, optimising query has been a crucial subject for the Distributed Database Management System (DBMS). The progress in computer hardware, software, networks, storage and protocols have altered the view of business demands.

Basic task of this paper is to create query optimizer for distributed database which make use of the positive characteristics of Ant Colony Optimisation Algorithm combined with genetic algorithm to optimize big queries in distributed systems. Ant colony optimisation is entirely combined with genetic algorithm, in order to overcome the insufficiencies of Ant colony optimisation and improving its processing time.

A. Distributed Database System Architecture

Nowadays online processing is preferred over traditional processing in many business applications. Therefore, the database requirements by the applications are largely changed. In comparison to early era the aim of database to manage large amount of data today has increased. It is required for big organisations to partition voluminous data at several sites for many reasons like may be for becoming competitive as well as economic in the market. The main aim for distributing data is to effectively manage voluminous data by increasing their availability, accessibility and decreasing the cost of communication. Therefore, distributed data concept is widely used in areas like HR departments, online banking, and telecommunication industry and for e-commerce purpose. Basically, distributed database is group of several database that are dispersed over several network locations or over several sites. Hence the technique used for designing centralized database is also used for designing distributed database. But for designing distributed database three more factors are taken into account. These are replication, fragmentation and allocation.

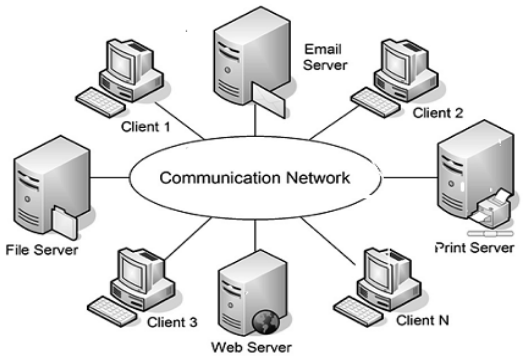


Fig. 1 Distributed database systems Architecture

B. Data Storage

Data can be stored in following two ways on different sites:

1) Replication: In this technique, the whole relation is stored excessively on two or more than two sites. In case whole database is accessible at all the sites, it is a completely repetitive database. Therefore in replication, systems retain copies of data. This enhances the accessibility of data at several sites. Moreover query requests can be processed in side by side.

2) Fragmentation: The relations are partitioned into fragments (smaller parts) and every one of these fragments is saved at multiple sites where ever needed. It needs to be ensured that the smaller units are so that these can be anyway used to rebuild an original table.

*Vertical fragmentation***:** This splits a relation vertically with columns.

*Horizontal fragmentation***:** This approach splits a relation 'horizontally' by simply choosing the appropriate rows.

*Mixed fragmentation***:** The original relation could be rebuild by using operations named natural and union join in correct sequence in this approach.

C. Advantages

Several advantages of distributed database system are as follows:

1) Better Response – User requests can be fulfilled from local data available there, in case the information is distributed in a relevant manner, which result in quick response.

2) More Reliable − In case any part or component doesn't work, then also the system continues to work whether at a low performance in distributed systems, which makes it more consistent.

3) Lower Communication Cost − Where data is frequently used, if it is stored locally over there, then the cost required for handling of data can be reduced.

4) Local autonomy — since only a particular department is aware of data stored so they are the only one that can manage the data related to them.

5) Protection of valuable data — since data is distributed at multiple sites, so any problem cannot affect the functioning of entire organisation because lost data can be recovered from other sites.

6) Improved performance —great load on one part of the database will not alter the functionality of other modules in distributed database network.

D. Query Plan Optimizer in Distributed Database Management System

Query optimizer tries to find out most efficient way to run a given query by seeing the possible query plans. Among the basic operations while using database, one is the Multi-joint query. Hence optimizing Multi-joint query can be of great considerations, in order to enhance the performance of the database. To compare query plans, along with cost metrics, execution time is also relevant. For example, in cloud computing one needs to relate query plans not only on the basis of time required to execute query but also on the basis of money required for execution. So in order to generate relevant results with decreased overhead while execution, query plans can be executed on the random selected samples for input data for optimizing query.

Query processing consists of optimizing query at both the local and global level in distributed database network. Query is input to the database system at client site or also called as controlling site. The main tasks such as user validation, checking of query and its translation as well as optimization at global level takes place at this phase.

The factors defined for optimizer, largely affects it. Some of these factors are reliable on the structural framework of DDBMS and some of them are dependent on its procedural behaviour. These factors are: (i) Allocation of data at multiple sites impacting the actual Data Transmission Cost (ii) Shape of Join Query Graph (iii) Order of Join Operation (v) Arrangement of Query Operators Among all these factors, the most important factor researched upon by applying appropriate search strategies is the Order of Join Operation of the relations involved in the query. Many search strategies have been researched upon and the search is still going on for finding an appropriate Search Strategy for efficiently optimizing huge join queries. The review of literature focuses on the Search Strategies implemented till now as query optimizer in Distributed Database Management System.

E. Genetic Algorithm (GA)

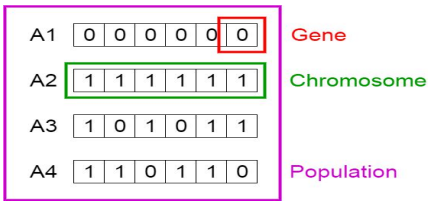
Genetic algorithm belongs to the category of evolutionary algorithms which is also called adaptive heuristic search algorithms. GAs, work on the basis of the concept of natural selection as well as genetics. They are intellectual manipulation of random search on data in order to lead the search into high performance region in solution space. So, genetic algorithms are basically utilised, to produce better quality solutions, for both optimization as well as search problems. GA is intellectual manipulation of random search on data in order to lead the search into high performance region in solution space. So, genetic algorithms are basically utilized, to produce better quality solutions, for both optimization as well as search problems.

With advancement in multimedia technology, databases have become primary source of information. Since the size of database is large, so, we generally use distributed database to provide information to users. However, query optimization in distributed database is still a challenging issue. Many techniques have been proposed so far to optimize the distributed queries. However, the majority of existing techniques suffer from the effect of query cost and communication overheads are ignored in most of existing research on distributed databases. The use of multi-objective optimization is ignored by most of existing researchers. The use of multi-objective non-dominated sorting genetic algorithm to reduce query cost is also neglected in existing literature. Thus, there is a need to design a novel distributed query optimization technique.

Operators of Genetic Algorithms

Genetic operators are as follows:

1) Initialisation: The first step in solving problem with the help of genetic algorithm is to define the initial population.



2) Selection: In this process fittest individual is selected from initial population.

3) Crossover: Two solutions are combined to produce the one best solution by using crossover operator.

4) Mutation: A new solution is created by altering existing solution's gene values. In this phase few of the genes are exposed to a mutation having lowest random probability in some of the new offspring generated. It means that few bits can be reversed.

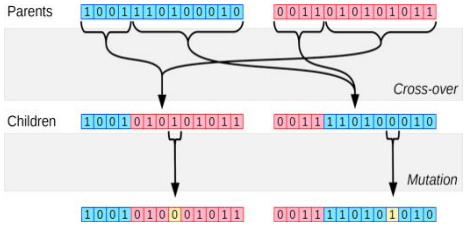


Fig. 2 Crossover and Mutation operation

5) Termination: If the offspring that are different from the previous generation of population, are not produced then the algorithm terminates.

Thus steps involved in genetic algorithm are:

1. Initialise random population p
2. Determining population fitness score
3. Till the population converge repeat the following:
    a) Select individuals from population
    b) Perform crossover operation on individuals and produce novel population
    c) Do mutation on the novel population
    d) Compute the fitness function for novel population

II. LITERATURE REVIEW

Ban et al. (2015) [1] has combined GA and Min-Max Ant System to propose query optimization algorithm so as to enhance the efficiency of query. Initially, number of query processing plans is generated that are highly optimal, by using high speed convergence behaviour of Genetic Algorithm. They are then converted into the initial pheromone of Min-Max Ant System which helps the ants to converge faster in finding the relatively optimal query execution plan by increasing their convergence-speed.

Morsali et al. (2015) [2] information is discovered by making use of the concepts of grid computing in an open environment that permit users to collect data from multiple data sources available online and run their work of data mining by making use of remote resources ant this is referred to as Knowledge discovery "On the Grid". This paper proposed the concept of distributed clustering in distributed database environments.

Shyam Padia et al. (2015) [3] for queries optimization in distributed database system, using hybrid ACO (ant colony optimization) is a learning field till now also. Implementing these probabilistic algorithms work to create feasible solution in both relational as well as distributed database management environments when quantity of joins as well as query size increases.

Umashankar et al. (2015) [4] This paper identifies several common themes, approaches and issues which expand this work as well as the settings within which every component of this task is much suitable. Aim of this paper is being best over the existing papers, thereby providing small summary related to each approach along with a main infrastructure in order to understand processing and optimization of query in brief.

Dermino et al. (2016) [5] It involves ideal assignment of generation sources in distributed system as well as reclose in instantaneous manner and produces IHS (Improved Harmony Search) algorithm in order to find solution. To achieve it, 2 primary control parameters are attuned so as to obtain best answer from a simple Harmony Search algorithm.

Lakshmi SV et al. (2016) [6] to search for best plan from the multiple plans with same meanings which are attained from particular query; query optimization is best as it is multidimensional search technique. Main aim of optimizing distributed query is to attain an efficient query optimization strategy with correctness and less response time or query execution cost.

Chiregi et al. (2016) [7] This paper takes into account the effect of opinion leaders on other entities to calculate the trust as well as to remove effect of troll entities in the cloud computing environment. Five parameters are used to evaluate the value of trust which are; reliability, availability, capability, identity and data integrity. This paper also proposed method for identifying troll entity as well as opinion leaders making use of three hierarchal metrics such as degree of input, degree of output and reputation measures.

Sheikholeslami et al. (2016) [8] Internet-based evaluation technique, named cloud computing has in-built scalability and elasticity. Paper focuses on three contradictory objectives, which are increasing revenue for providers as well for users and searching for optimal solution at relevant time.

Sangeeta et al. (2016) [9] Paper presents a review of artificial bee colony algorithm and also analysis its performance by considering various population sizes. Initially this paper describes the cooperative behaviour of social agents which are honey bees and afterwards simulation of these social agents for artificial bee colony algorithm is presented. Artificial bee colony algorithm's performance is analysed with variation in their population size.

Aponso et al. (2017) [10] proposed a Genetic algorithm based method to optimize join query in distributed database. Initial population is created arbitrarily by applying GA. The genetic operation is performed on every phase, and this changes the population.

Abu Bakar et al. (2017) [11] Paper initially presents the introduction of genetic algorithm and then explains search and manipulation strategies of genetic algorithm in order to search optimal solution. Further it describes lists of few existing mutation and crossover operators.

Muhammad Haroon et al. (2018) [12] optimizing query means executing query with reduced runtime and utilising equitable space. Giving appropriate information and on time also, research is carried out in the existing work. To handle the above issues, deep understanding of distributed system is needed and knowledge about distributed system is also essential to write the query. The basic challenge to deal with is to minimise the cost factor.

Panahi et al. (2019) [13] In this paper, technique is proposed which is known as ABC-GO in order to search a solution to join problems for optimizing query in the distributed database systems. ABC algorithm creates candidate solutions using its genetic operators as well as local-global search abilities which results in improved performance of Artificial Bee Colony technique. The outcomes so achieved show that query evaluation cost is reduced and also the quality of top query plans is enhanced for a particular query in distributed system. The problem of optimizing query is NP-hard problem in a distributed database system. As the number of joins and relations increases, complexity of particular optimizer also increases. This paper solves the problem of query optimization by using artificial bee colony algorithm along with mutation and crossover genetic operators and improves overall performance or throughput of distributed database system. As compared to other algorithms, artificial bee colony based on genetic operators has reduced cost, which can be viewed from the results. But it has more time of execution as compared to other algorithms. To improve time of execution of query PSO (particle swarm optimization) and other strategies such as fuzzy logic or hill-climbing can be used for solving the problem.

III. PSEUDOCODE OF NON-DOMINATED SORTING GENETIC ALGORITHM

*Input: R*p: Relations contributing in the query, P_C : Probability of Crossover, P_M : Probability of Mutation, *G*: number of Predefined generations, P_S : Size of Population

Output: Top-k query plans.

Method: A random parent population PP of query plans is initialised where relations accessed

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in the query are represented by chromosome length "L" and the gene at the k^{th} position in the chromosome represents the site of the k^{th} relation.

WHILE generation ≤ G DO

Step 1: Evaluate each query plan in PP on the following objective functions

$$M1: minimise\ TCC = \sum_{p=1, q=p+1}^{p=n-1, q=n} CC_{pq} \bullet b_p ,$$

$$M2: minimise\ TPC = \sum_{p=1}^{n} LPC_P \bullet a_p ,$$

n are the sites that are processed by the query plan in ascending order of cardinality per site, CC_{pq} is the communication cost per byte between sites p and q, LPC_P is the local processing cost per byte at site p, b_p is the number of bytes to be communicated from site p and a_p is the number of bytes to be processed at site p.

Step 2: Perform Non-Dominated (ND) Sort on PP for "M1" and "M2" separately and place each query plan (QP) into corresponding *ND fronts* "F_i" and sort the QPs within each "F_i".

Step 3: Evaluate Crowding Distance Function F (d) for each objective function

Assign F (d) = ∞ for smallest and highest values in each front "F_i".

For the remaining QPs, F (d) is calculated as:

$$F(d_k) = F(d_k) + \frac{F(k+1)_m - F(k-1)_m}{F_m^{max} - F_m^{min}} \quad (1)$$

Where $F(k)_m$ is the value of m^{th} function of k^{th} query plan in Front F_i and F_m^{max} and F_m^{min} are the maximum and minimum values obtained for the objective function m.

Step 4: Perform Selection from parent population using binary tournament selection using crowded comparison operator ($\bullet_n$)

Step 5: With crossover probability P_C, perform random single point crossover on selected chromosomes

Step 6: Apply mutation on resulting population with mutation probability P_M

Let the resulting child population be CP

Step 7: Attach CP into PP, and let the resulting intermediate population be IP

Step 8: Repeat Step 1 and Step 2 for intermediate population IP

Step 9: Form the parent population PP for the next generation by picking query plans Front-wise from IP till the population size = P_S.

Step 10: Increment Generation by 1

END DO

From Parent Population PP, return Top-*K* Query Plans.

The term non-dominated is used to describe that one factor will not dominate the effect of other factor, as all factors will be considered equally.

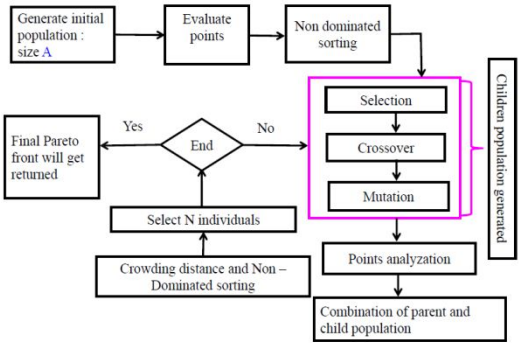

Fig. 3 Layout of multi-objective non-dominated sorting genetic algorithm

IV. RESULTS AND DISCUSSIONS

Existing and proposed techniques are compared based on following factors or metrics.

1) Communication overheads: It is the proportion of time we spend communicating with members of our team, instead of getting productive work done. The communication overhead is measured by the number of bytes in every communication message sent.

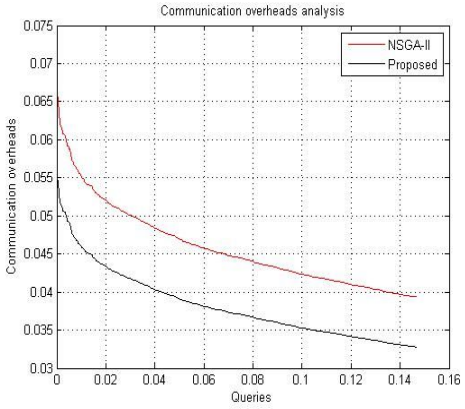

Fig. 4 Communication overheads analysis

Figure analysed the communication overheads for different queries for both existing technique (genetic algorithm combined with artificial bee colony algorithm) and proposed technique (non-dominated sorting genetic algorithm). Figure shows

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that results of proposed techniques are better than that of existing technique.

2) Execution time: Execution time of a given task is defined as the time spent by the system for executing that task, including the time spent executing run-time or system services on its behalf. It is the time in which a single instruction is executed.

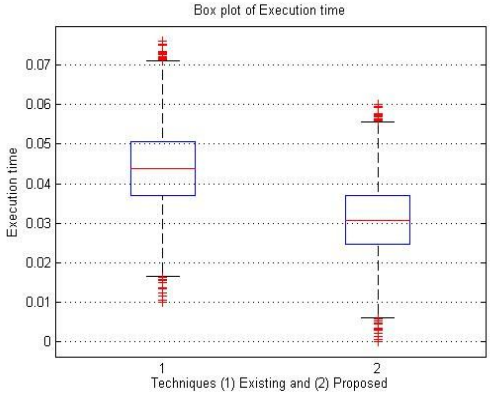

Fig. 5 Box plot of Execution time

Figure shows the box plot of execution time for the existing technique (genetic algorithm combined with artificial bee colony algorithm) and proposed technique (non-dominated sorting genetic algorithm), thereby comparing time taken by both the techniques for executing the task. It can be viewed that results of proposed technique are better than that of existing technique.

V. RESULTS AND DISCUSSIONS

From the literature review, it has been found that the query optimization is defined as an ill-posed problem. Therefore, suitable meta-heuristic technique is required to handle this issue. Therefore, to handle this issue, a novel multi-objective non-dominated sorting genetic algorithm-based query optimization technique is proposed. The effect of communication overheads and execution time have also been considered. The use of non-dominated sorting genetic algorithm can find optimistic query in order to reduce the query cost. Extensive experiments reveal that the proposed technique outperforms the competitive techniques. However, in this paper, effect of site failure is not considered, therefore, in this paper, we will try to design a fault-aware technique which can resist failures as well.

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Review and Analysis of Signature Verification System Using Image Processing Technique.

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Abstract— Signature check and acknowledgment is an innovation that can improve security in our everyday exchange held in the public eye. This paper exhibits a novel methodology for disconnected mark check. Right now signature check utilizing neural system is anticipated, where the mark is composed on a paper are acquired utilizing a scanner or a camera caught and introduced in a picture group. For confirmation of mark, the proposed technique depends on geometrical and factual component extraction and afterward the whole database, highlights are prepared utilizing neural system. The separated highlights of examination mark are contrasted and the recently prepared highlights of the reference signature. This procedure is reasonable for different applications, for example, bank exchanges, travel papers with great validation results and so on.

Keywords— Security, Signature Verifier, False Acceptance Rate (FAR), Image Processing, Edge Detection.

I. INTRODUCTION

A mark might be named a social biometric, as it can alter contingent upon numerous basics, for example, outlook, fatigue, and so forth. The critical parts of robotized signature acknowledgment and confirmation have been, for quite a while, a genuine driving force for analysts. Investigation into signature check has been enthusiastically sought after for various years [1] is as yet being investigated (particularly in the disconnected mode). Mark acknowledgment and confirmation includes two independent however firmly related assignments: one of them is recognizable proof of the mark proprietor, and the other is the choice about whether the mark is certified or produced. Likewise, contingent upon the need, signature acknowledgment and check issue is placed into two significant classes: (I) online mark acknowledgment and confirmation frameworks (SRVS) and (ii) disconnected SRVS. Prior approaches depicts the novel framework for disconnected mark check, in the novel framework both static and pseudo unique highlights are removed as unique sign, which is prepared by Discrete Wavelet Transform (DWT) to improve the distinction in time space between a certifiable mark and its falsification. Likewise author free model which decreases the example acknowledgment issue to a 2-class issue, thus, makes it conceivable to assemble vigorous mark confirmation frameworks in any event, when hardly any marks per essayist are accessible. Beneficiary Operating Characteristic (ROC) bends is utilized to improve the presentation of the proposed framework [2]. Analyses are carted out utilizing both away line frameworks, including the separation of marks composed on a bit of paper, and on-line frameworks, in which dynamic data of the marking procedure, (for example, speed and increasing speed) is additionally accessible.

Usage of the signature as a verification technique has just become a custom in the western development and is regarded among the others. The mark is an acknowledged verification of personality of the individual in an exchange taken for their benefit. Along these lines the clients are bound to favour this sort of automated confirmation technique. Various classifiers, for example, Support Vector Machines (SVMs) and Hidden Markov Models (HMMs), have additionally been fruitful in disconnected mark check; SVMs giving a general upgraded result than the HMM-based methodology.[3] In view of the meanings of mark, it can prompt two unique methodologies of mark confirmation.

A. **Off-Line Signature Verification-** This methodology depends on static qualities of the mark which are invariant. Right now confirmation, turns into an average example acknowledgment task realizing that varieties in signature design are inescapable; the errand of mark validation can be limited to drawing the edge of the scope of certified variety. In the disconnected mark check strategies, pictures of the marks composed on a paper are gotten utilizing a scanner or a camera.

B. **On-Line Signature Verification-** This is the second kind of mark confirmation strategy. This methodology depends on powerful attributes of the way toward marking. This confirmation utilizes marks that are caught by pressure delicate tablets that extricate dynamic properties of a mark notwithstanding its shape. Dynamic highlights incorporate the quantity of request of the strokes, the general speed of the mark and the pen pressure at each point that make the mark increasingly one of a kind and progressively hard to produce. Application regions of Online Signature Verification incorporate insurance of little close to home gadgets (for example PDA, PC), approval of PC clients for getting to delicate information or projects and confirmation of people [4].

II. LITERATURE REVIEW

Conventional bank checks, bank credits, MasterCard's and different authoritative records are a fundamental piece of the advanced economy. They are one of the essential mediums by which people and associations move cash and take care of tabs. Indeed, even today every one of these exchanges particularly monetary require our marks to be validated. The unavoidable reaction of marks is that

they can be misused to fake a record's valid ness. Henceforth the requirement for inquire about in proficient robotized answers for signature acknowledgment and confirmation has expanded as of late to abstain from being defenceless against extortion [5]. signature check and acknowledgment utilizing another methodology that relies upon a neural system which empowers the client to perceive whether a mark is unique or a fake. The client brings into the PC the examined pictures, alters their quality by picture improvement and clamour decrease systems, to be trailed by include extraction and neural system preparing, lastly checks the credibility of the mark. A disconnected mark checks and acknowledgment framework dependent on a blend of highlights extricated, for example, worldwide highlights, cover highlights and lattice highlights. The framework is prepared utilizing a database of marks. For every individual, a centroid highlight vector is acquired from a lot of his/her veritable examples utilizing the highlights that were separated. The centroid mark is then utilized as a layout which is utilized to confirm an asserted mark. To get a good proportion of comparability between our format signature and the guaranteed signature, we utilize the Euclidean separation in the element space. The outcomes were promising and a triumph pace of 70 to 80% was accomplished utilizing a restricted edge [6].

The following methodology depicted Feature extraction is a significant procedure in disconnected mark check. Right now, execution of two element extraction procedures, the Modified Direction Feature (MDF) and the angle highlight are analysed based on comparative test settings. Moreover, the presentation of Support Vector Machines (SVMs) and the squared Mahalanobis separation classifier utilizing the Gradient Feature are additionally thought about and detailed. Without utilizing falsifications for preparing, test results showed that a normal mistake rate as low as 15.03% could be acquired utilizing the inclination highlight and SVMs.

This methodology depends on the limit of a mark and its projections are portrayed for upgrading the procedure of computerized signature confirmation. The main worldwide element is gotten from the absolute 'vitality' an essayist uses to make their mark. The subsequent component utilizes data from the vertical and level projections of a mark, concentrating on the extent of the separation between key strokes in the picture, and the stature/width of the mark. The blend of these highlights with the Modified Direction Feature (MDF) and the proportion include demonstrated promising outcomes for the disconnected mark confirmation issue. When being prepared utilizing 12 certified examples and 400 arbitrary phonies taken from openly accessible database, the Support Vector Machine (SVM) classifier acquired a normal blunder rate (AER) of 17.25%. The bogus acknowledgment rate (FAR) for arbitrary fabrications was additionally kept as low as 0.08% [7]. Alan McCabe et al, shows a technique for checking manually written marks by utilizing ANN engineering. Different static (e.g., stature, incline, and so forth.) and dynamic (e.g., speed, pen tip pressure, and so on.) Signature highlights are extricated and used to prepare the NN. A few Network topologies are tried and their exactness is analysed. The subsequent framework performs sensibly well with a general blunder pace of 3.3% being accounted for the best case [8].

III. OBJECTIVES

1)To create signature acknowledgment and confirmation System by utilizing counterfeit neural system.

2)To confirm an entered signature with the assistance of an Normal mark, which is gotten from the arrangement of, recently gathered marks.

3)To precisely portray every client's mark, therefore offering great check and acknowledgment execution.

4)To diminish the time required for Signature confirmation and acknowledgment.

5)To keep up the Security in different money related space, for example, banking, Insurance and so forth.

IV. PROPOSED METHODOLOGY

To perform check or recognizable proof of a signature, a few stages must be performed.

These means are

4.1 Image pre-preparing

4.2 Feature extraction

4.3 Neural system preparing

4.1 Image Pre-Processing

Picture pre-preparing speaks to a wide scope of methods that exist for the control and change of pictures. It is the initial phase in signature confirmation and acknowledgment. A fruitful usage of this progression produces improved outcomes and higher exactness rates.

4.2 Feature Extraction

Highlight extraction is the subsequent significant advance in signature acknowledgment and check. On the off chance that we are to look at 2 representations; there ought to be at any rate one estimation on which to base this examination. The principle capacity of this progression is to create highlights which can be utilized as examination estimations. Since the issue of mark check is an exceptionally touchy procedure, more than one component/estimation must be created so as to upgrade the precision of the outcome.

4.3 Neural Network Training

Neural systems - like people - rely upon learning so as to accomplish any undertaking. They learn through preparing on countless information, which empowers them to make an example with time, that they will utilize later. They are useful in recognizing designs that are confounded and difficult to infer by people or by basic methods. Much the same as the instance of mark acknowledgment, it is exceptionally difficult to tell whether a mark is unique or produced, particularly in the event that it is completed by a gifted falsifier. In this way a further developed strategy to recognize the distinctions is expected to accomplish a choice on its

genuineness. Neural systems don't adhere to a lot of guidelines, given to them by the creator, however they learn as they go one case at a time case.

4.4 Signature Recognition &Verification Using ANN

Neural systems are profoundly solid when prepared utilizing a lot of information. They are utilized in applications where security is exceptionally esteemed. For signature acknowledgment and check a few stages must be performed. In our proposed work fundamentally we gather the examined pictures of mark of various people, essentially we gather the 10 filtered pictures of people's genuine marks and their manufactured marks. These pictures are put away in a database which we are going to use in preparing and testing of ANN, in our proposed work we need to utilize an interface with scanner for getting a picture and These pictures are put away in a database. Subsequent to pre-processing all marks pictures from the database, highlights extraction will be utilized to extricate different highlights of mark, for example, stroke, minute invariants, GLCM, shading predominant, histogram that can recognize marks of various people. These are utilized for preparing and testing of neural system.

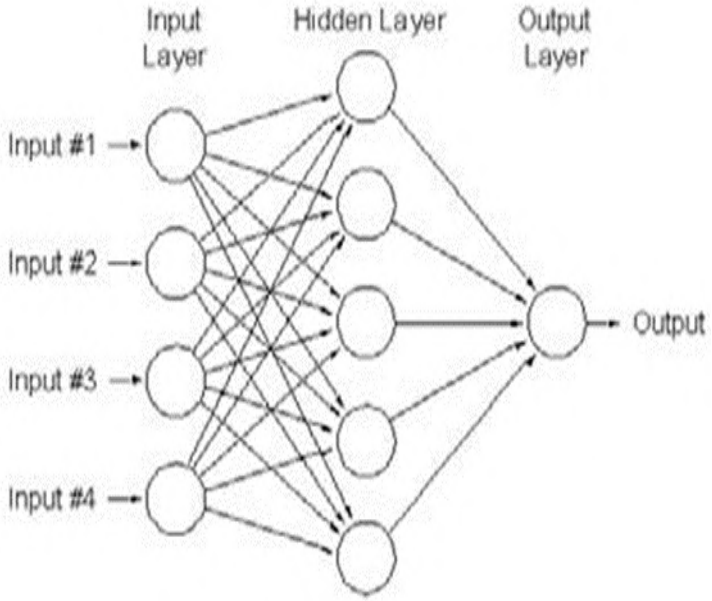

Figure 1: Neural Network Diagram

Here these are ANN numerical models which emulating natural neural systems where they comprise of a gathering of associated which speaking to the neurons of the cerebrum. It spoke to by a chart of hubs in different layers with weighted associations between hubs in various layers. [9] Where RBF arrange is an ANN that utilizes spiral premise works as enactment capacities where RBF organizes ordinarily have three layers that are input layer, concealed layer with a non-straight RBF initiation work and a yield layer with direct actuation capacities and the most famous structure is given underneath:

$$\widetilde{y}(x)=\sum_{i=1}^{m} \underbrace{wi}_{weight}\ \underbrace{hi(x)}_{hidden\,units}$$

Where Φ is the activation function.

The proposed methodology or procedure for signature recognition and verification are as follows:
a. Acquire the Signature images.
b. Image preprocessing.
c. Extract the various features.
d. Use these features to train the system using ANN algorithm
d. Test the Signature image.
e. Take decision as originals or forgeries.

4.5 Proposed System Design

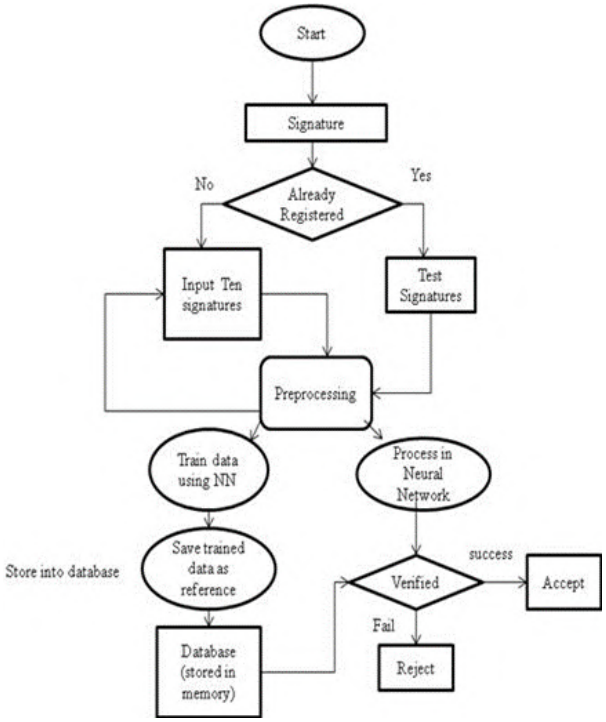

Figure 2: Flowchart of Proposed Work

V. COMPARISON

Below table showing FAR (False Acceptance Ratio) percentage values for different thresholds for both combinations GMM-LCSS and GMM-DTW:

S.no.	Threshold	Using LCSS---FAR	Using DTW-FAR
1	0.1	0.95	1
2	0.2	0.95	1
3	0.3	0.95	1
4	0.4	0.95	0.92
5	0.5	0.96	0.84
6	0.6	0.68	0.68
7	0.7	0.4	0.36

Table 1: FAR Comparison using LCSS and DTW

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Below table showing FRR (False Rejection Ratio) percentage values for different thresholds for both combinations GMM-LCSS and GMM-DTW:

S.no	Threshold	Using LCSS—FRR	Using DTW---FRR
1	0.1	0.04	0.16
2	0.2	0.04	0.16
3	0.3	0.04	0.2
4	0.4	0.04	0.3
5	0.5	0.08	0.28
6	0.6	0.2	0.6
7	0.7	0.4	0.75

Table 2: FRR Comparison using LCSS and DTW

VI. CONCLUSION

This proposed framework is centred around Bank Check Signature Verification System utilizing fake neural system. Marks are checked dependent on parameters extricated from the mark utilizing different picture preparing procedures. This proposed framework will gives utility of mark confirmation is appeared. it helps in distinguishing the specific individual and it gives more precision of checking marks for usage of over, this paper utilizes Neural Networks for acknowledgment and confirmation of marks of people.

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A Review on Face Recognition and Retrieval Techniques using Wavelet

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***Abstract*—Face recognition has been a quickly developing, challenging and interesting area progressively applications. A substantial number of face recognition algorithms have been created in most recent couple of decades. In this paper an endeavour is made to survey an extensive variety of techniques utilized for face recognition. This include PCA, LDA, ICA, SVM, Gabor wavelet soft computing tool like ANN for recognition and different half and half blend of this strategies. This survey researches every one of these techniques with parameters that difficulties face recognition like illumination, pose, variation, facial expression.**

***IndexTerms*—Wavelets, DWT, Gabor,Principal Component Analysis (PCA), Linear Discriminant Analysis (LDA), Face Recognition, Independent Component Analysis (ICA), Artificial Neural Networks (ANN).**

INTRODUCTION

Face Recognition becomes one of the most biometricsauthentication techniques from the past few years. Facerecognition is an interesting and successful application ofPattern recognition and Image analysis.Face Recognition, as one of the major biometric advances, has turned out to be progressively critical attributable to fast advances in image catch gadgets, accessibility of gigantic measure of face image on the web, expanded interest for higher security. Face Recognition has a few preferences over other biometric modalities, for example, fingerprint and iris: next to natural and nonintrusive the most imperative favourable position of face is that it can be caught at a distance and in a secretive way.

The feature extraction is a special type of dimensionality reduction process. Transforming the input data into the set of features is called feature extraction. If the features extracted are carefully chosen it is expected that the features set will extract the relevant information from the input data in order to perform the desired task using this reduced representation instead of the full size input. Different popular techniques such as Principal Component Analysis (PCA), Kernel PCA, Linear Discriminate Analysis (LDA), and SVM are pixel based component extraction techniques having great results. The major limitation of these techniques is, features are directly proportional to the accuracy and inversely proportional to the speed. It means if the selected features are more the probability of accuracy also more and rate of speed is less because the selected features are more, it required more time for computation of more features. Wavelets have found third approach to find eminent solution to such problems.

The transform of a signal is simply another form of representing the signal. It doesn't change the information content present in the signal. The Wavelet Transform gives a time-frequency representation of the signal. It was developed to overcome the short coming of the Short Time Fourier Transform (STFT), which can also be used toanalyze non-stationary signals. While STFT gives a constant resolution at all frequencies, the Wavelet Transform utilizes multi-resolution system by which different frequencies are analyzed with different resolutions.

A wave is an oscillating function of time or space and is periodic. In contrast, wavelets are localized waves. They have their energy concentrated in time or space and are suited to analysis of transient signals. While Fourier Transform and STFT use waves to analyze signals, the Wavelet Transform uses wavelets of finite energy.

The Wavelet Series is just a sampled version of CWT and its computation may consume significant amount of time and resources, depending on the resolution required. The Discrete Wavelet Transform (DWT), which is based on sub-band coding, is found to yield a fast computation of Wavelet Transform. It is easy to implement and reduces the computation time and resources required.

LITERATURE REVIEW

Jagadeesh H S et al.,[17] proposed a technique for face recognition, The image is pre-processed and DWT is applied. The DBC(Directional Binary Code) technique is used to extract features from LL sub band only. TahiaFahrin Karim et al., [9] implemented a reliable PCA based face recognition system and evaluated the performance using standard face databases such as Indian database and the Face recognition data, University of Essex, UK. The different techniques such as sum of absolute difference, sum of squared difference and normalized cross correlation are used for matching unknown images with known images. Satiyan et. al., [10] investigated the performance of a Daubechies Wavelet family in recognizing facial expressions. A set of luminance stickers were fixed on subject's face and the subject is instructed to perform required facial expressions. Also the subject's expressions are recorded in video. A set of 2D coordinate values are obtained by tracking the movements of the stickers in video using tracking software.

Standard deviation is derived from wavelet approximation coefficients for each daubechies wavelet orders. Hengliang Tang et al., [11] proposed a novel face representation approach known as Haar Local Binary Pattern histogram (HLBPH). The face image is decomposed into four-channel sub images in frequency domain by Haar wavelet transform, and then the LBP operator is applied on each sub image to extract the face features. Jeffery and Masatoshi [1] proposed a new data structure known as Haar Spectral Diagram (HSD) which is useful for representing the Haar spectrum of boolean functions. To represent the Haar transform matrix in terms of a Kro-necker product yielding a natural decision diagram based representation is an alternative ordering of Haar coefficients. The resulting graph is a point-decomposition of the Haar spectrum using O-element edge values. Ramesh and Raja [14] proposed a performance evaluation of face recognition based on DWT and DT-CWT using Multi-matching Classifiers. The face images are resized to required size for DT-CWT. The two level DWT is applied on face images to generate four sub bands. Euclidian Distance, Random Forest and Support Vector Machine matching algorithms are used for matching.

VARIOUS FAMILIES OF WAVELET

We have many and various basic functions that can be used as basic source of Wavelet Transformation. It is worthy of a note that the basic (mother) source of wavelet used in transformation are produced by that mother wavelet by the means of translation and scaling. Thus characteristics of wavelet transformation can be determined. Therefore, the details of the particular application should be taken into account and the appropriate mother wavelet should be chosen in order to use the Wavelet Transform effectively. Figure 1 [17] illustrates some of the commonly used wavelet functions. Haar wavelet is one of the older and simplest wavelet. Therefore, any examination of wavelets begins with the Haar wavelet. Daubechies wavelets are the most well known wavelets. They represent to the foundation of wavelet signal processingand are utilized in various applications.

We characterize the scaling and wavelet filters, construct them and show several examples of the associated functions. We prove that these functions are square-integrable and that they converge to their classical counterparts of the corresponding order.

These are also called Maxflat wavelets as their frequency responses have maximum flatness at frequencies 0 and π. This is a very desirable property in some applications. The Haar, Daubechies, Symlets and Coiflets are compactly supported orthogonal wavelets. These wavelets along with Meyer wavelets are capable of perfect reconstruction. The Meyer, Morlet and Mexican Hat wavelets are symmetric in shape. The wavelets are chosen based on their shape and their ability to analyze the signal in a particular application.

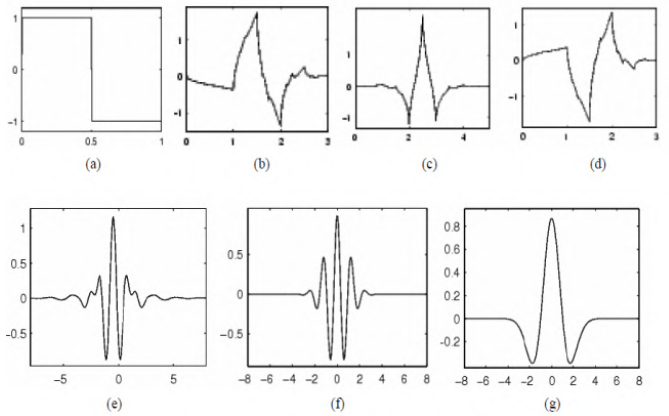

Fig.1. Wavelet families (a) Haar (b) Daubechies4 (c) Coiflet1 (d) Symlet2 (e) Meyer (f) Morlet (g) Mexican

WAVELETAPPLICATIONS

There is an extensive variety of application for Wavelet Transforms. They are applied in various fields ranging from signal processing to biometrics, and the list is growing still. One of the prominent applications is in the FBI fingerprint compression standard. Wavelet Transforms are used to compress the fingerprint pictures for storage in their data bank. The previously chosen Discrete Cosine Transform (DCT) did not perform well at high compression ratio. It produced severe blocking impacts which made it difficult to follow the ridge lines in the fingerprints after reconstruction. This didn't happen with Wavelet Transform because of its property of retaining the detail present in the data.

In DWT, the most prominent information in the signal appears in high amplitudes and the less prominent information appears in very low amplitudes. Data compression can be achieved by discarding these low amplitudes. The wavelet transforms enables high compression ratios with good quality of reconstruction. At present, the application of wavelets for image compression is one the hottest areas of research. Recently, the Wavelet Transforms have been chosen for the JPEG 2000 compression standard.

Wavelets also find application in speech compression, which reduces transmission time in mobile applications. They are used in denoising, edge detection, feature extraction, speech recognition, echo cancellation and others.

They are very promising for real time audio and video compression applications. Wavelets also have numerous applications in digital communications. Orthogonal Frequency Division Multiplexing (OFDM) is one of them. Wavelets are used in biomedical imaging. For example, the ECG signals, measured from the heart, are analyzed using wavelets or compressed for storage. The popularity of Wavelet Transform is growing because of its ability to reduce distortion in the reconstructed signal while retaining all the significant features present in the signal. The feature extraction with Discrete Wavelet Transform also used for Speech Recognition [2].

The fine-scale and large-scale information in the original signal is separated into the wavelet detail and approximation coefficients, respectively, and 2) the wavelet decomposition coefficients include all information in the original signal. Thus, multiscale features of the original hyperspectral signal

can be extracted directly from the wavelet decomposition coefficients. Infinitely many choices of features could be extracted, including the coefficients themselves or any combination of the coefficients. However, for comparison purposes, other methods of feature extraction were also investigated. The wavelet-based feature extraction is quite a departure from traditional hyperspectral dimensionality reduction methods. It allows the user to extract features related to scale (or frequency) from the hyperspectral signal. Furthermore, hen individual coefficients are used, it allows the user to extract features related to very localized activity in the hyperspectralsignal [3].

The construction of feature vectors is then conducted by thresholding and counting of wavelet coefficients. The proposed feature extraction method can be applied to classifying any kind of bank note. However, in this paper we examine Korean won bills of 1000, 5000 and 10000 won types [5]. Discrete Wavelet Transform for Image Classification.[6]

This paper presents a method of features extraction in Speaker Recognition. This methoddivides voice signal into two parts based on the MPEG Psychological Model I, and processesthem respectively. And then we analyze the extracted MFCC parameters, and compare thepartition of frequency-band between Mel-spaced filter group and wavelet packet decomposition. We extract the coefficients by Wavelet Package Transform (called "WPTC") as diagnostic parameters used in the Speaker Recognition. The results of experiments indicated that it perform well than MFCC while using the WPTC based on MPEG-1. [8]

This research proposes feature extraction and classification method using Wavelet. The DWT is used to generate the feature images from individual wavelet sub bands. The feature imagesconstructed from Wavelet Coefficients are used as a feature vector for the further process.[12]

USES OF RECOGNITION AND RETRIEVAL

Haar, 9/7 wavelet filters have been implemented as a part of the proposed algorithms due to their simplicity, suitability and regularity for face recognition using multi-resolution approaches[18].

According to the fact that the basic features of a palmprint, including principal lines, wrinkles and ridges, have different resolutions, in this paper we analyzepalmprints using a multi-resolution method and define a novel palmprint feature, which called wavelet energy feature (WEF), based on the wavelet transform. WEF can reflect the wavelet energy distribution of the principal lines, wrinkles and ridges in different directions at different resolutions (scales), thus it can efficiently characterize palmprints. This paper also analyses the discriminabilities of each level WEF and, according to these discriminabilities, chooses a suitable weight for each level to compute the weighted city block distance for recognition. The experimental results show that the order of the discriminabilities of each level WEF, from strong to weak, is the 4th, 3rd, 5th, 2nd and 1st level. It also shows that WEF is robust to some extent in rotation and translation of the images. Accuracies of 99.24% and 99.45% have been obtained in palmprint verification and palmprint identification, respectively. These results demonstrate the power of the proposed approach. [4]

A new face recognition system based on Haar wavelet transform (HWT) and Principal Component Analysis (PCA) using Levenberg-Marquardt backpropagation (LMBP) neural network is presented. The image face is preprocessed and detected. The Haarwavelet is used to form the coefficient matrix for the detected face. The image feature vector is obtained by computing PCA for the coefficient matrix of DWT. A comparison between the proposed recognition system using DWT, PCA and Discrete Cosine Transform (DCT) is also made. [13]

Image Retrieval system is an effective and efficient tool for managing large image databases. A content based image retrieval system allows the user to present a query image in order to retrieve images stored in the database according to their similarity to the query image. In this paper content based image retrieval method is used as diagnosis aid in medical fields. The main objective of this paper is to evaluate the retrieval system based onTexture features. The texture features are extracted by using pyramidal wavelet transform. The major advantage of such an approach is that little human intervention is required. The method is evaluated on Diabetic Retinopathy Database (DRD). Here the precision rate obtained is about 60% for DRD images. [15]

In this study we reviewed four important techniques of the face recognition in the feature extraction phase. With regard to the results obtained from several studies and also comparison made on the performance of four techniques of the feature extraction methods in the face recognition, it is concluded that weighted-LBP has the highest recognition rate compared to the rest of the techniques. Non-weighted LBP has the highest performance in the feature extraction among three techniques EBGM, 10-Gabor filter and the 15-Gabor filter. Although the vector length in 10-Gabor and 15-Gabor filters is long, the extracted recognition rates in these two techniques are higher compared to the EBGM and Optimal-EBGM methods[19].

A new method for texture feature extraction and description is proposed. The method starts from whole scale space and whole direction space, and extracts time-frequency coefficients from each scale and each direction using Gabor wavelet. The energy is computed according to the coefficients, and dominant multi-scale and multi-direction fuzzy set is computed based on all energy computed. The standardized energy is used to measure the dominance of each element. Texture feature vector is computed according to the fuzzy set. The similarity measure is carried out between the fuzzy sets. When two images are of the same kind, their similarity measure is carried out between the texture feature vectors of two images. [7]

Multi-resolution representations and Subspace analysis have beenwidely accepted in the face recognition systems. This research paper combines the benefits and presents the featureextraction method using Discrete Wavelet Transform (DWT) and Independent Component Analysis (ICA). The DWT provides multi-resolution representations and are effective in analyzing the information content of the image and generates the feature sets for images from individual wavelet sub bands. The feature images constructed from Wavelet Coefficients (Cohen DaubechiesFeauveau (CDF-

9/7)) are used as a feature vector for ICA based subspace analysis. ICA is an unsupervised statistical method reduces the dimensionality of the feature vector and extracts the information in the higher-order relationship of pixels. ICA method has been used to find statistically independent basis images or coefficients for the face images to deal with the sensitivity to higher order image statistics. Reduced feature vector are used for further classification using Euclidean Distance (ED) classifier. The proposed scheme has been tested on the standard and real-time Database and the results have been reported. It was observed that the proposed method classifies the images with better accuracy and outperforms the existing methods. [16]

Wavelet packet analysis (WPA) and gray model (GM) are investigated for nonlinear unsupervised feature extraction of hyperspectral remote sensing data. This letter has addressed the problem of feature extraction for hyperspectral image classification by combining WPA with GM. There are two generic indices to reveal spectral profiles, which are not limited to individual applications. Our proposed feature extraction method is unsupervised and has no need for training samples, which is an advantage over other supervised techniques. Experimental results show that WGFE cannot only largely reduce the dimension of data space but also keep reliable information for classification. [20]

CONCLUSION AND FUTURE SCOPE

The study and analysis would help to identify problems in current techniques and improved by eliminating it. Study assists to use and impact of face recognition and retrieval using wavelet. The proposed work provides review and analysis of recent different available techniques on wavelet.The categorization and classification has been performed on the available and studied. We explored the study and analysis for any other available and latest relevant approaches with suitable classification. This work would be extended with using scientific tools and data for evaluation and performance analysis.

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A novel normalization architecture for floating-point arithmetic

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Abstract: The use of normalization architecture is very vast in the field of Digital Signal Processing (DSP). In this research paper a unique approach of designing normalization architecture is proposed using basic logical blocks such as Multiplexer, Adder etc. The implementation of the same is done on Cadence Virtuoso 90 nm technology & analysis is performed in cadence spectre tool.

Keyword: *Data Normalization; Cadence Virtuoso; Signed-Floating-point MAC; Block Enabling; Clock Gating.*

Introduction: In the era of digital signal processing, such as graphics and computation systems, multiplication-accumulation is one of the prime operations. A MAC unit is a vital component of any digital system, such as various FFT algorithms, convolution, image processing algorithms, etc. The actual MAC block is not just limited to the fixed-point number system. For applications such as image processing, speech encoding, audio mixing, etc., floating-point MAC architecture is much needed. In the literature, different approaches are adopted for designing effective floating-point MAC architectures. Vangal et al. propose one of the notable floating-point MAC architectures in 2006, where a "pipelined single-precision Floating-Point Multiply Accumulator (FPMAC)" consisting of the accumulator in radix-32 and internal carry-save addition is explained. Additionally, an improved version of "Leading-Zero Anticipator (LZA) and overflow prediction logic" required in carry-save addition is also described [1]. The FPMAC is shown in figure 1.

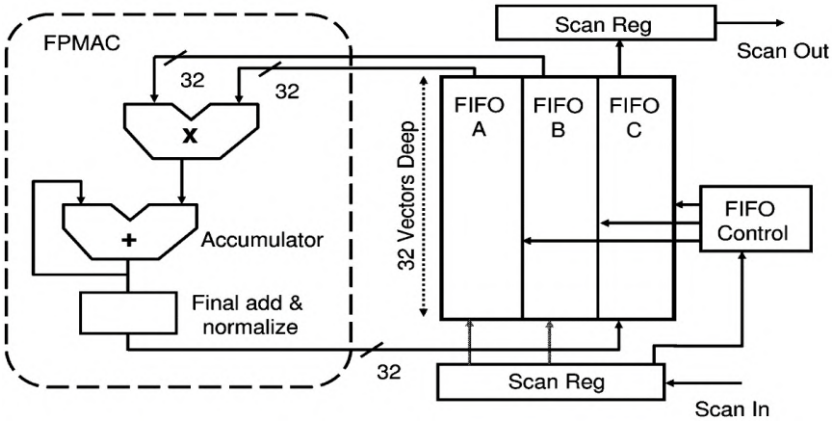

Figure 1: Pipelined single-precision FPMAC [1]

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A floating-point MAC architecture is proposed by Suzuki et al. in the year 1996, where an LZA technique is used for a FADD core, as shown in figure 2. This logic carries out the simultaneous execution of the "pre-decoding for normalization" along with a summation of the significand [2]. The rounding operation, in parallel with the shifting of the normalization, is also proposed in this architecture. The CMOS logic is used for implementing the primary circuits for the design. Its area penalty of the FADD core is found to be as low as 30% of the traditional LZA method. The FADD core is fabricated by 0.5 µm CMOS technology at a supply voltage of 3.3 V.

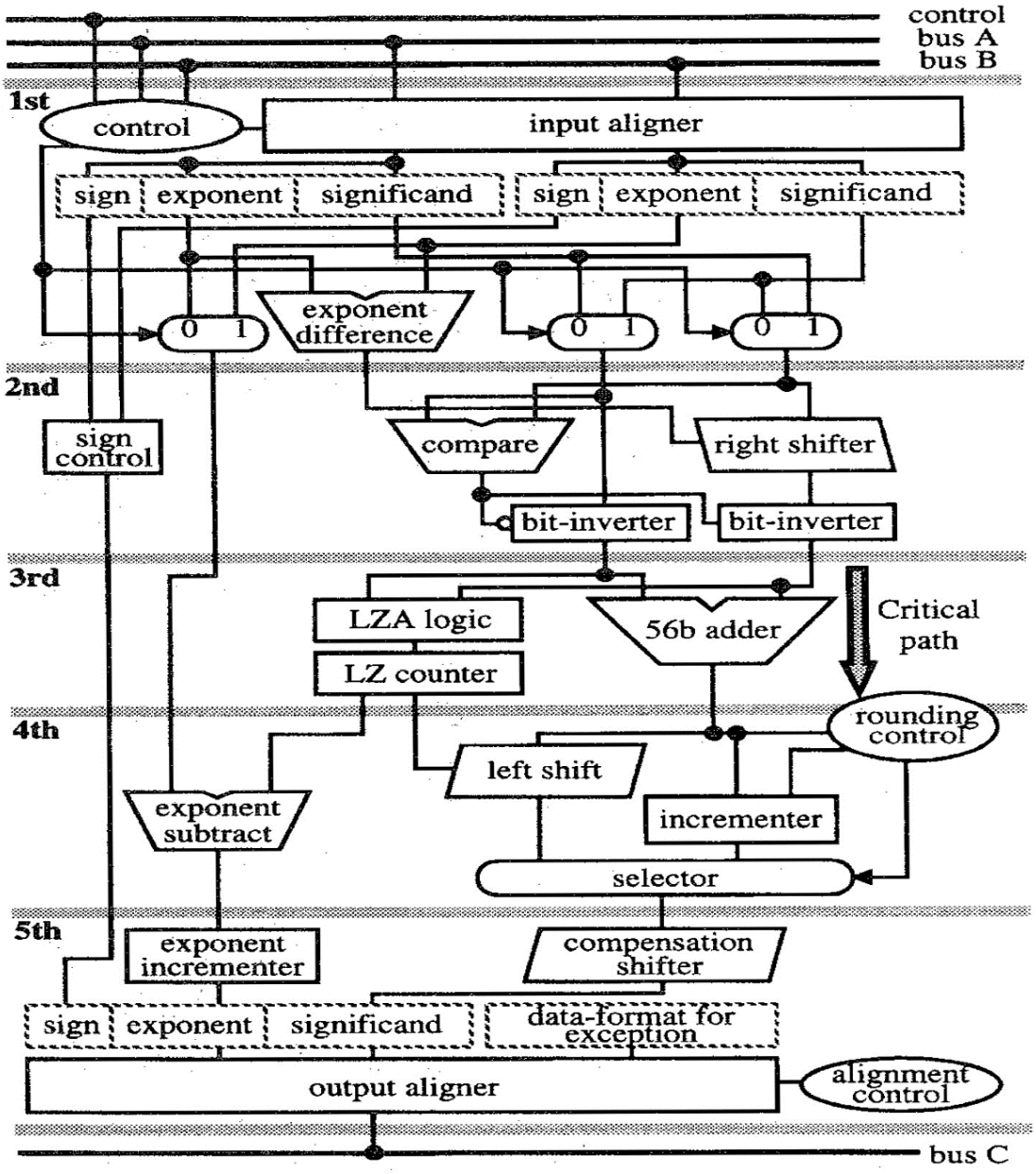

Figure 2: A LZA logic for floating-point addition operation [2]

A "Floating-point multiply-add fused" architecture for IEEE 16-bit or IEEE 32-bit (half precision or single precision respectively) is discussed in [3]. The architecture is designed by the amalgamation of the multiplier and adder/subtractor required for mantissa data calculation in a single operation, which has provided an efficient usage of DSP blocks in

FPGAs. The architecture is also implemented on FPGA. The architecture is shown in figure 3.

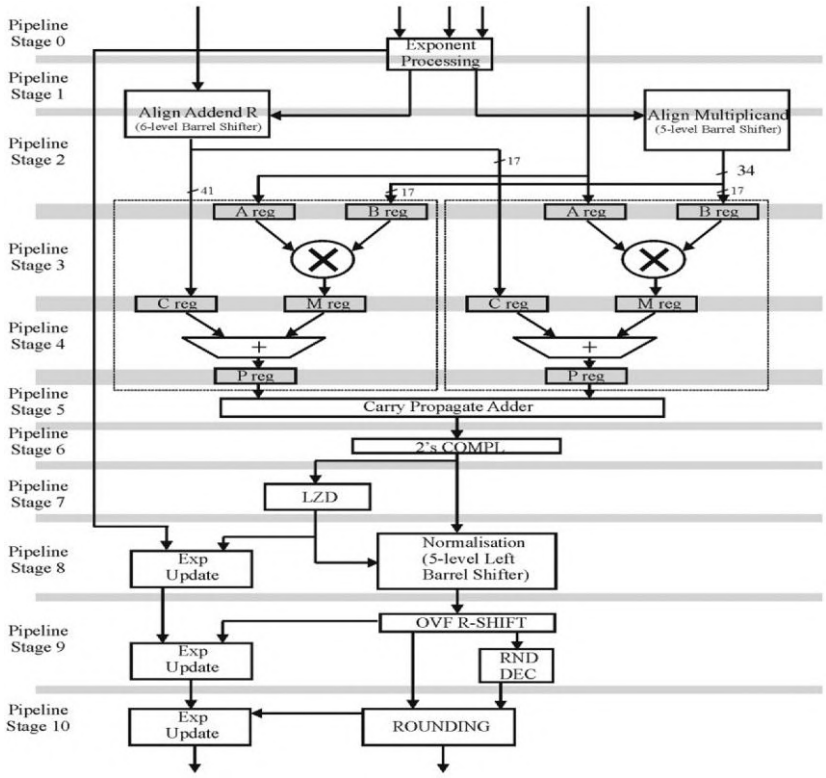

Figure 3: Floating point multiply-add units for IEEE 16-bit or IEEE 32-bit [3]

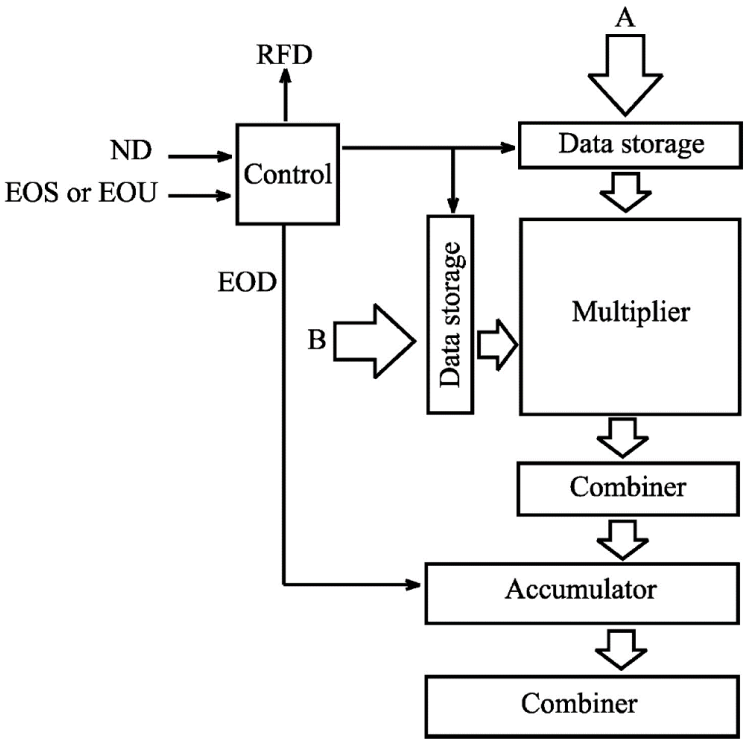

Figure 4: RSFQ DS Processor [4]

In [4], as shown in figure 4, explains about RSFQ DS processor, mainly used for the removal of interferences from any signal. The author proposed the MAC unit for floating-point multiplication-addition. The MAC unit consists of a three-unit parallel multiplier, combiner, and accumulator. The "combiner performs a summation of sums and carries from M-MSB" bits of the multiplier. The simulation is verified in VHDL [14, 15].

In this research paper, a multiplexer-based normalization architecture is proposed, which is capable of performing MAC operation on signed floating-point inputs. For this, a novel input-data format is introduced, which takes 9-bit binary data with the MSB as the sign bit and 4-bit exponential input with the MSB as the exponential sign bit. Therefore, the size of the novel input-data format is 13-bits. The proposed normalization architecture consists of two primary algorithms namely ECC block & ESC block.

Exponent Comparator Circuit (ECC)

As shown in figure 5, the inputs to the ECC are the product of the exponents (EA output, i.e., 5-bit) and the output exponent of the previous cycle (5-bit in size). The major point to consider here is that if both the input terms to the ECC block carry the same sign, then the actual difference among the two is the arithmetic difference between the numbers. Whereas, if both the inputs carry different signs, then the actual difference among the two is the arithmetic sum of the two numbers. For example, the actual difference between '+a' and '+b' is 'a-b' or 'b-a'. Whereas, for '-a' and '-b', the actual difference is 'a-b' or 'b-a' only. But if the inputs are '+a' and '-b' or '-a' and '+b' then the actual difference is going to be 'a+b' or 'b+a'. The operation of the ECC block is as follows:

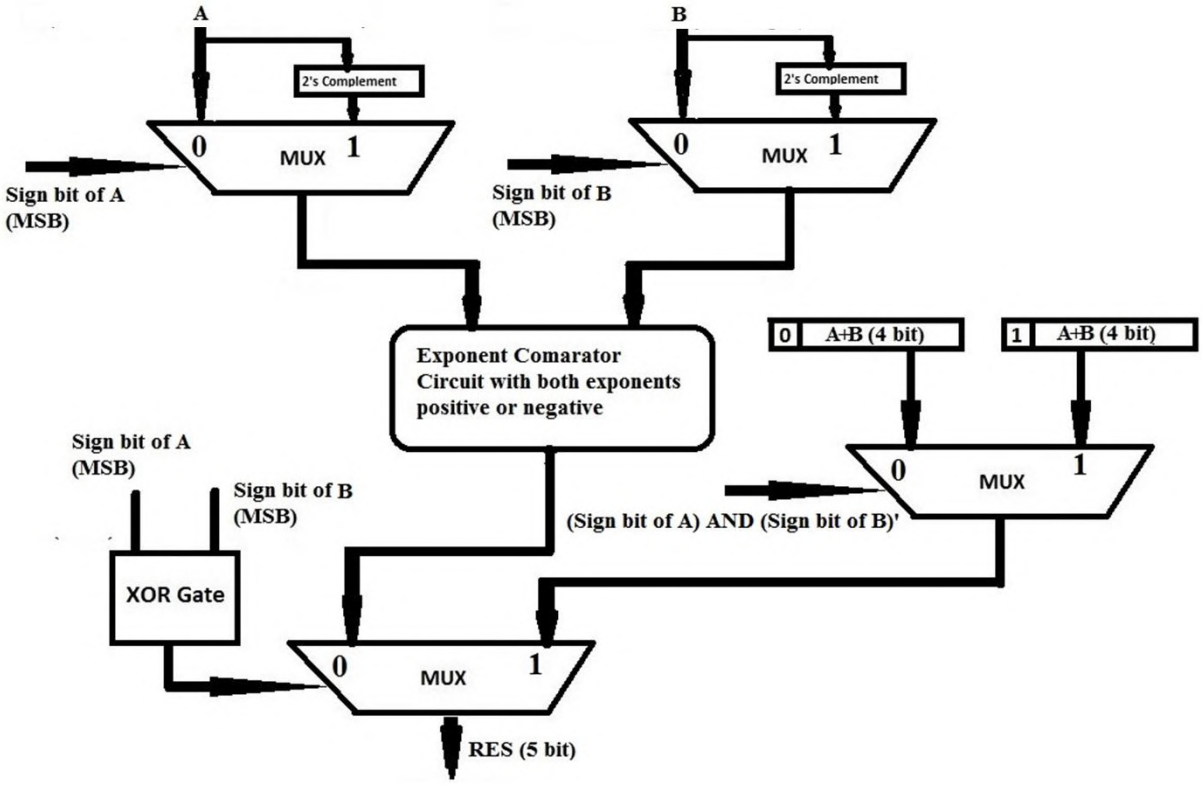

Figure **Error! No text of specified style in document.**: The ECC architecture

i) Based on the sign bit, the inputs to the ECC are represented in 2's complement form.

ii) The operation of the ECC is further segregated based on the sign bits of the inputs as follows:

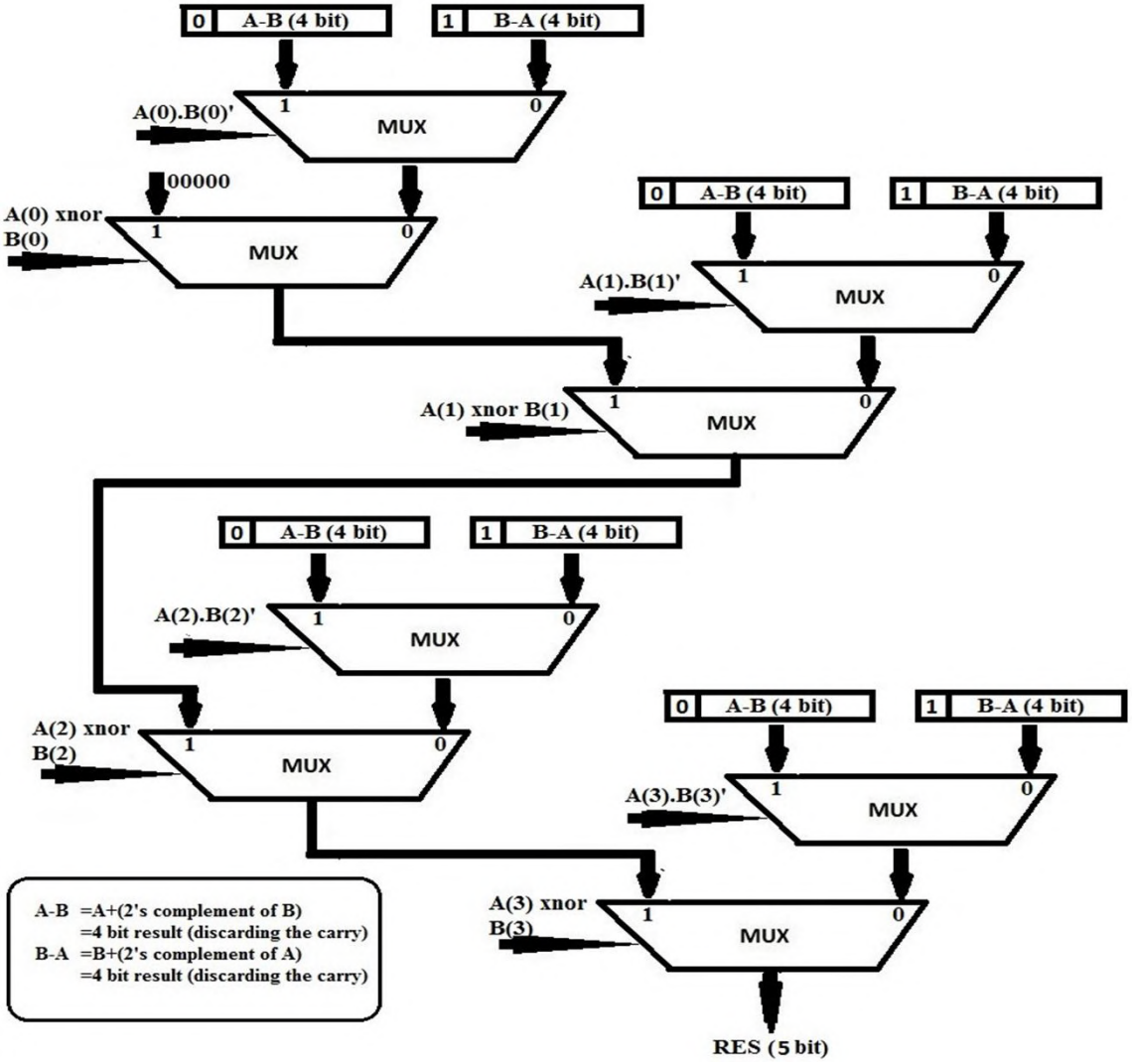

Figure 6: The ECC with same sign bit

a. If both the sign bits are different, then add the inputs of the ECC to produce a 4-bit output (i.e., discard the carry bit) but introduce the 5th bit as '1' if the product of the exponents of the inputs is negative, but the previous exponent is positive. Make the 5th bit as '0' in the other circumstances.

b. If both the sign bits of the inputs to the ECC are same then find out the input which is higher among the two and find the difference between the inputs as per the following procedure:

- For finding the higher number, compare both the numbers bit by bit, i.e., start comparing from MSB to LSB, as shown in figure 6.

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- For finding the difference, use the 2's complement approach. The difference produces a 4-bit output (i.e., discard the borrow bit) but introduces the 5^{th} bit as '0' if the product of the exponents of the inputs is higher than the previous cycle exponent. Make the 5^{th} bit as '1' in the other circumstances.
- In this architecture, multiplexers are used to compare the inputs.

iii) This operation produces a 5-bit output, which is further used for performing the binary shifts.

Exponent Shifter Circuit (ESC)

The ESC block is responsible for shifting the smaller number (either the product of the 8-bit inputs or the previous cycle MAC output) by the amount of difference between the exponents of these two. The inputs to the ESC block are the 5-bit output of the ECC block, a 16-bit product of the inputs & 16-bit value of the previous cycle output. The step by step procedure is as follows:

- The identification of the smaller number is made based on the ECC output (5-bits). If the MSB of the ECC block output is 1, then the product of the inputs is shifted towards the right by the equivalent decimal value of the remaining 4-bit binary of the ECC block output. On the other hand, if the MSB of the ECC block output is 0, then the previous output is shifted towards the right by the equivalent decimal value of the remaining 4-bit binary of the ECC block output.
- The input to the ESC block, which needs no shift, is identified by the MSB of the ECC block output.

Result & Discussion

Delay plays an important role in a normalization architecture. To evaluate the performance in terms of delay, the implementation of the normalization architecture is done on Cadence Virtuoso 90 nm technology. The propagation delay for all units of the normalization architecture along with its sub-blocks is shown in table 1.

Table 1: Delay comparison

Block	**Delay (in ps)**	**Inference**
Multiplier	433.7	The maximum delay from A0 to P15, considering all inputs as high.
Register	123.6	Delay from the positive edge of the clock to any of the output
Full Adder	22.4	Delay from A0 to OUT15, considering all inputs as high

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ESC Block (along with ECC block)	1367.5	With same sign bits of both the exponents (as negative or positive) in the ECC block and maximum bit shift in the ESC block
2:1 MUX	12.6	With the critical path from ‘s’ to ‘y’
4:1 MUX	18.9	Maximum delay occurred either in ‘s0’ to ‘y’, ‘s1’ to ‘y’ or ‘s2’ to ‘y’

Conclusion & Future work

In the near future, the work can be further extended to design the signed floating-point MAC architecture. A parametric analysis, along with Monte-Carlo analysis, will give a detailed picture of the proposed architectures at extreme corners and extreme supply voltage as well as temperature. Much more optimization at the abstract level will improve the performance of the MAC architectures designed using novel normalization architecture. An optimized layout design would provide an opportunity for post-layout simulation and hence ASIC fabrication.

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ANALYSIS OF BRAIN TUMOR DETECTION IN MRI IMAGES USING DWT & EDGE DETECTION.

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***Abstract*--The distinguishing proof, division and recognition of contaminating territory in cerebrum tumor MRI pictures are a repetitive and tedious assignment. The distinctive life systems structure of human body can be imagined by a picture handling ideas. It is hard to have vision about the anomalous structures of human cerebrum utilizing straightforward imaging methods. Attractive reverberation imaging procedure recognizes and explains the neural design of human cerebrum. X-ray method contains many imaging modalities that sweeps and catch the inward structure of human cerebrum. Right now, have focused on commotion evacuation system, extraction of dim level co-event grid (GLCM) highlights, DWT-based mind tumor locale developing division to diminish the multifaceted nature and improve the exhibition. This was trailed by morphological separating which expels the commotion that can be framed after division. The probabilistic neural system classifier was utilized to prepare and test the presentation exactness in the identification of tumor area in cerebrum MRI pictures. The trial results accomplished about 100% precision in distinguishing typical and unusual tissues from mind MR pictures showing the adequacy of the proposed procedure.**

***Keywords*—MRI Images, Brain Tumor Detection, Image Processing, Database, DWT Technique, Edge Detection.**

I. INTRODUCTION

In image processing, pictures pass on the data where information picture is handled to get yield additionally a picture. In this day and age, the pictures utilized are in computerized group. As of late, the presentation of data innovation and e-human services framework in medicinal field encourages clinical specialists to give better social insurance to patients. This investigation uncovers the issue division of irregular and typical tissues from MRI pictures utilizing dark level co-event grid (GLCM) highlight extraction and probabilistic neural system (PNN) classifier. The cerebrum tumor is an unusual development of uncontrolled malignant tissues in the mind. [1] A mind tumor can be amiable and dangerous. The generous tumor has consistency structures and contains non-dynamic malignancy cells. The threatening tumor has non-consistency structures and contains dynamic malignancy cells that spread all over parts.

As per world wellbeing association, the evaluating framework scales are utilized from grade I to review IV. These evaluations arrange kindhearted and threatening tumor types. The evaluation I and II are low-level evaluation tumors while grade III and IV are significant level evaluation tumors. Cerebrum tumor can influence people at any age. The effect on each individual may not be same. Because of such a mind boggling structure of human cerebrum, an analysis of tumor zone in mind is testing task.

The harmful kind grade III and IV of tumor is quickly developing. Influences the solid synapses and may spread to different pieces of the cerebrum or spinal line and is progressively unsafe and may stay untreated. [2] So discovery of such mind tumor area, ID and order in prior stage is a difficult issue in restorative science. By improving the new imaging procedures, it encourages the specialists to watch and track the event and development of tumor-influenced districts at various stages so they can take give appropriate analysis these pictures filtering.

The key issue was discovery of brain tumor in beginning times so appropriate treatment can be embraced. In view of this data, the most reasonable treatment, radiation, medical procedure or chemotherapy can be chosen. [3] Accordingly, it is clear that the odds of endurance of a tumor-tainted patient can be expanded essentially if the tumor is identified precisely in its beginning period. The division was utilized to decide the influenced tumor part utilizing imaging modalities. Division is procedure of separating the picture to its constituent parts sharing indistinguishable properties, for example, shading, surface, difference and limits.

II. LITERATURE REVIEW

Breaking down and handling of MRI cerebrum tumor pictures are the most testing and forthcoming field. Attractive reverberation imaging (MRI) is a propelled medicinal imaging system used to create top notch pictures of the parts contained in the human body and it is significant procedure for choosing the right treatment at right stage for tumor-tainted person.

Numerous procedures have been proposed for order of cerebrum tumors in MR pictures, for example, fluffy grouping implies (FCM), bolster vector machine (SVM), counterfeit neural system (ANN), information based methods, and desire boost (EM) calculation strategy which are a portion of the well-known strategies utilized for area based division thus to extricate the significant data from the restorative imaging modalities.

Bahadure et al. proposed BWT and SVM procedures picture examination for MRI-based cerebrum tumor recognition and arrangement. Right now, of 95% was accomplished utilizing skull stripping which wiped out all non-cerebrum tissues for the identification reason [4].

Joseph et al. [5] proposed division of MRI cerebrum pictures utilizing K-implies bunching calculation alongside morphological sifting for the location of tumor pictures. The mechanized mind tumor characterization of MRI pictures utilizing bolster vector machine was proposed by **Alfonse and Salem** [6]. The precision of a classifier was improved utilizing quick Fourier change for the extraction of highlights and negligible repetition maximal pertinence procedure was utilized for decrease of highlights. The precision got from this proposed work was 98%.

The cerebrum MRI picture contains two locales which are to be isolated for the extraction of mind tumor areas. One piece of locale contains the tumor anomalous cells, while the subsequent district contains the typical synapses. For the mind tumor division, **Zanaty** [7] proposed a methodology dependent on half breed type, with the mix of seed developing, FCM, and Jaccard similitude coefficient calculation with the proportion of dark and white portioned tissue matter from tumor pictures. A normal score of S of 90% division was accomplished with commotion level of 9–3%.

To oversee and to address conventions of various pictures and nonlinearity of genuine information a compelling order dependent on complexity of upgraded MRI pictures, **Yao et al.** [8] proposed an approach which included extraction of surfaces highlights with wavelet change and SVM with a precision of 83%. For the characterization and cerebrum tumor division, **Kumar and Vijayakumar** [9] proposed strategy utilizing head part examination (PCA) and outspread premise work bit with SVM. They got an exactness of 94% with this technique. A counterfeit neural system instrument as both classifier and division was utilized for the successful grouping of cerebrum tumor from MRI pictures was proposed by **Sharma et al**. [10] with the utilization of textural crude highlights which accomplished an exactness of 100%.

For the restorative picture division, a confined fluffy grouping with the extraction of spatial data was proposed by **Cui et al.** [11]. The creator utilized Jaccard simi-larity list as a proportion of division asserting an exactness of 83–95% and separating in to white, dim and cerebrospinal liquid.

For the cerebrum tumor picture division, dynamic shape strategy was applied to take care of the issue dependent on power homogeneities on MRI pictures was proposed by **Wang et al**. For the programmed extraction of highlights and tumor identification a with an improved element utilizing Gaussian blend model applied on MRI pictures with wavelet highlights and head part investigation was proposed by **Chaddad** [12] with a precision of T1-weighted 95% and T2-weighted 92% for FLAIR MRI weighted pictures.

The creator **Sachdeva et al**. [13] utilized a fake neural system and PCA–ANN for the multi class mind tumor MRI pictures grouping, division with informational collection of 428 MRI pictures and a precision of 75–90% was accomplished.

The writing overview above gives an away from of the methods that were imagined uniquely to acquire the division—locale of intrigue, a few procedures for extricating highlights and some to prepare and test utilizing the classifiers for characterization as it were. Much viable division with the joined component extraction couldn't be directed, and just not many highlights were removed which brought about low precision in tumor ID and location. The classifiers used to prepare the highlights are additionally very little powerful.

III. Proposed Methodology

This portrays the materials, the source from which the cerebrum picture information gathered and the calculations for mind MRI division and highlight extraction. The strategy proposed remembers application for cerebrum MRI pictures of 256 9 256, 512 9 512-pixel size on informational index. It is changed over into dark scale for additional improvement. The accompanying conversation manages execution of calculation.

A. Preprocessing

The preprocessing step improves the standard of the cerebrum tumor MR pictures and makes these pictures appropriate for future preparing by clinical specialists or imaging modalities. It additionally helps in improving parameters of MR pictures. The parameters remember improvement for signal-to-clamor proportion, upgrade in visual appearance of MR pictures, the evacuation of superfluous commotion and foundation of undesired parts, smoothing locales of internal part, keeping up significant edges.

B. Segmentation

The division is where the picture is apportioned into various locales. Leave a whole area of picture alone spoke to by S. Division procedure can be seen as parcel of S into p sub locales like S1, S2, S3, … Sp. Certain conditions needs to fulfilled, for example, the division must be flawless; that is every single pixel ought to be inside the locale, each point in the districts ought to be associated in some sense, areas ought to be disjoint, and so forth.

C. Region Growing

Locale developing is gathering of pixels or sub areas into bigger districts dependent on specific criteria. The fundamental point was to choose a 'seed' focuses and join every one of these seed to those neighbouring pixels having indistinguishable properties to develop district. A lot of seeds was taken as contribution inside the picture and denoted the items to be divided. The locale develops intelligently by assessing all uncatalogued neighbouring pixels of the area. The similitude was the proportion of contrast between pixel's power esteem and the district's mean, d. The pixel with the littlest distinction estimated thusly was dispensed to the separate district. This was proceeded until all pixels were distributed to an area. Seeded locale developing requires seeds as extra information. The outcomes rely upon the determination of seeds [14]. The estimation depended on mean estimation of the pixel force. The picture gets divided; this picture was utilized to distinguish the ideal tumour area.

D. Morphological Operations

Morphology manages investigation of shapes and limit zone extraction from mind tumor pictures. Morphological activity is reworking the request for pixel esteems. It works on organizing component and info pictures. Organizing components are characteristics that tests a highlights of intrigue. The fundamental activities utilized here are widening and disintegration. Enlargement activity adds the pixels to limit area, while disintegration expels the pixels from the limit district of the items. These activities were completed dependent on the organizing components. Expansion picks most elevated an incentive by looking at all pixel esteems in neighborhood of information picture portrayed by organizing component, while disintegration picks the least incentive by contrasting all the pixel esteems in the neighbor-hood of the information picture [15].

E. Feature Extraction Utilizing DWT

Highlight extraction is procedure of removing quantitative data from a picture, for example, shading highlights, surface, shape and complexity. Here, we have utilized discrete wavelet change (DWT) for removing wavelet coefficients and dim level co-event lattice (GLCM) for measurable element extraction.The wavelet was utilized to break down various frequencies of a picture utilizing various scales. Here, we are utilizing discrete wavelet change (DWT) which is useful asset for include extraction. It was utilized to extricate coefficient of wavelets from mind MR

pictures. The wavelet restricts recurrence data of sign capacity which was significant for characterization.

2D discrete wavelet change was applied that brought about four sub groups LL(low–low), HL(high–low), LH(low–high), HH(high–high) with the two-level wavelet deterioration of Region of Interest (ROI). The 2D level disintegration of a picture shows a guess with definite three pictures that speaks to low and significant level recurrence substance in a picture, separately. The wavelets approximations from the start and second level are rep-disdained by LL1, LL2, individually; these speak to the low-recurrence part of the pictures. The high-recurrence some portion of the pictures are spoken to by LH1, HL1, HH1, LH2, HL2 and HH2 which gives the subtleties of even, vertical and slanting headings from the outset and second level, separately. We have utilized low-level picture, where LL1 speaks to the guess of unique picture and is additionally disintegrated to second-level estimation and subtleties of picture. The procedure was rehashed until we got the ideal degree of goals. By utilizing 2D discrete wavelet change, the pictures were disintegrated into spatial recurrence segments were extricated from LL sub groups and since HL sub groups have better when contrasted with LL, we have utilized both LL and HL for better examination which portrays picture content highlights [16].

IV. Proposed Algorithm

As the customary procedure was contemplated a few cons were breaking down as far as edge finding and the conventional ANN use, The Proposed model which is given right now have some adjustment that will improve the customary framework and give better outcomes in field of therapeutic preparing. In Proposed model the work will have a progression in finding the edge for the division, the proposed edge will be versatile that can be characterized consequently. Also the proposed model will upgrade the old style ANN by supplanting it with the ML ANN that is multi-layer ANN which is relied upon to be give better outcomes in term of arrangement.

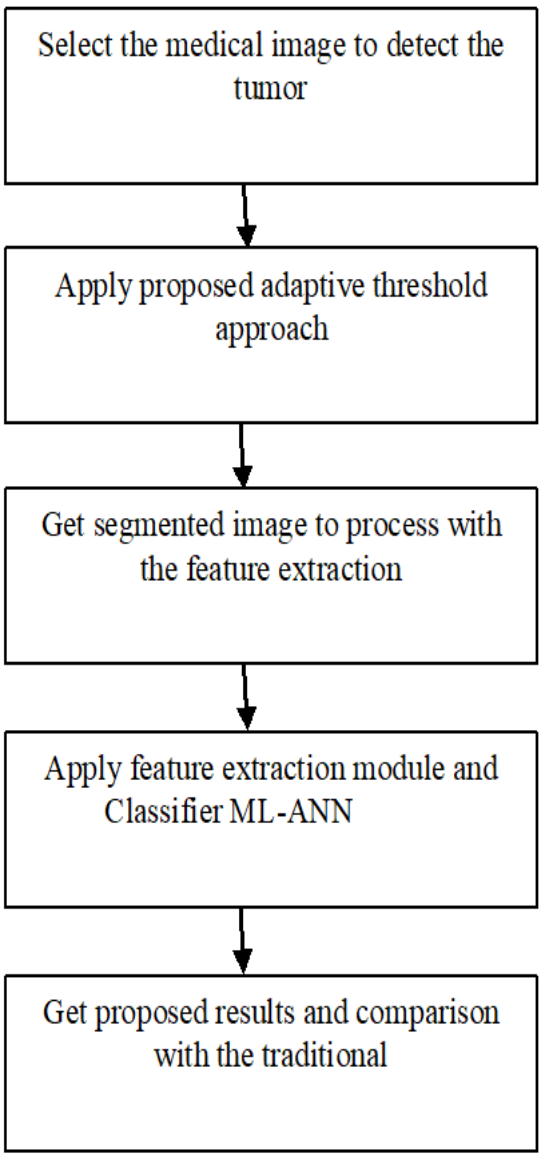

Fig.1: Proposed Algorithm

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V. COMPARISON

Here is the table below comparison of different methods, the various methods are as follows:

A. Histogram Thresholding.
B. K-Mean
C. FCM
D. Region Growing
E. Watershed

On other hand, we have three cases. In which the two images is abnormal and one is normal images. The table are as follow

Parameter	Hist.	K-Mean	FCM	Region Growing	Water shed
Centroid(x)	141	141	141	141	143
Centroid(y)	139	139	137	139	137
Height	141	124	136	139	122
Width	177	160	172	175	156
Time	4.3587	3.5447	9.4856	9.1243	0.7971

Table 1: Comparisonfor 1st Abnormal Image.

Parameter	Hist.	K-Mean	FCM	Region Growing	Water shed
Centroid(x)	123	123	131	123	122
Centroid(y)	130	130	127	130	131
Height	95	79	90	93	73
Width	139	123	134	137	98
Time	3.6264	3.8710	17.0676	7.0217	0.7823

Table 1: Comparison for 2nd Abnormal Image.

Parameter	Hist.	K-Mean	FCM	Region Growing	Water shed
Centroid(x)	136	136	136	136	148
Centroid(y)	136	132	133	132	144
Height	164	185	208	211	50
Width	197	192	215	218	64
Time	3.2182	2.7889	9.9939	8.6547	0.6325

Table 1: Comparison for 3rdNormal Image.

VI. CONCLUSION

we have utilized cerebrum MR pictures, sectioned into ordinary mind tissue (unaffected) and anomalous tumor tissue (tainted). To expel a commotion and smoother the picture, preprocessing is utilized which likewise brings about the improvement of sign to-clamor proportion. Next, we have utilized discrete wavelet change that breaks down the pictures and textural highlights were separated from dark level co event lattice (GLCM) trailed by morphological activity. Probabilistic neural system (PNN) classifier is utilized for the characterization of tumors from mind MRI pictures. From the perception results, it tends to be obviously communicated that the discovery of mind tumor is quick and exact when contrasted with the manual identification did by clinical specialists. The exhibition factors assessed likewise shows that it gives better result by improving PSNR and MSE parameters. The proposed approach brings about exact and quick recognition of tumor in cerebrum alongside recognizable proof of exact area of the tumor.

VII. In recognizable proof and order into typical and strange tumors from cerebrum MR pictures, exactness of about 100% was accomplished for prepared informational index in light of the fact that the factual textural highlights were removed from LL and HL sub groups wavelet decay and 95% was accomplished for tried informational collection

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Carbon Nanotubes composites, a potential candidate as RAM - A Review

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***Abstract*- Electromagnetic wave absorbing technology is a valuable topic for military purposes and is also a rising major issue in the business field. The development of radar absorbing material (RAM), electromagnetic wave absorbing materials in the frequency region of radar, GHz bandwidth, had been actively researched for quite a long time. Carbon nanotubes (CNTs) have many practical and potential applications due to their outstanding physical and electrical properties. The main purpose of this review article is to present the carbon nanotubes (CNTs) based composites as a radar absorbing materials (RAMs). In this review paper, carbon nanotube based composites for microwave absorption are reviewed on the basis of different parameters; materials, reflection loss, thickness, bandwidth, and frequency band.**

I. Introduction

Due to the increasing number of electrical and electronic industries, electromagnetic interference (EMI) has become a significant cause of concern for modern society. EMI causes not only operational malfunction of electronic instruments but also detrimental to human health. Some diseases such as leukemia, miscarriages and breast cancer are associated with ongoing exposure to electromagnetic pulses. To save society from these harmful radiations, efficient shielding from unwanted electromagnetic waves is necessary [1]. Materials that absorb electromagnetic waves are very important in many modern technology applications including electronics and telecommunications. Microwave absorbent materials are designed to provide electromagnetic shielding and absorption for commercial, civil and consumer applications of electronic devices [2]. Several types of devices that use electromagnetic waves in the gigahertz range have recently been widely used. There has also been a drastic increase in demand for gigahertz microwave range utilization. To decrease baneful effects of some electromagnetic inference problems on human bodies, the production of electronic devices with electromagnetic compatibility is becoming very relevant [3].

For example, the development of radar-absorbing materials (RAMs) that work in the radar frequency (i.e. GHz) had gained a great momentum due to their potential applications in aircraft stealth technology and dark-room microwave protection. RAM is expected to

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absorb the electromagnetic energy emitted and minimize the reflected wave in the direction of a radar receiver. Two essential conditions must be met by lossy materials. The first is" matched impedance characteristics" in which the material's intrinsic impedance equals the impedance of free space. That involves making the material's dielectric constant and magnetic permeability equal to one another. Second, the electromagnetic wave incident must enter and be rapidly attenuated through the material layer, thereby reducing the emerging wave to an acceptable low magnitude [4]. Microwave absorbing materials can therefore be classified into the following two classifications: magnetic and dielectric absorbing materials. The effective RAM should be lightweight, compact and be able to cover a wide range of frequencies. Magnetic absorbers have good absorptivity but typically too high densities. Dielectric absorbers are much lighter in weight compared with magnetic absorbers, but do not match the absorptivity of magnetic absorbers. Since the absorption loss is a function of the material's conductivity, dielectric permittivity, and magnetic permeability, the absorption loss in the material is consequently caused by the heat loss due to the alignment of the electric and/or magnetic dipole in the EM field. The contribution to the absorption is primarily due to magnetic losses (μ'') and dielectric losses (ϵ''). RAM prepared with the inclusion of both magnetic and dielectric fillers in the polymer matrix could therefore result in better absorption of material [5].

From year to year, radar absorbing materials (RAMs) become more widely used in the electronic devices development. Carbon nanotubes (CNTs) are nanostructures derived from rolled graphene planes and possess various interesting chemical and physical properties, have been extensively used as Microwave Absorbing Material [6], [7]. The bulk of absorbing materials are the composites, consisting of a polymer matrix and electrically-conductive or magnetic fillers. CNTs are one of the most perspective materials for these purposes. Carbon nanotubes (CNTs) have generated enormous interest in most areas of science and engineering due to its outstanding physical and chemical properties. CNTs exist as single (SWNTs), and multi-walled (MWNTs) structures [8]. They present several interesting properties, such as high aspect-ratio, ultra-light weight, tremendous strength, high thermal conductivity [8, 9]. A single-walled carbon nanotubes (SWCNTs) can be considered to be formed by the rolling of a single layer of graphite (called a graphene layer) into a seamless cylinder (long wrapped graphene sheets). Its usage potential as an advanced filler with better physical and chemical properties incorporated in composites makes CNT an ideal candidate for use in a broad range of applications. Multi-walled carbon nanotubes (MWCNTs) can be considered as a collection of concentric SWCNTs (consist of multiple layers of graphite rolled in on themselves to form a tube shape) with different diameters.

Various researchers have developed different composites of MWCNTs with different fabrication techniques, epoxy compositions with variation in thickness of composites [5], [8], [11]–[15].

Multi–walled carbon nanotubes (MWCNT)-Polyurethane (PU) composite films have been fabricated and significant enhancement in their mechanical, electrical and EMI shielding properties had been observed by Gupta et. al. The addition of MWCNTs into the PU matrix not only reduced the deformation energy considerably but also improved the stiffness and other mechanical parameters significantly. In addition to improved mechanical properties, the absorption dominating SET reached upto -29 dB with an SEA of -21 dB in the X-band (8.2–12.4 GHz) frequency for 10 wt% loaded a MWCNT–PU composites, which is the highest reported value to the best of our knowledge in the literature for MWCNT–PU composites in the X-band at1.5 mm thickness [1].

The carbon nanotubes-epoxy composites with MWCNT (outer diameter less 8 nm) loadings from 1 to 10 wt% had been fabricated by Wang et. al. The results showed that the microwave absorption ratio of the MWCNTs-epoxy composite samples strongly depend on the MWCNT loadings in the compo- sites. The microwave absorption ratio up to 20% - 26% around 18 - 20 GHz was reached for the samples with 8 - 10 wt% MWCNT loadings in the frequency range of 2-20 GHz. The microwave absorption of the MWCNTs-epoxy composites is mainly due to the dielectric loss of the microwave field in the composites [2]. A chemical reducing method has been successfully employed to prepare MWCNTs filled with Co nanoparticles by Yi et. al. The microwave electromagnetic properties were studied in the 0.1- 18 GHz frequency range. Three resonance absorption peaks are observed in the $\mu'' - f$ spectrum:

the first resonance peak around 5.0 GHz is due to natural resonance and the other two resonance peaks corresponding to higher frequencies are due to exchange resonance. The peak with minimum RL value moves to lower frequencies and the reflection loss value increases from with the increase of the absorber's thickness [3].

Spherical (sample A), chain-like (sample B), and flake-like (sample C) cobalt powders are synthesized on a large scale through simple chemical liquid reduction method by Wen et. al. Based on uniformly dispersing samples into a paraffin matrix, morphology-dependent electromagnetic responses in GHz range, including permittivity and permeability, are investigated for these three cobalt powders in the microwave frequency of 2-18 GHz. The calculated reflection loss (RL) indicates as-prepared samples have potential application as a candidate for microwave absorption. The maximum RL of sample A is -15.28 dB at 12.85 GHz with a matching thickness of 2.5

mm. The maximum RL of sample B is -28.05 dB at 5.74 GHz corresponding to a thickness of 2.0 mm, and the maximum RL of sample C is -41.17 dB at 5.10 GHz with a thickness of 2.5 mm [16].

Co-filled carbon nanotubes composites were synthesized via using a simple and efficient wet chemistry solution method by Lin et. al. The reflection loss (RL), matching frequency and matching thickness were calculated using the theory of the absorbing wall. The electromagnetic properties and microwave-absorbing characteristics effects of the modified carbon nanotubes by the encapsulation of metal Co were investigated. A matching thickness is found corresponding to a matching frequency. The maximum reflection loss is about -39.32 dB and the bandwidth corresponding to the reflection loss below -10 dB is 3.47 GHz in the 2-18 GHz frequency range. With increasing thickness, the maximum reflection loss shifts to lower frequency [4].

The electromagnetic properties of pure MWCNTs composites and Co-MWCNTs composites were studied by Tianjiao et. al. To sum up, the pure MWCNTs composites with a filler concentration of 2 wt% had an intense absorbing peak at 15.20 GHz, where the highest reflection loss (R) reached -21.41 dB. Compared to the pure MWCNTs composite at the same concentration, the Co- MWCNTs composites showed a higher impedance which implies a better potential absorbing property and makes Co-MWCNTs probable to be utilized in electromagnetic absorbing field [17].

Long length multi-walled carbon nanotubes (MWCNTs) were synthesized in-house by chemical vapor deposition and their reinforced polyurethane (PU) based composites were fabricated using solvent casting followed by compression moulding technique by Gupta et. al. Electromagnetic interference (EMI) shielding effectiveness of these composites was investigated in the frequency range of 8.2–12.4 GHz (X-band). The experimental results indicate that the EMI shielding effectiveness of the composites is achieved up to –41.6 dB at 10 wt% loading of MWCNT, indicating the usefulness of this material for EMI shielding in the X-band [18].

Thin MWCNT- polymethyl methacrylate (PMMA) and MWCNT- polystyrene (PS) composite films containing 0.1–10 vol% CNTs were fabricated using solvent casting method by Mathur et. al. Conductivity of the films increased with increasing nanotube content with a percolation threshold of about 0.5%. EMI shielding effectiveness of about 18 dB was achieved suggesting the use of these composites as effective EMI shielding materials in X-band frequency range [19].

The preparation and characterization of CNTs/polymer (PET, PP, PE and varnish) composites were studied for microwave absorption applications in the range of 2–18

GHz by Zhuangjun et. al. The results indicated the position of reflectivity peak moves to a lower frequency and the loss factors of composites increase with increasing CNTs concentrations. When CNTs concentration was above 4 wt%, there was a sharp increase of loss tangent. 4 wt% CNTs/PET and 8 wt% CNTs/varnish composites had considerable absorbing peak at 7.6 GHz, 15.3 GHz and achieved maximum absorbing value of -17.61 dB, -24.27 dB, respectively. In addition, the frequencies range for absorbing values exceeding -5 dB of CNTs/(PET, PP, varnish) composites are 13 GHz, 10 GHz and 6 GHz, respectively [20].

The electromagnetic characteristics of Co(C) embedded in paraffin at 10, 40, 50, 70, and 80 wt%

(2, 10, 15, 29, and 41 vol%, respectively) at 2–18 GHz were investigated by Danfeng et. al. The major electromagnetic absorption mechanism was dielectric loss. The minimum calculated reflection loss (RL) was -52 dB at 7.54 GHz with 50 wt% Co(C) for a 3-mm Co(C)/paraffin composite. The measured RL of a Co(C)/epoxy coating with 40 wt% loading at 3mm showed good agreement with that of calculated reflection loss. The electromagnetic property of Co(C) can be tailored through both control Co(C) concentrations and coating thickness [21].

Porous carbon/Co nanocomposites were fabricated by a sol-gel method. The electromagnetic parameters were measured in the 2–18 GHz range by Liu et. al. Compared with porous carbon composite, porous carbon/Co nanocomposite has larger dielectric loss due to the enhanced interfacial polarization relaxation loss and Ohmic loss. The maximum reflection loss of the porous C(Co) nanocomposite can reach -40 dB at 4.2 GHz with 5 mm in thickness and the primary microwave absorptive mechanism is ascribed to the dielectric loss [22].

The electromagnetic (EM) characteristics of the carbon nanotubes/carbonyl iron powders (CNTs/CIPs) complex absorbers synthesized by mixing CNTs with CIPs were studied at 2–18 GHz by Tong et. al., for the aim of the absorbing coating with thinness, lightness, width, and strength. Compared with CIPs, the CNTs/CIPs composites had higher electrical conductivity, permittivity, and dielectric loss, which gradually increased with the increasing CNTs content (wt%). Among them, with wt = 2.2 %, a reflection loss (RL) exceeding -20 dB was obtained in the frequency range of 6.4–14.8GHz for a coating thickness of 1.2–2.5mm. Particularly, a minimum reflection loss of -33.3 dB was found at 11.2GHz corresponding to a matching thickness of 1.5 mm [23].

II. Conclusion:

CNTs have prospective applications as radar absorbing material. It is concluded that, encapsulated metals in the nanotubes have substantial effects on the dielectric and magnetic properties which leads to enhanced reflection loss characteristics and with magnetic

modification make it better candidate for microwave absorption. Metal filled/coated CNTs provide better mechanical and absorption properties due to the fact that the energy level of encapsulated metals in the carbon nanotubes are not continuous but split because of quantum confinement effect. When an energy level is in the range of microwave energy, the electron will absorb a photon to hop from a low energy level to a higher one. Also, the defects and suspending bands can cause multiple scattering and interface polarization, which provides another important absorbing mechanism. Metal filled/coated CNTs with polymer provide enhancement in electrical properties and mechanical properties.

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REVIEW & ANALYSIS OF MOVING OBJECT FRAME CAPTURING THROUGH REAL TIME VIDEO.

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***Abstract*--Constant moving article identification in unconstrained scenes is a troublesome assignment because of dynamic foundation, changing closer view appearance and restricted computational asset. Right now, optical stream based moving item location outline work is proposed to address this issue. Homography grid's to online develop a foundation model as optical stream. When making a decision out moving forefronts from scenes, a double mode judge instrument is intended to elevate the framework's adjustment to testing circumstances. In try section, two assessment measurements are re-imagined for all the more appropriately mirroring the presentation of techniques. We quantitatively and subjectively approve the adequacy and practicality of our technique with recordings in different scene conditions. The exploratory outcomes show that our strategy adjusts to various circumstances and beats the cutting edge strategies, demonstrating the benefits of optical stream based techniques.**

***Keywords*—Object Detection, Frames, Real Time Video, Video Processing, Image Processing.**

I. INTRODUCTION

Right now, study the recognition of moving article. Targeting recognizing moving items from complex scenes, numerous techniques have been proposed and created inside and out. As moving item is characterized by its condition of movement, it cannot be excellently recognized by a component based well-prepared classifier like. This basic assignment is dealt with by certain structures, which can be arranged generally into two classifications: one is breaking down closer view and foundation together to separate them into two classes The other is to get a discriminant foundation model for making a decision out the frontal area focuses. For instance, Tom et.al, utilized factual models Dirichlet process Gaussian blend model (DP-GMM). [1] Cui et.al. and Zhou et.al. displayed the foundation as a low position lattice. Also, the others utilized Fuzzy Models Robust Subspace Models Sparse Optical Flow Velocity Field Models, et.al. Techniques referenced above, somewhat, can arrive at a specific level forefront extraction. In any case, they for the most part work under some solid requirements like under stationary scenes, utilizing group preparing or requiring worldwide enhancement.

To dispose of these requirements, we propose an optical stream based system. The structure receives the foundation displaying technique yet models the foundation online just as in the scenes at the same time including foundation and closer views, which is unique in relation to. At that point gauge a moderate variable (i.e. the homography framework) which can give a parametric portrayal of the sensor's movement. Dissimilar to numerous different works, who gauge the homography framework utilizing pointsets got by point following calculation LK [2] or KLT, we get point sets utilizing the optical stream field legitimately. This can abstain from presenting additional calculation cost and abstain from presenting temperamental data as the following calculations LK and KLT are managed without worldwide advancement. At last the foundation is displayed as optical stream utilizing the homography grid.

In this manner, the moving forefronts are made a decision out by setting a limit for the distinction between the optical stream gave by optical stream evaluating calculation and that gave by the foundation model. [3-4] To expand the precision of judgment and reinforce the framework's adjustment to various circumstances, a double mode judge instrument is acquainted right now manage the issue brought about by the sensor's apparent zooming.

In analyze section, two assessment measurements are reclassified. In such a case that the F-Measure assessment metric is characterized as in et.al, the outcomes in the edges that contain little closer view add little effect on the video-level outcome. We figure outline level exactness, review and F-Measure first, and the video-level outcome is gotten by averaging over all edges in a similar video. Right now, empower the assessment measurements to manage a few recordings that contain lopsided size of closer view in various casings, and to all the more appropriately mirror the strategies' capacity of identifying forefront. We test the heartiness of the strategy utilizing ten recordings with different scene conditions. Our strategy subjectively and quantitatively beats cutting edge calculations right now. Besides, we likewise test the effectiveness of the proposed structure inside and out and offer some guidance for functional applications.

II. RELATED WORK

Right now, survey late calculations for moving item location as far as a few primary modules: Gaussian model based, optical stream model based and optical stream angle based. Gaussian Model Based. The strategy proposed in utilized Dual-Mode Single Gaussian Model (SGM) to demonstrate the foundation in framework level, and used homography lattices between back to back casings to achieve movement compensation by blending models. Frontal area was made sense of by assessing the component's adjustment to the comparing SGM. Profiting by Dual-Mode SGM, the strategy can diminishthe closer view's contamination to the foundation models. Butt-centric ogously,

Yun and Jin [5], and Kurnianggoro et.al, [6] utilized a frontal area likelihood guide and straightforward pixel-level background models individually to tweak the outcome acquired in. Technique depends on SGM and introduced a full covariance grid of the pixel models to accomplish the movement remuneration. The foundation model built and refreshed by these strategies do not have a reflection to the embodiment of the issue. They are touchy to parameters and absence of power to various scenes.

Optical Flow Model Based. Kurnianggoro et.al, [7] modeled the foundation utilizing zero optical stream vectors. In the wake of utilizing a homography grid to adjust the past casing, thick optical stream was assessed between the aftereffect of adjusting and the present casing. At last a basic optical-stream greatness edge was utilized to make a decision out the closer view focuses. As the homography grids are utilized for adjusting, the foundation model and the judge system built by this strategy are too easy to even think about dealing with unpredictable unconstrained scenes.

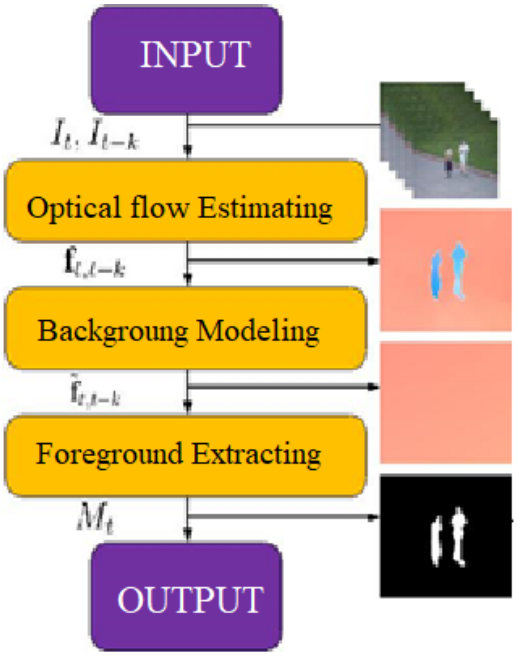

Fig.1: Visualization of Moving Object Detection Frame-Work.

III. Proposed Methodology

Discovery of moving articles and movement based following are significant segments of numerous PC vision applications, including action acknowledgment, traffic checking, and car security. The issue of movement based item following can be separated into two sections:

Identifying moving items in each edge Associating the identification relating to a similar article after some time. The recognition of moving articles utilizes a foundation subtraction calculation dependent on Gaussian blend models. Morphological tasks are applied to the subsequent closer view cover to wipe out clamor. At last, mass examination recognizes gatherings of associated pixels, which are probably going to compare to moving articles.

The relationship of recognition to a similar item depends entirely on movement. The movement of each track is assessed by a Kalman channel. [8] The channel is utilized to foresee the track's area in each casing, and decide the probability of every discovery being allotted to each track.

Track support turns into a significant part of this model. In some random casing, some location might be doled out to tracks, while other recognition and tracks may stay unassigned. The appointed tracks are refreshed utilizing the comparing discovery. The unassigned tracks are stamped imperceptible. An unassigned identification starts another track. [9] Each track keeps tally of the quantity of back to back casings, where it stayed unassigned. In the event that the tally surpasses a predefined limit, the model expect that the article left the field of view and it erases the track.

IV. Proposed Algorithm

The calculation recognizes and tracks moving articles in factor foundation in three primary advances: 1) by evaluating and altering pseudo movement, 2) by investigating ongoing history of a casing by estimating state vector of an object and solving association problem

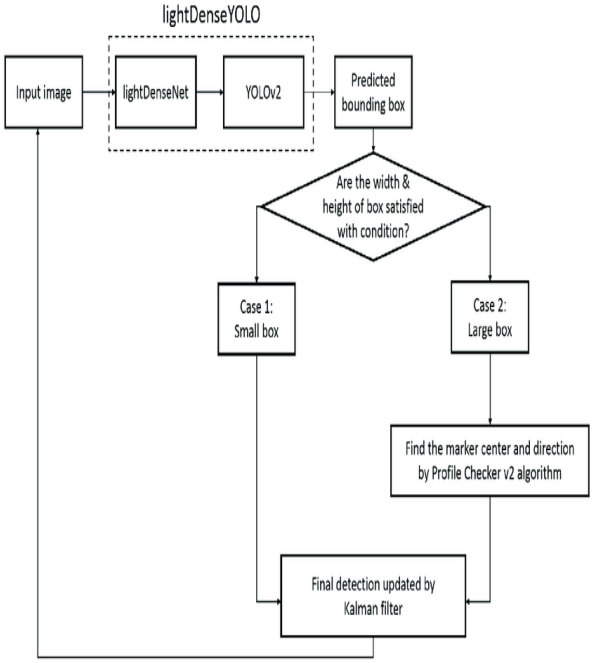

Fig. 2: Flow Chart of Proposed Algorithm

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V. COMPARISON

Here is the table below comparison of different methods, the various methods are as follows:

A. Detection using Harris corner inside masking operation.
B. Temporal differencing and the background subtractions inside using blobs.
C. Combination between foreground modeling and the background subtraction.
D. Edges detection techniques. (Canny)

S.no.	Method	Processing time (Sec)	Detection Region(Pixels)	Ratio (Pixels/sec)
1	A	4.258881	2324	545
2	B	0.138505	6701	48380
3	C	0.887163	9592	10811
4	D	0.3206	9606	9712

Table 1: Comparison of Various techniques.

VI. CONCLUSION

We propose an optical stream based system for continuous moving item recognition in unconstrained scenes. The foundation model is developed as optical stream using homography lattices, and a double mode judge component is acquainted with increase the framework's adjustment to various circumstances. In analyze section, two assessment measurements are re-imagined for all the more appropriately mirroring the presentation of the strategies. The quantitative and subjective outcomes acquired by our system beat the best in class strategies showing the upsides of optical stream based technique. At long last, the exactness and casing pace of the optical stream estimation calculation are the essential of the accomplishment of our casing. With the advancement of optical stream estimation calculation, the presentation of our structure will correspondingly improve.

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Design and development of Bidirectional Visitor Counter with Automatic Room Light Controller using Arduino

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Keywords: Arduino, LCD, LED, Visitor Counter

ABSTRACT

This manuscript proposes the way to develop the Bidirectional Visitor Counter with Automatic Room Light Controller using Arduino which is used to count the visitors of any entry/exit point. The developed system counts both the entering and exiting visitor of the auditorium or hall or other place, where it is placed. Depending upon the sensors interruption, the system identifies the entry and exit of the visitor .On the successful implementation of the system, it displays the number of visitors present in the auditorium or hall. This is an economical cost reducing system when implemented in places where the visitors have to be count and controlled. Counting the visitors can be time consuming so it helps to maximize the efficiency and effectiveness of employees, time saving and sales potential of an organization etc.

INTRODUCTION

Bidirectional Visitor Counter with Automatic Room Light Controller is a reliable circuit that takes over the task of controlling the room lights as well as counting number of person's visiting the room very accurately. When somebody enters into the room then the counter is incremented by one value and the light in the room will be automatically switched ON and when anyone leaves the room then the counter is decremented by one value and the light will be only switched OFF until all the persons in the room go out.The total number of persons inside the room is also displayed on the LCD display. The Arduino does the above job. It receives the signals from the sensors and this signal is

operated under the control of software called Arduino (328). Also in addition the total number of person in the room be incremented value or decremented value will always be displayed on the LCD thus makes this system a very user friendly. This manuscript has been divided into four main sections namely Introduction, Methodology, Project and Working and Conclusion, where the working has been explained in the third section.

Although not same but many related work have been done by many researchers. Some of the papers have been studied and described below .

Asha Rawat, et al. [2016] has done an "Automated Room Light Controller With Visitor Counter " [1]. The main purpose of the project is automation, saving electricity, increasing appliance life span and yet providing a desired output smartly .

SubhankarChattoraj, Aditya Chakraborty et al [2016] has done a "Bidirectional Visitor Counter With Automatic Room Light Controller and Arduino as the master controller [2]". This paper gives the basicidea how to control the bidirectional visitor counter and room light counter usingArduino Mega and Arduino (IDE). The cost of this technology is very economical.

Sonali K. Pawar et al [2016] has done a "AUTOMATIC ROOM LIGHT CONTROLLER USING MICROCONTROLLER AND VISITOR COUNTER "[3]. This digital world technology is very advanced and we prefer things to be done automatically without any human efforts. Also it is very useful to conserve resources.

E.Shilpa et al [2014] has done a "Implementation of Automatic Room Light Controller with Visitor Counter Design using 8051 Microcontroller "[4].This project compacts with the usage of the energy in this competitive world of electricity. This project is well organized enough to let someone know about the accuracy of the person entered and have taken the exit from the room.

D.HariPriya et al [2014] has done a "Gas Leakage System "[5]. The heart of this paper here is a LPG gas leakage sensor circuit that detects the outflow of LPG gas and circuit is gas sensor module SEN 1327.QM 6 gas sensor is used in the SEN 1327 module.

Kaushik SEN et al[2015] has done a "Automated Fire Detection and Controlling System "[6]. In this paper

basically a low cost fire detection and control system based on smoke and heat detection is proposed. It is comprised of a combination of electrical/electronic devices/equipments working together to detect the presence of fire and alert people through audio and visual medium after detection.

Winfred Adjardjah et al[2016] has done "Design and Construction of a Bidirectional Digital Visitor Counter "[7]. This paper presents the design and construction of a digital bidirectional visitor counter (DBVC). The DBVC is a reliable circuit that takes over the task of counting number of person/visitors in the room very accurately and beeps a warning alarm when the number of visitors exceeds the capacity limit of the auditorium/hall.

Gaurav Warakaret al [2016] has done "Automated Room Light Controller with Visitor Counter "[8]. This paper presents design and construction of a digital bidirectional visitor counter. This is reliable project that takes over the task of counting number of visitors in the room.

Kimbley et al[2016] has done "AUTOMATIC ROOM LIGHT CONTROLLER USING MICROCONTROLLER AND VISITOR COUNTER"[9]. The Project 'Automatic Room Light Controller Using microcontroller ATMEGA 16A and bidirectional visitor counter ' controls a room light as well as count the number of individuals entering and leaving a room. When an individualenters into a room then one counter is incremented by one and one light in a room will be switched ON and when the individuals leaves a room then the counter is decremented by one.

SibuSkaria et al [2014] has done a "Automatic Lighting Controller "[10]. Based on the paper title, "AUTOMATIC LIGHTING CONTROLLER ", controls the amount of lighting in a room by constantly monitoring the level of luminance in a room. Lights are then controlled such that required illumination is available in the room. It can be applied effectively in commercial buildings, homes, colleges etc.

Wastage of electricity is one of the main problems which we are facing now-a-days. In our home, school, colleges or industry we see that fan and lighting point are kept on even if there is nobody in the room or area and passage. This happens due to negligence or because we forgot to turn lights off or we are in a hurry. To avoid all such situations this project called "Bidirectional Visitor Counter with Automatic Room Light Controller" is

designed. This project has two modules, first one is known as "Digital Visitor counter" and second module is known as "Automatic room light controller" and third one is. Main concept behind this project is known as "Visitor counter" which measures the number of persons entering in any room like seminar hall, conference room, hotel rooms. This function is implemented using IR diode and photodiode. Here Arduino receives the signals from the sensors, and this signal is operated under the control of software which is stored in the ROM.

LCD display placed outside the room displays this value of person count. This person count will be incremented if somebody enters inside the room and at that time lights are turned on. And in reverse way, person count will be decremented if somebody leaves the room. When number of persons inside the room is zero, lights inside the room are turned off.

The hardware part mainly consists of aArduino Board, a Photodiode, an IR diode, 741 IC, Relay, 16*2 LCD display, Male Header and Female Header, which is being discussed along with their specific functions.

A. Arduino Board

An Arduino board [11] historically consists of an Atmel 8-, 16-or 32-bit AVR microcontroller with complementary components that facilitate programming and incorporation into other circuits. An important aspect of the Arduino is its standard connectors, which let users connect the CPU board to a variety of interchangeable add-on modules termed shields. Some shields communicate with the Arduino board directly over various pins, but many shields are individually addressable via an I^2C serial bus—so many shields can be stacked and used in parallel. It provides 14 digital I/O pins, six of which can produce pulsewidth modulated signals, and six analog inputs, which can also be used as six digital I/O pins. This board has a 5 volt linear regulator and a 16 MHz crystal oscillator.

B. Photodiode

A photodiode is a semiconductor device that converts light into an electrical current. The current is generated when photons are absorbed in the photodiode. Photodiodes may contain optical

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filters, built-in lenses, and may have large or small surface areas. Photodiodes usually have a slower response time as their surface area increases. The common, traditional solar cell used to generate electric solar power is a large area photodiode. Photodiodes are similar to regular semiconductor diodes exce pt that they may be either exposed (to detect vacuum UV or X-rays) or packaged with a window or optical fiber connection to allow light to reach the sensitive part of the device. Many diodes designed for use specially as a photodiode use a PIN junction rather than a p–n junction, to increase the speed of response. A photodiode is designed to operate in reverse bias [12].

C. IR Diode

An Infrared light emitting diode (IR LED) is a special purpose LED emitting infrared rays ranging from 700 nm to 1 mm wavelength. Different IR LEDs may produce infrared light of differing wavelengths, just like different LEDs produce light of different colors.IR LEDs are usually made of gallium arsenide or aluminium gallium arsenide. In complement with IR receivers, these are commonly used as sensors [12].

D. OP AMP(IC 741)

The IC 741 operational amplifier looks like a small chip. The representation of 741 IC op-amp is given below that comprises of eight pins. The most significant pins are 2, 3 and 6, where pin2 and 3 denote inverting & non-inverting terminals and pin6 denotes output voltage. The triangular form in the IC signifies an op-amp integrated circuit. The current version of the chip is denoted by the famous IC 741 op amp. The main function of this IC 741 is to do mathematical operations in various circuits. IC 741 op amp is made from various stages of transistor which commonly have three stages like differential i/p, a push-pull o/p and an intermediate gain stage. The differential op-amps comprises of a set of FETs or BJTs [13].

E. Relay

The relay is the device that open or closes the contacts to cause the operation of the other electric control. It detects the intolerable or undesirable condition

with an assigned area and gives the commands to the circuit breaker to disconnect the affected area. Thus protects the system from damage. It works on the principle of an electromagnetic attraction. When the circuit of the relay senses the fault current, it energizes the electromagnetic field which produces the temporary magnetic field [14].

F. Liquid Crystal Display (LCD)

Liquid Crystal Display screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD [15].

G. Pin Header Connectors

Pin header connectors comprise several different means of connection. Generally, one side is a series of pins which are soldered to a PCB, and they can either be at a right-angle to the PCB surface (usually called "straight") or parallel to the board's surface (confusingly referred to as "right-angle" pins). Such connectors come in a variety of pitches, and may have any number of individual rows of pins [16].

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METHODOLOGY

In this manuscript our main aim is to propose model for visitor counter. The major steps which have been followed while proposing the model are as explained below.

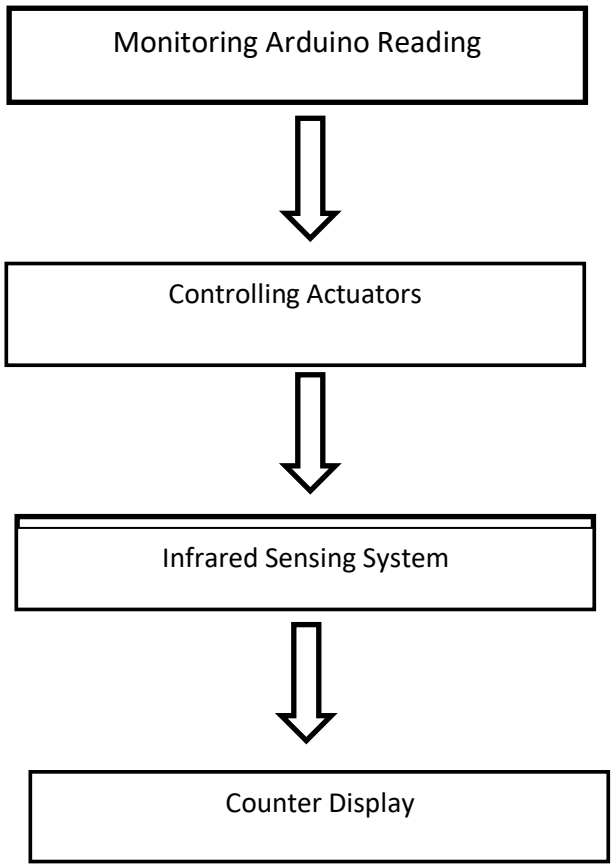


Fig 1: Procedure to design the project

A. Monitoring Arduino Reading

Arduino enables users to monitor various kinds of sensors such as IR sensor and motion detectors in real-time. The analog and digital pins on the Arduino board can serve as general purpose input and output pins (GPIO).Usually The ATmega328 microcontroller embedded on the Arduino board contains the analog-to-digital converter (ADC), which converts the analog input signal to a number between 0 and 1023.

The integer number is always proportional to the amount of the voltage being applied to the analog input. Any sensor operating

on 5 volts can be directly connected to the Arduino board. The prototype has been implemented on the board.

B. Controlling Actuators

The triggering is finally done by Arduino gateway. While monitoring sensors in real-time, the Arduino takes action in real time to control the on/off of the led and controlling the buzzer.

In this system it has two section one the transmitter section where the power supply and the light output is given. The other one is the receiver section where light input is taken and implemented on enters sensor circuit and exit sensor circuit.

C. Infrared Sensing System

The IR sensor modules contain IR diodes, potentiometer, Comparator (IC 741) and LED's. Potentiometer is used for setting reference voltage at comparator's one terminal and IR sensors sense the object or person and provide a change in voltage at comparator's second terminal. Then comparator compares both voltages and generates a digital signal at output one for enter sensor & second for exit sensor circuit.

D. Counter Display

In this section we have used LCD to display number of persons in the room. The system is designed using the Arduino (328) platform. When Arduino check for zero condition (Zero condition means no one in the room) and finds it is true then Arduino turn off the bulb by deactivating the relay through transistor. And if zero condition is false then Arduino turns on the light. Here is two functions for enter and exit. This increment or decrement is displayed in LCD.

PROJECT AND WORKING

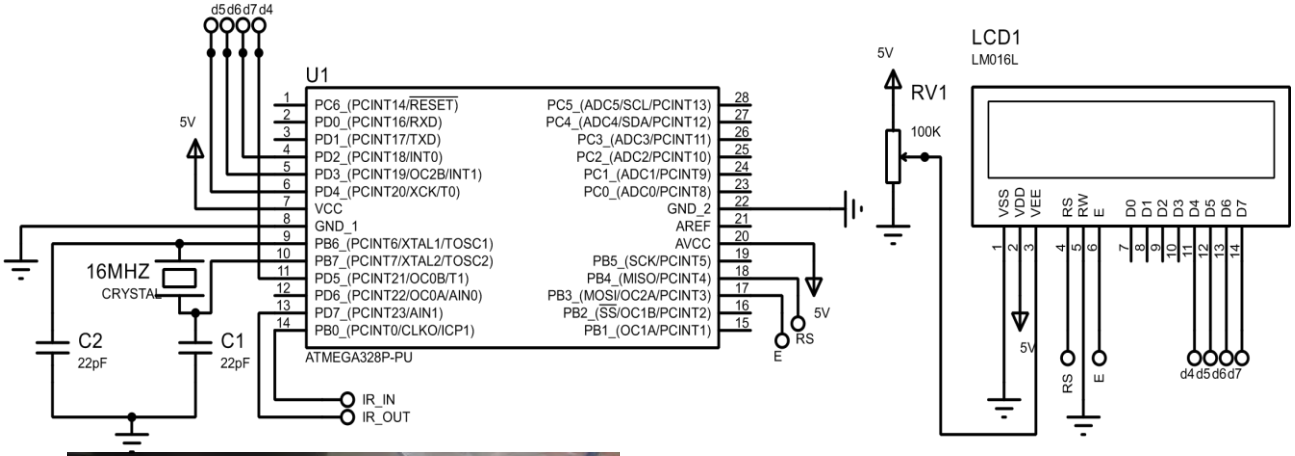
In order to implement and demonstrate the system developed theoretically, we created a circuit that represents the system. Thus the whole system that is being developed is given below.

Fig 2: Circuit Diagram

 ISBN 978-81-945285-0-0

From this figure given here we can see different parts of the circuit board that is developed, which is connected with the Arduino`s digital and analog pins where it is required. The image of the visitor counter panel designed by Arduino is given below which consists of all the components mentioned above.

because it is low cost, low noise, excellent



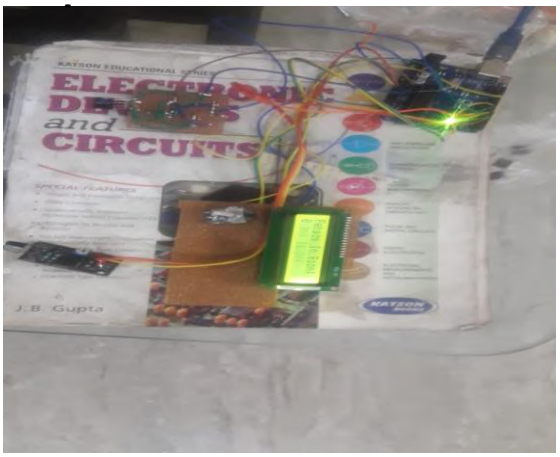


Fig 3: A complete circuit

CONCLUSION

The smart home appliance control system was designed and developed for minimizing the wastage of electricity. We have used 5V from Arduino board and used 12V DC power supply for relay connection. We have used photodiode

linearity in output photocurrent over 7 to 9 decades of light intensity and fast response times. Finally, we have designed and developed an Arduino based smart home appliance control system.A novel architecture for an economic Bidirectional Visitor Counter and Room Lighter Controller is proposed and implemented in this paper. It gives basic idea of how to control the bidirectional visitor counter and room light counter using Arduino. The cost of this technology is very economical. This project uses low cost off the shelf components, and is based on Arduino platform which is FOSS (Free Open Source Software). So the overall implementation cost is very cheap and is affordable by a common person. This low cost system is designed to improve the

living standard and complexity of visitors counting. It provides accurate data and eliminating the error where possible.

FUTURE WORK SCOPE

For future work, some recommendation can be made like, addition of cameras through which not only counting is done but also the image can be stored precisely. Wireless connectivity can be added to system, by controlling the Wi-Fi modules. The whole system can be fabricated as economic commercial hardware package. So we have a big work scope in this sector. We hope that, we will be able to complete all the features needed for its ultimate applications.

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Survey Of Digital Image Processing Used Compression Techniques For Remove Redundancy

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Abstract— **Image processing is used in order to enhance, smoothening, filtering etc. the image. There are number of techniques which are suggested in order to enhance and smoothening the image. When images merged together than pixels may overlap with each other and remove redundancy. In our paper we will analyze this redundancy problem. We will also try to adjuster the problem. In order to build a base we have analyze large number of papers. Some of the papers have described the problem of redundancy. In this paper review of those papers has been conducted.**

Keywords- Image Processing, Lossy Compression, Lossless Compression.

I. INTRODUCTION

Today even the naïve user is using the computer. Naïve users do not now much command associated with the computers. So in order to make them understand the computer, Graphical User Interface is required. This interface will be provided with the help of applications of image processing. So main application of image processing is in the field of interface designing. The interface is important as it will lead to the success or failure of the system. When interface is designed we may required in order merging multiple images together. When this happens pixels may overlap with each other. This overlapping of pixel will cause redundancy in the images. Redundancy within the image will cause number of problems. The redundancy will cause extra space requirements. Hence when redundancy is present than extra cost will be encountered. The redundancy can also be present due to compression technique which is used. The compression method can be lossy or lossless in nature. The redundancy problem is common in lossless compression.

Image Compression Techniques

There are number of image compression techniques which are available to be used. Each compression technique which is used is complex in nature. Compression techniques are divided into following categories.

a) Lossy Compression

b) Lossless Compression

a) Lossy Compression Technique

(i) Transformation Coding

In this technique Discrete Fourier transformation is used. In this technique the pixel in original image is changed to frequency domain. The overall energy of the entire pixels are concentrated on the few necessary pixels. Only some significant pixels are selected and rest of the pixels is rejected.

(ii) Vector quantization

In this case dictionary of code vectors are prepared. Code vector is the block of pixel values. The given image is then divided into parts. This is known as image vector. The image vector is than compared with the code vector in order to determine the code for the given image.

(iii) Fractal Coding

The idea behind this encoding is to divide the image into parts. The image will be divided into parts on the basis of colors, edge detection etc. The technique is useful in case image contain redundancy.

(iv) Block Truncation Coding

The image in this case is divided into block of non overlapping pixels. For each block threshold and reconstruction values are determined. The values of the block will then be compared against the threshold values. If the pixel values are greater than the threshold values than the pixel values will be rejected. This technique is not useful if the redundancy is presented within the images.

b) Lossless Compression Techniques

(i) Run Length Encoding

This is very simple form of encoding. In this case encoding the larger set of string is replaced with the smaller set of code. The Run Length Encoding is useful in a system where large number pixels repeat itself. In order to describe this system we will take following example of string

1122223344444444444443333333333333222222222255555555555

{1,2}, {2,4},{3,2},{4,13},{3,13},{2,10},{5,11}

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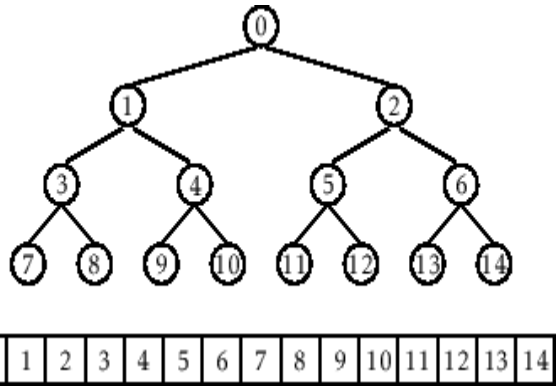
In this type of encoding the frequency of each digit is included within the braces along with the digit itself.

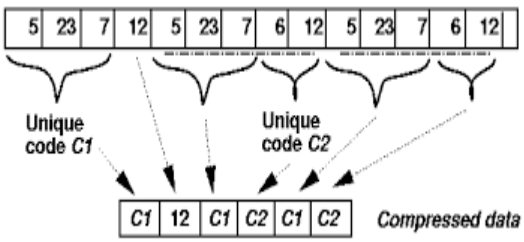
Huffman Encoding is used to encode the given image into set of codes. The codes can be represented in the form a tree. The reverse approach is followed in order to formulate a code. The code is generally represented in the form of a binary string.



The last two bits are extracted and then added together to achieve the value of the root node. This process continues until the root node is reached or tree terminated.

(ii) LZW Coding

LZW (Lempel- Ziv – Welch) is a dictionary based coding.[1]Dictionary based coding can be static or dynamic. The static dictionary coding describes dictionary as a fixed during the encoding and decoding processes. The dynamic dictionary coding describes the dictionary as updated on fly. LZW is widely used in computer industry and is implemented as compress command on UNIX.



II. RELATED WORK

There are number of papers which described the problem of redundancy in images. In order to build the base we analyze number of such papers. Some of the papers which we have studied will be described in this section. Redundancy will make certain portion of the image much brighter than the other portion of the images. [2]This paper considers the compression technique for jpeg images. The jpeg images are common extension for the images which are being transferred. The transferred images will be compressed so that image should not take much space over the transmitted medium. The transmission media will charge expenses if the data transferred are large. So compression is required. Discrete cosine transform is used in this case to compress the image. If image is compressed properly than less bits per image is required to represent the image. Hence the mechanism of image compression will help in decreasing the cost associated with the image storage. [3] In addition to the redundancy image processing also contains the problem of noise. This considered paper considers the impact of noise on the image. The impact of noise will cause distorted image.[3]Image de-noising via sparse and redundant representations over learned dictionaries will be considered in this case. The advantages of the redundancy will be shown. In other word the positive side of the redundancy will be considered in this case.[4] There are number of types of redundancy which are present within the image. The pixels will have large spaces in between the pixels. This is known as inter pixel distance. In order to reduce the distance compression techniques are followed. In order to efficiently compress the images compression techniques are used. Compression technique which is suggested in this paper includes lossless and lossy compression. The redundancies which are considered are inter pixel, coding and Psycho visual. [5] The image compression will be considered in this case. Image compression is required so that the space requirements can be reduced. The image compression will be required to reduce the redundancy. The type of redundancy which is considered in this case will include Psycho visual. This redundancy indicates sensitivity to different images by human eye. So some unnecessary information from the image can be rejected. [6] Image compression techniques are considered. The image compression will be used so that relatively less pixels should be used in order to represents the image. Sometimes image does not contain any relevant data. In that case that irrelevant information has to be eliminated. This is accomplished with the help of compression techniques. [7] The concept of medical images is considered in this case. The MRI is a form of images which are used in the area of medical field. Various types of redundancies are present within the images. These redundancies are eliminated by the use of compression techniques. In this paper the area of concern is medical images. [1]The study of various image compression techniques are considered in this case. Principal Component Analysis technique is considered in this case. Image f(x,y) is fed into the encoder, which creates asset of symbols form the input data and uses them to represent the image. If we let n1 and n2 denote the number of information carrying units(usually bits) in the original an encoded images respectively, the compression that is Achieved can be quantified numerically via the can be quantified numerically via the compression ratio. The main area of concern is Huffman coding, LZW coding etc. PCA technique suggested in this paper is based upon two factors data reduction and interpretation.

In machine learning, design acknowledgment and in picture handling, highlight extraction begins from an underlying arrangement of measured information and manufactures inferred values (highlights) proposed to be educational and non-repetitive, encouraging the consequent learning and speculation steps, and now and again prompting better human elucidations. Include extraction is identified with dimensionality lessening. At the point when the information to a calculation is too vast to ever be prepared and it is suspected to be repetitive (e.g. a similar estimation in both feet and

meters, or the tedium of pictures exhibited as pixels), then it can be changed into a lessened arrangement of components (likewise named an element vector). Deciding a subset of the underlying elements is called highlight selection.[1] The chose components are relied upon to contain the significant data from the info information, so that the coveted assignment can be performed by utilizing this lessened portrayal rather than the total introductory information.

Include extraction includes decreasing the measure of assets required to depict an extensive arrangement of information. When performing investigation of complex information one of the real issues originates from the quantity of factors included. Examination with a substantial number of factors by and large requires a lot of memory and calculation control, likewise it might make a grouping calculation over fit to preparing tests and sum up ineffectively to new specimens. Include extraction is a general term for strategies for building blends of the factors to get around these issues while as yet depicting the information with adequate exactness.

The best outcomes are accomplished when a specialist builds an arrangement of use ward features, [citation needed] a procedure called highlight designing. All things considered, if no such master learning is accessible, general dimensionality diminishment systems may help.[1] These include: Free part examination, Is map, Part PCA, Inert semantic examination, Incomplete, slightest squares, Vital part examination, Multifaceted dimensionality lessening, Nonlinear dimensionality lessening, Multilinker Principal Component Analysis, Multilinker subspace learning, Semi definite inserting, Auto encoder, Profound element union

The variety of numerical apparatuses is available and effectively attempting to in the field of picture handling. The primary issue with graphical validation system is that, the pictures are of expansive size, preparing is moderate. A picture is handled when we begin extricating information from it. A picture for the most part experiences some upgrade ventures, to enhance the extractability of intriguing information and die down other information. The Principal Component Analysis (PCA) is a standout amongst the best procedures that have been utilized as a part of picture acknowledgment and pressure.

Picture preparing comprises of a wide assortment of procedures and scientific instruments to handle an information picture [1]. Broad research has been done in the territory of picture preparing in the course of the most recent 30 years [2]. Picture preparing has a wide range of uses. A portion of the essential ranges of utilization are business, pharmaceutical, military, and robotization. Picture preparing has been characterized as a wide assortment of methods that incorporates coding, separating, improvement, reclamation enrollment, and examination [4]. There are two distinctive ways to deal with picture handling, simple preparing and advanced preparing. Computerized picture preparing is handling of two dimensional pictures by an advanced PC. An advanced picture is spoken to by a variety of frequently separated and little quantized specimens of the picture. Two procedures that are identified with any computerized framework are testing and quantization. At the point when a photo is digitized, it is spoken to by consistently dispersed examples of this photo. These quantized examples are called pixels. The variety of pixels that are prepared by and by can be very extensive. To speak to a conventional high contrast (TV) picture carefully, a variety of 512 × 512 pixels is required. Every pixel is spoken to by a 8 bit number to permit 256 dark levels. Subsequently a solitary TV picture needs around 2 × 106 bits. Advanced picture handling incorporates a wide assortment of methods and numerical devices [5] Main Component Analysis is the general name for a system which utilizes refined basic numerical standards to changes various conceivably corresponded factors into fewer factors called foremost segments [8]. PCA is a measurable technique under the wide title of component investigation. The motivation behind PCA is to lessen the expansive dimensionality of the information space (watched factors) to the littler inborn dimensionality of highlight space (autonomous factors), which are expected to portray the information financially. [8]–[10]This is the situation when there is a solid connection between's watched factors. The employments which PCA can do are expectation, excess expulsion, include extraction, information pressure, and so forth. Since PCA is a traditional strategy which can accomplish something in the straight space, applications having direct models are reasonable, for example, flag preparing, picture handling, framework and control hypothesis, interchanges, and so on. Confront acknowledgment has numerous appropriate ranges [9]. Besides, it can be sorted into face recognizable proof, confront characterization, or sex determination [10].

In regular day to day existence we watch that there exist certain connections between sets of factors The Mean, SD and fluctuation, are simply 1-dimensional. Informational indexes like this could be precipitation in a locale, farming creation, and tallness of the considerable number of individuals in a city, weights of the considerable number of individuals in a city. However numerous informational collections have more than one measurement, and the point of the factual examination of these informational collections is normally to check whether there is any connection between the measurements. For instance, we may have as our informational collection both the heaviness of the considerable number of understudies in a class, and the check they got for that paper or precipitation in a locale and horticultural creation of the area and so on. We could then perform measurable investigation to check whether the heaviness of an understudy has any impact on their stamp or increment of precipitation may come about an expansion in horticultural creation and so forth. Such kind of connection between two factors is called relationship.

Standard deviation and change just work on 1 measurement, with the goal that you could as it were ascertain the standard deviation for each measurement of the informational collection autonomously of alternate measurements. In any case, it is valuable to have a comparative apportion to discover how much the measurements differ from the mean as for each other. Covariance is such a measure. Covariance is constantly measured between 2 measurements. In the event that you ascertain the covariance between one measurement and itself, we get the fluctuation.

It speaks to a picture as a grid where each component has an esteem comparing to how brilliant/dull the pixel at the relating position ought to be shaded. There are two approaches to speak to the number that speaks to the brilliance of the pixel: The twofold class (or information sort). This relegates a skimming number ("a number with decimals") in the vicinity of 0 and 1 to every pixel. The esteem 0 compares to dark and the esteem 1 relates to white. Alternate class is called uint8 which allots a number in the vicinity of 0 and 255 to speak to the splendor of a pixel. The esteem 0 compares to dark and 255 to white. The class uint8 just requires approximately 1/8 of the capacity contrasted with the class twofold. We can change over amongst twofold and uint8.

When we store a picture, we ought to store it as a uint8 picture since this requires far less memory than twofold. When we are handling a picture (that is performing scientific operations on a picture) we ought to change over it into a twofold. Changing over forward and backward between these classes is simple. Make a point to utilize semi-colon after these charges. The accompanying table demonstrates to change over between the diverse arrangements. When we have perused a document, we presumably change over it into a force picture (a network) and work with this grid. When we are done we might need to spare the lattice speaking to the picture so as to keep on working with this framework at some other time. This is effectively done utilizing the summons spare and load. Presently the size shows that our picture is nothing else than a standard you may see that there is one lattice relating to the picture size and one framework called delineate in Matlab. All things considered, we have stacked an ordered picture. Keeping in mind the end goal to change over the listed picture into a power (dark scale) picture, utilize the ind2gray charge. Infrequently our picture may not be shown in dim scale despite the fact that you may have changed over it into a dark scale picture. You can then utilize the charge color map (dark) to "drive" Matlab to utilize a dim scale while showing a picture. Make a layout for coordinating by removing the face from the picture.

The main focus of all the papers studied is data compression and reducing the redundancy present within the image. The techniques which are suggested within the papers are very complex and time consuming.

III. Conclusion and Future Work

The papers we have analyzed study the compression techniques. The compression techniques which are specified are lossy or lossless in nature. All the suggested techniques use complex mechanisms in order to reduce the redundancies. In the proposed work we will use relatively simple mechanism to reduce the redundancy from the given image. The proposed method will use the buffer in order to store the threshold values which can be compared against the newly generated pixels to reject them if they are repeated.

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Load Balancing Algorithms in Cloud Computing: A Comparative Study

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Abstract- Cloud computing is exponentially growing phenomenon which has enhanced the use of network services, where, the proficiency of one node can be utilised by another node as per the uneven demand of the users. To accommodate this type of requirement in the proper and balanced way, load balancing techniques came into the existence. Load Balancing Techniques ensure the even distribution of the load on every individual node as well as higher resource utilisation and lower response time. This Manuscript demonstrates the comparative study of the various existing static and dynamic load balancing algorithms such as Equal Spread Current Execution, Round Robin, Throttled, Minimum Execution Time, Min-Min, Max-Min, A-Star, Switching, Genetic, Tabu Search, Central Load Balancer and Virtual Machine Load Balancer.

Keywords: Cloud Computing, *Load Balancing, LBT, CLB, VM*

I. INTRODUCTION

In the modern technical era, the cloud computing has become the hot cake of the market with the rapid changes in the internet technologies and it requires the efficient load balancing techniques for proper execution of the assigned jobs with in stipulated time period. A variety of scheduling algorithms are used by load balancers to determine which backend server to send a request to. Simple algorithms include random choice or round robin. Depending on who initiated the process, load balancing algorithms can be divided into the various categories as Sender Initiated, Receiver Initiated, Symmetric, Static, Dynamic etc. and have been explained in the following subsections [1]

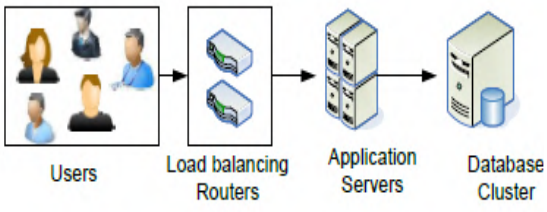

Figure 1: Schematics of highly available computers with load balancing

1.1 Round Robin Algorithm (RR)

In Round Robin Scheduling the time quantum play a very important role for scheduling, because if time quantum is very large then Round Robin Scheduling Algorithm is same as the FCFS Scheduling. If the time quantum is extremely too small then Round Robin Scheduling is called as Processor Sharing Algorithm and number of context switches is very high. It selects the load on random and found the situation that nodes are heavily or lightly loaded loaded. [2].

1.2Equally Spread Current Execution Algorithm(ESCE):

In this Algorithm, Load balancer maintains an index table of Virtual machines (VM) as well as number of requests currently assigned to the VM. If the request comes from the data centre to allocate the new VM, it scans the index table for least loaded VM. In case, there are more than one VM is found than first identified VM is selected for handling the request of the client/node, the load balancer also returns the VM id to the data centre controller. The data centre communicates the request to the VM identified by that id. The data centre revises the index table by increasing the allocation count of identified VM. When VM completes the assigned task, a request is communicated to data centre which is further notified by the load balancer. [3].

1.3 Throttled Load balancing Algorithm (TLB):

In this algorithm the load balancer maintains an index table of virtual machines as well as their states. The client/server first makes a request to data centre to find a suitable VM to perform the recommended job. The data centre queries the load balancer for allocation of the VM. The load balancer scans the index table from top until the first available VM is found. If the VM is found, the load data centre communicates the request to the VM identified by the id. Further, the data centre acknowledges the load balancer of the new allocation and the data entre revises the index table accordingly. The total execution time is estimated in three phases. In the first phase, the formation of the virtual machines and they will be idle waiting for the scheduler to schedule the jobs in the queue, once jobs are allocated, the virtual machines in the cloud will start processing, which is the second phase, and finally in the third phase the cleanup or the destruction of the virtual machines. [4] [5].

1.4 Minimum Execution Time: Heuristic Technique

This technique is applicable for both static and dynamic strategy and also known as Limited Best Assignment. This algorithm was designed to map each task to the virtual machine.

1.5 Min-Min Algorithm

In this heuristic technique, cloud environment elects the job with minimum size and Virtual Machine with least capacity. When the job is assigned to a particular VM, it is being eliminated from the queue and focussed is made to pursue for the allocation of the other unassigned jobs [6].

1.6 Max-Min Algorithm

This heuristic algorithm is also identical to the Min-Min algorithm except it elects the job with maximum size, whereas, chosen Virtual Machine also has the least capacity, then assigned job is removed from the queue and remaining jobs are allotted to the cloud resource [7].

1.7 Genetic Algorithm

This Algorithm is based on the individual chromosome as well as population. Load balancing metrics such as Throughput, fairness, makespan etc. may be considered as fitness value of chromosomes and population, further, these fitness values are also optimised. In the each iteration Genetic Algorithm executes Selection, Crossover and Mutation. Distinguished Researchers have assumed the chromosome size as the total number of jobs available in the cloud computing.

1.8 Tabu Search

This is a meta-heuristic approach used to inquire into the solution space ahead local optimality. This technique utilises the adaptive memory which performs a more elastic search behaviour [8].

1.9 A-star Search

It is a graphical searching algorithm based on heuristic approach. This algorithm integrates the advantages of breadth-first search and depth-first search and algorithm. In this algorithm, two lists are being prepared, one list is used as priority queue of the jobs, whereas, other list is related to the processing capacity of all VMs.

1.10 Switching Algorithm

In the Cloud Environment, Switching algorithm is used for of tasks jobs or Virtual Machines which is highly beneficial for the fault-tolerant property.

1.11 Central Load Balancer

In this technique, each request form the user reached at Data Centre Controller (DCC). DCC asks from the Central Load Balancer (CLB) in regard to allotment of requests. CLB manages a table that comprises of id, States and Priority of Virtual Machines. CLB checks for the highest priority along with available status of virtual machine, if it is available then return that VMid to DCC. If not available than elects virtual machine which is next in priority. At the end, DCC assigns the job to that VMid that is made available by CLB.

1.12 Virtual machine-assign load balancer algorithm

This algorithm manages a table of virtual machines containing attributes (index/assign) and the load of virtual machine. This algorithm scans for less loaded VM, if it is available and not occupied in the previous job assignment, then it assigns the job and id to the available VM and also notified to the data centre. If VM is not aviable , then it check for the next one and assign the job to the next least loaded VM and this procedure will remain continuous till the completion of all the received jobs.

Related Literature Survey

Switching Algorithm has been proposed by Shao et al. [9] for switching of jobs to get balanced the load in the cloud environment

A fusion of Fuzzy Method and A-star algorithm is being illustrated by AlShawi et al. [10], in this research procedure has been elaborated for improving the network lifetime.

Tsai et al. [11] have demonstrated a parallel variant of Tabu Search which is being employed to the master-slave model.

Tsai et al. [12] premeditates an efficient Tabu Search technique for arranging the cloud data centers at distinct locations. The vital focus of their research is to improve the network performance, reduce the CO2 emissions and optimizing the utilization cost of the resources used in the cloud environment. To support this research, proposed technique is being employed for networks comprising of 500 nodes and 1,000 data center.

Genetic Algorithm based approach have been anticipated by Dasgupta et al. [13] for minimising the makespan. The population is being encoded with the binary strings, and the chromosomes exhibits a random single point crossover with 0.05 as mutation probability.

Li et al. [14] explained Max-Min algorithm containing job status table for measuring the real-time load of Virtual Machines along with expected completion time of jobs.

Chen et al. [15] demonstrated enhanced Min-Min algorithm for balancing the load, optimization of the makespan along with enhancement in the resource utilization.

Maheswaran et al. [16] intended to improve the makespan and balancing the load of data centre by allotting the jobs in the optimised way. The vital disadvantage of proposed technique is that it does not pay attention to the machine ready time and also indicates various changes in the load across the virtual machines.

Minimum Compilation Time Technique has been proposed by Kim et al. [17]. This technique focus on time such as ready- to-execute time as well as expected execution time for balancing the loa, and allot the job to the core that takes minimum completion time.

Gulsan Soni et al. [18] have projected a CLB for balancing the load along with least response time in the cloud environment.

Raza Abbas Haidri et al. [19] adorned a load balanced scheduling model based on heuristic approach i.e; CLB for proficient execution of assigned jobs. Centralised load balancing (CLB) strategy used in proposed model.

Shridhar G. Domanal et al. [20] limned virtual machine- assign algorithm with no under and over utilisation of the Virtual Machines. Proposed technique also overcomes the disadvantages of Active – virtual machine algorithm.

Madhuurima Rana et al. [21] contemplated the soft computing approaches such as GA, particle swarm optimization, Ant Colony Optimizatin and Artificial Bee Colony (ABC) which are highly useful for balancing the load in the cloud environment.

Chhabra, G. Singh [22] has categorized the Load Balancing algorithms into two basic categories - static and dynamic. While static load balancing algorithms (SLB) take decisions regarding assignment of tasks to processors and communication delays at compile time, Dynamic load balancing algorithms (DLB) are adaptive to changing situations and take decisions at run time.

Zenon Chaczko [23] described that load balancing is applied across different data centers to ensure the network availability by minimizing use of computer hardware, software failures and mitigating recourse limitations.

Nidhi Jain Kansal [24] explained that load balancing is one of the main challenges in cloud computing which is required to distribute the dynamic workload across multiple nodes to ensure that no single node is overwhelmed. It helps in optimal utilization of resources and hence in enhancing the performance of the system.

Comparison has been on the basis of aforementioned discussion and delineated in Table 1

TABLE 1: COMPARISION OF LOAD BALANCING ALGORITHMS

Algorthim	Based on Criteria	Advantages	Disadvantages
Round- Robin	Equal Time Quantum assigned to each node	Uniformity in load balancing with least complexity	Context Switching Time is more and may lead to less throughput
Equal Spread Current Execution	Equal load assigned to all VMs	Easy to implement	Additional computation overhead required to scan the queue repeatedly
Throttled	Search the appropriate VM to perform the recommended job	Uniformity in distributing the load to each node	computation overhead needed to find the appropriate VM
Minimum Execution Time	Assign the job to the VM based on Least Execution time	Applicable to both static and dynamic strategies	Long-time starvation
Min-Min	Job with minimum size is allocated to the VM with least capacity	Applicable to small scale distributed systems	Jobs with large size will starve
Max-Min	Job with maximum size and least VM Capacity	Applicable to small scale distributed systems	Jobs with minimum completion time will starve
Genetic	Chromosomes and population helps in Selection, Crossover and Mutation	Better performance and efficiency	More time consuming as well as complex too
Tabu Search	Meta-heuristic approach	Better performance	Comparatively Requires more time for the completion of assigned jobs
A-Star Search	Combination of breadth-first and depth-first search and two separate lists are prepared for priority as well as processing capacity of VMs	Improved Performance	More overheads are required
Switching	Switching of jobs	Good efficiency	Chances are likely that assigned jobs are not accomplished within stipulated time
Central Load Balancer	Heterogeneous physical servers	Less response time	Less dynamic and
Virtual Machine-assign	Least loaded VM	Better response time, fairness	For mixed loads (static and

load balancer		in load	dynamic)

III. CONCLUSION

In this manuscript, comparative study of various existing load balancing algorithms has been discussed and found that distinct algorithms have their unique characteristics such as some may focussed to reduce the makespan of the network and others also support to executes the assigned job with in short span of time. The comparison of the various load balancing algorithms has been made in this manuscript along with their advantages and disadvantages.

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A case study on crime dataset of "city of Baltimore, Maryland(USA)" using Big Data Analytics with pig

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Abstract:- In the information era, enormous amounts of data have become available on hand of data analysts to analyze in the form of datasets which are not only big, but also high in variety and velocity, using these analysis reports Now, human society is making many types of counter measures in the field of medical, weather, crime and many more. The case study on "crime dataset" found on keggle.com specifying some threats and wanted places in "city of Baltimore, Maryland(USA)" where, there is a need of some extra counter measures against some criminal activity.

Keywords:-Big data analysis, Apache pig, Hadoop Distributed file system.

1. TOOLS AND TECHNOLOGYS USED

Imagine a world without data storage; a place where every detail about a person or organization, every transaction performed, or every aspect which can be documented is lost directly after use. It will lead to a disaster on human society like crime, diseases, governments and all the organization's.

Due to data storage and it's analysis the structure of whole human society is now changed. We are capturing each and every data generated by human activity. By analyzing these data's all the needs of human is being completed every day like city structure, safety measures, traffic control, medical improvements, human comfort, education quality, crime control etc.

Now a days we are generating enormous amounts of data every minute which are generating difficulties to store and analyze them. To store and retrieve very efficiently Big Data Analytics and its tools are gathering huge trust between many big organizations.

1.1 Big Data Analytics

Big Data is a term used to describe a collection of data that is huge in size and yet growing exponentially with time. In short such data is so large and complex that none of the traditional data management tools are able to store it or process it efficiently.

1.1.1 Types of Big Data

Big Data could be found in three forms:

1. Structured 2. Unstructured 3. Semi-structured

Structured :-Any data that can be stored, accessed and processed in the form of fixed format is termed as a 'structured' data. Over the period of time, talent in computer science has achieved greater success in developing techniques for working with such kind of data (where the format is well known in advance) and also deriving value out of it. However, nowadays, we are foreseeing issues when a size of such data grows to a huge extent, typical sizes are being in the rage of multiple zettabytes.

For example:-Record of employees.

Unstructured:-Any data with unknown form or the structure is classified as unstructured data. In addition to the size being huge, un-structured data poses multiple challenges in terms of its processing for deriving value out of it. A typical example of unstructured data is a heterogeneous data source containing a combination of simple text files, images, videos etc. Now day organizations have wealth of data available with them but unfortunately, they don't know how to derive value out of it since this data is in its raw form or unstructured format.

For example:-Results of Google search.

Semi-Structured:- Semi-structured data can contain both the forms of data. We can see semi-structured data as a structured in form but it is actually not defined with e.g. a table definition in relational DBMS.

For example:-Personal data stored in an XML file

1.1.2 Characteristics of Big Data

(i) **Volume –** The name Big Data itself is related to a size which is enormous. Size of data plays a very crucial role in determining value out of data. Also, whether a particular data can actually be considered as a Big Data or not, is dependent upon the volume of data. Hence, 'Volume' is one characteristic which needs to be considered while dealing with Big Data.

(ii) **Variety –** The next aspect of Big Data is its variety. Variety refers to heterogeneous sources and the nature of data, both structured and unstructured. During earlier days, spread sheets and databases were the only sources of data considered by most of the applications. Nowadays, data in the form of emails, photos, videos, monitoring devices, PDFs, audio, etc. are also being considered in the analysis applications. This variety of unstructured data poses certain issues for storage, mining and analyzing data.

(iii) **Velocity –** The term 'velocity' refers to the speed of generation of data. How fast the data is generated and processed to meet the demands, determines real potential in the data. Big Data Velocity deals with the speed at which data flows in from sources like business processes, application logs, networks, and social media sites, sensors, Mobile devices, etc. The flow of data is massive and continuous.

(iv) **Variability –** This refers to the inconsistency which can be shown by the data at times, thus hampering the process of being able to handle and manage the data effectively.

(v) **Value -** How will the extraction of data work? Here, our fourth V comes in, which deals with a mechanism to bring out the correct meaning out of data. First of all, you need to mine the data, i.e., a process to turn raw data into useful data. Then, an analysis is done on the data that you have cleaned or retrieved out of the raw data. Then, you need to make sure whatever analysis you have done

benefits your business such as in finding out insights, results, etc. which were not possible earlier.

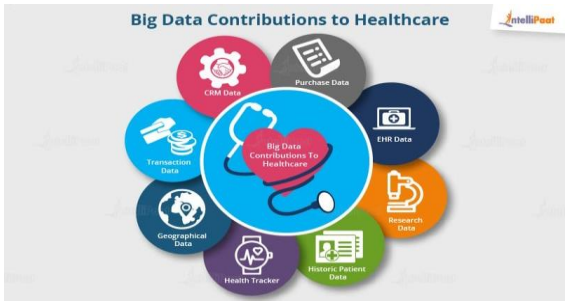
1.1.3 Applications of Big Data Analytics

Big Data technologies can be used for creating a staging area or landing zone for new data before identifying what data should be moved to the data warehouse. In addition, such integration of Big Data technologies and data warehouse helps an organization to offload infrequently accessed data.

Big Data in Education

Education industry is flooding with huge amounts of data related to students, faculty, courses, results, and what not. Now, we have realized that proper study and analysis of this data can provide insights which can be used to improve the operational effectiveness and working of educational institutes.

Big Data in Healthcare



Healthcare is yet another industry which is bound to generate a huge amount of data. Following are some of the ways in which big data has contributed to healthcare:

- Big data reduces costs of treatment since there is less chances of having to perform unnecessary diagnosis.
- It helps in predicting outbreaks of epidemics and also in deciding what preventive measures could be taken to minimize the effects of the same.

Big Data in Government Sector

Governments, be it of any country, come face to face with a very huge amount of data on almost daily basis. The reason for this is, they have to keep track of various records and databases regarding their citizens, their growth, energy resources, geographical surveys, and many more. All this data contributes to big data.

Big Data in Media and Entertainment Industry

With people having access to various digital gadgets, generation of large amount of data is inevitable and this is the main cause of the rise in big data in media and entertainment industry.Other than this, social media platforms are another way in which huge amount of data is being generated. Although, businesses in the media and entertainment industry have realized the importance of this data, and they have been able to benefit from it for their growth.

1.2 HADOOP

Hadoop is an Apache open source framework written in java that allows distributed processing of large datasets across clusters of computers using simple programming models. The Hadoop framework application works in an environment that provides

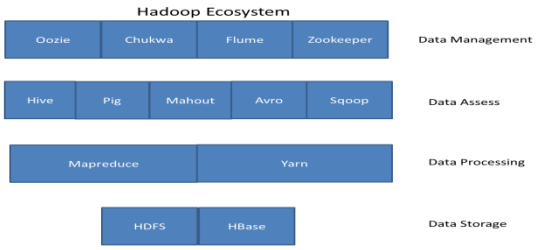
distributed storage and computation across clusters of computers. Hadoop is designed to scale up from single server to thousands of machines, each offering local computation and storage.

1.2.1 Hadoop Ecosystem

Hadoop Ecosystem is a platform or a suite which provides various services to solve the big data problems. It includes Apache projects and various commercial tools and solutions. There are four major elements of Hadoop i.e. HDFS, MapReduce, YARN, and HadoopCommon. Most of the tools or solutions are used to supplement or support these major elements. All these tools work collectively to provide services such as absorption, analysis, storage and maintenance of data etc.

Following are the components that collectively form a Hadoop ecosystem:

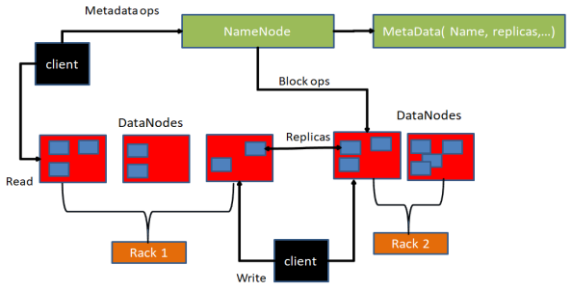
- **HDFS:** Hadoop Distributed File System
- **YARN:** Yet Another Resource Negotiator
- **MapReduce:** Programming based Data Processing
- **Spark:** In-Memory data processing
- **PIG, HIVE:** Query based processing of data services
- **HBase:** NoSQL Database
- **Mahout, Spark MLLib:** Machine Learning algorithm libraries
- **Solar, Lucene:** Searching and Indexing
- **Zookeeper:** Managing cluster
- **Oozie:** Job Scheduling



1.2.2 HDFS Architecture

Hadoop HDFS architecture is a master/slave like Architecture in which master is NameNode and slave is DataNode. HDFS Architecture consist of single NameNode and Multiple DataNodes.

- In today's scenario we are dealing with a huge amount of dynamic data which is not possible to handle with local File system.
- These huge amount of Data which we have to analyze every second is known as Big Data.The volume of Big Data is increasing with a high velocity over per second.
- Big Data files are always at least 1 TB in size.
- Hadoop distributed file system (HDFS) is the worlds most Trusted Big Data storage system which stores very large files running on a cluster of "cheap" commodity hardware.



The components of the HDFS Architecture are as follows..

NAMENODE :

NameNode in HDFS Architecture is the master of the cluster. NameNode stores meta-data rather than the actual data. Meta-data is nothing but the information of the actual data like data block information,replica's information and Rack information etc. NameNode manages all the operations on each blocks of data as it is the only one who knows all the information about the each data blocks of each file. This is the Single Point Of Failure (SPOF) for the entire HDFS Architecture Because it is the only source for retrieval of Data, if it goes down whole the HDFS cluster goes down.

Feature's of NameNode:

- NameNode is responsible for the management of file system namespace/meta-data/file blocks. Here are some important **file's** related to namespace of NameNode:
  - **FsImage** – It is an "Image file". FsImage contains entire file system and stores as a file in the NameNode's local file system.
  - **EditLogs** – NameNode directly does not modifies any changes made in FsImage file. EditLogs contains all the recent modifications made to the file system on the most recent FsImage.

NameNode receives a create/update/delete request from client After that this request is recorded to edits file.

- It runs on 1 machine to several machines.
- It is single point of Failure.
- It manipulates all the file system operations like naming, opening, closing of files/directories.
- It Handles and verify the access of files to the client's.
- It is responsible for the High Availability of Data on the basis of **Replica Placement Policy**.
- It is responsible to ensure that all the DataNodes are alive or not, By the help of **Heartbeats** and **Block report**.
- It is responsible for the management of replication factor of all the blocks.

SECONDARY NAMENODE :

Secondary NameNode helps NameNode to perform house-keeping tasks of the cluster. It is not used for high Availability or a backup for the NameNode, it is just for speeding-up the process of NameNode. Itrequires similar hardware as NameNode.

Feature's of Secondary NameNode:

- In HDFS when daemons starts, Secondary NameNode loads the FsImage and EditLogs from the NameNode. And then merges EditLogs with the FsImage. It keeps edits log size within a limit. It stores the modified FsImage into persistent storage. And we can use it in the case of NameNode failure. These operations takes ample amount of time. If This operation is done by NameNode then it will take a lot of time of Namenode.
- All the operation performed by NameNode is always stored in physical memory. Secondary Namenode is set at a regular checkpoint, where it stores all the updates to the permanent memory at a regular interval of time.

DATANODES :

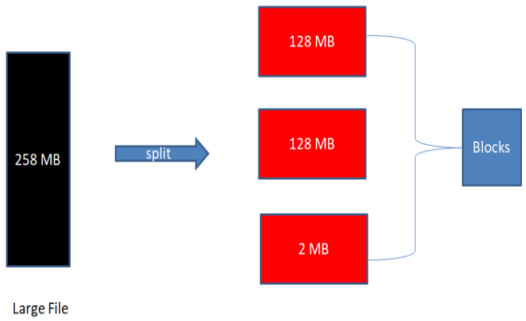
DataNode is the Slave of the HDFS architecture. It stores the actual data in HDFS. it is responsible for the read and write operations as per the request of the clients. they can deploy on cheap commodity hardwires like ext3 and ext4.

Feature's of DataNode:

- They are responsible for storing and retrieving of Data blocks.
- They Runs on many system.
- Block creation, deletion and replication are done by DataNodes as per instruction of NameNode.
- They are arranged in the form of Racks.
- DataNode sends heartbeat message to the NameNode to report the health of HDFS. By default, this frequency is set to 3 seconds.

BLOCKS :

In HDFS, NameNode splits huge files into small files known as Blocks. all the operations and manipulations on the blocks are done by NameNode. All the blocks of a particular file are stored into different DataNodes. The default **size** of each block is 128 MB, which can be configured as per individual's need. All the blocks are having same size except the last block. The last block of a file can be of a size less than or equal to 128 MB.For example, if we are storing a file of size 258 MB, then this file is splits into 3 blocks 2 of them are of size 128 MB and the last block is of the size 2 MB.

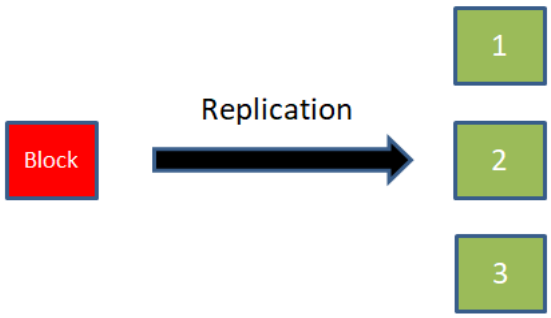


Feature's of Blocks:

- Blocks are managed by NameNode and stored by DataNode.
- Every blocks are independent of each other. they do not have any information about each other.
- These are the smallest unit of file which can be stored in any file system
- The default size of the blocks are 128 MB which can be configured as per requirement
- The size of each blocks are equal except the last block
- The target for block management is to minimize the cost of seeks as compare to transfer rate.
- It provides the seek time of 1% transfer rate when the block size is at least of 100 MB.

REPLICATION :

NameNode stores the same copy of a block into multiple DataNodes. The number of copies of same block is termed as number of replicas and the process of storing multiple copies of same block is known as replication of a block. If any DataNode gets failed then DataNode pick-up the block from the other DataNode. The number of replicas of a file in HDFS is called replication factor.For example if replication factor is 3 and the block size is 128 then each block will end up by occupying a space of 384 MB (3*128 MB) for each block.

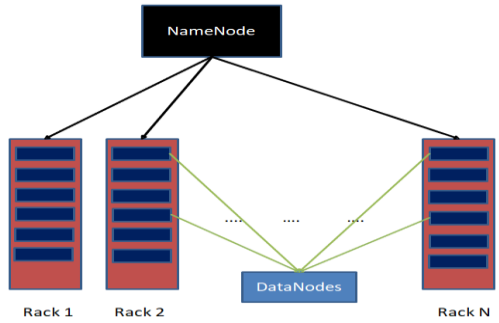


Feature's of Replication :

- Replication provides the feature of **fault tolerance**.
- The default replication factor is 3.
- DataNode sends block report to the NameNode periodically to maintain the replication factor.
- When a block is over-replicated (number of replications of a block are more than the replication factor), then NameNode deletes the extra replica of the block.
- When the block is under-replicated (number of replication of a block are less than the replication factor), then NameNode adds the required number of replicas.

RACK AWARENESS :

In a large Hadoop cluster the term Rack awareness is introduced to improve the high availability of Data and performance of the entire cluster. Rack awareness term provides an algorithm to the NameNode known as Rack Awareness Algorithm, using which NameNode maintains a huge amount of Data blocks and its replicas in Rack like structure in which every Rack consists of a specific number of DataNode.



Feature's of Rack Awareness :

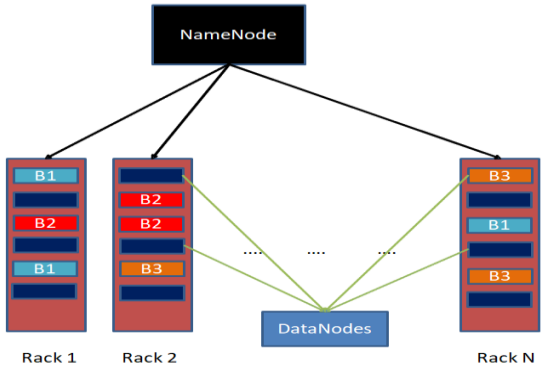
- For reading/writing operation NameNode chooses the DataNode from the same Rack or the nearby rack to improve the traffic and speed of the cluster.
- NameNode maintains Rack id's to get access to each rack and to perform various operations over there.
- In large Hadoop cluster Rack awareness is responsible for less complexity of read/write pipeline, due to which there is less chances of Data getting lost.

REPLICA PLACEMENT POLICY :

NameNode determines the replica placement of blocks. According to Replica Placement policy if Replication Factor is 3 then…

- First Replica is stored on the local Rack.
- Second replica is stored on the local Rack but in different DataNode.
- Third replica is stored on the different Rack.

For example, we have a huge file B. To store this file first NameNode split's it into small blocks, suppose it splited into 3 blocks B1, B2 and B3. Now according to Replica Placement Policy it will be placed into cluster as follows :



Feature's of Replica Placement Policy:

- It usage different DataNodes and Different Racks also.
- If DataNode gets failed then NameNode reads the block from different DataNode but if Rack Fails then NameNode reads Block from different Rack.
- It will improve the High Availability of Data to the client.

1.2.3 HDFS commands

HDFS commands using which you can access the Hadoop File System :

- **fsck**

HDFS Command to check the health of the Hadoop file system.

Command*:* hdfs fsck /

- **ls**

HDFS Command to display the list of Files and Directories in HDFS.

Command*:* hdfs dfs –ls /

- **mkdir**

HDFS Command to create the directory in HDFS.

Usage: hdfs dfs –mkdir /directory_name

Command*:* hdfs dfs –mkdir /mydir

- **cat**

HDFS Command that reads a file on HDFS and prints the content of that file to the standard output.

Usage*:* hdfs dfs –cat /path/to/file_in_hdfs

Command: hdfsdfs –cat /mydir/mydata

- **copyFromLocal**

HDFS Command to copy the file from a Local file system to HDFS.

Usage: hdfs dfs -copyFromLocal<localsrc><hdfs destination>

Command: hdfs dfs –copyFromLocal /home/test /mydir

- **copyToLocal**

HDFS Command to copy the file from HDFS to Local File System.

Usage: hdfs dfs -copyToLocal<hdfs source><localdst>

Command: hdfs dfs –copyToLocal /mydir/test /home/

- **put**

HDFS Command to copy single source or multiple sources from local file system to the destination file system.

Usage: hdfsdfs -put <localsrc><destination>

Command: hdfs dfs –put /home/test /user

- **get**

HDFS Command to copy files from hdfs to the local file system.

Usage: hdfs dfs -get <src><localdst>

Command: hdfsdfs –get /user/test /home

- **count**

HDFS Command to count the number of directories, files, and bytes under the paths that match the specified file pattern.

Usage: hdfs dfs -count <path>

Command: hdfsdfs –count /user

- **rm**

HDFS Command to remove the file from HDFS.

Usage: hdfsdfs –rm <path>

Command: hdfsdfs –rm /newdir/test

- **cp**

HDFS Command to copy files from source to destination. This command allows multiple sources as well, in which case the destination must be a directory.

Usage: hdfs dfs -cp<src><dest>

Command: hdfsdfs -cp /user/hadoop/file1 /user/hadoop/file2

- **mv**

HDFS Command to move files from source to destination. This command allows multiple sources as well, in which case the destination needs to be a directory.

Usage: hdfs dfs -mv <src><dest>

Command: hdfs dfs -mv /user/hadoop/file1 /user/hadoop/file2

- **expunge**

HDFS Command that makes the trash empty.

Command: hdfs dfs -expunge

- **rmdir**

HDFS Command to remove the directory.

Usage: hdfs dfs -rmdir <path>

Command: hdfs dfs –rmdir /user/hadoop

- **help**

HDFS Command that displays help for given command or all commands if none is specified.

Command: hdfsdfs -help

- **usage**

HDFS Command that returns the help for an individual command.

Usage: hdfsdfs -usage <command>

Command: hdfsdfs -usage mkdir

1.3 Apache pig

Pig is a high-level platform or tool which is used to process the large datasets. It provides a high-level of abstraction for processing over the MapReduce. It provides a high-level scripting language, known as Pig Latin which is used to develop the data analysis codes. First, to process the data which is stored in the HDFS, the programmers will write the scripts using the Pig Latin Language. Internally Pig Engine(a component of Apache Pig) converted all these scripts into a specific map and reduce task. But these are not visible to the programmers in order to provide a high-level of abstraction. Pig Latin and Pig Engine are the two main components of the Apache Pig tool. The result of Pig always stored in the HDFS.

Note: Pig Engine has two type of the execution environment i.e. a local execution environment in a single JVM (used when dataset is small in size)and distributed execution environment in a Hadoop Cluster.

Need of Pig: One limitation of MapReduce is that the development cycle is very long. Writing the reducer and mapper, compiling packaging the code, submitting the job and retrieving the output is a time-consuming task. Apache Pig reduces the time of development using the multi-query approach. Also, Pig is beneficial for the programmers who are not from Java background. 200 lines of Java code can be written in only 10 lines using the Pig Latin language. Programmers who have SQL knowledge needed less effort to learn Pig Latin.

Features of Apache Pig:

- For performing several operations Apache Pig provides rich sets of operators like the filters, join, sort, etc.
- Easy to learn, read and write. Especially for SQL-programmer, Apache Pig is a boon.
- Apache Pig is extensible so that you can make your own user-defined functions and process.
- Join operation is easy in Apache Pig.
- Fewer lines of code.
- Apache Pig allows splits in the pipeline.
- The data structure is multivalued, nested and richer.
- Pig can handle the analysis of both structured and unstructured data.

Types of Data Models in Apache Pig:

It consist of the 4 types of data models as follows:

- **Atom**: It is a atomic data value which is used to store as a string. The main use of this model is that it can be used as a number and as well as a string.
- **Tuple**: It is an ordered set of the fields.
- **Bag**: It is a collection of the tuples.
- **Map**: It is a set of key/value pairs.

1.3.1 Apache Pig Architecture

For writing a Pig script, we need Pig Latin language and to execute them, we need an execution environment. The architecture of Apache Pig is shown in the below image.

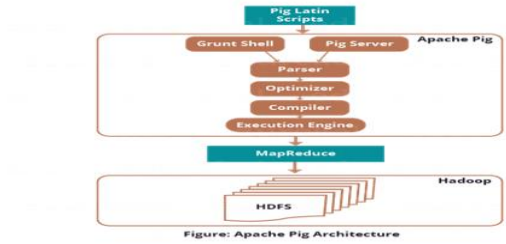


Figure: Apache Pig Architecture

Pig Latin Scripts
Initially as illustrated in the above image, we submit Pig scripts to the Apache Pig execution environment which can be written in Pig Latin using built-in operators.

There are three ways to execute the Pig script:

- ***Grunt Shell*:** This is Pig's interactive shell provided to execute all Pig Scripts.
- ***Script File*:** Write all the Pig commands in a script file and execute the Pig script file. This is executed by the Pig Server.
- ***Embedded Script*:** If some functions are unavailable in built-in operators, we can programmatically create User Defined Functions to bring that functionalities using other languages like Java, Python, Ruby, etc. and embed it in Pig Latin Script file**.** Then, execute that script file.

Parser
From the above image you can see, after passing through Grunt or Pig Server, Pig Scripts are passed to the Parser. The Parser does type checking and checks the syntax of the script. The parser outputs a DAG (directed acyclic graph). DAG represents the Pig Latin statements and logical operators. The logical operators are represented as the nodes and the data flows are represented as edges.

Optimizer

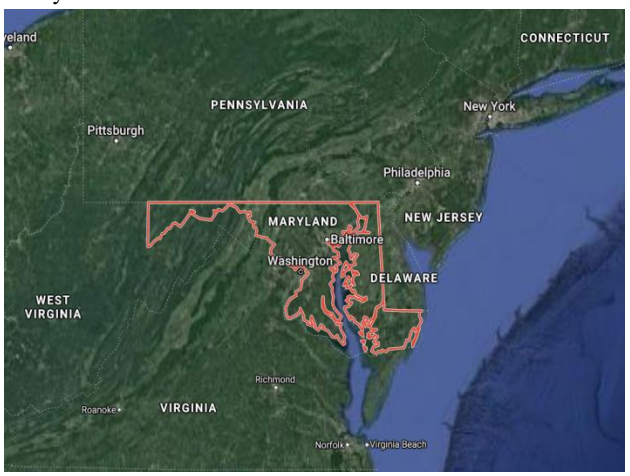
Then the DAG is submitted to the optimizer. The Optimizer performs the optimization activities like split, merge, transform, and reorder operators etc. This optimizer provides the automatic optimization feature to Apache Pig. The optimizer basically aims to reduce the amount of data in the pipeline at any instance of time while processing the extracted data.

Compiler
After the optimization process, the compiler compiles the optimized code into a series of MapReduce jobs. The compiler is the one who is responsible for converting Pig jobs automatically into MapReduce jobs.

Execution engine
Finally, as shown in the figure, these MapReduce jobs are submitted for execution to the execution engine. Then the MapReducejobs are executed and gives the required result. The result can be displayed on the screen using "**DUMP**" statement and can be stored in the HDFS using "**STORE**" statement.

2. INFORMATION ABOUT DATASET

- Dataset Name: Baltimore.csv
- This is the dataset of the city **"BALTIMORE"**and its nearest places of state 'Maryland' in United-State.



- Total records : 276530
- Total columns: 15
- Column Names:(sno,crime_date,crime_time,crime_code,address,description,Indoor/Outdoor,weapon,post,district,neighbourhood,longitude,attitude,premesis,totalIncidents)
- This dataset contains crime record from 2012-10-01 to 2017-09-02.
- There are total 18 different categories of crime description according to USA rules is involved in the dataset. some of them are as follows:-
    - **Homicide:-**act of one human killing other or the volitional act by any people leads to death of any people. This may result from accident, reckless or negligent acts even if there is no intent to cause harm.

- **Auto-theft:-**robbery of any vehicle.
- **Assault by threat**:- A person commits assault by threat if he or she intentionally threatens another person with imminent bodily injury.
- **Burglary**:- Entering any building against the law intentionally for the act of any crime(even if the crime is not performed) is called burglary.
- **Common assault**:-unlawful violence by any people to apprehend(catching pr arresting) any criminal or a person who violated the law.
- **Larceny**:- Taking of the personal property of any other person or business.
- **Arson**:- Arson means intentionally burning of other things like building, motor vehicles, forest or any property.
- **Rape**:- physical harassment given to any female.

- Link for the original Dataset: https://www.kaggle.com/sohier/crime-in-baltimore
- Link for the updated Dataset: https://drive.google.com/file/d/1t5rmHwOHd4zCgtVE0WVeN-PWtkT2VSkx/view
- Tool used for analysis is apache pig.

2.1 Sample Dataset

1,2017-09-02,1111-11-11 23:30:00,3JK,4200 AUDREY AVE,ROBBERY - RESIDENCE,I,KNIFE,913,SOUTHERN,Brooklyn,-76.60541,39.22951,ROW/TOWNHO,1

2,2017-09-02,1111-11-11 23:00:00,7A,800 NEWINGTON AVE,AUTO THEFT, O,, 133, CENTRAL, Reservoir Hill,-76.63217,39.3136,STREET,1

3,2017-09-02,1111-11-11 22:53:00,9S,600 RADNOR AV, SHOOTING, Outside,FIREARM,524,NORTHERN,Winston-Govans,-76.60697,39.34768,Street,1

4,2017-09-02,1111-11-11 22:50:00,4C,1800 RAMSAY ST,AGG. ASSAULT,I,OTHER,934, SOUTHERN, Carrollton Ridge,-76.64526,39.28315,ROW/TOWNHO,1

5,2017-09-02,1111-11-11 22:31:00,4E,100 LIGHT ST,COMMON ASSAULT, O, HANDS, 113,CENTRAL,Downtown West,-76.61365,39.28756,STREET,1

6,2017-09-02,1111-11-11 22:00:00,5A,CHERRYCREST RD, BURGLARY, I,, 922, SOUTHERN, Cherry Hill,-76.62131,39.24867,ROW/TOWNHO,1

7,2017-09-02,1111-11-11 21:15:00,1F,3400 HARMONY CT, HOMICIDE, Outside, FIREARM,232,SOUTHEASTERN,Canton,-76.56827,39.28202,Street,1

8,2017-09-02,1111-11-11 21:35:00,3B,400 W LANVALE ST,ROBBERY - STREET,O,,123,CENTRAL,Upton,-76.62789,39.30254,STREET,1

2.2 Analytical case study's on the dataset

Case study 1:- Top 5 places of most wanted district near which indoor crime takes place using knife from the analysis of the year 2015 to 2017.

Analysis report: Northeastern district of Maryland is most wanted area in case of criminal activity. In northeastern district Hillen, original northwood, stonewood-pentwood-winsto, Beverly hills and Rosemont east are the top 5 landmarks near which the highest indoor crimes are recorded between the year 2015-2017 using knife.

Analytical model for case study:

- fs -put baltimore.csv /
- a = load '/Baltimore.csv' using PigStorage(',') as (sno,date:datetime, time:datetime, code, address, description, io, weapon, post, district, nearest, longitude, latitude, premesis, total);
- b = group a by district;
- c = foreach b generate group,COUNT(a);
- d = order c by $1 DESC;

- e = limit d 1;
- f = filter a by district matches e.$0 and weapon matches 'KNIFE' and GetYear(date) <= 2017 and (io matches 'I' or io matches 'Inside');
- g = group f by nearest;
- h = foreach g generate group,COUNT(f);
- I = order h by $1;
- j = limit I 5;
- dump j;

case study 2:- The time duration of a day at winter season during which there should more security at NorthEastern district against crime.

Analysis report:-As NorthEastern district of Maryland is most wanted area in case of criminal activity, During winter season the maximum of crime cases are recorded in night. By the analysis of the dataset there should more security during the time period between 15:59:32 and 20:59:32.

Analytical model for case study:

- fs -put baltimore.csv /
- a = load '/Baltimore.csv' using PigStorage(',') as (sno, date:datetime, time:datetime, code, address, description, io, weapon, post, district, nearest, longitude, latitude, premesis, total);
- b = filter a by (GetMonth(date) >= 08 or GetMonth(date) <= 02) and disctrict matches 'NORTHEASTERN';
- c = group b by time;
- d = foreach c generate group,COUNT(b);
- e = order d by $1 DESC;
- f = limit e 5;
- x = order f by $0 DESC;
- g = limit x 1;
- h = order f by $0;
- I = limit h 1;
- j = join g by GetMonth($0),I by GetMonth($0);
- k = foreach j generate GetHour($0) as (h1:chararray),GetMinute($0) as (m1:chararray),GetSecond($0) as (s1:chararray),GetHour($2) as (h2:chararray),GetMinute($2) as (m2:chararray),GetSecond($2) as (s2:chararray);
- l = foreach k generate CONCAT('From ',$0,':',$1,':',$2,' To ',$3,':',$4,':',$5);
- dump l;

Case study 3:- The post, where less than crime cases were reported in the year 2013 and where no rape cases are reported.

Analysis report:-Although there are large number of criminal activity happening over Maryland but there are some post where less than 5 cases were reported in the year 2013 and those post are as follows. Post115, 134, 135, 215, 216, 427, 516, 525, 535, 624, 625, 816 and 924 where one case is reported with no rape cases. Post 314, 725, 825, 834, 835 and 945 where two crime cases were reported with no rape cases. Post 217, 325, 436, 615 and 634 where total three crime cases were reported with no rape cases. Post 214 and 526 where four cases are reported with no rape cases.

Analytical model for case study:

- fs -put baltimore.csv /
- a = load '/Baltimore.csv' using PigStorage(',') as (sno, date:datetime, time:datetime, code, address, description, io, weapon, post, district, nearest, longitude, latitude, premesis, total);
- b = filter a by GetYear(date) == 2013;
- c = filter b by description matches 'RAPE';

- d = foreach c generate post as temppost;
- t = distincts d;
- e = join b by post LEFT OUTER,t by temppost;
- f = filter e by temppost is null;
- g = group f by post;
- h = foreach g generate group,COUNT(f);
- i = filter h by $1 < 5;
- dump i;

case study 4:- The hills throughout the city near which people loose there life normally due to the unwanted activity of other peoples like reckless driving of car on the road and murder for robbery. [suppose if more than 10 cases were reported in a particular place. It would be considered as dangerous place.]

Analysis report:-There are three hills near Baltimore city which are not so much safe for tourist because there are multiple accident cases had been reported due to unwanted activities of other people. Those hills are Cherry hill, Chipley hill and Reservoir hill.

Analytical model for case study:

- fs -put baltimore.csv /
- a = load '/Baltimore.csv' using PigStorage(',') as (sno, date:datetime, time:datetime, code, address, description, io, weapon, post, district, nearest, longitude, latitude, premesis, total);
- b = filter a by (nearest matches '.*Hill.*' or nearest matches '.*hill.*') and description matches 'HOMICIDE';
- c = group b by nearest;
- d = foreach c generate group,COUNT(b);
- e = filter d by $1 >= 10;
- dump e;

Case study 5:- Number of average attempt to crime are reported in a day in central and southern district for the year 2014 month wise.

Analysis report:-Throughout the world there are many cases when some dangerous crime activities are detected and stopped them before happening. Similarly there are some such cases near Baltimore city where attempt to crime are reported per day in central and southern district in 2014.

1) In the January month average 3 cases were reported per day.
2) In the February month average 4 cases were reported per day.
3) In the March month average 3 cases were reported per day.
4) In the April month average 3 cases were reported per day.
5) In the May month average 4 cases were reported per day.
6) In the June month average 4 cases were reported per day.
7) In the July month average 4 cases were reported per day.
8) In the August month average 4 cases were reported per day.
9) In the September month average 4 cases were reported per day.
10) In the October month average 5 cases were reported per day.
11) In the November month average 4 cases were reported per day.
12) In the December month average 4 cases were reported per day.

Analytical model for case study:

- fs -put baltimore.csv /
- a = load '/Baltimore.csv' using PigStorage(',') as (sno, date:datetime, time:datetime, code, address, description, io, weapon, post, district, nearest, longitude, latitude, premesis, total);
- b = filter a by GetYear(date) == 2014 and (district matches 'CENTRAL' or district

matches 'SOUTHERN') and description matches 'BURGLARY';

- c = group b by date;
- d = foreach c generate group,COUNT(b);
- e = group d by GetMonth($0);
- f = foreach e generate group as (a:chararray),AVG(d.$1) as (b:chararray);
- g = foreach f generate CONCAT('In Month ',$0,' Average ',$1,' Attemp to crime cases are reported');
- dump g;

case study 6:- The post for each district where the security cops are most violent against the criminal and attempting the unlawful activities on them.

Analysis report:-There are many crime cases in the world where cops has to be strict towards criminal but, attempting unlawful actions on them is not correct. There is list of post for each district where cops are most violence with respect to other posts in the city.

1) In central district post 111 have 1824 such cases.
2) In eastern district post 331 have 740 such cases.
3) In western district post 123 have 780 such cases.
4) In northern district post 411 have 685 such cases.
5) In southern district post 922 have 913 such cases.
6) In northeastern district post 443 have 802 such cases.
7) In northwestern district post 614 have 585 such cases.
8) In southeastern district post 212 have 693 such cases.
9) In southwestern district post 842 have 602 such cases.

Analytical model for case study:

- fs -put baltimore.csv /
- a = load '/Baltimore.csv' using PigStorage(',') as (sno, date:datetime, time:datetime, code, address, description, io, weapon, post, district, nearest, longitude, latitude, premesis, total);
- b = filter a by description matches 'COMMON ASSAULT';
- c = group b by post;
- d = foreach c generate group,b.district,COUNT(b);
- e = foreach d generate $0,flatten($1),$2;
- f = distinct e;
- g = group f by $1;
- h = foreach g generate group,MAX(f.$2);
- i = join f by $1,h by $0;
- j = filter i by $2 == $4;
- h = foreach j generate $1,$0,$2;
- dump h;

Case study 7:- The safest hill near which tourist may stay.

Analysis report:-Crime and accident risk is everywhere in the world but, every people wants to stay at that place where the risk of crime and accident is less. Among all the hilly areas in the state of Maryland "Beverly hill" is the most safest place where a tourist may stay.

Analytical model for case study:

- fs -put baltimore.csv /
- a = load '/Baltimore.csv' using PigStorage(',') as (sno, date:datetime, time:datetime, code, address, description, io,

weapon, post, district, nearest, longitude, latitude, premesis, total);

- b = filter a by nearest matches '.*Hill.*' or nearest matches '.*hill.*';
- c = group b by nearest;
- d = foreach c generate group,COUNT(b);
- e = order d by $1;
- f = limit e 1;
- dump f;

3. CONCLUSION

In this review, I have examined different aspects and applications of Big Data Analytics. I have reviewed types of big data, its properties. I have also reviewed the tools and commands used in Big Data Analysis like Hadoop, HDFS Architecture and its commands, hadoop ecosystem, pig, data models of pig and its architecture.

Finally I have analyzed a dataset taken from kaggle.com by updating it according to my requirements. I have Analyzed some of Analytical case studies related to crime in city of Baltimore and its nearest places which may help the USA government to control criminal activities under city.

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DESIGN AND DEVELOPMENT OF HYBRID SOLAR INVRETER

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Abstract---The main function of Hybrid solar energy is to obtain energy from both sources- solar energy with the help of PV panels. Solar panel absorbs the sun rays and converts it into DC current .Now both the current works simultaneously and goes to the circuit board and charge the mobile phones connected with the help of wires. A digital clock with temperature reader is also connected to this system. This paper proposes a hybrid energy system, which combines photovoltaic (PV) and wind power as an alternative source small-scale electric power, where the conventional production is not practical. The proposed system is attractive because of its simplicity, ease of control and low costs.

INTRODUCTION

Evolution of human beings began with the parallel consumption of resources. Natural resources were the first to start with and then eventually through technological evolution, man-made resources also came into existence. With the gradual utilities, natural resources started taking a toll on human lives by ruining the very nature or precisely the environment that produced it. Thus, a more innovative corner of technology is now bringing out alternatives to combat this current situation. One of them is solar energy and its wide range of uses and advantages over the normal electrical power resources. The main aim of using solar energy is obviously involved with the reduction in the use of non-renewable resources for electricity production to increase the longevity of these resources and also do huge welfare to the environment. Various of these utilities of solar energy include solar panels, solar inverters, solar streetlights and so on.

Solar inverters are a huge contribution to the solar energy system to mankind. These operate with solar panels. The solar panels are engraved with photovoltaic cells on them. These cells do the main job of absorbing the sun rays in the daytime and store it to eventually convert it to electrical energy. This electrical energy is then transferred to the areas of utility. The inbuilt generator or storage section converts the DC into the usable AC and stores the energy for later use, by connecting it to the root connection grid when there's not enough sunlight. These inverters are doing wonders in households and industries and are being widely used every day.

HISTORY

In many ways, the solar PV industry still feels very new, especially to the general public. Fly-by-night companies aren't doing us any favors establishing trust in the longevity of solar either.

So here's the truth: the concept of solar energy has been around for a long, long time, and technology advances happening right now will ensure it sticks around for an even longer time. It's sometimes easy to forget about the path solar PV has been on while we're in the trenches each day, trying to reiterate to a hesitant public that solar power adoption is a good, secure and necessary thing.The science is there, the proof is there, the longevity is happening right now. Here's a look back at solar's journey to arm you with some facts to educate the public and prove solar's lasting power. In the year **1839,** While mirrors and other reflective surfaces have been concentrating solar rays to light fires for centuries, and south-facing sunrooms and bathhouses take advantage of the sun's natural heating qualities, it isn't until 1839 that the photovoltaic effect is discovered and using the sun to generate electricity is first considered.

French scientist Edmond Becquerel was experimenting with electrolytic cells when electricity was generated when exposed to light. Becquerel was just 19 when he placed silver chloride in an acidic solution and generated voltage and current .then in **1876** London professor William Grylls Adams and his student Richard Evans Day witness the photovoltaic effect when they expose selenium to light and produce an electrical current. They are unable to convert enough sunlight to power electrical equipment with their selenium solar cells, but it proved that solid materials could produce electricity without moving parts and just using the sun. The idea for a photovoltaic cell is born. then in **1883** American inventor Charles Fritts creates the first working selenium cell. He coats selenium with a thin layer of gold and this first functioning solar cell has a conversion efficiency of 1%. Fritts' solar cells are used on the world's first rooftop solar array in New York City in 1884. But the cells' high material cost prevents widescale adoption.

In **1905** Gifted mind Albert Einstein finally brings theory explanation to photoelectricity. In the paper "Concerning an

Heuristic Point of View Toward the Emission and Transformation of Light," Einstein describes that light contained packets of energy he called "light quanta." Quanta today are known as photons. Einstein's theory helped explain how photons, when properly connected in a circuit, could generate electricity. He went on to win the Nobel Prize in Physics in 1921 for "his services to Theoretical Physics, and especially for his discovery of the law of the photoelectric effect."In this year **1954** Concentrated solar power and solar thermal energy applications had been in use for a while, but purely photovoltaic solar isn't born until U.S. scientists at Bell Labs developed the silicon PV cell. This is the first time enough of the sun's energy is converted to run electrical equipment. Bell Labs scientists Daryl Chapin, Calvin Fuller and Gerald Pearson achieved 6% efficiency with this first silicon cell, and soon early solar panels were used to power satellites orbiting the earth. In 1958, the Vanguard I was launched with six solar cells producing about 1 W of power.

Fig 1:- Gerald Pearson, Daryl Chapin and Calvin Fuller from Bell Labs. Source: Bell Labs [1]

In 2000

Worldwide solar PV installations surpass 1 GW. The United States alone hits 1 GW in 2008 and surpasses 25 GW in 2015.

First Solar's production plant in Perrysburg, Ohio, opens as the world's largest PV manufacturing plant with an estimated annual production capacity of 100 MW, although the company only reaches 25 MW each year until 2005.

Fig 2:-The First Solar Perrysburg campus after a 2008 R&D addition by Program Solutions Group. Source: PSG [12]

2010

The popularity of ZepSolar's grooved solar panel frame leads the way for rail-less mounting systems. SolarCity acquires Zep Solar in 2013 to force the innovative installation technique in-house.[12]

Fig 3:- ZepSolar's rail-less mount. Source: Zep Solar[12]

2018

India is an extremely tropical country and is blessed with a lot of sunlight almost throughout the year. Thus the market of solar inverters in India is countless. The competition of reliability and genuineness is pretty tough among the companies. PoweroneMicroSystems is one of the best of these companies. We are extremely devoted to what we produce and customers are kept on the topic our list of priorities. Our company consists of a group of the finest technicians and engineers who manufacture products according to the demands of the customers. We believe in the dynamicity of energy and technology and thus commit to moving along the evolutionary trajectory of technological advancements to cope up with the daily demands. We produce varieties of solar energy-based products among which our solar inverters have managed to attract a lot of attention.[8]

There are several types of these solar inverters-

- **Standalone inverters** – These invertors are used in isolated systems where the inverters draw their direct charge from the batteries charged by photovoltaic arrays. These are mostly used in the domestic sphere and has an additional advantage of power production even in the absence of sunlight. These are completely comfortable for customers since it cuts down on the customer's dependence on the mechanical form of power production and one becomes capable of the power conversion all by themselves.
- **Grid Tie Inverter** – This type of inverter provides net metering capabilities and helps in converting DC into AC. The main advantage of this type of an inverter is the cost management and everything becomes essentially compact and easy to be used. The conversion that takes place inside the device for inbuilt power storage makes it possible for power production even in the absence of sunlight for which it can be used throughout the year, even in the presence of mild sunlight when the AC is put into work and the grid current is then implemented.

- **Hybrid Solar Inverters-** Hybrid inverter is a deep cycle battery-based power storage system. The battery could be charged through three different modes namely, the line supply, generator, and Photovoltaic system.[13]

RELATED WORK

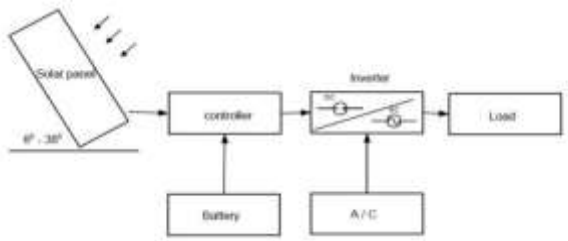
Water pumping worldwide is generally dependent on conventional electricity or diesel generated electricity. Solar water pumping minimizes the dependence on diesel, gas or coal based electricity. The use of diesel or propane based water pumping systems require not only expensive fuels, but also create noise and air pollution. The overall upfront cost, operation and maintenance cost, and replacement of a diesel pump are 2–4 times higher than a solar photovoltaic (PV) pump. Solar pumping systems are environment friendly and require low maintenance with no fuel cost [1]. Keeping in view the shortage of grid electricity in rural and remote areas in most parts of world, PV pumping is one of the most promising applications of solar energy. The technology is similar to any other conventional water pumping system except that the power source is solar energy. PV water pumping is gaining importance in recent years due to non-availability of electricity and increase in diesel prices. The flow rate of pumped water is dependent on incident solar radiation and size of PV array. A properly designed PV system results in significant long-term cost savings as compared to conventional pumping systems. In addition, tanks can be used for water storage in place of requirement of batteries for electricity storage [2]. Agricultural production in developing countries is largely dependent on rains and is adversely affected by the non availability of water in summers. However, maximum solar radiation is available in summers as such more water can be pumped to meet increased water requirements. Urban water supply systems are also dependent on electricity to pump water in towns. There is a wide scope to utilize PV pumping systems for water supplies in rural, urban, community, industry and educational institutions. In this study, a review of current state of research and utilization of solar water pumping technology is presented. The study focuses on recent advancement of the PV pump technology, performance evaluation, optimal sizing, modeling and simulation, degradation of PV generator supplying power to pump, economic and environmental aspects, and viability of PV water pumping systems for irrigation, livestock and community water supplies in rural, urban and remote regions. The research findings of solar photovoltaic water pumping systems of different configurations are presented for further follow-up research. The main objective of the study is to present current research status, and identify research gaps and impediments in the widespread propagation of solar water pumping technology. The strategy and policy issues for the promotion of PV water pumping are also presented.

Nowadays renewable energy generation systems are gaining more attraction due to the exhaustive nature of fossil fuel resources and its increased prices. Also the need for pollution free green energy has created a keen interest towards alternate energy sources. Solar power is the most common and available renewable power source to meet our rapidly increasing energy requirements [3]. Peak power from the solar pv maodule is to be tracked for its efficient implementation. Various algorithms are available in the literature for tracking maximum power from solar panels. In this paper Perturbation and Observation algorithm is considered due to its simplicity. A boost converter is used to implement maximum power point tracking algorithm [4]. The output power generated from the solar panels is intermittent in nature and varies with the irradiance level. Hence to make the system more reliable, a battery is included in the system. A bidirectional converter is also used to adjust the flow of power from and into the battery [5]. A five level inverter is used to convert the dc voltage from the solar pv array to ac voltage and connect feed to the load. In this paper a novel topology for single phase five level inverter is suggested [6]. This topology uses reduced number of switches compared to conventional five level inverter topologies. Multilevel inverters produce a desired output voltage from different levels of direct current voltages as inputs. As the number of levels increases, the synthesized output waveform is staircase wave which approximates a sine wave with more number of steps. Thus the output voltage approaches the desired sinusoidal waveform [7]. The basic idea of a multilevel converter is to obtain higher operating voltage using a series connection of power semiconductor switches with much lower voltage rating compared to power switches used in conventional two-level inverter. These power switches are controlled in such a way that more number of voltage levels is generated in the output using many dc sources. The rated voltage of the power semiconductor switches depends upon the rating of the input voltage sources to which they are connected and it is much less than the output voltage [8] The main advantages of a multilevel inverter are that they can generate the output voltages with very less THD, can draw input current with very low distortion, lower EMI effects, lower dv/dt across each switch and can operate at wide range of switching frequencies from fundamental frequency to very high frequency. The most common topologies for multilevel inverters are diode clamped, flying capacitor and cascaded H- bridge multilevel inverter. The paper presents a modified topology for multilevel inverter which uses less number of switches compared to conventional topologies
[9].

Worldwide, there is a growing concern to the impending energy crisis, triggered by its ever increasing demand and rapid depletion of fossil fuels. Conventionally, the major

sources of the electrical energy production are the fossil fuels such as coal and natural gas, which are under threat of reduced reserve left. The gap between supply and demand, specially being experienced by developing countries, is leading to frequent load shedding. Moreover, electrification of certain remotely located areas through extending the electrical power grids become infeasible due to economic and environmental reasons. On the other hand, greenhouse gases and hazardous wastes released from the use of fossil fuels in power plants have increased the threat of global warming, pollution of air, soil and water. Nuclear energy is one clean form of energy for bulk electricity production. However, it demands huge installation cost and involves several protection issues, in addition to the release of harmful radioactive wastes, with no sustainable disposal mechanism. Of the above, alternative and renewable energy have drawn the attention of the whole world as sustainable form of energy sources and are their increased share in power generation is being planned in almost all the countries. Some of these sources, such as those based on solar radiation and wind, can never be exhausted, and, therefore, are called 'Renewable Energy Sources (RES)'. These are often described as clean and green forms of energy.[10]

METHODOLOGY



graphical representation of such a circuit. An H-Bridge is built with four transistor switches. The transistors are divided into four groups with the transformer primary connected across the middle of the bridge The transistors are switched on and off in a specific pattern to produce each part of the waveform. If the switch 1 and 4 are closed, current will flow from the battery negative through transformer primary to the positive terminal of the battery.

This current induces a current flow in the secondary of the transformer, which has a peak voltage equal to the battery voltage times the turn ratio of the transformer. The switch 1 and 4 open after a period of time and the switch 2 and 4 close providing off time shorting .The length of the on and off time is determined according to the Pulse Width Modulation (PWM) controller.

Then, the switch 2 and 3 are close and allow current flow through the transformer in a direction opposite to the current flow. The switch 2 and 4 are close after this cycle is complete for off time shorting. This cycle will continuous to produce AC power.

SOLAR INVERTER PARTS

There are few sections of the solar inverter they are:

1. The solar battery recharger,
2. The solar panel
3. Rechargeable battery
4. The inverter.

SOLAR BATTERY CHARGER

A battery charger is a device used to put energy into a secondary cell or (rechargeable) battery by forcing an electric current through it. The charge current depends upon the technology and capacity of the battery being charged. For example, the current that should be applied to recharge a 12 V car battery will be very different from the current for a mobile phone battery. The solar battery recharger as the name suggest it is in fact a battery charger which charges a sealed rechargeable battery of 6V 4.5 AH in this case. The solar battery charger derives its power from the12V 500mA solar panel. The solar panel which in turn converts the sunlight to electrical energy. The charger converts the raw 12V from the solar panel to a regulated voltage feed for the sealed rechargeable battery. The solar battery recharger features:

1. Custom controllable voltage regulation.
2. Auto cut-off when battery is fully charged.
3. Filtered input from the solar panel.
4. No current back flows from the battery.
5. Very simple, compact and efficient.

SOLAR PANEL

A solar panel (also solar module, photovoltaic module or photovoltaic panel) is a packaged, connected assembly of solar cells, also known as photovoltaic cells. The solar panel can be used as a component of a larger photovoltaic system to generate and supply electricity in commercial and residential applications. Because a single solar panel can produce only a limited amount of power, many installations contain several panels. A photovoltaic system typically includes an array of solar panels, an inverter, and sometimes a battery and interconnection wiring.

Solar panels use light energy (photons) from the sun to generate electricity through the photovoltaic effect. The structural (load carrying) member of a module can either be the top layer or the back layer. The majority of modules use wafer- based crystalline silicon cells orth in-film cells based on cadmium telluride or silicon. The conducting wires that

take the current off the panels may contain silver, copper or other non-magnetic conductive transition metals.

The cells must be connected electrically to one another and to the rest of the system. Cells must also be protected from mechanical damage and moisture. Most solar panels are rigid, but semi-flexible ones are available, based on thinfilm cells.

Electrical connections are made in series to achieve a desired output voltage and/or in parallel to provide a desired current capability. Separate diodes may be needed to avoid reverse currents, in case of partial or total shading, and at night. The p-n junctions of mono - crystallization cells may have adequate reverse current characteristics that these are not necessary. Reverse currents waste power and can also lead to overheating of shaded cells. Solar cells become less efficient at higher temperatures and installers try to provide good ventilation behind solar panels.

Some recent solar panel designs include concentrators in which light is focused by lenses or mirrors onto an array of smaller cells. This enables the use of cells with a high cost per unit area (such as gallium arsenide) in a cost-effective way.

Depending on construction, photovoltaic panels can produce electricity from a range of frequencies of light, but usually cannot cover the entire solar range (specifically, ultraviolet, infrared and low or diffused light). Hence much of the incident sunlight energy is wasted by solar panels, and they can give far higher efficiencies if illuminated with monochromatic light. Therefore, another design concept is to split the light into different wavelength ranges and direct the beams onto different cells tuned to those ranges. This has been projected to be capable of raising efficiency by 50%.

Currently the best achieved sunlight conversion rate (solar panel efficiency) is around 21% in commercial products, typically lower than the efficiencies of their cells in isolation. The energy density of a solar panel is the efficiency described in terms of peak power output per unit of surface area, commonly expressed in units of watts per square foot (W/ft2). The most efficient mass-produced solar panels have energy density values of greater than 13 W/ft2 (140 W/m2).

RECHARGABLE BATTERY

The battery used in this project is a rechargeable sealed lead sulphate battery rating 12V 4.5AH.This type of battery is excellent for rechargeable purpose A rechargeable battery or storage battery is a group of one or more electrochemical cells. They are known as secondary cells because their electrochemical reactions are electrically reversible. Rechargeable batteries come in many different shapes and sizes, ranging anything from a button cellto megawatt systems connected to stabilize an electrical distribution network. Several different combinations of chemicals are commonly used, including: lead – acid, nickel cadmium (NiCd), nickel metal hydride(NiMH),lithium ion(Li-ion), and lithiumion polymer(Li-ion polymer).

Rechargeable batteries have lower total cost of use and environmental impact than disposable batteries. Some rechargeable battery types are available in the same sizes as disposable types .Rechargeable batteries have higher initial cost, but can be recharged very cheaply and used many times.

INVERTER

Since normal dc can't be used in most applications due to which there is a requirement that somehow the dc is changed to ac for this the inverter is used which converts the dc to ac of suitable range for use in house hold appliances. In this project the dc from the sealed rechargeable battery of 6V is fed to the inverter which then converts it to ac of 140V – 220V this makes it possible to recharge normal mobile chargers. An inverter is an electrical device that converts direct current (DC) to alternating current (AC), the converted AC can be at any required voltage and frequency with the use of appropriate transformers, switching, and control circuits. Solid-state inverters have no moving parts and are used in a wide range of applications, from small switching power supplies in computers, to large electric utility high-voltage direct current applications that transport bulk power. Inverters are commonly used to supply AC power from DC sources such as solar panels or batteries. The inverter performs the opposite function of a rectifier.

MODELLING OF 50WATT SOLAR INVERTER

A successful design involves accurate knowledge of daily electrical load calculation and accounts for all worst case scenarios which might possibly occur during operation. A good designer will be pragmatic and keep the costs down by cutting on unnecessary over sizing the system.

SELECTION OF BATTERY SIZE AND SOLAR PANEL

Now let's begin, Suppose we have to design an inverter for load of 40 Watts and required backup time for batteries is 1 Hour and we have to model a Solar Inverter than Inverter ratings, Required No of Solar Panel and No of batteries are calculated as follows.

Inverter should be greater 25% than the total Load

40 x (25/100) = 10

40+10 = 50 Watts

This is the rating of the UPS (Inverter)

Now the required Back up Time in Hours = 2.5 Hours

Suppose we are going to install 4.5Ah, 6 batteries,

6V x 4.5Ah = 27Wh

Now for One Battery (i.e. the Backup time of one battery)

27Wh / 40W = 0.675 Hours

But our required Backup time is 1 Hour. Therefore, 1/0.675= 2→i.e. we will now connect two batteries each of 4.5Ah, 6V.

So this is a 12 V inverter system, now we will install two batteries (each of 6V, 4.5Ah) in Parallel. Because this is a 6V inverter System, so if we connect these batteries in parallel, then the Voltage of batteries 6Vremains same, while it's Ah (Ampere Hour) rating will be increase

1. In parallel Connection, Voltage will be same in each wire or section, while current will be different i.e. current is additive e.g. I1+I2+I3…+In= 4.5Ah +4.5Ah = 9 Ah .

2. In Series Circuits, Current is same in each wire or section while voltage is different i.e. Voltage is additive e.g.V1+V2+V3….Vn. For The above system if we connect these batteries in series instead of parallel, then The rating of batteries become V1+V2 = 12Vwhile the current rating would be same i.e. 4.5Ah.

We will now connect 2 batteries in parallel (each of 4.5Ah, 6V), therefore for two Batteries it will be 9 Ah 6V, Now Required Charging Current for these two batteries (Charging current should be 1/10 of batteries Ah)→ 9Ah x (1/10) = 0.9A

Now the required No of Solar Panels

P = VI

P = 6V x 0.9 A

P = 5.4 Watts

This is our required watts for solar panel (only for battery charging, and then battery will supplypower to the load), Now

5.4W/3W = 2 Solar panels

Or 5.4W/6 = 1 Solar panels

It can be stated from the aforementioned literature surnvay that the inverter is overheated becaues They are made up of electronic components, and therefore sensitive to temperatures. High temperatures will lead to a significant reduction in production, and can even result in a production stop if the maximum operating temperature is reached. An assessment must therefore be made as early as the design stage to determine whether the proposed cooling technology is adequate and whether it has sufficient capacity**.** For example, it is very important that the switch cabinet and the building housing the inverter(s) are well ventilated.

Alongside an assessment of the initial design, it is highly advisable to regularly check the cooling during the operational period and to establish that the cooling or ventilation system is actually operating correctly**.** In addition to this, a number of steps can be taken in order to prevent excessively high temperatures, such as installing and cleaning dust filters, removing undergrowth that impedes airflow, etc.

Ventilation: It is always better to keep inverters in an airy space. Batteries might get heated up as it might not be experiencing a sufficient amount of air circulation. Battery heating under normal working conditions is negligible. Due to lack of air circulation heat cannot escape properly.

LEAKAGE: Inverter batteries like other lead acid batteries suffer from leakage of electrolyte. Sometimes the leakage is not apparent. The solution is to top it up with distilled water once. Generally an inverter battery requires a monthly top-up. If the battery continues to get heated up, call the technician. If you have a battery with electrolyte level indicator, like those in SF Sonic inverter batteries, this can be easily done.

DEPOSITS ON TERMINALS/RUSTING: Sometimes crusty deposits accumulate on the battery terminals which lead to power leakage and hence heating up of the battery. Check your battery terminals to see if deposits have accumulated. Remove deposits with baking soda and hot water. Apply petroleum jelly on the terminals to prevent further deposits. Rusting can also cause excess current flow resulting in heat. Inferior quality of terminal material is the principal cause. A regular checkup is the simplest solution.

PROJECT DESIGN AND DISCUSSION

One of the primary needs for socio-economic development in any nation in the world is the provision of reliable electricity supply systems. These rural dwellers are mostly farmers whose socio-economic lives can only be improved when provisions are made to preserve their wasting agricultural products and provide energy for their household equipment such as refrigerator, fan, lighting etc. There is also such a need to provide electricity for e-information infrastructures in our rural communities to service school, rural hospital, rural banking and rural e-library. Hence, there is the need to develop an indigenous technology to harness the renewable energies in Sun and Wind to generate electricity. Hence, there is the need to develop an indigenous technology to harness the renewable energies in Sun and Wind to generate electricity. In the recent years, photo voltaic power generation has been receiving considerable attention as one of the more promising energy alternative. The reason for this rising interest lies in the direct conversion

of sunlight into electricity. Photo voltaic energy conversion is one of the most attractive non conventional energy sources of proven reliability from the micro to mega watt level. The wide spread use of PV generation is however mainly hampered by economic factors. Efforts are being made worldwide to reduce the cost/watt through various technological innovations. Wind energy also is equally and effectively used in large scale wind farms to provide electricity to rural areas and other far reaching locations. Wind energy is being used extensively in areas like Denmark, Germany, Spain, India and in some areas of the United States of America. It is one of the largest forms of Green Energy used in the world today.

IMPORTANCE OF RENEWABLE ENERGY

The global search and the rise in the cost of conventional fossil fuel is making supply-demand of electricity product almost impossible especially in some remote areas. Generators which are often used as an alternative to conventional power supply systems are known to be run only during certain hours of the day, and the cost of fuelling them is increasingly becoming difficult if they are to be used for commercial purposes. There is a growing awareness that renewable energy such as photovoltaic system and Wind power have an important role to play in order to save the situation. Figure 1 is the schematic layout of Solar-Wind Hybrid system that can supply either dc or ac energy or both. 2.1 Solar Systems There are two types of solar systems; those that convert solar energy to D.C power, and those that convert solar energy to heat.Solargenerated Electricity – Photovoltaic The Solar-generated electricity is called Photovoltaic (or PV). Photovoltaic are solar cells that convert sunlight to D.C electricity. These solar cells in PV module are made from semiconductor materials. When light energy strikes the cell, electrons are emitted. The electrical conductor attached to the positive and negative scales of the material allow the electrons to be captured in the form of a D.C current. The generated electricity can be used to power a load or can be stored in a battery. Photovoltaic system is classified into two major types: the off-grid (stand alone) systems and inter-tied system. The off-grid (stand alone) systems are mostly used where there is no utility grid service. It is very economical in providing A Hybrid System (Solar and Wind) Energy… 65 electricity at remote locations especially rural banking, hospital and ICT in rural environments. PV systems generally can be much cheaper than installing power lines and step-down transformers especially to remote areas. Solar modules produce electricity devoid of pollution, without odour, combustion, noise and vibration. Hence, unwanted nuisance is completely eliminated. Also, unlike the other power supply systems which require professional training for installation expertise, there are no moving parts or special repairs that require such expertise.

Block Diagram:-

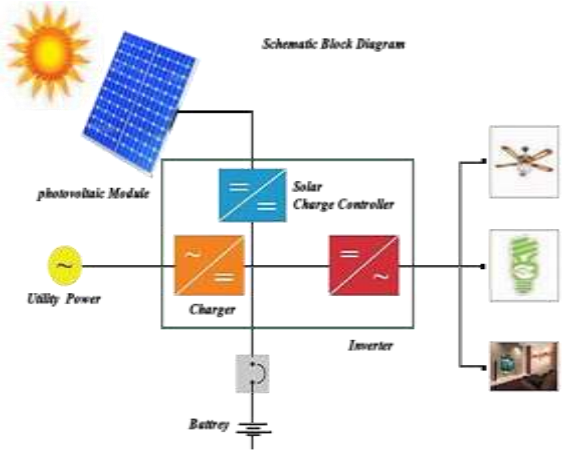


Fig 5**:**-Schematic Block Diagram[11]

Design of the Reflectors:-

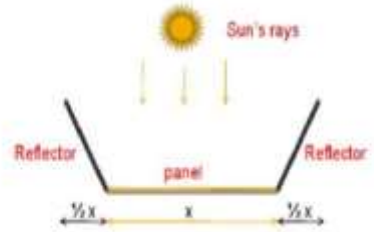


Fig.8: Testing Set up of the designed Prototype

OUTPUT:-

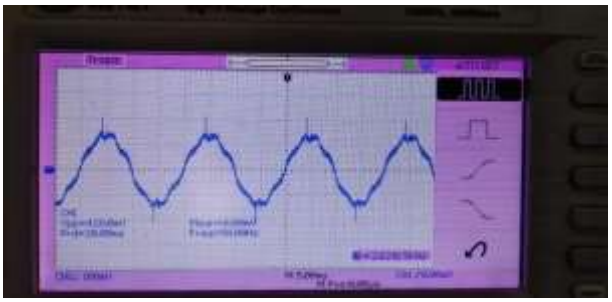


Fig.9 waveform

In fig.9 we obtained the desired sine wave the then we connect the solar panel to the circuit And final design to be ready.

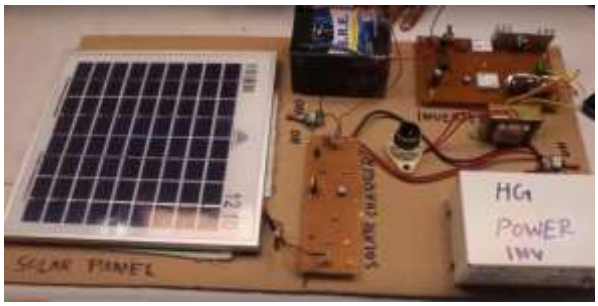


Fig 10:-Proposed of Hybrid Solar Inverte

Table 2:-Comparison of existing work with proposed model

Ref	Efficiency	Output sin wave	Stable frequency	Power losss
[3]	✓	×	×	✓
[4]	×	×	✓	✓
[5]	×	×	✓	✓
Proposed Work	✓	✓	✓	✓

CONCLUSION

From this project we observed that this solar inverter is producing electricity free of cost by using solar energy so, its eco- friendly, pollution free and can be used for domestic appliances as well as for industrial purpose on three phase. In this project ,we made an inverter which is sufficient to supply the power to domestic load and we have indicated on the LCD display battery terminal voltage and the output voltage. From this observation, the user can get the idea about the availability of the power.

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Design of alcohol detector and automatic engine locking system based on arudino technology :

Vikas singh[1],Mehak[2],Neeraj kumar[3],Dr.Narinder Sharma[4]

Abstract

The paper presents a new approach to automobile safety and security to decrease the number of accidents caused due to drunken drivers. It has a smart electronic system that continuously monitors the alcohol content in the air surrounding by the body of the protagonist. The speed of the vehicle varies on the content of alcohol detected. The vehicle-based countermeasure system progressively monitors the speed locking system of the vehicle running from high (100kmph), medium (60-80kmph) and low (40kmph) which helps the driver to reach the destination safely. In extreme things, the system disables the vehicle by switch off the ignition. The Global Positioning System (GPS) captures the location and sends information to the authorities with the help of a Global System for Mobile (GSM) device with the onetime password. Solely once the password is entered the vehicle will be restarted. Within the back end, all the riding circumstances, quantity of alcohol detected, vehicle speed and therefore the location is sent into net GSM automatically and accurately as shortly because the sign of alcohol detected for investigation purpose

Keywords: automatic engine locking system ,alchohal detector, Gsm and gprs based system.

INTRODUCTION

These days, majority of road accidents are caused by drink-driving. Drunken drivers are in an unstable condition and so, rash decisions are made on the highway endangers the lives of road users, the driver inclusive. The enormity of this menace transcends race or boundary. In Nigeria, the problem is being tackled by issuing laws prohibiting the act of drivers getting drunk before or while driving as well as delegating law enforcements agents to arrest and persecute culprits. However, effective monitoring of drunken drivers is a challenge to the

policemen and road safety officers. The reason simulator. The software code to be burnt into the Arduino board was written in Arduino IDE sketch.

The alcohol sensor module, GPS, GSM, LCD and DC motor. The GPS module captures the location of a vehicle and forwards it as a distress message through the GSM module. The LCD acts as the display while the DC motor was employed as a model for specifying the ability of the mechanism to lock the engine every time ethanol is sensed. proposed an automatic vehicle engine locked control system using Virtual Instrumentation. The proposed system used to implement an alcohol breath analyzer. The method used an Arduino as the control unit interfaced with sensor as a breathalyzer. The LED and LCD served as the output device. mail to be sent to concerned persons of arrested drunk suspects. proposed system included the use of a GPS for tracking the vehicle's location, heart pulse sensor to notify normal or abnormal condition of driver, and bumper switch to detect collision of vehicle. Other functional modules interfaced to the Arduino module are GSM, GPS, LCD, alcohol sensor, obstacle sensor, fuel block.er, alarm and relays. proposed system is based on arduino which provides the continuous monitoring of a driver's BAC. PAS 32U alcohol sensor was utilized to continuously check the existence of liquor, while the Global Positioning System and Global System for Mobile communication units send the place where the vehicle is situated via SMS.

In our project, we are using a siren which will be more cost efficient. Use of siren will alert the people nearby and hence any kind of necessary action can be taken.

There are many flaws with their design. A major shortcoming is the limitation of the its application to only vehicles which use helmets, i.e. 2 wheelers which is not a feasible idea while driving, especially for short distances. Another drawback being, the system when implemented makes the helmet too heavy which is not favorable for driving. Also, they have used an expensive microcontroller whereas we are using open source hardware, which is very cheap.

A major drawback of this system is the possibility of a false alarm. The system is designed in a manner that even a slight change in some particular condition can result in ringing false alarms even though everything was normal. In our project, we are using only the required technology thereby making the system more reliable and cost effective when implemented. We have seen many news of accidents caused due due to drunk and drive. We have designed this project to solve the said problem.

The basic functioning of the GPS tracker and alcohol detector project: As shown in the video demonstration, the project is actuated on switching on the vehicle with the help of ignition key. This would actuate the working circuit and make the entire unit in a vigilant mode. Alcohol detection is performed in real time by the alcohol sensor, the microcontroller and Analog to digital converter circuit. Thus there is never a situation when the system is in a shadow or a sleep. .

In the GPS based drunk and drive detection project, the system generates an alarm once the level of alcohol measured in above a set threshold value. At the same time engine locking is done with the help of deactivating Relay and DC motor. Also it reads data from the GPS unit which gives the position of the vehicle to microcontroller. Then microcontroller sends sms to the hand held mobile phone with the help of GSM modem. User can click on the link in the received SMS. The integration of the GPS tracker with the Google Maps would ensure that the position of the offender is given out on the maps readily to ensure easy location and possible further action.

Literature survey

Mandalkar Rahul B et.al [1] Now-a-days,mobile phone is used mostly by all people with internet usage are, so these mobile phone also provide correspondence platform as they are equipped with 2G or 3G network. There are lots of cause for mischance of car such as drunkenness of driver, drowsiness of driver, unconsciousness of driver, and numerous time what happens driver is not responsible for mishap but rather their (car) neighboring car behavior also have made and part to uphold mischance. There are some system that have been implemented to maintain a strategic distance from mischance but that do not give proper solution to implement in car to avoid various accidents that they are normally being happen.International Journal of Pure and Applied Mathematics Special Issue 3001.

Kathiravan S et.al [2] introduces methods such as alcohol detection, heart beat rate observing system

tegic distance from accidents.

S.P. Bhumkar et.al [3] investigated in this paper "Accident avoidance and detection on highways" In this procedure the weakness will be detected instantly and standard traps the events driver and out-sider. The new weakness detection algorithms and techniques using eye blink, alcohol, impact, gas, etc. sensors.

1.4 Problem Statement of the project

The factor of vehicle compactness on the road increased dramatically because of the population Ethiopia has been increasing rapidly years by years. Moreover the improvement in Ethio pialiving standard has contributed to the increasing number of vehicle on the road (private vehicle).These factors are leading to a lot of road accidents. Some of the cases of these road

accidents may happen when there are drunken driver who driving in dangerous condition. At present the death causes due to the drunken driver have increased radically. Traffic accidents caused by drunk drivers not only causes the fatalities of life but also a distraction of the vehicle instrument.However, an effective apparatus for preventing such kinds of accidents has not yet been developed in our country

1.5 Objective of the project

The aim and objective this system will to sense the alcohol level of the driver through breath and control the motor to prevent the driver from such accident.

Prevent the driver from driving if the alcohol level is over the limit.

To provides an automatic safety system for cars and other vehicles as well.

It prevents material distraction and avoids traffic accidents.4

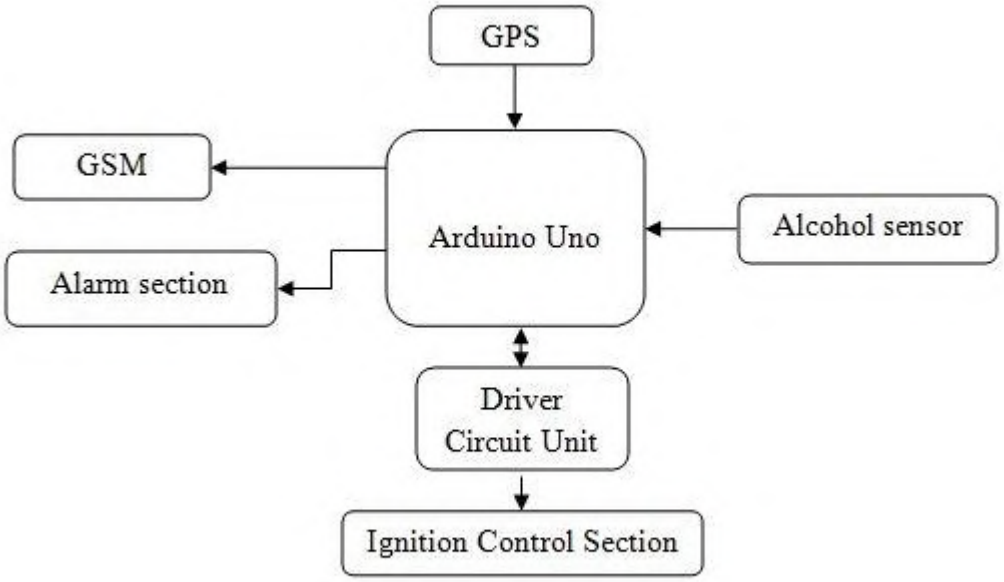
It saves the live of passengers.

Scope of the project

The Proposed System of an Automatic Locked Control System of Vehicle for Drunken Driver

to assure safety of lives and to prevent material distraction when installed with every vehicle by maintaining its real time operation. This System not only deals with component monitoring, even more than that like sending message to the traffic police station to indicate its status and take another opportunity to run the activity safely.Alcohol detection are the vital and of great importance from the perspective of passenger safety and traffic safety. Impact detection and notification is also one of the lifesaving and critical information provider system.

Block diagram of project:



COMPONENT REQUIRED

1 .arduino uno

2. Alcohol sencer unit

3. Dc motor

4. Power supply

5 Gsm module

6. LCD Display

7. Moter driver

8 .relay

9. ingintion locking

.ARDUINO UNO

Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connec-

tion, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a UNO cable or power it with a AC-to-DC adapter or battery to get started.. You can tinker with your UNO without worring too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again."Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards

Alcohol Sensor Unit

The sensor is made of Tin Dioxide (SnO2) sensitive layer. The sensor is configured with a high sensitivity to alcohol and small sensitivity to Benzene. It has a simple drive circuit with fast response, stability, and long life. It has an analog interface type. On the sensor, port pins 1, 2 and 3 represents the output, GND and VCC respectively.

• **Engine locking unit**

The engine locking unit was built by the concept of using a DC motor to demonstrate as the car engine. The DC motor operate based on preset conditions; once the alcohol level goes above 40% the engine motor stops. The engine motor continues to run when the alcohol level goes below 39%. The DC motor is connected to pin 9 on the microcontroller and it operate from 1.5V TO 6V.

LCD Display Unit

LCD display is used for displaying the message sent from the remote location. The LCD module (Fig. 5) displays alphanumeric, kana (Japanese characters) and symbols. It consists of 16 pins (8 data lines, 3 control lines, 2 power lines, 1 contrast line and 2 pins for back light LED connection). Data line and control line are connected to the microcontroller.

Alarm and Indicating Unit

The alarm unit used is a buzzer which indicates when alcohol is detected. The buzzer used belongs to the PS series. The PS series are high-performance buzzers that employ Uni-morph piezoelectric elements and are designed for easy incorporation into various circuits. They have very low power consumption in comparison to electromagnetic units. It has a voltage requirement of 2V and is connected to pin 10 of the microcontroller. The standard resistor value of 220 Ω. Commercially available is closest to the computed value of 250 Ω, so a 220 Ω resistor was used to limit the current going through the LEDs.

DC Motor

The DC motor is an electric DC motor used to demonstrate the concept of engine locking. Here in this work, the DC motor will be connected to pin 9 on the microcontroller, when alcohol is detected the DC motor stops in other to indicate that alcohol is detected and continue running when there is no a We tested the sensor's accuracy using a deodorant perfume to simulate its response to alcohol concentration level. To verify the functionality of our system, we employed breadboard, digital multimeter , LEDs, Arduino sketch IDE, and Proteus VSM software.

Alcohol Sensor Accuracy

Accuracy is the measurement of an instrument to give equivalent value to the true value or the quantity being measured. The accuracy can be related to the percentage error as

$$\text{Error} = \text{Actual reading} - \text{Experimental reading}$$

$$\text{Percentage error} = \text{Error} / \text{Actual reading} \times 100\%$$

From the experimental results obtained as shown in table 5, Total percentage error for the whole table = 45%. Therefore, Overall percentage error = Total percentage /total sample reading = 45/20 = 2.25%. The average accuracy of the alcohol sensor used is obtained as Ave %

accuracy = 100 − 2.25% = 97.75 %. Thus, our calculation above shows that the alcohol sensor is 97.75% accurate.

Features of MQ3- Alcohol Gas Sensor

Operating Voltage: 5V ± 0.1

Concentration: 0.05 mg/L ~ 10 mg/L Alcohol

Current Consumption: 150mA

Output sensitivity adjustable

Analog output 0V to 5V and Digital output 0V or 5V

Low Cost and Fast Response

Stable and Long Life

Fair Sensitivity to Alcohol Gas

Both Digital and Analog Outputs

Operation Temperature: -10°C ~ 70°C

Sensitivity Level Characteristics

The values in ppm correspond to the voltage and percentage. Our system displays the percentage alcohol level to the driver. The ppm values are the concentration level, that is, BAC level. The voltage values increase or decreases based on the resistance of the alcohol sensor. Using this table, the locking concept was achieved by programming instruction to the microcontroller to lock the car engine when the alcohol sensor reading is above 40%. The microcontroller uses the analog voltage values coming from the sensor to determine whether the sensor reading is above the set limit. In essence, once the microcontroller receives analog value above 2V, it automatically compares it with the preset limit, if it is not the same the engine will stop.

Level of Drunkenness

Experimental results were obtained based on the three pre-designated conditions for drunk driving. In intoxication stage, the car engine will be running as the driver can still control himself. Also in the slightly drunk state, the system will still allow the engine to run. Finally, in the drunken state, the driver will lose stability and cannot make decisions. In that case, the engine automatically locks off.

LEVEL OF DRUNKNESS

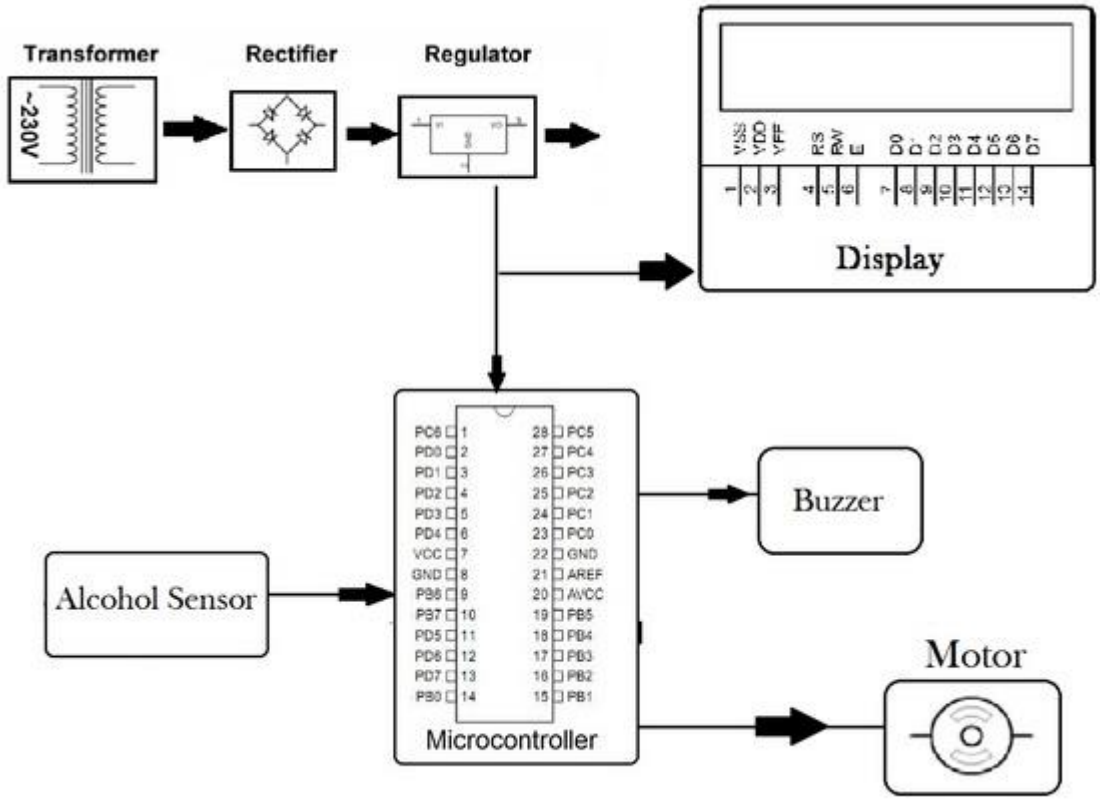
Voltage Output	200 - 300ppm 1 – 1.5V 20 – 30%	300 – 400ppm 1.5 – 2V 30 – 40%	400 – 500ppm 2– 2.5V 40 – 50%
LCD Display	Intoxicated	Slightly Drunk	Drunkenness
Alarm	Off	Off	On
Ignition SYS	On	On	Off

METHODLOGY

Procedure: In this stage, when the car is switched on the system measures the level of alcohol from the driver breath to check whether the driver is intoxicated, slightly drunk and whether if he is extremely drunk. Based on this, the microcontroller only locks the engine when the level exceeds 40% in which case car engine stops so that the alcohol detectorWe usually come across drink and driving cases where drunk drivers crash their cars under the influence of alcohol causing damage to property and life. So here we propose an innovative system to eliminate such cases. Our proposed system would be constantly monitoring the driver breath by placing it on the driver wheel or somewhere the drivers breath can be constantly monitored by it. So if a driver is drunk and tries to drive the system detects alcohol presence in his/her breath and locks the engine so that the vehicle fails to start. In another case if the driver is not drunk while he starts the vehicle and engine is started but he/she drinks while driving the sensor still detects alcohol in his breath and stops the engine so that the car would not accelerate any further and driver can steer it to roadside. In this system we use an AVR family microcontroller interfaced with an alcohol sensor along with an LCD screen and a dc motor to demonstrate the concept. So here the alcohol sensor is used to monitor users breath and constantly sends signals to the microcontroller. The microcontroller on encountering high alcohol signal from the alcohol sensor displays alcohol detection note on LCD screen and also stops the dc motor to demonstrate

as engine locking. The system needs a push button to start the engine. If alcohol is detected at the time of starting the engine the engine does not start at all. If alcohol is detected after engine starting, the system locks the engine at that time.

Working and block diagram:



WORKING:

The input for the Microcontroller is identified by the alcohol detector sensor through the breath of a human. In the next scenario the levels of alcohol measured by the sensor and compared with the set-in limits. If the set limit of consumption of alcohol is less than the alcohol con-

sumed by the person, the system of activating relay is initiated which in turn activates the automatic lock on the vehicle, i.e. it stops the motor rotation if it is in running state or it is unable to start. The system will lock the Engine at the same time will automatically give a buzzer. By this, we can avoid accidents by checking the driving people on the roads. Software Program for the system developed in embedded C. ISP is used to dump the code into the Microcontroller. When you turn the ignition key to the Start position, the battery voltage goes through the starter control circuit and activates the starter solenoid, which in turn energizes the starter motor. At the same time, the starter solenoid pushes the starter gear forward to mesh it with the engine fly wheel. The flywheel is attached to the engine crankshaft. The starter motor spins, turning the engine crankshaft allowing the engine to start. Natural safety switch: - For safety reasons, the starter motor can only be operated when theautomatic transmission is in Park or Neutral position, or if the car has a manual transmission,when the clutch pedal is depressed. To accomplish this, there is a Neutral Safety Switch installed the automatic transmission shifter mechanism or at the clutch pedal in case of a manual transmission. When the automatic transmission is not in a Park or Neutral (or when the clutch pedal is not depressed), the neutral safety switch is open and the starter control circuit is disconnected.

Microcontroller Based Automatic Vehicle Lock Control System of Drunken Driver

2.9 Hardware Requirements of the project

The overall placement and organization of the intended material to accomplish the desire sytems is given below with their brief explanation.Figure 11: Hardware Materials of the Project We

check the driver weather she/he is drunken or not using the above system inserted inside vehicle. If the driver is dunked

then alcohol sensor will sense the amount of alcohol consumed and displays the amount on the LCD. Then the microcontroller takes an action based on pre-sated amount. There are three states that characterize the driver states; intoxication, slightly drunk and unconscious. When the driver drives at unconscious mode the GSM modem sends the desired SMS to the traffic police as soon as the vehicle motor stops.

Software discriptions:

```
#include <LiquidCrystal.h>
```

```
#include <AFMotor.h>
LiquidCrystal lcd(12, 11, 5, 4, 3, 2);
AF_DCMotor motor(1);
int val;
void setup() {
Serial.begin(9600);
Serial.println("Motor test!");
pinMode(7,OUTPUT);
// turn on motor
motor.setSpeed(250);
motor.run(RELEAS}

}
void loop() {
uint8_t i;
val=analogRead(A5);
Serial.println(val);
motor.run(FORWARD);
for (i=0; i<255; i++) {
motor.setSpeed(i);
if(val>=100)
{
motor.run(RELEASE);
motor.setSpeed(0);
Serial.print("ALCOHOL DETECTED ");
lcd.print("ALCOHOL DETECTED");
lcd.print(" ");
digitalWrite(7,HIGH);
delay(2000);
digitalWrite(7,LOW);
delay(2000);
lcd.clear();
} } }
```

Advantages:

There are primarily three main advantages that go in favor of Alcohol detector and Vehicle Tracking System as in the given project.

1) Handy and portable: The compact and small sized design make a unit as demonstrated in the project very portable. This means that the unit can be carried around with ease and comfort.

The solid state components used in the project ensures a good life to the device and ensures long service life. Most agencies like the police and other law enforcing agencies rely on breath analyzers as they are convenient to use and very compact at the same time.

2) Easy and efficient to use: As can be seen in the demonstration, the gadget is simple in construction and easy to use. The results obtained by the breath analyzer are consistent with the further tests conducted on blood samples of suspect persons. The unit is easy to use and needs minimal training and familiarization. This helps keep the costs involved in introduction of the device in various applications and projects.

3) Quick and accurate: There is minimal time between testing of a subject and the availability of results. This helps enormously in situations where a large number of subjects are to be tested as in traffic policing. The results are consistent and accurate, making it suitable for law enforcing applications as the results need to stand the scrutiny of various courts and appeal systems in place.

Applications of the Alcohol detector and Engine locking system with aurdino based:

Most law enforcing agents would need to monitor the alcohol level of drivers and integrating the device to better manage people and vehicles are the need of the hour. Moreover there are a lot of situations when people need to be reassured of their safety on the roads while hailing a third party service provider like a taxi or a radio cab. Thus the need for a safety device as demonstrated in the project is felt by most people availing of such service.

CONCLUSION

An effective solution is provided to develop the intelligent system for vehicles which will monitor various parameters of vehicle in between constant time period and will sent data to the concerned persons. This is done by using platforms like Arduino, Sensor, DC motor, LCD display. The whole system has the advantage of small volume and high reliability .This system brings innovation to the existing technology in the vehicles and also improves the safety features hence providing to be an effective development in the automobile industry.

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DEVELOPMENT OF BLUMATIC DEVICE USING BLUETOOTH, GPRS AND MOBILE APPLICATION

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Abstract--

The main objective of this project is to develop a device for car control by using mobile phone. What if you forgot your car keys and that keyless entry remote banded to them, how are you going to get in your car? Well, if you haven't forgotten your cell phone, too, you can call up someone who has access to that keyless remote or you can unlock your car or truck via the wireless mobile phone! What? A car is usually an electro-mechanical machine that is guided by computer and electronic programming. The mobile operated vehicle is a concept where a human being can control a vehicle by an android app by mobile, without physically touching it. A keyless future is coming closer to fruition now. The car which can be controlling using an APP for android mobile. We are developing the remote buttons in the android app by which we can control the car activity or working with them. This project is based on ATMEGA 328 microcontroller, the same microcontroller which we used in ARDUINO and hc-05 or hc-06 Bluetooth module. In particular, this first stab at a solution offers a secure way for customers to "download" a digital key straight to their mobile device. Using this device we can unlock the car, start engine, start AC and activate and deactivate anti- theft system. This techniques currently used in car by using remote or key controller system but in future car will be controlled by using mobile device. This will also lead the concept of automatic car driving system in future.

Keywords: Vehicle, ARDUINO, Bluetooth, Microcontroller, Mobile Controlled

I. INTRODUCTION

Nowadays smart phones are becoming more powerful with reinforced processors, larger storage capacities, richer entertainment function and more communication methods. Smartphone , which is a small yet powerful device is rapidly changing the traditional ways of human-machine interaction. Smartphone users, smart phones have gradually turned into an all-purpose portable device and provided people for their daily use. We named this project as the " Blumatic Car ". Because we control car by using Bluetooth model. It allow us to operate our car without even touching it. It has a number of features including anti-theft, ignition and door unlocking in case if we forgot car's key inside the car or lose key while the car is locked. We haven't be panic. We take out our cell phone and by using cell phone we can unlock the car. By enabling anti-theft function nobody can start car even if we has a key to do so. If we suspect anyone near to car, we can horn to scare the people away. This project is designed in such a way that even if someone remove the battery terminal the car won't reset, that's how efficiently the anti-theft function works.

J. This project is mainly based on mobile phone communication with Bluetooth and controlling the device from mobile using Bluetooth. Bluetooth is a wireless technology is becoming a popular standard in the communication arena and it is one of the fastest growing fields in the wireless technology. It is convenient, easy to use and has a bandwidth to meet

most of today's demands for mobile and personal communication channel. It transmits and receives data wirelessly between these devices. It delivers the received data and receives the data to be transmitted to and from a host system through a host controller interface (HCI). Various researches have been made by different researchers in developing this project. However, they serve a different application and have different technologies implemented. Some of those papers are mentioned below stating their technology and application

K. Jorge Kazacos Winter [1] has developed android controlled robot automation. Main aim of his project was the transfer of information wirelessly between a smartphone and the robot and developing the robot

L. and its communication system underneath a low price and open source philosophy. He used 3D

M. design technique to style the structure of the robot with the facilitation of parametrical modelling

N. software. The style, when fed to the 3D printer can print the parts of the robot in a layered manner one by one and can then use these parts to assemble the robot simply. He has used ARDUINO micro-controller and Wi-Fi technology in this robot.

O. Vito M Guardi [2] has evolved the method of Bluetooth technology by developing an android app for a robot which is driven by a microcontroller. The central idea of his work is to show that one android app can be operated using totally different electronic devices. Vito M Guardi has invented a communication protocol for android smartphone and robotic platform over a Bluetooth.

P. Ranjith Kumar Goud and B.Santhosh Kumar [3] have invented a pick and drop robot. They wanted it to be used for diffusing a bomb remotely with safety. For the robotic arm, they used a pair of motors and another pair as the wheels of the robot for controlling the movement. Connectivity is established using Bluetooth. The micro-controller used is LPC2148. They had also attached a wireless camera for remote surveillance. They have worked on this project mainly for industrial and military applications.

Q. M.Selvam [4] in his paper has projected design to develop a robotic system which has a wireless camera attached to it for surveillance. Bluetooth was implemented in his project for providing connection between robot and smartphone. Wireless night vision camera was used for providing remote surveillance .The video which is recorded by camera is the transmitted to TV unit through Radio Frequency signal. He used 8051 micro controller for the robotic unit.

R. Xiao Lu, Wenjun Liu, Haixia Wang, Qia Sun [5] have published a paper based on a project in which the smartphone is capable of IFLYTEK voice as well as handwritten input. The design is therefore robust, suitable, and practical for use and it also ensures the reliability of the full system. For connectivity between the smartphone and robot, WIFI is used. Use of WIFI makes it easy and absolutely convenient for controlling the robot so that it can act according to the commands.

S. Arpit Sharma, Reetesh Verma, Saurabh Gupta,Sukhdeep Kaur Bhatia [6] have configured an android smartphone which can control a robot via Bluetooth technology. The phone uses motion sensors and records the gestures sent via an android mobile phone. It also has an inbuilt accelerometer and Bluetooth module for controlling the movements of a robot.

T. Jayesh George, Adithya Sreyaj PP, Danielb Joseph, Sajeer P [7] have worked on android controlled smart car. Their Project reduce the effort of controlling car in rough terrain and it also help in reducing the difficulties of parking a car in tight parking condition. For this phenomenon the command are sent to the Bluetooth module in microcontroller with the help of Bluetooth in smartphone.

U. Rahul Kumar, Ushapreethi P, Pravin R.Kubade, Hrushikesh B. Kulkarni[8] have worked on Android phone controlled Bluetooth robot. The operating system of smart phone is android which can develop effective remote control program. At the same time, this program use Bluetooth connection to communicate with robot. Generally many of the wireless controlled robots use RF module. But this project use mobile phone.

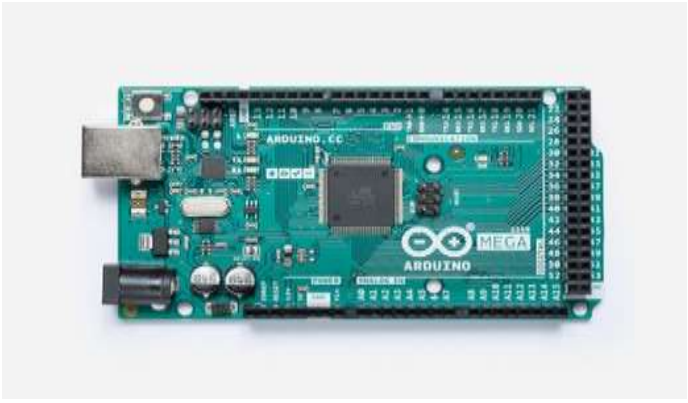
V. Nerson Rai, Deepak Rasaily, TashiRapdenWangchunk, Manoj George, Rit Kr. Khawas[9] have worked on Bluetooth remote controlled car using ARDUINO. In this project by using ARDUINO and Bluetooth module convert digital signal into physical movements. In this, if once a program is burned we don't need to worry about the program getting eraser as long as it isnot.

2. SYSTEM DESIGN AND ARCHITECTURE:

ARDUINO Uno : ARDUINO Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.. You can tinker with your UNO without working too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

Fig 1: **ARDUINO Uno board [10]**

Mega 2560: The ARDUINO Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support



the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Mega 2560 board is compatible with most shields designed for the Uno and the former boards DUEMILANOVE or DIECIMILA.

Fig 2: ARDUINO Mega 2560 is a microcontroller board [11]

HC-05 Bluetooth Module: The HC-05 is a very cool module which can add two-way (full-duplex) wireless functionality to your projects. You can use this module to communicate between two microcontrollers like ARDUINO or communicate with any device with Bluetooth functionality like a Phone or Laptop. There

are many android applications that are already available which makes this process a lot easier. The module communicates with the help of USART at 9600 baud rate hence it is easy to interface with any microcontroller that supports USART. We can also configure the default values of the module by using the command mode. So if you looking for a Wireless module that could transfer data from your computer or mobile phone to microcontroller or vice versa then this module might be the right choice for you. However do not expect this module to transfer multimedia like photos or songs; you might have to look into the CSR8645 module for that.

Fig 3: HC-05 Bluetooth Module [12]

GSM sim900A: GSM/GPRS Modem-RS232 is built with Dual-Band GSM/GPRS engine- SIM900A works on frequencies 900/ 1800 MHz. The Modem is coming with RS232 interface, which allows you connect PC as well as a microcontroller with RS232 Chip (MAX232). The baud rate is configurable from 9600-115200 through AT command. The GSM/GPRS Modem is having internal TCP/IP stack to enable you to connect with internet via GPRS. It is suitable for SMS, Voice as well as DATA transfer application in M2M interface. The onboard Regulated Power supply allows you to connect wide range unregulated power supply. Using this modem, you can make audio calls, SMS, Read SMS, attend the incoming calls and internet etc through simple AT commands.

Fig 4: GSM sim900A [13]

The NEO-6M GPS module: The NEO-6M GPS module is a well-performing complete GPS receiver with a built-in 25 x 25 x 4mm ceramic antenna, which provides a strong satellite search capability. With the power and signal indicators, you can monitor the status of the module. Thanks to the data backup battery, the module can save the data when the main power is shut down accidentally. Its 3mm mounting holes can ensure easy assembly on your aircraft, which thus can fly steadily at a fixed position, return to Home automatically, and automatic waypoint flying, etc. Or you can apply it on your smart robot car for automatic returning or headingto a certain destination, making it a real "smart" bot!

Fig 5: NEO-6M GPS module [14]

NODEMCU esp8266 WIFI module: NODEMCU is an open source IOT platform.[4][5] It includes firmware which runs on the ESP8266 Wi-Fi SoC from ESPRESSIF Systems, and hardware which is based on the ESP-12 module.[6][7] The term "NODEMCU" by default refers to the firmware rather than the development kits. The firmware uses the LUA scripting language. It is based on the ELUA project, and built on the ESPRESSIF Non-OS SDK for ESP8266. It uses many open source projects, such as LUA-CJSON[8] and SPIFFS.[9]

Fig 6: **NODEMCU esp8266 WIFI module [15]**

3. PROBLEM FORMULATION:

- Project deals with the only one car at one time, for different car different mobile application will be needed.
- A lot of component is used for making it, so it becomes costly.
- This project is run by using only android operating system. It will not work on other operating system like window or Mac.
- This only applies to cars that can be unlocked by that remote button on your key ring.

4. OBJECTIVE:

This project aims at controlling the working of a car by using mobile phone. We can control our car by using an android application. It is designed so that if we lost our car's key then we have not to be panic about it, we just use our mobile to operate our car.

METHODOLOGY

In this project we have used a toy car for demonstration. Here we have selected a RF toy car with moving left right steering feature. After buying this car we have replaced its RF circuit with our ARDUINO circuit. Bluetooth controlled car works according to button touched in the android Bluetooth mobile app. To run this project first we need to download Bluetooth app. We tried to design this project according to the market requirements, for this purpose before building the hardware, first we designed our hardware in 3d software called SOLIDWORKS. This designing really helped us in understanding the dimension of the components and then using these components within the defined area, for the complete hardware design we had to make each and every component. After the design was final, then we started performing some experiments on the Bluetooth interfacing and basic commands transferring. We defined the credentials like pin code and its baud rate. After we completed the circuit then we started the programming to check our hardware. For the programming we used ARDUINO UNO IDE. The heart of our project is Atmega328 microcontroller. The Android software is highly secured as it needs pairing code, and the login password. In android application, we also defined different passwords for all the features. This android application cannot be used for other cars unless new passwords are defined. Each and every car will have its own codes in order to make highly secured.

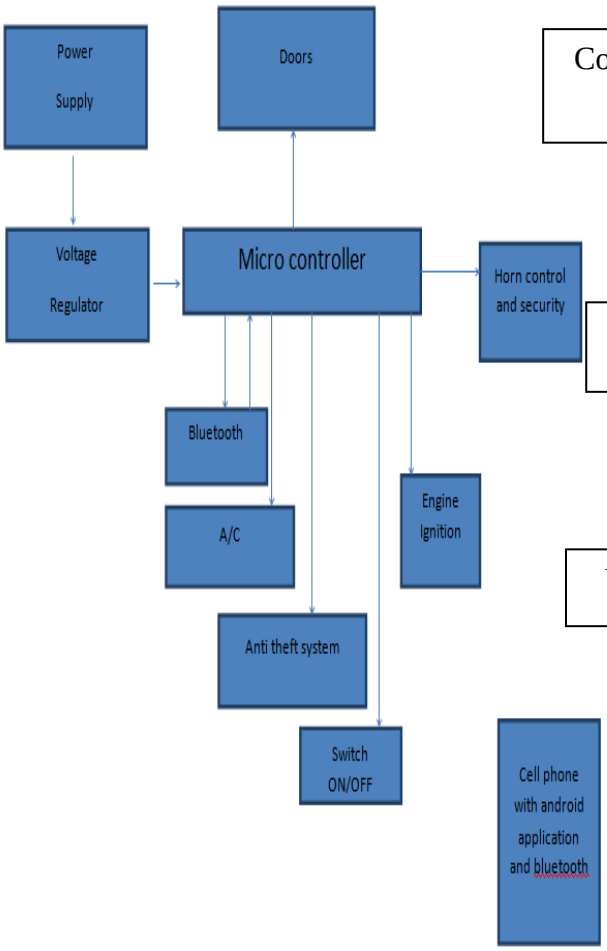


Fig 7 : Block diagram [16]

Flow Chart for this:

Connect all essential electronics component according to circuit diagram

Write program into ARDUINO software and upload to microcontroller

Use APK for controlling circuit through mobile phone

A. Connecting component according to circuit diagram:

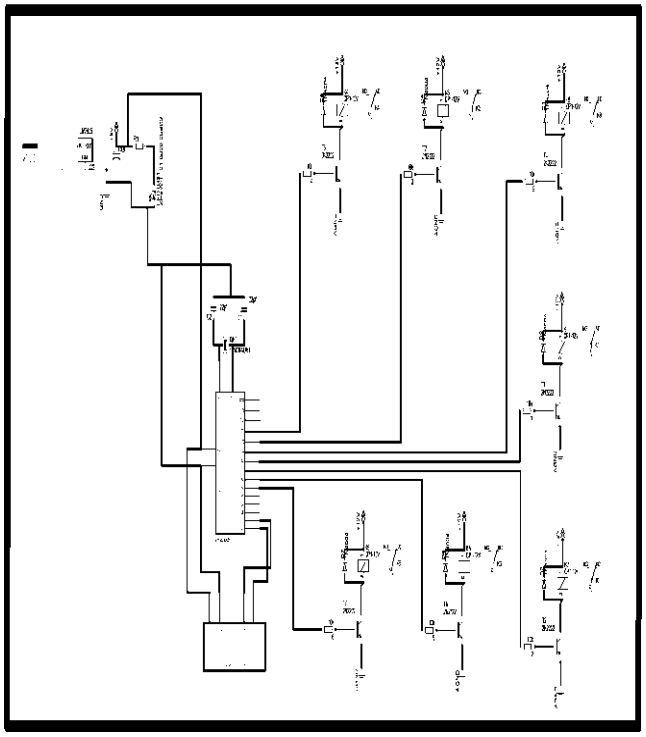


Fig 8: circuit diagram [17]

According to fig. connect all component into PCB. There are total six type of working of this project. So, use 6 relay, 6 transistor, 6 diode and 6 resistor package. Except all of these we use ARDUINO board and hc-05 BLUETOOTH module .Another component like HC-05 BLUETOOTH module ,ARDUINO, mega 2560 ,neo 6m GPS module ,Mq-2 gas/smoke sensor ,WIFI module is added with their circuit externally .

B. Write program into ARDUINO software and upload to microcontroller.

For BLUEMATIC car device following program should be written in ARDUINO software .Then this program upload to micro controller. .

```
#include <Software Serial. h>
Software Serial Blue (0, 1);
long int data;

int relay1 = 5; // car switch ON
long int password1 = 98421615;// to on switch
long int password2 = 96951628;// to off switch

int relay2 = 6; // engin ON " this will turn on the switch for few seconds to turn on the engine, after the engine starts the switch is released again.
long int password3 = 74151525; // engine self on
long int password31 = 45614787; // engine self 0ff

int relay3 = 7; // doors open
long int password4 = 84515822;

int relay4 = 8; // doors close
long int password5 = 81426337;

// car A/C

int relay5 = 9;// for A/c
long int password6 = 86741749; // to turn on ac
long int password7 = 22241729; // to turn off A/c

// Horn

int relay6 = 10; // for horn
long int password8 = 34156469; // to turn the horn button

// PARKING LIGHTS

int relay7 = 11; // anti theft
long int password9 = 24127161; // to turn on anti theft
long int password10 = 48615369; // to turn off anti theft
char state = 0;
void setup()
{
pinMode(relay1, OUTPUT);
digitalWrite(relay1, LOW);
pinMode(relay2, OUTPUT);
digitalWrite(relay2, LOW);
pinMode(relay3, OUTPUT);
digitalWrite(relay3, LOW);
pinMode(relay4, OUTPUT);
digitalWrite(relay4, LOW);
pinMode(relay5, OUTPUT);
digitalWrite(relay5, LOW);
pinMode(relay6, OUTPUT);
digitalWrite(relay6, LOW);
pinMode(relay7, OUTPUT);
//digitalWrite(relay7, LOW);
digitalWrite(relay7, HIGH);
delay(500);

// incase if the power from battery is disconnected and then connected again then the horn will on and off few times

digitalWrite( relay6, HIGH);
```

```
delay(1000);
digitalWrite(relay6, LOW);
delay(500);
digitalWrite( relay6, HIGH);
delay(1000);
digitalWrite(relay6, LOW);
delay(500);
digitalWrite( relay6, HIGH);
delay(1000);
digitalWrite(relay6, LOW);
delay(500);



Serial.begin(9600);
Blue.begin(9600);

}

void loop()
{

  while(Blue.available()==0) ;

 if(Blue.available()>0)
{
data = Blue.parseInt();



}
//delay(100);
//Serial.print(data);

if (data == password1)
{
  digitalWrite(relay1,HIGH);
  Serial.println("Switch On");
  delay(1000);

   }
 if( data == password2)
 {
    digitalWrite(relay1,LOW);
Serial.println("Switch OFF");
 }

 if( data == password3) // for self on
 {
    digitalWrite(relay2,HIGH);
 Serial.println("Self ON");
delay(200);
 }
  if( data == password31) // for self off
 {
    digitalWrite(relay2,LOW);
 Serial.println("Self OFF");
 delay(1000);

 }

 if( data == password4) // for doors opening
 {
    digitalWrite(relay3,HIGH); // press button
Serial.println("Doors Opened");
delay(2000); // keep the switch pressed for 2 seconds
 digitalWrite(relay3,LOW); // release button
 }

   if( data == password5) // for doors opening
 {
    digitalWrite(relay4,HIGH); // press button
Serial.println("Doors Closed");
delay(2000); // keep the switch pressed for 2 seconds
 digitalWrite(relay4,LOW); // release button
 }

      if( data == password6) //to turn on a/c on
 {
    digitalWrite(relay5,HIGH); // press button
Serial.println("A/c ON");
```

```
delay(2000);

 }

      if( data == password7) //to turn on a/c on
 {
    digitalWrite(relay5,LOW); // press button
 Serial.println("A/c OFF");
 delay(2000);

 }

       if( data == password8) //to turn on and off horn switch
 {
    digitalWrite(relay6,HIGH); // press button
 Serial.println("Horn ON");
 delay(2000); // keep the switch pressed for 2 seconds
     digitalWrite(relay6,LOW);
 Serial.print("Horn OFF");

 }

          if( data == password9) //to turn on anti theft
 {
    digitalWrite(relay7,HIGH);
 Serial.println("Anti theft ON");
 delay(2000);

 }

            if( data == password10) //to turn off anti theft
 {
    digitalWrite(relay7,LOW);
 Serial.println("Anti theft OFF");
 delay(2000);

 }
```

Program Explanation :

In this program we use relay 1,relay 2,relay 3,relay 4,relay 5,relay 6,relay 7 variable for car switching on ,engine on ,door open ,door close ,for ac, for horn , antitheft respectively. Now we set pin mode for different relay variable .Then we use loop for continuous process .We also set password for this BLUEMATIC car device operation.

C. Application for Controlling :-

Firstly ,when we open application then it will ask user name and password .This is provided for security purpose .Because someone can misuse this .After putting right user name password it opens .Now on screen there are 11 button icon .These button icon for car switching on ,engine on ,door open ,door close ,for ac, for horn ,antitheft .

5. CONCLUSION

The objective of the paper is to realize the smart living, .Hardware component and smartphones are a perfect match. As phones and mobile devices are each time more powerful, using them as robot for building robot with advanced feature such as voice recognisation . Android BLUETOOTH-enable phones and BLUETOOTH module via HC-06 and communication among BLUETOOTH devices . It is concluded that smart living will gradually turn into a reality that consumer can control remotely and wirelessly

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JARVIS ,DIGITAL HUMAN ASSISTANT

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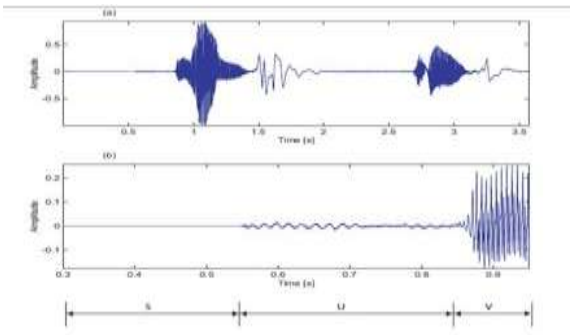
Abstract-- jarvis was main character of Tony's Stark's life assistant in Movies Iron Man. Unlike original comic in which Jarvis was Stark's human butler, the movie version of Jarvis is an intelligent computer that converses with stark, monitors his household and help to build and program his superhero suit. *In this Project Jarvis is Digital Life Assistant which uses mainly human communication* means such Twitter, instant message and voice to create two way connections between human and his apartment, controlling lights and appliances, assist in cooking, notify him of breaking news, Facebook's Notifications and many more. In our project we mainly use voice as communication means so the Jarvis is basically the Speech recognition application. The concept of speech technology really encompasses two technologies: Synthesizer and recognizer. A speech synthesizer takes as input and produces an audio stream as output. A speech recognizer on the other hand does opposite. It takes an audio stream as input and thus turns it into text transcription. The voice is a signal of infinite information. A direct analysis and synthesizing the complex voice signal is due to too much information contained in the signal. Therefore the digital signal processes such as Feature Extraction and Feature Matching are introduced to represent the voice signal. In this project we directly use speech engine which use Feature extraction technique as Mel scaled frequency cepstral. The mel- scaled frequency cepstral coefficients (MFCCs) derived from Fourier transform and filter bank analysis are perhaps the most widely used front- ends in state-of-the-art speech recognition systems. Our aim to create more and more functionalities which can help human to assist in their daily life and also reduces their efforts. In our test we check all this functionality is working properly. We test this on 2 speakers(1 Female and 1 Male) for accuracy purpose.

1. INTRODUCTION

Speech is an effective and natural way for people to interact with applications, complementing or even replacing the use of mice, keyboards, controllers, and gestures. A hands-free, yet accurate way to communicate with applications, speech lets people be productive and stay informed in a variety of situations where other interfaces will not

Speech recognition is a topic that is very useful in many applications and environments in our daily life. Generally speech recognizer is a machine which understands humans and their spoken word in some way and can act thereafter. A d ierent aspect of speech recognition is to facilitate for people with functional disability or other kinds of handicap. To make their daily chores easier, voice control could be helpful. With their voice they could operate the light switch turn o /on or operate some other domestic appliances. This leads to the discussion about intelligent homes where these operations can be made available for the common man as well as for handicapped.*With the information presented so far one question comes naturally: how is*

speech recognition done? To get knowledge of how speech recognition problems can be approached today, a review of some research highlights will be presented. The earliest attempts to devise systems for automatic speech recognition by machine were made in the 1950's, when various researchers tried to exploit the fundamental ideas of acoustic-phonetics. In 1952, at Bell Laboratories, Davis, Biddulph, and Balashek built a system for isolated digit.*recognition for a single speaker [12]. The system relied heavily on measuring spectral* resonances during the vowel region of each digit. In 1959 another attempt was made by Forgie , constructed at MIT Lincoln Laboratories. Ten vowels embedded in a /b/-vowel-/t/ format were recognized in a speaker independent manner [13]. In the 1970's speech recognition research achieved a number of significant mile- stones. First the area of isolated word or discrete utterance recognition became a viable and usable technology based on the fundamental studies by Velichko and Zagoruyko in Russia , Sakoe and Chiba in Japan and Itakura in the United States . The Russian studies helped advance the use of pattern recognition ideas



in speech recognition; the Japanese research showed how dynamic programming methods could be successfully applied; and Itakura's research showed how the ideas of linear predicting coding (LPC). At AT&T Bell Labs, began a series of experiments aimed at making speech recognition systems that were truly speaker independent. They used a wide range of sophisticated clustering algorithms to determine the number of distinct patterns required to represent all variations of di erent words across a wide user population. In the 1980's a shift in technology from template-based approaches to statistical modeling methods, especially the hidden Markov model (HMM) approach [1].

The purpose of this paper is getting a deeper theoretical and practical understanding of a speech recognizer. The work started by examines a currently existing state of the art for feature extracting method MFCC. With this study from MFCC applying this knowledge in practical manner, the speech recognizer is implemented in .Net technology in C# language developed by Microsoft [11]. In our project we use The Speech Application Programming Interface or SAPI is an API developed by Microsoft to allow the use of speech recognition and speech synthesis withinWindows

Applications that use SAPI include Microsoft Office,Microsoft Agent and Microsoft Speech Server.. In general all API have been designed such that a software developer can write an application to perform speech recognition and synthesis by using a standard set of interfaces, accessible from a variety of programming languages. In addition, it is possible for a 3rd-party company to produce their own Speech Recognition and Text- To-Speech engines or adapt existing engines to work with SAPI.

Basically Speech platform consist of an application runtimes that provides speech functionality, an Application Program Interface (API) for managing the runtime and Runtime

Languages that enable speech recognition and speech synthesis (text-to-speech or TTS) in specific languages.

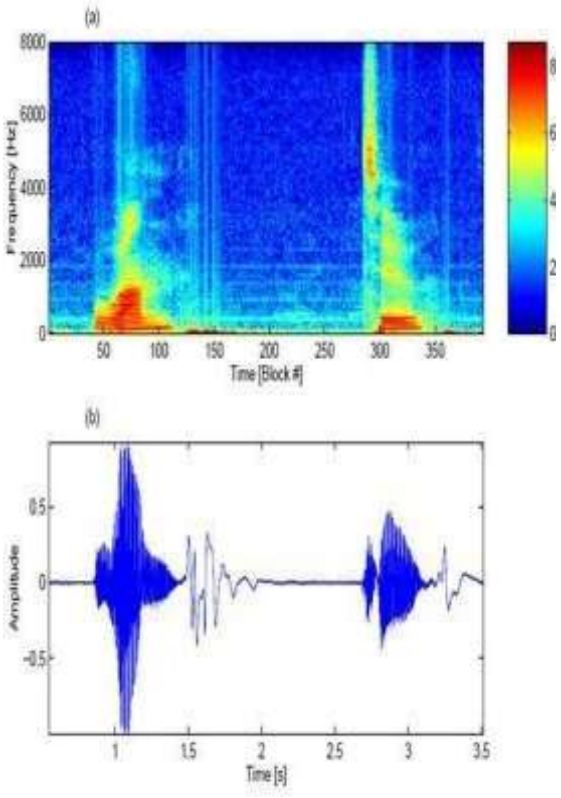
2. METHODLOGY:

The speech signal and all its characteristics can be represented *in two di erent* domains, the time and the frequency domain A speech signal is a slowly time varying signal in the sense that, when examined over a short period of time (between 5 and 100 ms), its characteristics are short- time stationary. This is not the case if we look at a speech signal under a longer time perspective (approximately time T>0.5 s). In this case the signals characteristics are non- stationary, meaning that it changes to reflect the di erent sounds spoken by the talker To be able to use a speech signal and interpret its characteristics in a proper manner some kind of representation of the speech signal are preferred.

- Voiced (V) - Vocal cords are tensed and vibrating periodically, resulting in a speech waveform that is quasi- periodic.

Quasi-periodic means that the speech waveform can be seen as periodic over a short-time period (5-100 ms) during which it is stationary.

The upper plot (a) contains the whole speech sequence and in the middle plot (b) a part of the upper plot (a) is reproduced by zooming an area of the speech sequence. At the bottom of Fig. 1 the segmentation into a three-state representation, in relation to the di erent parts of the middle plot, is given. The segmentation of the speech waveform into well-defined states is not straight forward. But this

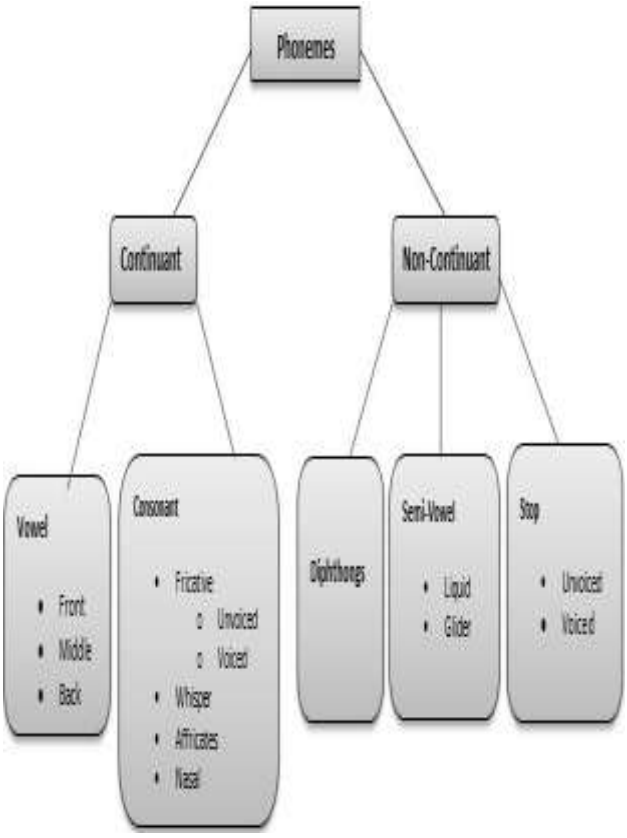


Here the darkest (dark blue) parts represents the parts of the speech waveform2 where no speech is produced and the lighter (red) parts represents intensity if speech is produced. speech waveform is given in the time domain. For the spectrogram Welch's method is used, which uses averaging modified periodograms [3]. Parameters used in this method are block size K= 320, window type Hamming with 62.5% overlap resulting in blocks of 20 ms with a distance of 6.25 ms between block.

state. In opposite of this state, the phoneme is non-continuant when the vocal tract changes its characteristics during the production of speech. For example if the area in the vocal tract changes by opening and closing the mouth or moving your tongue in di erent states, the phoneme describing the speech produced is non-continuant Phonemes can be grouped based on the properties of either the time waveform or frequency

characteristics and classified in di erent sounds produced by the human vocal tract. The classification, may also be seen as a division of the sections in Fig 3

The extraction of the best parametric representation of acoustic signals is an important task to produce a better recognition performance. The efficiency of this phase is important for the next phase since it affects its behavior. MFCC is based on human hearing perceptions which cannot perceive frequencies over 1Khz. In other words, in MFCC is based on known variation of the human ear's critical bandwidth with frequency [8-10]. MFCC has two types of filter which are spaced linearly at low frequency below 1000 Hz and logarithmic spacing above 1000Hz. A subjective pitch is present on Mel Frequency Scale to capture important characteristic of phonetic in speech. The overall process is shown in following Fig



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As shown in Figure 4, MFCC consists of seven computational steps. Each step has its function and mathematical approaches as discussed briefly in the following:

STEP 1:PRE–EMPHASIS

This step processes the passing of signal through a filter which emphasizes higher frequencies. This process will increase the energy of signal at higher frequency.

$$Y[n]=X[n]-0.95X[n-1] \quad (1)$$

Let's consider a = 0.95, which make 95% of any one sample is presumed to originate from previous sample.

The process of segmenting the speech samples obtained from analog to digital conversion (ADC) into a small frame with the length within the range of 20 to 40 msec. The voice signal is

divided into frames of N samples .

STEP 3: HAMMINGWINDOWI*Hamming window is used as window shape by considering the next block in feature* extraction processing chain and integrates all the closest frequency lines. The Hamming window equation is given as: If the window is defined as W (n), $0 \leq n \leq N-1$ where

N = number of samples in each frame

STEP 4: FAST FOURIER TRANSFORM

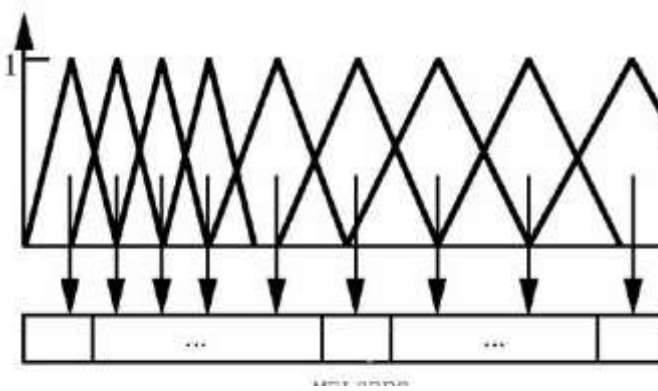
To convert each frame of N samples from time domain into frequency domain. The Fourier Transform is to convert the convolution of the glottal pulse U[n] and the vocal tract impulse response H[n] in the time domain. This statement supports the equation below:

$$y(w)=FFT[h(t)*X(t)]=H(w)*X(w) \quad (4)$$

If X (w), H (w) and Y (w) are the Fourier Transform of X (t), H (t) and Y (t) respectively

STEP 5: PROCESSING

The frequencies range in FFT spectrum is very wide and voice signal does not follow the linear scale. The bank of filters according to Mel scale as shown in figure 5 is then performed.



As mentioned in [12], voice recognition works based on the premise that a person voice exhibits characteristics are unique to different speaker. The signal during training and testing session can be greatly different due to many factors such as people voice change with time, health condition (e.g. the speaker has a cold), speaking rate and also acoustical noise and variation recording environment via microphone. Table II gives detail information of recording and training session, whilst Figure 7 shows the flowchart for overall voice recognition process.

PYTTSX3 MODULE

pyttsx is a cross-platform text to speech library which is platform independent. The major advantage of using this library for text-to-speech conversion is that it works offline. However, pyttsx supports only Python 2.x. Hence, we will see pyttsx3 which is modified to work on both Python 2.x and Python 3.x with the same code.

Use this command for Installation: pip install pyttsx3.

After imorting this module we initialise it using function(init). This function may take 2 arguments.

SPEECH RECOGNITION MODULE:

Speech recognition has its roots in research done at Bell Labs in the early 1950s. Early systems were limited to a single speaker and had

limited vocabularies of about a dozen words. Modern speech recognition systems have come a long way since their ancient counterparts. They can recognize speech from multiple speakers and have enormous vocabularies in numerous languages.

The first component of speech recognition is, of course, speech. Speech must be converted from physical sound to an electrical signal with a microphone, and then to digital data with an analog-to-digital converter. Once digitized, several models can be used to transcribe the audio to text.

Most modern speech recognition systems rely on what is known as a Hidden Markov Model (HMM). In a typical HMM, the speech signal is divided into 10 -millisecond fragments. The power spectrum of each fragment, which is essentially a plot of the signal's power as a function of frequency, is mapped to a vector of real numbers known as cepstral coefficients. The dimension of this vector is usually small—sometimes as low as 10, although more accurate systems may have dimension 32 or more. The final output of the HMM is a sequence of these vectors.

WEB BROWSER MODULE:

In Python, webbrowser module provides a high-level interface which allows displaying Web- based documents to users. The webbrowser module can be used to launch a browser in a platform-independent manner as shown below: The script ***webbrowser*** *can be used as a* command-line interface for the module. It accepts a URL as the argument. It accepts the following optional parameters: -n opens the URL in a new browser window, if possible; -t opens the URL in a new browser page ("tab"). The options are, naturally, mutually exclusive.

SMTP MODULE:

You probably found this tutorial because you want to send emails using Python. Perhaps you want to receive email reminders from your code, send a confirmation email to users when they create an account, or send emails to members of your organization to remind them to pay their dues. Sending emails manually is a time-consuming and error-prone task, but it's easy to automate with Python.

3. CONCLUSION:

This paper has discussed voice recognition algorithms which are important in improving the voice recognition performance. The technique was able to authenticate the particular speaker based on the individual information that was included in the voice signal. The results show that these techniques could use effectively for voice recognition purposes. Several other techniques such as Liner Predictive Coding (LPC), Dynamic Time Wrapping (DTW), and Artificial Neural Network (ANN) are currently being investigated. The findings will be presented in future publications.

Figure 8 is used for carrying the voice analysis performance evaluation using MFFC. A MFCC cepstral is a matrix, the problem with this approach is that if constant window spacing is used, the lengths of the input and stored sequences is unlikely to be the same. Moreover, within a word, there will be variation in the length of individual phonemes as discussed before, Example the word Volume Up might be uttered with a long /O/ and short final /U/ or with a short /O/ and long /U

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Controlling Light with Google Assistant

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Keywords : Automation, Google Assistant, IoT

ABSTRACT

This Paper demonstrates about the project of light automation with the help of voice commands. Light automation is a building automation for the lights**,** to make the home or office as a smart home or smart office**.** A light automation system will be used to control the lighting appliances .Controlling Light using Google Assistant is a controlled device designed to access lights with the help of the user command. After several studies and survey it have shown that both children and adults benefit substantially from access to lights as a means of comfort level. This reduces the user's human effort to get up from their respective place to turn on and off the lights. Many researchers have used several technologies to make a home automation . My proposed work is provided with the controlling of lights through Google Assistant from your smartphones. Home automations have gain lots of interests in the recent times. These devices are useful especially in business world as well as in homes to reduce extra human efforts. The benefits of home automation typically fall into a few categories, including savings, safety, convenience, and control. This project will save energy and helps is preventing exorbitant bills. Home automation technologies technology performs rote tasks automatically, end users experience great convenience. Lots of smart gadgets are compatible with one another, Connected devices can also help create a comfortable atmosphere as they provide intelligent and adaptive lighting which can all help create an inviting environment.

I. INTRODUCTION

Home automation as a part of IoT has been around for many decades in terms of lighting and simple appliance control [1], most commonly used idea is interconnected world at the touch of your fingertips or a simple voice command to

Fig 1: Controlling Light with Voice Commands [15]

Alexa, Google Assistant etc. The ESP8266 have really shaken the world of IoT from being pretty much a novelty industry (we all remember fridges that tweet and ovens that force us to accept an end user licence agreement) into a citizen science revolution where sensors across the world are monitoring climate change, animal migration patterns and much more. The Bolt IoT platform is one such board, and we had one on the bench and took it for a test drive. Lazy people like myself going to the switchboard to turn on the light is a big task. But what if the lights got turned on themselves whenever the room got dark and got turned off when the room was bright. This is exactly what is the aim of this project. [2] Using the Bolt Wifi module, I have made a circuit that can turn on and off the light based on my command from my phone using Google Assistant. All I have to say is, "Ok Google, turn on the light." It promptly does that and when you will say, “Ok Google , turn off the light” , it will
switch of the light.

Lighting influences private and working life. At the same time, it is a critical contributor to energy consumption. Although there exist manifold technical solutions for lighting to become ‘smart’, today’s lighting systems are often kept simple, and they are frequently not adjusted to the user’s behavior. [3] This paper presents the results of a systematic literature review on smart lighting systems and their related components. The aim of this paper is to present the state-of-knowledge on smart lighting systems and to highlights the potential of such systems for production and logistics facilities. Energy used for lighting is one of the major components of total energy consumption in buildings. Nowadays, buildings have a great potential to

reduce their energy consumption, but to achieve this purpose additional efforts are indispensable[4]. Experimental tests have been carried out in a university building with laboratories and other rooms, equipped

with KNX building automation system. A dimmable control strategy has been investigated, dependent on daylight luminance. Moreover, a relationship between external and internal daylight luminance levels has been evaluated as well. Based on the experimental results, the authors proposed a method for the rough estimation of electrical energy savings. Since, according to the EN 15232 standard, Building Automation and Control Systems (BACS) play an important role in buildings buildings and energy efficiency improvements, The potential to reduce energy consumption from lighting in non-residential buildings by 28% for offices and 24% for educational buildings has been explained [5]. Generally the Art of controlling the home appliances automatically & sometimes remotely is called home automation system.[6] Home Automation systems are highly increasing to Comfort in life and also improving quality of life. This paper focus on the studies and review of multiple home automation systems designed for disable peoples from multiple features standpoints.[7]

II. LITERATURE SURVEY

Gaurav Tripathi (2014) proposes an efficient implementation for IoT for monitoring and automation system This paper aims at controlling home appliances via Smartphone using Wi-Fi as communication protocol and Arduino Uno. [11].

Pooja. N. Pawar (2016) illustrated a remote Password Operated Home Appliances Control Project Algorithm was designed to read the data from Bluetooth module, Initialize the LCD and UART protocol and displays the status of the electrical loads on LCD. The system is installed beside the conventional electrical switches on the wall. The risk of dangerous electric shocks can be avoided by using low voltage switches. The user can monitor and control the devices from any remote location at any time using IOT [12].

S.A Jain Steven Maineka(2015) describes The Internet of Things (IoT) is an atmosphere in which objects, animals or people are make available with distinct identifiers and the capability to transfer data through a network without requiring human-to-human or human-to-computer interaction. ' This paper describes the concept of Wireless , IoT and architecture of Home Automation.[15]

Arun Gyril Josel(2015) anticipated various Home Automation Methodologies Analyzed from a Security Standpoint and Challenges in Home Automation Security. It shows how the concept of security and meaning of the word "intruder" [16]

III. Problem Formulation

In some of the referred paper paid applications are being used for the commands .But it will be easier for the user to use the user friendly free applications. There are number of components involved in making the automation circuit which can be reduced by using the wireless concept.

IV. Objectives

- **i.** To design the circuit using wireless concept of connecting the devices with each other
- **ii.** To observe and analyze the commands working with giving the acknowledgement first.
- **iii.** To demonstrate the comparison between the proposed model and the other existing models.
- **iv.** To make user friendly access model so that it can be easily used in our daily life

V. Methodology

To build this Intractable, you will need a Smartphone**,** a Laptop/Computer**,** a Bolt IOT Module, Relay module, light lamp and an interface circuit made from basic electronics components.

Bolt is an IoT platform to easily and quickly build products and services. Bolt comes with a WiFi/GSM chip and a cloud platform which helps you connect your devices and sensors to the Internet. With Bolt Cloud you can control and monitor them over the internet, create personalised dashboards to visualise the data,

monitor the device health, run machine learning algorithms and lot more.

We used a Bolt IOT Module as the controller and it is in Station mode in which it can connect to WiFi networks. When not connected to any WiFi network it hosts its own WiFi hotspot to which users can connect and runs at a frequency of 80 MHz.

The device is powered by connecting it to the home switch board that produces 220 V but the USB cable adjust it according to its own requirement as 3.3V or 5V. BOLT is an Internet of Things platform for both Hardware and Software that enables user to build IoT products and projects. Using BOLT**,** users can control and monitor devices from any part of the world.

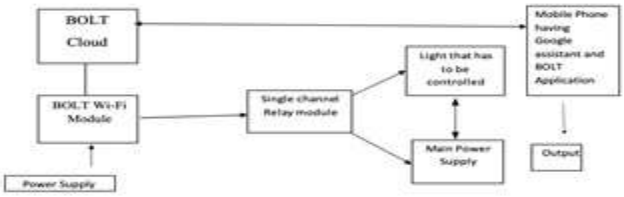


Fig 2: Procedure to develop the project

To control the light electronically, we need to make a connection with Smart phone and single channel relay module between Bolt Module and the light. Command on Google Assistant is given through the smart phone and the relay module is an electrically operated switch that can be turned on or off, letting the current go through or not, and can be controlled with low voltages. Connect the 5V supply pin and GND of the Bolt to the 5V and GND pins of the relay module..

Connect any one of the digital pin i.e. (0-4) of the Bolt to the IN/REL pin of the relay module. Connect a wire from the bulb holder to the COM pin of the relay module. Connect a wire from the NO pin of the relay module to the 2-pin socket. Connect the remaining terminal of the bulb holder tot the other terminal of the 2-pin socket. Open the Bolt cloud and login with your account credentials and click on 'Product' tab and create a product as shown.

Now Create the product by clicking on the configuration tab and configure its hardware and software.In the hardware first configure the input pins that you are using as your input pin and the time at which it is taking the input. Then click on the code section and enter the desired code.

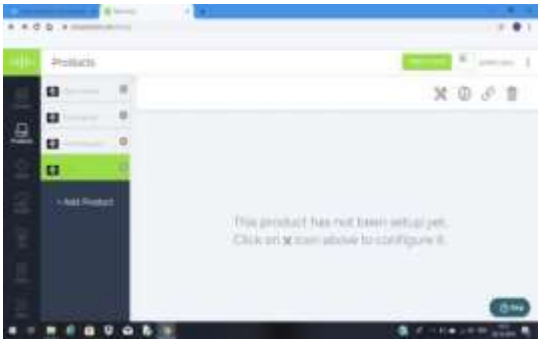


Fig 3: Creating the Project

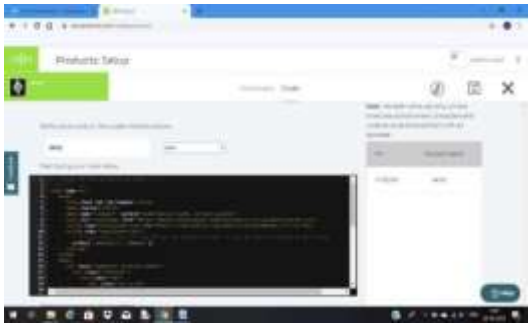


Fig 4: Project Set up

Fig 5: Configuring the hardware of the Project

Fig 6: Software Configure

Since, Light Bulb is a digital output device, we need to get a Digital Write Command that can be sent to Bolt over the Internet to switch on the Light Bulb. The

structure of the command**:**

https://cloud.boltiot.com/remote/API_KEY/digitalWrite?pin=PIN_NUMBER&state=HIGH/LOW&deviceName=DEVICE_ID Here, you

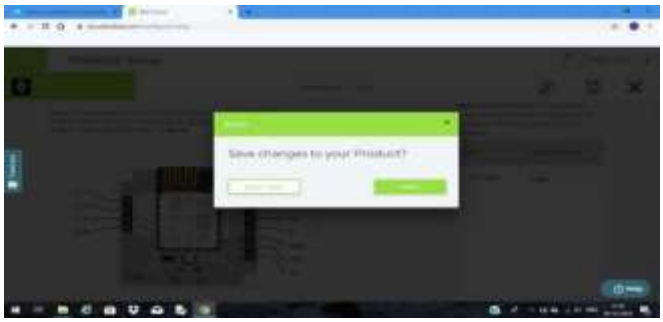


Fig. 7: Saving the Project

need to replace the API_KEY: API key which you've accessed from the bolt cloud. PIN_NUMBER: Pin Number is the number to which you've connected the IN pin of Relay Module to GPIO pin (0-4) of Bolt Module.

HIGH/LOW: The high/low indicates to Turn ON/OFF the Light Bulb. HIGH : ON & LOW : OFF DEVICE_ID: The Device ID can be accessed from your bolt cloud dashboard.

Fig 8: Getting the API Credentials

Virtual assistant is boon for everyone in this new era of 21st century. It has paved way for a new technology where we can ask questions to machine and can interact with IVAs as people

Fig 9: login to IFTTT

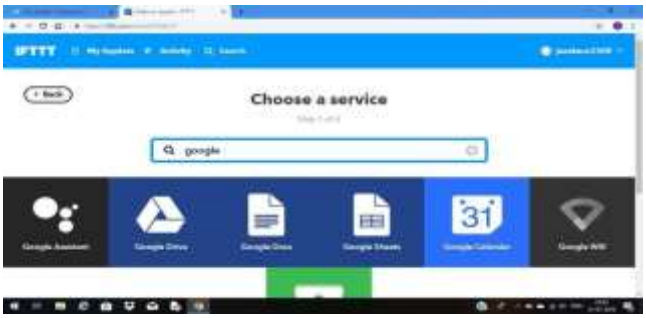
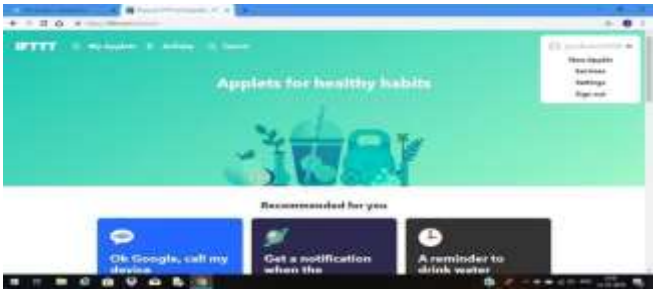


Fig 10: Selecting the Service as a Google Assistant

do with humans. This new technology attracted almost whole world in many ways like smart phones, laptops, computers etc. Some of the significant VPs are like Siri, Google Assistant, Cortana, and Alexa. Voice recognition, contextual understanding and human interaction are the issues which are not solved yet in this IVAs. So, to solve those issues 100 users participated a survey for this research and shared their experiences.[9] All users' task was to ask questions from the survey to all personal assistants and from their experiences this



research paper came up with the actual results. According to that results many services were covered by these assistants but still there are some improvements required in voice recognition, contextual understanding and hand free interaction. After addressing these improvements in IVAs will definitely increased its use is the main goal for this research paper [10].Now The Final Step of Creating an hsl . Login using your Gmail account, which you use on your mobile to interact with Google Assistant.Then go to the API section. If you have not generated your API key before, select the enable radio button and click on generate new API key button. Now go to the IFTTT login page[12] .Create an account in IFTTT by clicking the sign up button on the top right corner. Once you have created the account now click on NEW APPLETS option.Click on +THIS option and select Google Assistant, and click on "say a simple phrase" option and fill in the details and press 'create trigger. IFTTT is a popular trigger-action programming platform whose applets can automate more than 400 services of IoT devices and web applications. We conduct an empirical study of IFTTT using a combined approach of analyzing data collected for 6 months and performing controlled experiments using a custom testbed. We profile the interactions among different entities, measure how applets are used by end users, and test the performance of applet execution. [13]

Fig. 11: Selecting the Google Assistant

Phrases

Now for the case of webohooks which with get triggered in +That option for the IFTTT Command In the URL section, enter the below and replace it with your respective credentials.

https://cloud.boltiot.com/remote/API_KEY/digitalWrite?pin=PIN_NUMBER&state=HIGH/LOW&deviceName=DEVICE_ID

CREDENTIALS TO BE REPLACED:

API KEY - It will be available in the Bolt dashboard.

PIN NUMBER - Enter the pin number in which you have connected your resistor.

HIGH/LOW - If you want your google assistant to turn on the lights make the state to be high. Similarly, for switching the lights off make the state to be low

DEVICE ID - You can get it from your Bolt dashboard.

Select the "get" method and then select the content type to application and make sure your applet is turned on. For turning off the lights, follow the steps given for "turning on the lights." The only thing you have to do is to set the state = LOW in the URL section available in the "make the web request" window. Now we are ready with our project. It's time to get your hands on to the Google Assistant by saying the phrases you have saved. Now we are ready with our project. It's time to get your hands on to the Google Assistant by saying the phrases you have saved.

Fig 12: URL Commands in Webhook

VI. Results of the Proposed Work

When we connect our project to power supply and we give the commands from our phone from Google assistant as " Turn off the lights",It will turn the lights on and when we give a command to "turn off the lights" it will turn off the lights . The number of times the application is running is given by IFTTT applets modules. We can receive the notifications according to our choice . We can change the phrases accordingly.

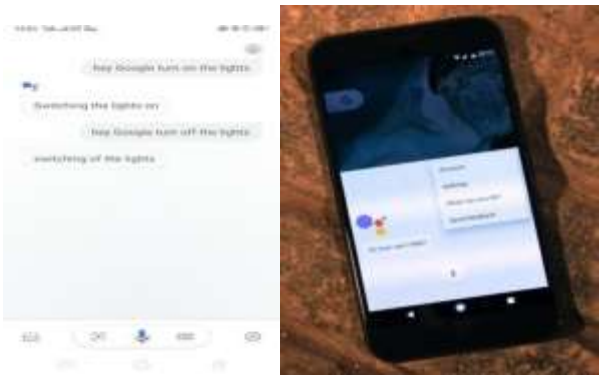


Fig. 14 : Output Screen of Google Assistant Application

VII. Comparison with existing work

The proposed work is far better than the other previous work in terms of cost efficient as less number of components are being used . It uses low power consumption and a simple circuit. It is more efficient and give proper results as compare to the other projects.When we connect our project to power supply and we give the commands from our phone from Google assistant as " Turn off the lights",It will turn the lights on and when we give a command to "turn off the lights" it will turn off the lights . The number of times the application is running is given by IFTTT applets modules. We can receive the notifications according to our choice . We can change the phrases accordingly.

No.	Cost efficient	Low Power Consumption	Simple Circuit	Efficiency
[2]	✓	×	×	✓
[6]	×	✓	×	×
[9]	✓	×	×	×
[10]	✓	✓	✓	✓

VIII. Conclusion

Proposed Design for Home automation is done with the help of BOLT Wi-Fi Module which will reduced the human effort as well as it consumes less power . It efficient designing reduces the wires in this project and make its connections through wireless communication and the personal hotspot of the module used. To design a wireless circuit with less number of components is the main purpose of this work . In this work less number of wired connections are taken and more wireless connections are being connected. We have used BOLT IoT Module which is connected to its own cloud which helps in the storage of the data and is used to write the code . In this proposed work commands are given with the help of the Google Assistant from anywhere in the world and we can control our lights from anywhere in the world by giving the voice commands. Proper security is being provided to every module by giving a unique device name as well as the unique api key to every access and can be change by only original user . Using application like Google Assistant will be more secure as it will be directly linked to your Gmail account and access only when you know the password as well as it is a open source.

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Automatic Load Sharing of Transformers

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Amritsar College of Engineering and Technology

ABSTRACT

Transformer is a static device, which transfers the electrical power from one circuit to another circuit with desired change in voltage and current at constant frequency. It is only one device, which operates at highest efficiency at full load condition. But abnormal condition occurs at overloading condition which may result in severe problem in future. To avoid such condition we are using other standby transformer, which supplies the load when overloading occurs on main transformer unit, which switch on automatically by Arduino Microcontroller. This will result in efficient loading of both transformers. Also, when load is normal both transformers can be switched on to supply the load alternately. This will avoid the thermal overloading of transformer. Also this arrangement will provide proper maintenance facility for both transformers. Whenever the sharing of load on transformer occurs, the operator gets message through the Buzzer. All these advantages will make this system very efficient and reliable.

KEY WORDS – Arduino, Buzzer, LED, Transformer

1. INTRODUCTION

Transformer is a static device which transfers the electrical power from one circuit to another circuit with desired change in voltage and current at constant frequency. Transformer is only one device which operates at higher efficiency at full load condition. But some abnormal conditions occur at overloading conditions. Also transformer efficiency gets reduced due to increased heating and increased losses. So it is very essential to share this load other transformer or replace the transformer of higher rating. Later technique is not feasible economically so the first technique is practically employed to supply load efficiently. We are employing the first technique to supply the load efficiently and reliably.

To accomplish this requirement there is one method of manual approach. In this other transformer is connected manually during heavy loading condition. But practically manual approach is not efficient. So we are employing Arduino to make the switching of transformer automatically. Arduino is an automation based microcontroller device which will automatically switch the transformer into

circuit when overloading condition occur for transformer one. Thus this will result in efficient working of both transformers. Also when load is constant both transformers are switched on into the circuit alternately. This will avoid continuous heating of only one transformer. This arrangement offers proper maintenance facility for both transformers. All this advantages will make this system very efficient.

2. BLOCK DIAGRAM

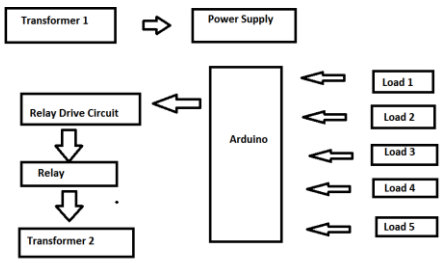

Fig 1: Block Diagram of Automatic Load Sharing of Transformer

3. CIRCUIT DIAGRAM

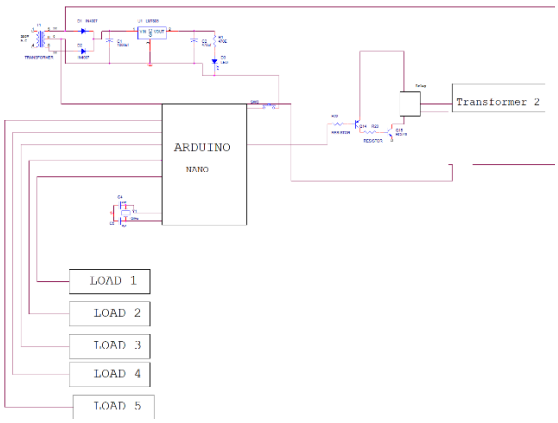

Fig 2: Circuit Diagram of Automatic Load Sharing of Transformer

4. COMPONENTS REQUIRED

1. Three Transformers : Rating 220/12V
2. Diode
3. Capacitor : Rating 1000µF
4. Voltage Regulator 7812
5. Capacitor : Rating 470µF
6. Five Voltage Regulator 7805
7. Arduino UNO
8. Resistor 470 ohm
9. LED
10. NPN Transistor 547
11. Resistor 1 Kohm
12. PNP Transistor 557
13. Relay 12V DC
14. Buzzer 5V DC

5. OPERATION

In the proposed system, only one transformer is operating to feed the loads. A standby transformer is connected in parallel through a relay. The current transformer continuously measures the load current and feeds it to the Arduino. The reference value or the maximum load limit is entered by the user and priority level of the load is also set by the user or concern authority. As the load demand increase during peak hours, a single transformer would not be able feed all the load. During this condition, when the load demand exceeds the reference value, the Arduino will give a control signal to energize the relay coil. Thus the stand by transformer will be connected in parallel and share the load equally. Since the transformers are of the same ratings. Thus all the loads are fed efficiently providing un-interrupted power supply.

When the load increases to further to a value which is greater than the capacity of the two transformers, priority based load shedding will be implemented. The loads which have the lowest priority will be shut down by opening the respective circuit breaker.

When the load decreases, and comes to normal working condition, first transformer will be shut down in order to avoid thermal loading. This is done because the first transformer operates for a longer time interval than standby transformer and its body temperature rises. By providing alternative switching the transformers can be cooled by natural methods. This will improve the efficiency of the system.

6. ADVANTAGES

i. The load is shared by transformers is automatically.
ii. No manual errors are taking place.
iii. It prevents the main transformer from damage due to the problems like overload and overheats.
iv. Un-interrupted power supply to the consumers is supplied
v. Remove power blackout at pick hours
vi. Accident Prevention
vii. Transformer safety

7. Future scope

The project describes about how to use power supply intelligently under peak loads. The project automatically connects and disconnects the transformer thus protecting transformer from overload. Sensing unit, i.e. Current transformer plays an important role by sensing the current through the load and sending feedback signal to the Ardiuno. The Ardiuno is so programmed that as soon as the load exceeds a particular current limit it will soon generate a control signal that would be amplified by the driver unit and finally control signal is fed to the relay. The switching process occurs in the Relay which automatically connects the transformer in parallel in accordance to the load sensed by the CT. The future scope of our project is particularly in Substation. In substations particularly during the peak hours there is a need for the operation of additional transformer to supply the additional load requirement. Our project automatically connects the transformer under critical loads. Thus there is no need to operate both transformers under normal loads, particularly during off peak hours. Thus power is shared intelligently with the transformers in parallel.

8. OBSERVATION AND CONCLUSION

In this paper, observed that if load on one transformer is increases then

the relay will sense the change in current & Arduino operates & slave transformers comes automatically in operation to share the load.

The work on “Automatic load sharing of transformers” is successfully designed, tested and a demo unit is fabricated for operating three transformers in parallel to share the load automatically with the help of change over relay and relay driver circuit and also to protect the transformers from overloading and thus providing an uninterrupted power supply to the customers.

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Research paper on IOT based Home Automation using Arduino

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Abstract: - The world is moving fastly towards automation. People have less time to handle any work so automation is simple way to handle any device or machine will work to our desire. This paper aim is to develop and design a Home automation using Arduino with Bluetooth module. Home automation system gives a simple and reliable technology with Android application. Home appliances like fan, Bulb, AC, automatic door lock are controlled by Home automation system using Arduino Uno with Bluetooth module. The paper mainly focuses on the monitor and control of smart home by Andorid phone and provide a security based smart home, when the people does not present at home. This paper motive is controlled home appliances in smart home with user friendly, design at low cost, simple installation.

Keyword: - Arduino, Home automation, Bluetooth, Smart phone, Security

I. Introduction

Now days everyone has smart phone and wants to control everything from smart phone. Everyone knows how to control mobile phone so it easy to use and understand. Lights, fan , switches , refrigerator are controlled through Bluetooth based remote using arduino. The designing of home automation are going to become simpler and more popular because most of people uses smart phone now days. In this device we are using Arduino which is most commonly used device for automation. Arduino is a hardware which is used to connect computer and the project model so that we can control it by using Arduino code accordingly. Ardiuno is a microcontroller it is just like human brain it processes information and then it perform some Logical and mathematical operation on that information. Arduino is connected with the Bluetooth module which receives the information from user. Arduino also connected relay, which receives information from Arduino and perform the operation as switch. Bluetooth technology is Wireless radio transmissions in a short distance providing a necessary technology to create intelligence and controllability. This generates personal area network in home environment, where all these appliances can be interconnected and monitored using a microcontroller with Arduino using smart phone. Home automation involves a degree of computerized or automatic control to certain electrical and electronic systems in a building.

II. Methodology

Home automation describes a system of networked, controllable device that work together to make your home more comfortable, customized, efficient and secure. In this device there are five main parts Arduino, Bluetooth module, Relay drivers, android application and step down transformer. Firstly we provide power to the step down transformer, it step down

the input voltage and given to the arduino with VIN pin. The Bluetooth module is also connected with arduino to Rx and Tx pin that provides the information to the microcontroller. Microcontroller reads the information and send to the relay drivers which work as switch. In Arduino we upload the program as per requirement then it performs some mathematical and logical operation to control the relay drivers.

Those all parts are connected as shown in figure 2(a).

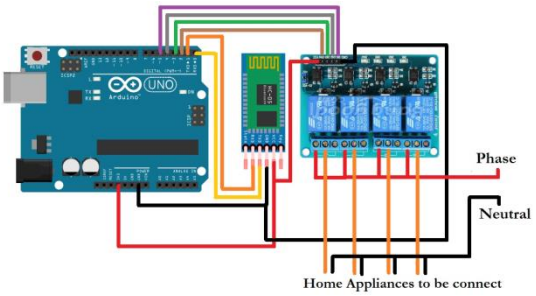


Fig2(a)-circuit diagram of home automation.

Android application are connected to the arduino Bluetooth (HC-05). In the figure 2(b) there are four switches which is connected to relay drivers and four relay are connected to the home appliances.

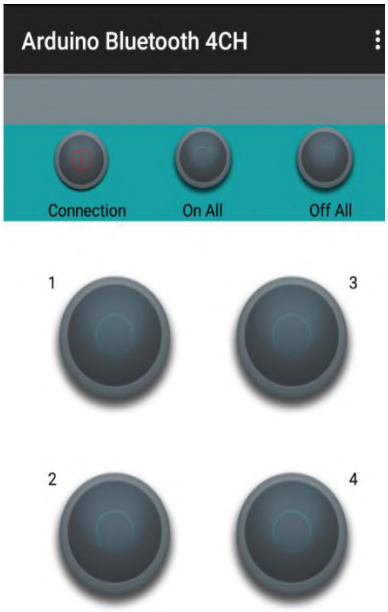


Fig.2(b)-Mobile android application.

III. Architecture of the Device

This venture centres around the robotization of machines with the assistance of an android application. In this day and age, enhancement is the primary thought process . Any framework created goes for streamlining the human endeavours to a negligible and our framework goes for doing likewise. The architecture of this device as shown in figure 3(a).

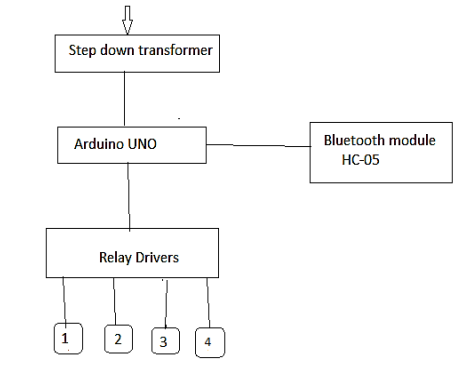


Fig. 3(a)- Architecture of Home Automation

The user will communicate to Android application through the Arduino Uno via Bluetooth module. This model is very resilient and gaugeable, maximum efficiency, safety and securely added smart home appliances with least amount of human effort . The Bluetooth signal having most efficient energy to connect any signal without loss of information with least harmonics .Home automation system main part consists of Arduino with microcontroller. The people must have mobile application with proper connection. It should be used as multi appliances works as together. The Arduino board is configured for each home appliances using coding in microcontroller. By the help of Microcontroller, we can control the electromagnetic relay which works as a switch to receive a signal from the Arduino through Bluetooth module HC-05. When the signal transmit from transmitter as datasheet to relay then the relay works as switch and control many appliances of smart home(multitasking) .There are three main parts of this home automation which is given below.

1. Arduino Uno
2. Bluetooth HC-05
3. Relay Drivers

IV. Description of Hardware

1. Arduino Uno:-

Arduino Uno is a microcontroller chip dependent on the Atmega328(datasheet) with 14 computerized I/o pins, in which 6 pins can be utilized as yields, 6 pins are utilized as simple information sources .It has 16 MHz clay resonator ,a USB association, a power jack and a reset button. The microcontroller has 32kB of ISP flash memory, 2kB RAM and 1kB EEPROM. The board provides serial communication capability via UART, SPI and 12C.Because of well design in the form of arduino it is easy to understand. In Arduino we use high level of programming language like C language, C++ language ect. It is easy to understand and user friendly language. It has much advantage like multitasking, automation, time domain etc. Arduino Uno fig4 (a) is given below.

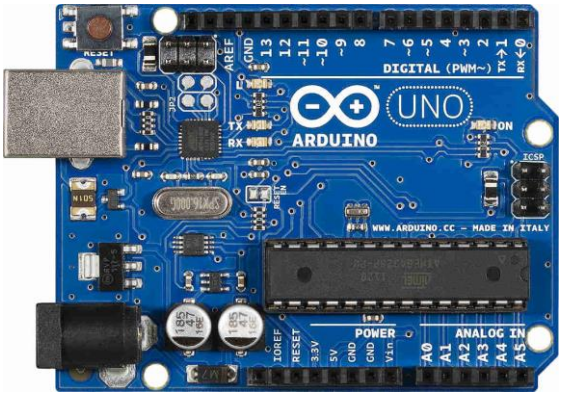


Fig 4(a)- Arduino Uno

2. Bluetooth Module:-

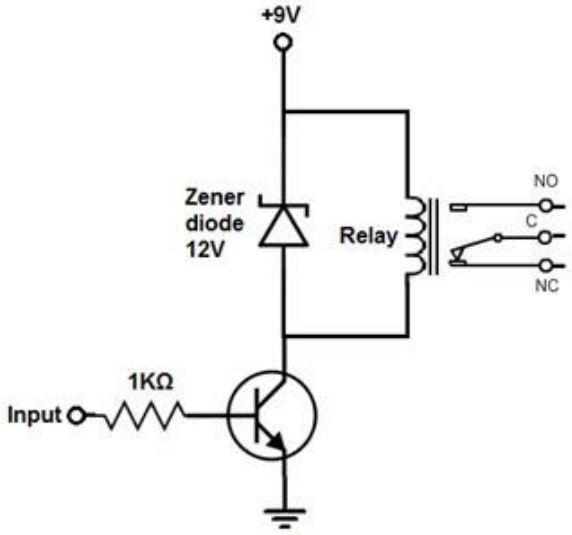
HC-05 Bluetooth module is used to connect the microcontroller with android application. Bluetooth receive the information from user and send to the microcontroller (Arduino Uno). It is simple to use Bluetooth Serial Port Protocol(SSP), designed as wireless serial connection setup.The Bluetooth of serial port module is Advanced Bluetooth v2.0+Enhanced data Rate at 3Mbps modulation with 2.4 GHz radio receiver with BB(base band).The Bluetooth of Rx and Tx pins are connected to the arduino pins of Tx and Rx respectively . HC-05 module is a simple to utilize Bluetooth SPP (Serial Port Protocol) module, intended for straightforward remote sequential association setup. It utilizes CSR Blue canter 04-External single chip Bluetooth framework with CMOS innovation and with AFH (Adaptive Frequency Hopping Feature). It has the impression as little as 12.7mmx27mm.The figure 4(b) of Bluetooth HC-05 module is given below.

Fig 4(b) Bluetooth HC-05.

Fig 4(c) Relay circuit diagram

3. Relay Drivers:-

Relay is an electromagnetic switch which is used to defer two circuits electrically and connect magnetically. When arduino transmit the signal then relay driver receive signal and start its work. They are frequently used to interface an electronic circuit (working at low voltage) to an electrical circuit which works at extremely high voltage. For instance, a hand-off can make a 5V DC battery circuit to switch 230V AC mains circuit. In this way a little sensor circuit can drive, say, a fan or an electric knob. A transfer switch can be separated into two sections: information and yield. The info area has a loop which creates attractive field when a little voltage from an electronic circuit is connected to it. This voltage is known as the working voltage. Generally utilized transfers are accessible in various arrangement of working voltages like 6V, 9V, 12v, 24V and so on. In a basic hand-off there are three contactors: ordinarily shut (NC), regularly open (NO) and normal (COM). At no info express, the COM is associated with NC. At the point when the working voltage is connected the transfer curl gets charged and the COM changes contact to NO. Diverse transfer setups are accessible like SPDT and DPDT which have distinctive number of changeover contacts. By utilizing legitimate blend of contactors, the electrical circuit can be turned on and off. Relay circuit shown in fig4(c).



So as to drive the hand-off, we use transistor and just less power can be utilized to get the transfer driven. Since, transistor is an intensifier so the base lead gets adequate current to make increasingly current stream from Emitter of Transistor to Collector. In the event that the base once gets control that is adequate, at that point the transistor lead from Emitter to Collector and power the transfer. When the power is transmit to the relay works as a switch due to electromagnetic effect so that we can switch ON or OFF our home appliances.

The figure 4(d) of relay is given below.

Fig 4(d) Relay module

V. Result

1. Everything is automated so it is easy to use.
2. It is control by mobile application so no extra training is required.
3. We can change controlling system as our requirement.
4. It works on arduino based system so we can easily understand how it works.
5. It saves our time.
6. Every home appliance can control by one android application.
7. Easy installation and user friendly.

VI. Future Scope

According to the proposed plan the final outcome of this paper leads to the development of a home automation. Through this project, an automation system has been created so that we can easily control home appliances like as light, fan, tube light, AC, bulb, etc. One of the objectives of this project is also to get us a smart automation and low cost project. In this paper we have also provided information about arduino Uno, Bluetooth controller and relay module. And the information about their work is given. Along with the component of home automation, its advantage has also been discussed. The system is easy and secured for access from ant user or intruder. Final outcome of the project is given below in fig 5(a)(b)(c)(d).

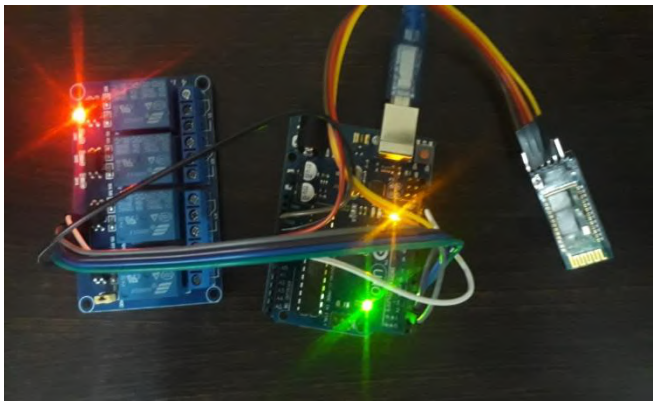


Fig 5(a) Arduino with relay module

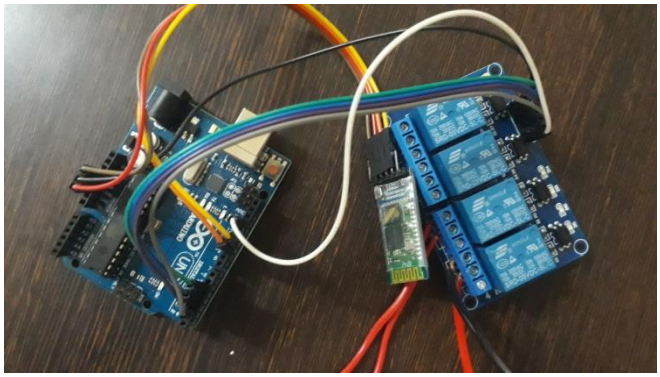


Fig 5(b) Arduino with Bluetooth

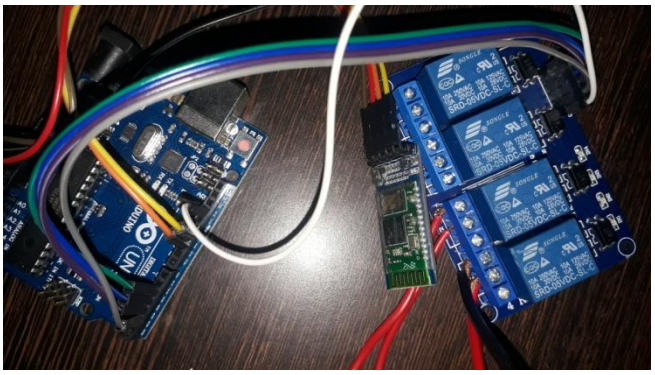


Fig 5(c) Relay module with Bluetooth

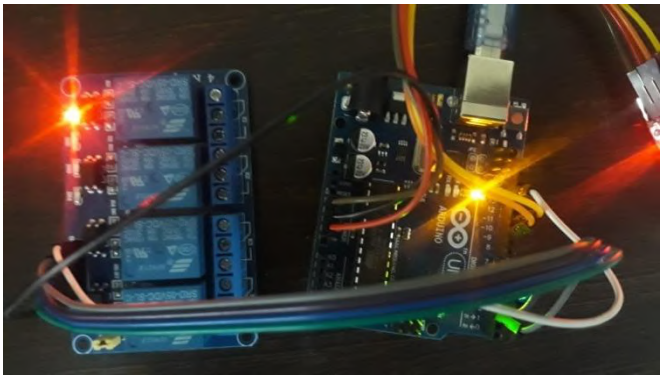


Fig 5(d) Home Automation

VII. Conclusion

It can be concluded from the above discussion that Home automation is a special kind of device which controls home appliances with using extra effort. And in this paper, we demonstrated how the home automation is made, discussed about methodology and what its application can be. And in the future, on the new technology can be included which reduces human effort, which is being researched, we also talked about it. And we've created a that type of device which is compact in size, low cost, more capacity, long life and more distant signal receivers . The need of this research paper is to create a device which saves the electricity and improve human life style.

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Wire Breakage Fault Detection Locator

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Abstract: This paper proposes fault location model for underground power cable using Microcontroller. The aim of this project is to determine the distance of underground cable fault from base station in kilometers. This project uses the simple concept of Ohms law. When any fault like short circuit occurs, voltage drop will vary depending on the length of fault in cable, since the current varies. A set of resistors are therefore used to represent the cable and a DC Voltage is fed at one end and the fault is detected by detecting the change in voltage using an Analog to Voltage converter and a Microcontroller is used to make the necessary calculations so that the fault distance is displayed on the LCD display.

Keyword: Underground Cable, Fault Location, Fault Detection, Location Methods, Microcontroller.

I. INTRODUCTION

The project uses the standard concept of Ohms law i.e., when a low DC voltage is applied at the feeder end through a series resistor (Cable lines), then current wouldvary depending upon the location of fault in the cable. Incase there is a short circuit (Line to Ground), the voltage across series resistors changes accordingly, which is then fed to an ADC to develop precise digital data which the programmed microcontroller of 8051 family would display in kilometers.
The project is assembled with a set of resistors representing cable length in KM's and fault creation is made by a set of switches at every known KM to crosscheck the accuracy of the same. The fault occurring at a particular distance and the respective phase is displayed on a LCD interfaced to the microcontroller.

II. CIRCUIT DESCRIPTION

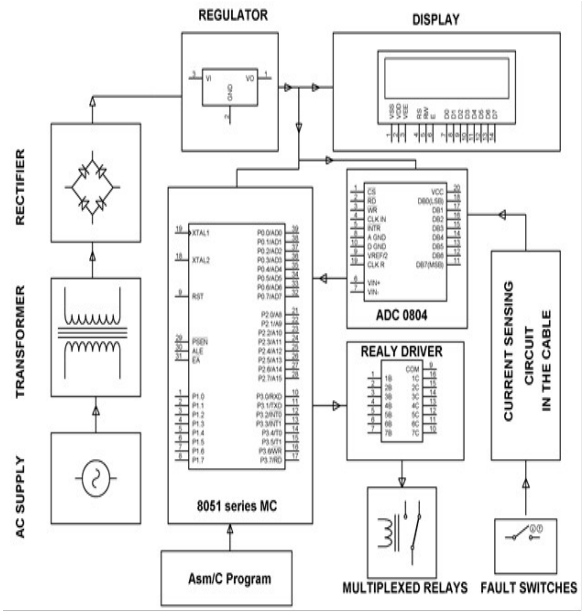


Fig. 1 Block Diagram

III. DESCRIPTION OF CIRCUIT

To detect the fault we are implementing the method of voltage drop through resistance network. When a particular media is grounded at different location it provides us different level of analog signal(voltage). The analog signal has to be convert into digital form so that it can be represent with numerical value. To interface the 0804 total 11 I/O pins are required. The 8 I/O pin to transfer digital data from ADC to microcontroller, one I/O pin for RD, one I/O pin for WR and one I/O pin for interrupt. When we ask the ADC to convert a analog signal to digital it assume a specific amount of time i.e we can get actual result only after 100% conversion. The INTR pin solve the problem for us. The program executing the microcontroller continuously monitors the interrupt pin and read the data from port 2 only after 100% conversion. The program executing in the microcontroller is responsible for converting the ADC value to resistance value and the resistance value is converted into distance of fault.

We are using a single channel ADC. Hence a change over circuit is necessary to monitor a specific line at a specific time. To do so we have create 3 way exchanger switch with the help of switching transistor SPDT electromagnetic relay and fly diode to protect from reverse current. The 3 relays are driven by relay driver circuit based on 2N2222 from Philips. The base of the transistors are connected to pin number 15, 16 & 17 i.e P3.5, P3.6 & P3.7 . As 8051 cannot gives us effective high, it is not possible to activate the driver without external pull up. Hence 4.7K pull resistance is connected across base and Vcc. One terminal of the relay coil is connected with the collector of the transistor and other terminals of coils are connected with +12V. As we are using electromagnetic relay. The transistor will be effected by reverse current which will effect the driver circuit. As to protect the reverse current a rectified diode IN4007 is connected parallel to the relay coil as fly diode.

IV. WORKING

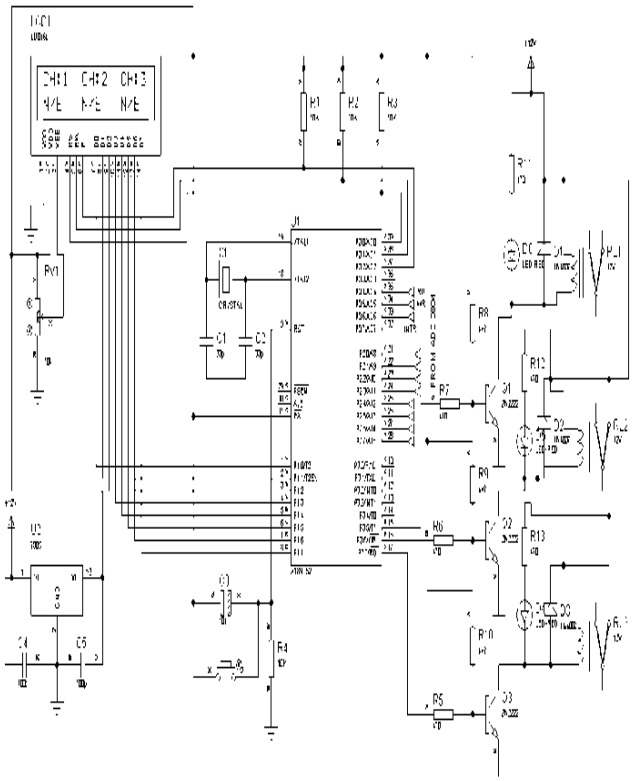


Fig.2 Circuit Diagram

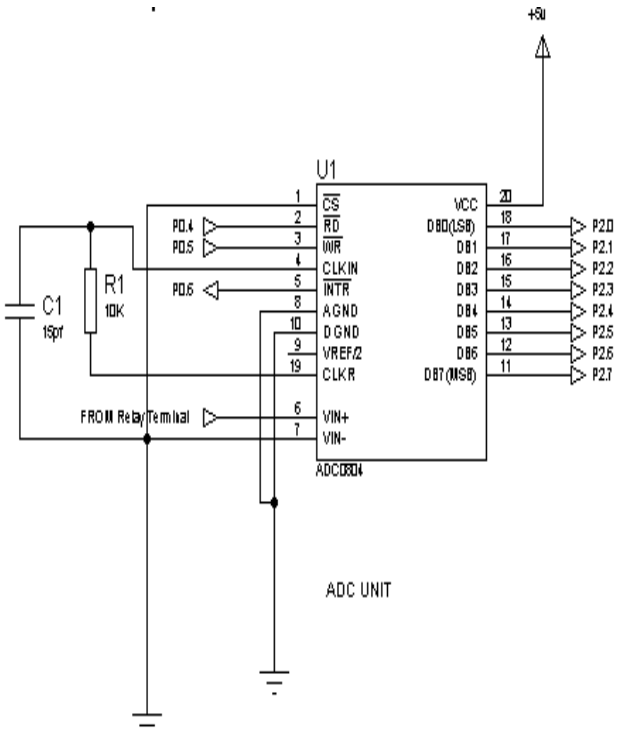


Fig. 3 ADC Unit Circuit

V. PRACTICALITY

- The project is used to detect the location of fault in digital way. Locating the faulty point in an underground cable helps to faciltate quicker repair, improve the system reliability and reduce outage period.
- The solution will provide real time visibility to customers on every single penny paid for their energy.
- There is an increasing need of centralised management solution for more reliable, efficient, scalable and managable operations which are provided by the timely detection of faults by the proposed system
- The power providers are also benefitted by the system as they can save a lot of energy by solving difficult and complex faults in real time and in as little cost because of the exact location provided by the proposed system.
- Potentially reduced mantenance and operational costs.
- Improved reliability.
- Less damage during severe weather.
- Far fewer momentary interuptions.
- Improved public safety.
- Improved property values.
- Reduced Live-wire connected injuries.
- Improved aesthetics (removal of unsightly poles and wires, enhanced tree canopies).

VI. LIMITATIONS

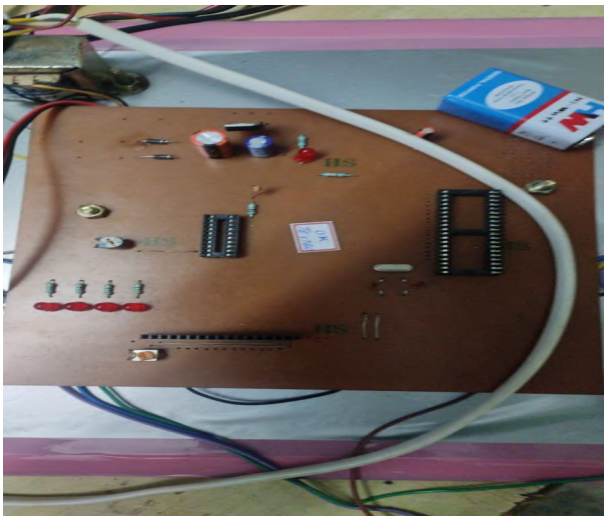
The only limitation is that the underground setup is costly in its intial phase and has insulation problems at high voltages.

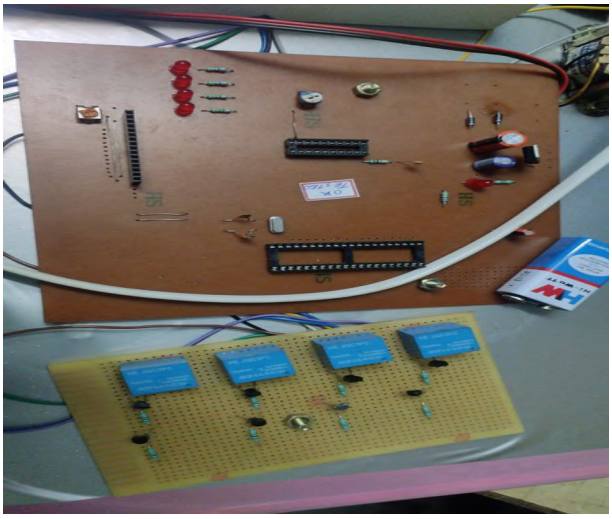
VII. CONCLUSION

The hardware model of underground cable fault locator is implemented and favourable results are brought forward. This hardware model can locate the exact fault location in an underground cable.

Further this project can be enhanced by using capacitor in an AC Circuit to measue the i impedance which can even locate the open circuited cable, unlike the short circuited fault only using resistors in DC Circuit as followed in the above proposed project.

VIII. REALISM - Snaps





IX. FUTURE SCOPE

The proposed system in this paper detect only the location of short circuit fault in underground cable line, and also detect the location of open circuit fault, to detct the open circuit fault, capacitor is used in circuit which measures the change in resistance and calculate the distance of fault. For future research, the system would proceed with similar neural networks structure for different types of fault section and fault location estimation

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STUDY OF AUTOMATIC SOLAR TRACKER PANEL

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ABSTRACT - Sun is a primary source of energy. A ray of light from sun is a renewable source of energy. Which is reached in earth in form of radiation. Radiation is emitted and transmitted energy in form of waves through space. Emission of radiation from sun is used in solar cell to produce electricity. In which small part of radiation is used in solar panel. And remaining part of radiation energy remains un-useful radiation to be dissipated in form of heat energy surrounding the environment. Solar panels are absorbed sunlight and generated direct current electricity. A photovoltaic panel is a packaged assembly of photovoltaic solar cell available in different voltages and wattages. Solar panel do not utilize chemical reaction and do not have any moving parts. The average efficient of solar panel falls between 15 to 18 percent efficiency range.

INTRODUCTION- A ray of light from sun is come to earth in small packet called photons. Photons can hit atoms and emits energy. Solar tracking is necessary for most of the solar systems to collect maximum amount solar photons. Concentrators are required a high degree of accuracy to ensure that the reflected sunlight is directed to the absorber, which is at the focal point of the reflector. Solar Tracker can be helped increase overall efficiency of a solar tracker system. Automatic Solar tracker system which is a device that follow the direction of the Sun regarding of stepper motor. Automatic sensors are constantly monitor the sunlight and are rotated the panel towards the direction where the intensity of sunlight is maximum controlled by the Ardiuno.

CIRCUIT DIAGRAM-

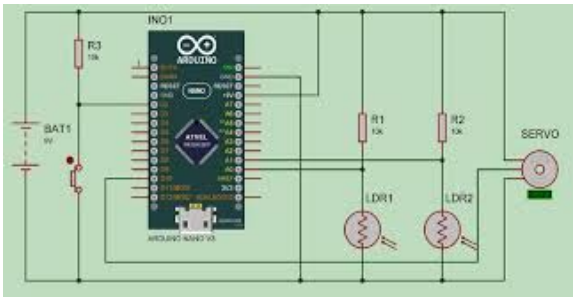

Figure-1(Arduino Circuit of Solar Tracker)

It is made of arduino, LDR sensor and stepper motor. Since LDR is an analogue sensor they are connected to the analog pins A0 and A1 of Arduino. The sensors are connected in series with 10 k ohm resistors. A servomotor is also connected to the digital pin D10. D10 is a PWM (pulse width modulation) pin.

BRIEF INTRODUCTION ARDUINO-

Arduino is an electronic circuit board which is worked as controller of all input and output device. Arduino is an open-source electronics platform based on easy to use hardware and software. The board is equipped with sets of digital and analog input and output pins that may be interfaced to various expansion boards and other circuits. The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) by USB cable. It can be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts.

General Pin Configuration of Arduino-

- GND: Ground pins.
- Reset: It is used to add a reset button to shields which block the one on the board.
- 5V: This pin outputs a regulated 5V from the regulator on the board.
- VIN: The input voltage to the Arduino board when it is using an external power source.
- LED: There is a built-in LED driven by digital pin 13. When the pin is high value, the LED is on, when the pin is low, it's off.

CIRCUIT WORKING-

Arduino which is worked as a controlling unit. Two LDR (Light Dependent Resistor) are also connected to analog pins of the Arduino. A solar panel is attached in parallel to the axis of servo motor and both the sensors are kept on the solar panel.

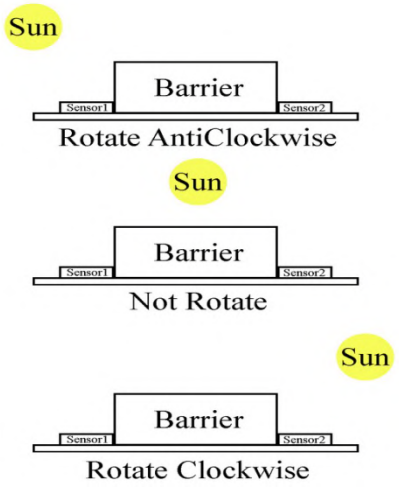

Figure-2 (Sun position regarding working LDR sensor)

There are three working conditions shown in above figure 2.

Condition1- Sun is in left side – Light on sensor1 is high because shadow of barrier falls on sensor 2 so solar plate moves clockwise.

Condition 2- Sun is in right Side – Light on sensor2 is high because shadow of barrier falls on sensor1 so solar plate movie anticlockwise.

Condition 3- Sun is in the middle – Light on both sensors are equal so, plate will not rotate in any direction.

PRACTICAL APPLICATION-

Solar Panel- Solar trackers are devices used to orient photovoltaic panels, reflectors, lenses or other optical devices toward the sun. Since the sun's position in the sky changes with the seasons and the time of day, trackers are used to align the collection system to maximize energy production.

Figure-3(Automatic Solar Tracker Panel)

Solar Thermal- Single Axis Tracker is used for Solar Thermal Parabolic Through Applications. Water is passed through the pipes to generate steam from water. And it is used in industry.

Figure-4(Solar Thermal Tracker)

LIMITATION OF SOLAR TRACKER-

- Solar trackers are slightly more expensive than their stationary counterparts, because of the more complex technology and moving parts necessary for their operation.
- There is generally more maintenance required than a fixed solar panel though the quality of the solar tracker can play a role in how much and how often this maintenance is needed.
- Solar trackers are generally designed for climates with little to no snow making them a more viable solution in warmer climates.
- Single-axis tracker projects also require an additional focus on company stability and bankability. When it comes to getting projects financed, these systems are more complex and thus are seen as a higher risk from a financier's viewpoint.
- Trackers are a more complex system than fixed racking. This means that typically more site preparation is needed, including additional trenching for wiring and some additional grading.
- Fixed tracking systems offer more field adjustability than single-axis tracking systems. Fixed systems can generally accommodate up to 20% slopes in the E/W direction while tracking systems typically offer less of a slope accommodation usually around 10% in the N/S direction.

COMPARISON B/W SOLAR TRACKING AND FIXED SOLAR

KWH Rating – As shown in figure , solar trackers have high KWH rating compare to fixed solar tracker. Because solar tracker is covered more radiation regarding to fixed solar panel.

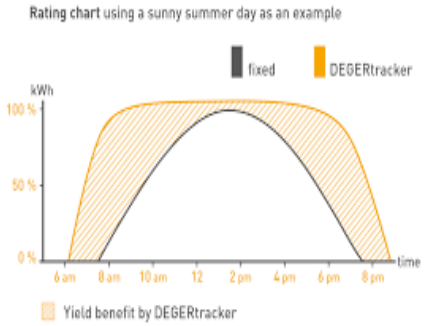

Figure -5 (curve KWH to day time)

Stability of energy –In graph below, solar tracker has high stability in energy due to track of sun position in sky.

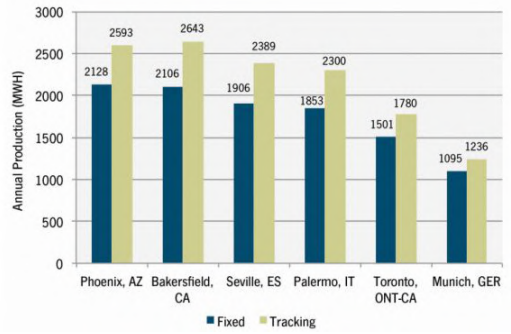

Figure-6(Stability curve)

CONCLUSION

It has been observed from the statistical analysis, that the sun tracking systems can collect about 31 more energy than what a fixed panel system collects and thus high efficiency is achieved through this tracker. The circuits developed are simple in nature and automatic, which avoids manual operation and flexibility in design. The Constructed system model can be applied in the residential area for alternative electricity generation especially for non-critical and low power appliances. The key aspects of the product are that it is affordable, efficient, stand-alone, relatively easy to transport, and ready to use. The system is also designed to be autonomous so that the user does not have to do a lot of configuring once the system is set up.

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Case Study Of Solar Ups Project Using Solar Inverter

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ABSTRACT

This paper provides the development of a solar powered UPS in India's market as an alternative source of energy. It consists of design which is done according to our research. The design of solar UPS consists of solar charge controller, inverter circuit and a solar panel. During this process many circuit simulations were done to fit the requirement of this project. It also shows that solar Ups can be highly efficient and successful in electrical UPS market. This project consists of solar panel which consist solar cell which convert solar energy into electrical energy. We also have charging circuit which will charge 12V DC (direct current) battery given in fig and inverter circuit have given in fig will convert it AC (alternative current). Here we propose a solar based ups project that uses solar energy to charge battery and then the DC battery is used to power an AC load using inverter. Our solar panel is used to constantly charge the 12V DC battery using charge controller circuitry. And once we turn on the load switch the battery charge is inverted and stepped up from 12V DC to around 140 – 150 V AC. This is now provided to the AC load. Thus, our system successfully powers AC load using a solar panel and battery. The system can be used as a UPS in case of emergency power cuts or outage and has the capacity to work as a standalone system without the need of any external electricity supply. Solar Power and Uninterruptible Power Supply (UPS) are two technologies that are growing rapidly. The demand for solar energy is mainly driven by the trend towards cheaper solar cells, making it economically profitable for a larger range of applications. However, solar power has yet to reach grid parity in many geographical areas, which makes ways to reduce the cost of solar power systems important. This thesis investigates

the possibility and potential economic synergies of combining solar power with UPS systems, which have been previously researched only from a purely technical point of view. This thesis instead evaluates the hypothesis that a combined solar and UPS system might save additional costs compared to regular grid-tied systems, even in a stable power grid. The primary reason is that online UPS systems rectifies and inverts all electricity, which means that solar energy can be delivered to the DC part of the UPS system instead of an AC grid, avoiding the installation of additional inverters in the solar power system. The study is divided into three parts. The first part is a computer simulation using MATLAB, which has an explorative method and aims to simulate a combined system before experimenting physically with it. The second part consists of experiments on a physical prototype system based on basic UPS and solar power components.

Introduction:

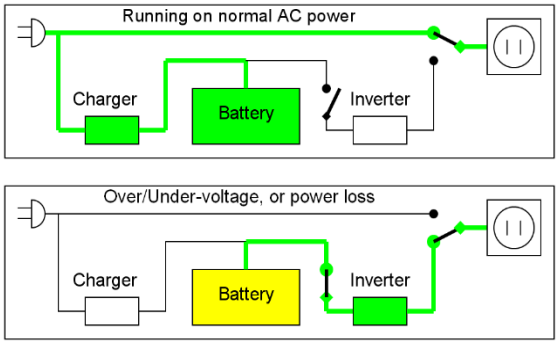
The world has seen a tremendous improvement in Solar Panel technology during recent years. Modern solar panels have proven to be more efficient and reliable in harnessing solar energy and are available at relatively lower prices. As the

silicon shortage disappeared in last quarter of 2009 due to thin film manufacturing, the price of the solar panels dropped from recent level of $3 - $4 per watt.

The on-battery runtime of most uninterruptible power sources is relatively short—5–15 minutes being typical for smaller units—but sufficient to allow time to bring an auxiliary power source on line, or to properly shut down the protected equipment.

An Uninterruptible Power Supply (UPS) is a device connected between the power source and a computer to ensure that electrical flow is not interrupted. UPS devices use batteries to keep the computer running for a period of time after a power failure. It is not to be confused with standby generators which do not provide protection from a momentary power interruption, or which may result in a momentary power interruption when it is switched into service, whether manually or automatically. UPS devices usually provide protection against power surges, brownouts and line noise as well. The UPS consists of three main components:

Methodology:



Archite cture of the device:

Solar Panel:

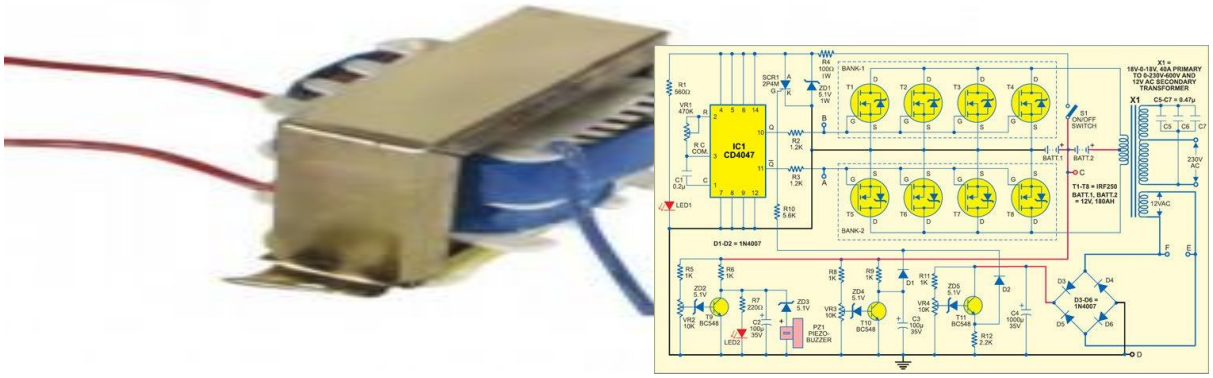
Photovoltaic solar panels absorb sunlight as a source of energy to generate direct current electricity. A photovoltaic (PV)

module is a packaged, connected assembly of photovoltaic solar cells available in different voltages and wattages. Photovoltaic modules constitute the photovoltaic array of a photovoltaic system that generates and supplies solar electricity in commercial and residential applications.

Transformer:

Transformer works on the principle of mutual inductance. We know that if two coils or windings are placed on the core of iron, and if we pass alternating current in one winding, back emf or induced voltage is produced in the second winding. We know that alternating current always changes with the time. So if we apply AC voltage across one winding, a voltage will be induced in the other winding. Transformer works on this same principle. It is made of two windings wound around the same core of iron. The winding to which AC voltage is applied is called

primary winding. The other winding is called as secondary winding.



Capacitors:

A capacitor is a device that stores electrical energy in an electric field. It is a passive electronic component with two terminals. The effect of a capacitor is known as capacitance.

A capacitor can store charge, and its capacity to store charge is called capacitance. Capacitors consist of two conducting plates, separated by an insulating material (known as dielectric). The two plates are joined with two leads. The dielectric could be air, mica, paper, ceramic, polyester, polystyrene, etc. This dielectric gives name to the capacitor. Like paper capacitor, mica capacitor etc.

Sine wave inverter circuit description

Fig. 1 shows the sine wave inverter circuit of the MOSFET-based 50Hz inverter. It comprises a CD4047 multivibrator (IC1), IRF250 MOSFETs (T1 through T8), transistors and a few discrete components.

IC CD4047 has built-in facilities for a stable and bistable multivibrators. The inverter application requires two outputs that are 180 degrees out of phase. Therefore IC1 is wired to produce two square-wave output signals at pins 10 and 11 with 50Hz frequency, 50 per cent duty cycle and 180-degree phase-shift. The oscillating frequency is decided by external pre-set VR1 and capacitor C1.

Conclusion:

The future of solar technology is very bright in Pakistan, the reason being the abundance of solar energy in the country. The advanced solar technologies including the CPV and CPVT are all meant for countries high in solar energy. Furthermore, the declining prices of solar panels worldwide will further make the solar UPS a viable option for domestic purposes. Haris Jawaid et al. / Procedia Technology 1 (2012) 217 – 224 221 To achieve the grid paritya , approximately 80 firms around the world including top manufacturers like Q-Cells, Sharp, Suntech, Kyocera, First Solar, Motech Solar, Topray Solar, Solar World, Sanyo and Yingli in Germany, Japan, China, USA and Taiwan have been chasing to manufacture their cells at US$1/Watt. Various solar cell manufacturing technologies are as given below:

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Research paper on IOT based Home Automation by remote control

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Abstract: - The world is moving fastly towards automation. People have less time to handle any work so automation is simple way to handle any device or machine will work to our desire. This paper aim is to develop and design a Home automation using wireless . Home automation system gives a simple and reliable technology with Android application. Home appliances like fan, Bulb, AC, automatic door lock are controlled by Home automation system using wireless. . The paper mainly focuses on the monitor and control of smart home by wireless and provide a security based smart home, when the people does not present at home. This paper motive is controlled home appliances in smart home with user friendly, design at low cost, simple installation.

Keyword: - Home automation, Bluetooth, Smart phone, Security

I. Introduction

In this project we show that how we control the Home Appliances through Remote.it is a wireless project we can easily do automation of our house or organization .This project consist of a transmitter and reciver section mainly automation. wireless is a hardware which is used to connect computer and the project model so that we can control it by using wireless code accordingly. Adriano is a microcontroller it is just like human brain it processes information and then it perform some Logical and mathematical operation on that information. wireless is connected with the Bluetooth module which receives the information from user. wireless also connected relay, which receives information from wireless and perform the operation as switch. Bluetooth technology is Wireless radio transmissions in a short distance providing a necessary technology to create intelligence and controllability. This generates personal area network in

home environment, where all these appliances can be interconnected and monitored using a microcontroller with wireless using smart phone. Home automation involves a degree of computerized or automatic control to certain electrical and electronic systems in a building.

II. Methodology

Home automation describes a system of networked, controllable device that work together to make your home more comfortable, customized, efficient and secure. In this device there are five main parts wireless , Bluetooth module, Relay drivers, android application and step down transformer. Firstly we provide power to the step down transformer, it step down

the input voltage and given to the wireless with VIN pin. The Bluetooth module is also connected with wireless to Rx and Tx pin that provides the information to the microcontroller. Microcontroller reads the information and send to the relay drivers which work as switch. In wireless we upload the program as per requirement then it performs some mathematical and logical operation to control the relay drivers.

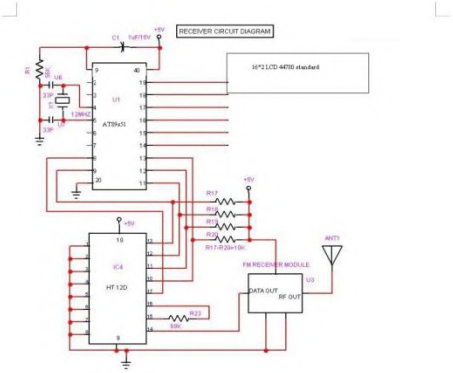


Fig2(a)-circuit diagram of home automation.

wireless application are connected to the wireless Bluetooth (HC-05). In the figure 2(b) there are four switches which is connected to relay drivers and four relay are connected to the home appliances.

III. Architecture of the Device

This venture centres around the robotization of machines with the assistance of an android application. In this

day and age, enhancement is the primary thought process . Any framework created goes for streamlining the human endeavours to a negligible and our framework goes for doing likewise.

The user will communicate to Android application through the wireless Uno via Bluetooth module. This model is very resilient and gaugeable, maximum efficiency, safety and securely added smart home appliances with least amount of human effort . The Bluetooth signal having most efficient energy to connect any signal without loss of information with least harmonics .Home automation system main part consists of wireless with microcontroller. The people must have mobile application with proper connection. It should be used as multi appliances works as together. The wireless board is configured for each home appliances using coding in microcontroller. By the help of Microcontroller, we can control the electromagnetic relay which works as a switch to receive a signal from the wireless through Bluetooth module HC-05. When the signal transmit from transmitter as datasheet to relay then the relay works as switch and control many appliances of smart home(multitasking) .There are three main parts of this home automation which is given below.

1. wireless Uno

2. Bluetooth HC-05

3. Relay Drivers

IV. Description of controller section. wireless

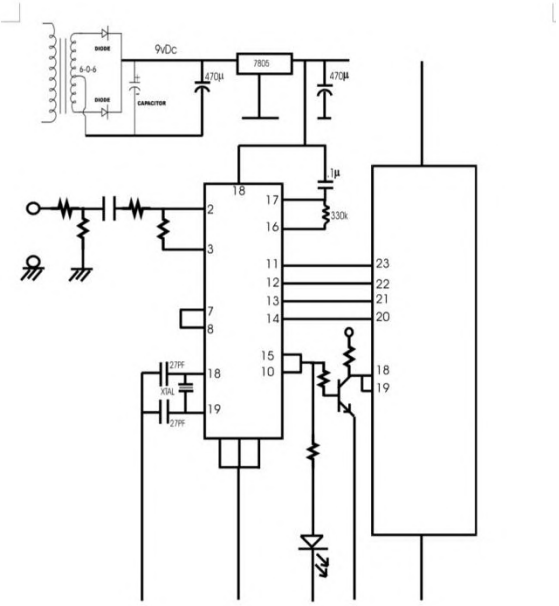


Fig: controller

wireless Uno is a microcontroller chip dependent on the Atmega328(datasheet) with 14 computerized I/o pins, in which 6 pins can be utilized as yields, 6 pins are utilized as simple information sources .It has 16 MHz clay resonator ,a USB association, a power jack and a reset button. The microcontroller has 32kB of ISP flash memory, 2kB RAM and 1kB EEPROM. The board provides serial communication capability via UART, SPI and 12C.Because of well design in the form of wireless it is easy

to understand. In wireless we use high level of programming language like C language, C++ language ect. It is easy to understand and user friendly language. It has much advantage like multitasking, automation, time domain etc wireless Uno fig4 (a) is given below.

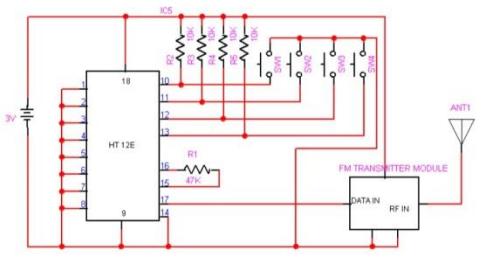


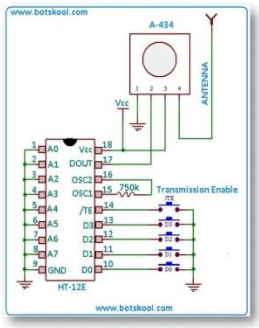
Fig 2: relay

2. Bluetooth Module:- HC-05 Bluetooth module is used to connect the microcontroller with android application. Bluetooth receive the information from user and send to the microcontroller (wireless Uno). It is simple to use Bluetooth Serial Port Protocol(SSP), designed as wireless serial connection setup.The Bluetooth of serial port module is Advanced Bluetooth v2.0+Enhanced data Rate at 3Mbps modulation with 2.4 GHz radio receiver with BB(base band).The Bluetooth of Rx and Tx pins are connected to the wireless pins of Tx and Rx respectively . HC-05 module is a simple to utilize Bluetooth SPP (Serial Port Protocol) module, intended for straightforward remote sequential association setup. It utilizes CSR Blue canter 04-External single chip Bluetooth framework with CMOS innovation and with AFH (Adaptive Frequency Hopping Feature). It has the impression as little as

3. Relay Drivers:-

Relay is an electromagnetic switch which is used to defer two circuits electrically and connect magnetically. When wireless transmit the signal then relay driver receive signal and start its work. They are frequently used to interface an electronic circuit (working at low voltage) to an electrical circuit which works at extremely high voltage. For instance, a hand-off can make a 5V DC battery circuit to switch 230V AC mains circuit. In this way a little sensor circuit can drive, say, a fan or an electric knob. A transfer switch can be separated into two sections: information and yield. The info area has a loop which creates attractive field when a little voltage from an electronic circuit is connected to it. This voltage is known as the working voltage. Generally utilized transfers are accessible in various arrangement of working voltages like 6V, 9V, 12v, 24V and so on. In a basic hand-off there are three contactors: ordinarily shut (NC), regularly open (NO) and normal (COM). At no info express, the

COM is associated with NC. At the point when the working voltage is connected the transfer curl gets charged and the COM changes contact to NO. Diverse transfer setups are accessible like SPDT and DPDT which have distinctive number of changeover contacts. By utilizing legitimate blend of contactors, the electrical circuit can be turned on and off. Relay circuit shown in fig2.



(RF Remote Circuit)

Fig:3. RF remote circuit

So as to drive the hand-off, we use transistor and just less power can be utilized to get the transfer driven. Since, transistor is an intensifier so the base lead gets adequate current to make increasingly current stream from Emitter of Transistor to Collector. In the event that the base once gets control that is adequate, at that point the transistor lead from Emitter to Collector and power the transfer. When the power is transmit to the relay works as a switch due to electromagnetic effect so that we can switch ON or OFF our home appliances.

control by mobile application so no extra training is required. 3. We can change controlling system as our requirement. 4. It works on wireless based system so we can easily understand how it works. 5. It saves our time. 6. Every home appliance can control by one android application. 7. Easy installation and user friendly.

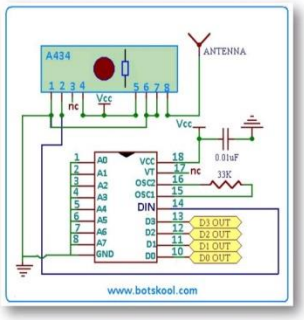


Fig4: RF receiver

According to the proposed plan the final outcome of this paper leads to the development of a home automation. Through this project, an automation system

has been created so that we can easily control home appliances like as light, fan, tube light, AC, bulb, etc. One of the objectives of this project is also to get us a smart automation and low cost project. In this paper we have also provided information about wireless Uno, Bluetooth controller and relay module. And the information about their work is given. Along with the component of home automation, its advantage has also been discussed. The system is easy and secured for access from ant user or intruder. Final outcome of the project is given below in fig 5(a)(b)(c)(d).

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THREE PHASE FAULT DETETCTION (OPEN FAULT, SHORT CIRCUIT FAULT & EARTH FAULT)

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Abstract: *The Project develops an automatic tripping mechanism for the three-phase transmission system. In the event of a temporary fault, the output of the project resets while it acquires permanent trip condition in case of a permanent fault. There can occur several failures in a three-phase supply system that provides power to industrial and domestic consumers. These failures are results of some faults which may be temporary or permanent in nature. Due to these faults, the power system may suffer considerable damage. This can lead to disturbance in power supply and may cause a standstill to various industries linked to the system. In a three phase power system, these faults are classified as LG (Line to Ground), LL (Line to Line), 3L (Three lines). This system can overcome such problem which by sensing the fault automatically and disconnects the system from the supply so that large scale damage to the system equipment can be avoided. The system automatically differentiates between a temporary disturbance and a permanent fault and appropriately cuts the supply for a short duration or long respectively.*
Keywords: *Temporary fault; permanent fault; LG; LL; and 3L faults; three-phase system.*

I. Introduction

In starting, we search for lots of electrical capstone projects. First of all we found short circuit fault detection. But circuit was small then after it we search for major project. Then we found power failure with short circuit, open circuit and earth leakage fault. It is already made by someone in some college. Then we decided to make fault detection for three phase supply. In this project we will make pole to pole three phases. There will be circuit for detection for fault detection like

- Short circuit
- Open circuit
- Earth leakage Fault detection
- we will display these fault on LCD display using controller and will give Buzzer output

In this project we will use 89c51 microcontroller for controlling and comparison purpose. Project is divided in to four steps

First step – making model for three phase supply

Second Step – Microcontroller circuit

Third Step – Detection circuits

Fourth Circuit – Output circuit

As we know it is tough to change supply out from three phase extractor. And we manually change the phase to select phase. Extra manpower required to change phase in industries.

So we are trying to make project to automatically change phase if phase is coming and if we want to make one phase permanent on priority basis. One phase will be permanent in programming i.e. on top priority. If supply from that phase is not coming only then it will allow changing the phase. After that, third phase. In this project first of all we need detecting circuit for microcontroller to read supplies coming or not. I studied lots of notes and websites in internet for that circuit and found that we can get it by converting it in dc signal. Then we used step down transformers at all three supplies. After that we changed it to DC with rectifiers and filtering circuit. After filtering, we gave signal to the Optocouplers. Optocouplers work as an isolator and a switch. It will give signal to microcontroller. Microcontroller will read that signal and if its low then signal is coming otherwise phase have no supply. After that we give output according to input to relay driving and LED circuit. We will use different color LEDs to give name to different phases. We used red, green and yellow LEDs. Red for first phase on top priority, yellow for second phase on second priority and green for third phase for last priority.

THREE PHASE FAULT DETETCTION (OPEN FAULT, SHORT CIRCUIT FAULT & EARTH FAULT)

Karandep Singh[1] Kapil[2] Arvinder[3] Er. Bimal Kumar[4]
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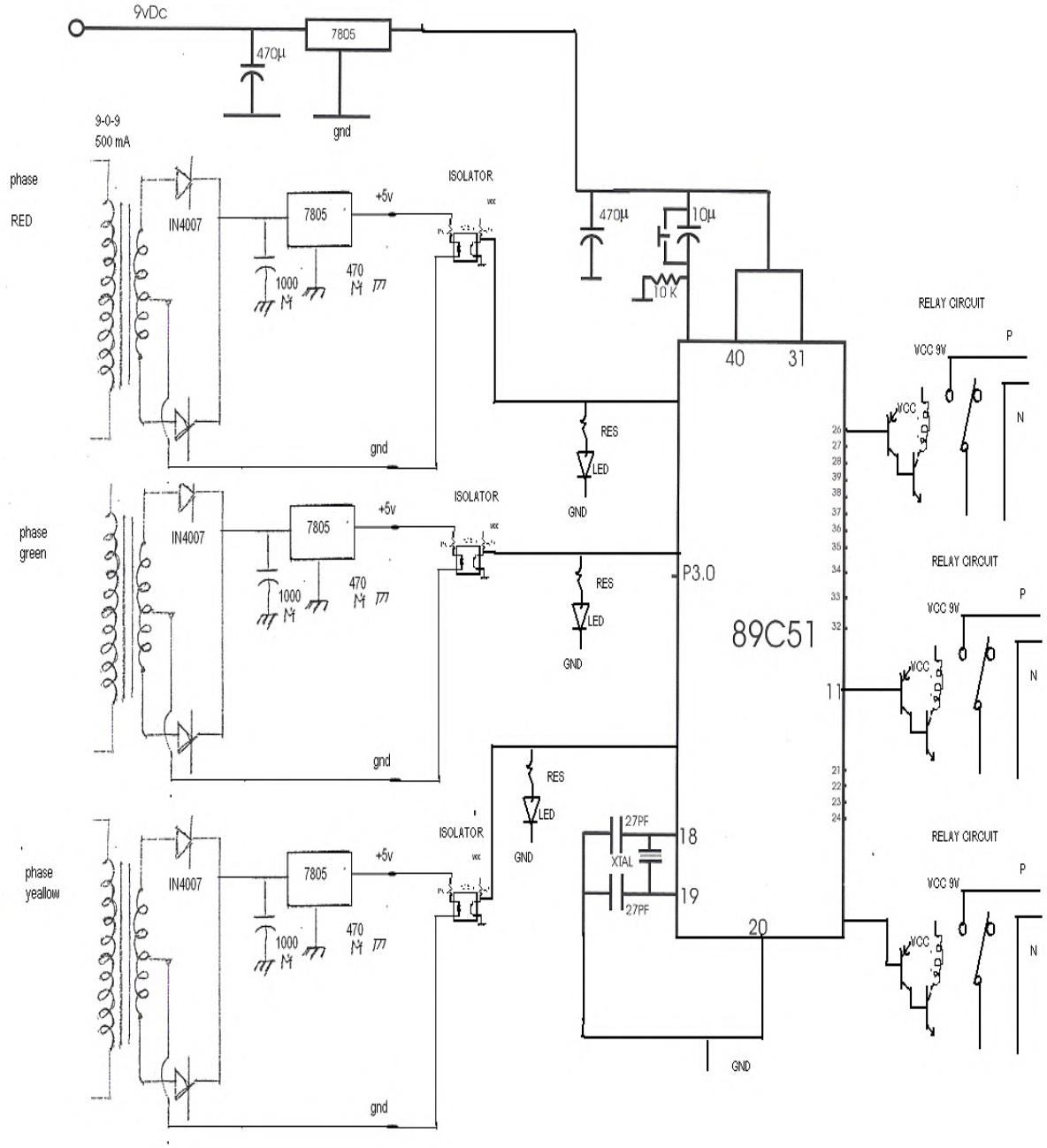
II. THREE PHASE SELECTROR CIRCUIT



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III. Block diagram Description

The setup or field devices consist of three major components, instrument transformer (Potential transformer), microcontroller, Temperature sensor. The primaries of PT which are connected to the line sense the corresponding voltage value of the system and fed the output to the ADC of the microcontroller which converts the signal to a digital form in order to be proceed by the CPU of microcontroller. The secondary of PT is connected to Temperature sensor and the output of the Temperature sensor is fed to the microcontroller. LCD is connected to the microcontroller. Its function to display the values which the controller has sensed.

Regular IC is design to automatically maintain a constant voltage level and is connected to the secondary of potential transformer. In our project it is design to maintain 5V (dc) constant voltage and supplies to the microcontroller.

The microcontroller serves as the central point of the setup. It contains a set of programming codes which has been stored in EEPROM which enables it to classify the fault type based on the voltage values & temperature values. Based on the program, the microcontroller compare these values to see whether they are within the range required. If the voltage values & Temperature value are out of range as compare to the reference it gives an indication of a fault and create a signal to trip the replay and send it towards the Relay Driver is to amplify the signal coming out from microcontroller.

IV. WORKING

The project uses one step down transformer for handling the entire circuit under low voltage conditions of 12V only to test the 3 phase fault analysis. The primaries of one transformer are rectified and filtered and are given to 3 relay coils. 12 fault switches, each one is connected across the relay coil, meant to create a fault condition either at star i.e. LL fault and 3L fault. LED's are connected at their output to indicate their status. The microcontroller is used which converts the analog value of the voltage to digital one which is displayed on 16x2 LCS screen. If the fault is created by means of any fault switches the digital value shown on the LCD screen will fluctuate abnormally giving the fault location.

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V. Conclusion

This paper is designed successfuly with on single phase transformer 230V to 12 V of output for develop and automatic tripping mechanism using microcontroller for the three phase supply system while temporary fault and permanent fault occurs.

VI. Realism Pic

VII. Advantage

- Safety Equipment
- Work complete Time to Time
- More efficiency.
- Reduce Losses
- More Reliable

VIII. Applications

- Substation
- Transformer
- Drives & Relay
- Transmission Line

IX. Components required

- Mircoontroller 89c51- 1nos
- IC base 40 pin
- 12Mhz crystal 1nos
- LCD 16x2
- 10µf,1000µf,470µf
- Transformers 0-9v 500 mA 4nos.
- In 4007diodes 20 nos
- 7805 – 1nos
- Relays 12v 200ohm -3nos.
- Microswitches
- Soldering iron
- Soldering wire
- BC548 Transistor
- BC558 Transistor
- LEDs
- Opto Coupler PC817
- Resisitor 1k, 10k, 100 E, 470 ohm, 400ohm
- Connecting wire

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IROWIR Optical wireless Communication- A review

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Abstract- Free space optics technology is not without challenges. These systems are susceptible to atmospheric conditions for outdoor FSO and various reflections, fading and shadowing in indoor FSO which further introduces errors and can make system inoperable for some time. In this paper various types of IR OWC also called indoor FSO are discussed. Indoor FSO is for very short range applications. It is also the medium for high speed data transmission covering very small range. It is used in various applications such as aircraft cabin, all optical lab-on-a-chip system, chip to chip communication, board to board interconnections, wireless body area networks, wireless personal area networks.

I INTRODUCTION

IR-OWC is very promising technology when it comes to faster of speeds, large B.W, Lower BER, and high SNR as it uses light as carrier. This involves no physical connections or any light invisible to naked eye. This wireless technology allows communication between transmitter and receiver at distances from few millimetres to few metres. [1] It is short range wireless communication technique which does not encounter any adverse atmospheric conditions. It is line of sight technique that transmits optical signal through indoor environment from IR transmitter to receiver. It's directivity is very high. IR transmitters such as LED & LASER's are used by indoor OWC. LED is preferred over LASER because they are cheap and have broader modulation bandwidth and linear characteristics in operating region. Arrays of LED's can be used in order to increase power, as LED is non- directional and hence it has low output power. LASER's are avoided because of eye safety regulations for indoor OWC as they can cause optical damage. Though LED's work at lower data rates up to 100 Mbps and LASERs operate at higher data rates up to few GHz, still LED's are preferred over LASER's. They work on 780-950nm range because of it's cheaper price and less complex circuit than other traditional wireless systems. They are same as Wi-Fi but also they are different from it in terms of bandwidth, speed. Hence indoor OWC has higher speed and higher bandwidth when compared to Wi-Fi. Also IR-OWC does not penetrate through obstructions unlike Wi-Fi. It uses weak turbulent channel for communication, which is further limited by reflection. It's receiver field of view is wide for tens of meters range and 40 degrees for few meters range. [2] The hardware equipment used is very light weight, portable and inexpensive.

II CLASSIFICATION OF INDOOR IR OWC

Indoor IROWC is very flexible and feasible technology inside the buildings where wired connections can be complex..The classification of indoor optical link is based on following factors-

a) Transmitter beam angle i.e. degree of directionality.
b) Detectors field of view (FOV) i.e. if view of receiver is narrow or wide.

Based on above given two factors four categories are obtained-

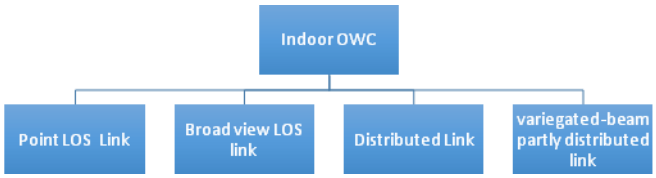

Fig. 1 Classification of Indoor OWC networks

A. Point LOS link

It is first type of indoor OWC. Single LED is used that emits average power of tens of milli watt. It has very narrow beam angle of transmitter and field of view of receiver. Transmitter and receiver are directed towards each other. It is very good option for point to point link. [2]

Table 1. Advantages and disadvantages of point LOS link

S. No.	Advantages	Disadvantages
1.	High power efficiency	Decreased mobility
2.	Decreased multipath distortion	Decreased flexibility
3.	Increased rejection of back ground light	It requires precise alignment between transmitter and receiver

It's applications are used for low data rate like- a) remote control applications such as TV or audio equipments b) point – to- point connectivity in portable electronic devices such as laptop, cellular telephones, compact disc, portable digital assistant, pagers.

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B. Broad view LOS link

It covers distance up to tens of meters and it provides data rate of 12 Mbps. The beam angle of transmitter and FOV of receiver is wide. Whole area of indoor environment is covered by the installed transmitter and receiver. It does not require very precise pointing and precise alignment. Only single LED is used. It provides high mobility. Hence it can be used for point-to-multipoint broadcast applications, such as if in large area hall this network is used then whole room is divided into multiple optical cells [3], [4]. Each optical cell of throom is controlled by different transmitter which has controlled beam divergence.

Table 2. Advantages and disadvantages of Broad view LOS link

S. No.	Advantages	Disadvantages
1.	Higher user mobility	Lower efficiency
2.	Highly robust	Reflections from walls and objects
3.	Reduced need of pointing	Multipath distortion

C. Distributed Link

In this technique, transmitter is facing roof of the hall. Then the transmitter emits wider beam of IR energy towards roof. Now, the IR signal under goes multiple reflection from walls and other objects from the surroundings. Now this IR signal collected by receiver placed on ground with wider FOV. It transmits optical power of 150-400 milli watt of power. For this link array of LED's can also be used to cover larger area of the hall. [5]

Table 3. Advantages and disadvantages of Distributed LOS link

S. No.	Advantages	Disadvantages
1.	Robust	Path loss
2.	It does not require alignment	Multi path distortion
3.	Flexible as it uses reflection properties of walls and ceiling	Moderate efficiency

D. Variegated-beam partly distributed link

This technique uses multi beam transmitter's such as array's of LED's. these array's of LED's transmit narrow beams in all directions outwardly. The angle diversity receiver is stationed at ground. This receiver works in two ways. In first way it collects optical signal by employing multiple non-imaging receiving elements. Each non-imaging receiving element has it's own lensing arrangement and also it is oriented in different direction. This technique has improved efficiency. Also small photodetectors are used with high sensitivity. According to second way fly eye receiver is used which has imaging optical concentrator. This concentrator has got segmented photodetector array placed at it's focal plane.

Table 3. Advantages and disadvantages of variegated-beam partly distributed link

S. No.	Advantages	Disadvantages
1.	Increased gain	Costly
2.	Reduced path loss	Bulky
3.	High immunity	Complex

III APPLICATIONS OF IROWC

As there has always been a paradigm leap in wireless communication systems decade after decade. In new century, many civil, commercial and military applications are using IROWC. IROWC can provide very high data rates, very high bandwidth providing synergistic effect in wireless world [6], [7]. It's various applications are – airplane pilot cabin, TV remote control, IrDA Ports, Personal Computers, Embedded Systems, Peripherals, Network of sensors, Unattended sensors, Small tele operated robots, Wireless Personal area networks, Millimeter range optical interconnect with IC's, High volume ubiquitous consumer electronic products, PDA's.

IV. CONCLUSION

In this paper, the various features, basic characteristics, advantages and disadvantages, various applications of indoor IROWC are demonstrated. It is observed that IROW operates in 780-950nm. They are also called IR system. Only one LED with power of tens of mill watts for point and non-point IROWC LOS is used. On other hand in distributed link arrays of LED's with power range of 150-400 milli watt are used. In new century, paradigm leap in applications of indoor wireless communications have been classified on the basis of range and field of application. The types of indoor OWC are highlighted and are also classified on the basis of various protocols used for data transmission between transmitter and receiver's equipment used.

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REVIEW: E-COMMERCE SERVICES IN UNIVERSE

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Abstract—E-commerce is a boom in modern business. The progress of innovation in information and communication has had many changes in all areas of the person's daily life. E- Commerce means electronic commerce. Electronic commerce involves the purchase and sale of goods and services, or the transmission of funds or data, through an electronic network, mainly the Internet.
The role of electronic commerce in business is that electronic commerce is synonymous with electronic commerce and involves the exchange of goods and services through electronic support. The number of electronic companies has grown considerably since the Internet was launched

INTRODUCTION

THE term electronic commerce or e-commerce refers to any sort of business transaction that involves the transfer of information through the internet .By definition it covers a variety of business activities which use internet as a platform for either information exchange or monetary transaction or both at times.
E-commerce means using the Internet and the web for business transactions and/or commercial transactions, which typically involve the exchange of value (e.g., money) across organizational or individual boundaries in return for products and services. E-commerce means using the Internet and the web for business transactions and/or commercial transactions, which typically involve the exchange of value (e.g., money) across organizational or individual boundaries in return for products and services. Here we focus on digitally enabled commercial transactions among organizations and individuals.
E-business applications turn into e-commerce precisely, when an exchange of value occurs. Digitally enabled transactions include all transactions mediated by digital technology and platform; that is, transactions that occur over the Internet and the web.
E-Commerce businesses may employ some or all of the following:
• Online shopping websites for retail sales direct to consumers,
• Providing or participating in online marketplaces, which process third-party business-
To-consumer or consumer-to-consumer sales.
• Business-to-business buying and selling.

Examples of E-Commerce -
Amazon, Flipkart , eBay , Fiverr , Upwork ,Olx , Quikr

MEANING OF E COMMERCE

E*-commerce* has the capability to integrate all inter-company and intra-company functions.

OR

The standard definition of **E-commerce** is a commercial transaction which is happened over the internet. Online stores like Amazon, Flipkart, Shopify, Myntra, Ebay, Quikr, Olx are **examples** of **E-commerce** websites. By 2020, global retail **e-commerce** can reach up to $27 Trillion.

INVENTION OF E COMMERCE

Fig1.Michael Aldrich (22 Aug 1941 – 19 May2014)

Michael Aldrich (22 August 1941-19 May 2014) was an English inventor, innovator and entrepreneur. In 1979 he invented online shopping to allow the processing of online transactions between consumers and companies, or between companies, a technique later known as electronic commerce.

In 1980 he invented Teleputer, a multipurpose home entertainment and information center that was a fusion of PC, TV and telecommunication network technologies. In 1981 he developed the concept of interactive broadband local circuit cable television for consumer telecommunications in the mass market.

FLOWCHART:

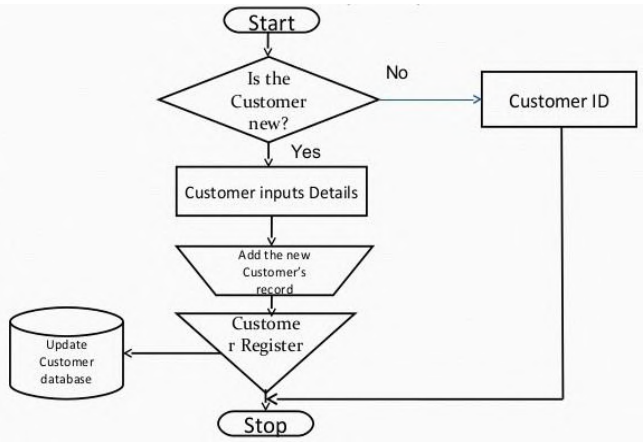

Fig2.flowchat of e-commerce

HISTORY OF E-COMMERCE

Early 2000s: Introducing Broadband

In 2003, over 20% of Americans had broadband in their homes, which means that more people were starting to have permanent Internet access and greater access to online shopping. An article in the E-Commerce Times described the effects of broadband on e-commerce and, in 2003, online sales increased by 26% and only Amazon recorded a 28% increase in sales year after year.

However, the introduction of broadband in people's homes not only meant that more people bought online, but they also started doing more research before placing an order.

Key Brands in eCommerce

E-commerce giants Amazon and eBay have been industry leaders since childhood and are among the first known e-commerce brands.

Amazon has pioneered affiliate marketing, which means that it allows other websites to earn sales commissions to recommend Amazon products to their customers. Amazon now generates approximately 40% of its total revenue from the sales of affiliates and sellers who list and sell their products through the Amazon website.

The growth of Paypal (assisted by the acquisition of PayPal from eBay and its subsequent partnership with Mastercard) has also transformed the way consumers could make payments and buy online.

Paypal has simplified the shopping experience for its users. Instead of entering customer and card data every time a consumer wishes to make a purchase, all he has to do is pay with Paypal and log in with his account and with the ease of using Paypal on a mobile device, the platform has lending a hand to the upside in mobile commerce.

2010s: The Rise of Mobile Commerce

With the rise of smartphone owners over the years, mobile devices have caused a change in the way e-commerce now works. Not only did online retailers have to consider the user experience for their mobile buyers, in April 2015, the increase in mobile users prompted Google to launch an update of the search algorithm called "Mobilegeddon". This update was designed to increase the visibility of responsive and mobile-optimized sites and penalize sites that do not satisfy their mobile users.

However, like users of mobile devices that affects search results and site visibility, the way users use mobile devices is also causing a change in buyer behavior.

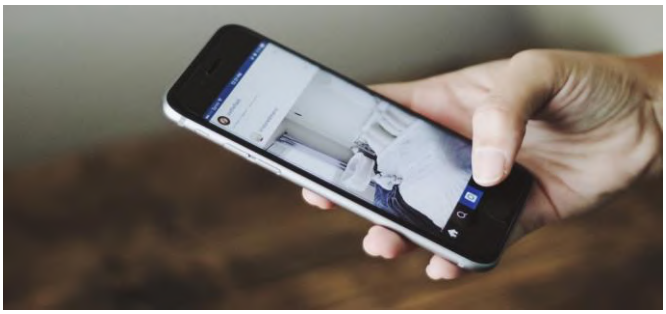

Fig3. Mobile commerce

2010s: The Effects of Social Media

Social networks have also changed the way consumers shop with their chosen e-commerce retailers. Social platforms have made brands much more accessible to their customers (consumers feel the same as brands on social networks, not below them) and the way they communicate with companies has changed.

Fig4. Social media in e-commerce.

Consumers are likely to interact with brands on social networks before they decide to shop with them, and the social presence of a brand can be very influential in how buyers perceive them. Consumers have higher expectations for brands in social networks and digital in general.

If a retailer does not meet these expectations, especially the Internet and social networks, it is very easy for consumers to switch to a different brand.

SEVEN ELEMENTS OF E COMMERCE ARE-

Online shopping is conventional. Everyone does it and, instead of the recent credit card security problems in the store, it is often considered safer than going to a retail store or handing the credit card to a customer service representative at random over the phone.

Trust in online shopping is no longer a problem. The problem is to convince your visitors to buy on your website through a competitor. To capture your audience and make sales, your e-commerce website needs to be updated and implement several very important elements.

1. Easy to use

The homepage should be attractive and encouraged on its own and should be divided into sub-categories so that visitors can quickly find what they are looking for. The search bar should be easy to find and quickly list all applicable items that are available for sale once the user types his query.

2. Cart and payment process

Adding items to the cart should be simple. Color options or style preferences should be easy to see and select. Customers like to see what they have in their shopping cart as they continue shopping, so make sure you have a design and functionality that makes it easier.

3. Mobile compatibility

80% of all adults online have a smartphone. Mobile visits, in many cases now, outweigh the use of the desktop. Your e-commerce site must be designed and built for all devices, not just a personal computer or laptop.

4. Calls to action (CTA)

Make sure to guide your customers through your site with specific calls to action for what you want them to do. For example, if you have a sale, your CTA button could be "Click here to save 20%!" Always avoid making your client feel stupid because they don't. If they visit your website, they should be smart enough to buy from the best company out there.

5. Images and descriptions

When people are looking for a product to buy, they want to know all the details before making the purchase.

Buying online can have its drawbacks because you cannot physically see or touch the objects they are looking at. For this reason, it is important to have professional-quality images of your products and, where appropriate, images from multiple angles, views and even contexts.

6. Customer service

Some kind of customer service should be available in case of problems or questions. There are several types of customer support, such as 800 numbers, email support and online chat. Decide which is the best option for your budget and the type of business. Keep in mind that you are always kind and respond in a timely manner to solve any problem and make your customers happy.

7. Security and privacy

Last but not least is security. Make sure you have an SSL certificate installed to encrypt data that arrives and arrives in the browser. Today every website, e-commerce or not, must have one. In addition, you have a transparent privacy policy that informs your customers about how your information is used on your site and by your company.

E-COMMERCE FACILITATORS:

Internet:

Massive Internet penetration has contributed to the growth of e-commerce. Internet and smartphones are becoming an integral part of every life. The Internet is no longer a source of information, but has become an important tool for purchasing, learning, communicating and even obtaining services from plumbers, carpenters, doctors, etc. The Internet user population was small during the 1980s, growing slowly but steadily until 1994 due to an increasing number of text-based users (for example, those using email and file transfer functions).

So with the introduction of the World Wide Web. The International Telecommunications Union (ITU), a United Nations agency, recently predicted in 2015 The population in May 2015 was 7.2 billion. The Internet in India took more than a decade to go from 10 million to 100 million and 3 years from 100 to 200 million, it took only one year to go from 300 to 400 million users. The mobile Internet user base in 2015 in urban India grew 65% from 2014 to reach 197 million, while the rural user base increased 99% to 80 million in October 2015. It is expected to grow to 219 respectively million (urban) and 87 million (rural).

Payment gateway:

A payment gateway is an e-commerce application service provider service that authorizes credit A payment gateway is an e-commerce application service provider service that authorizes credit card payments for e-companies, online retailers, bricks and clicks, or traditional bricks and mortar. The lifeblood of the online business is the payment routes which include credit card, debit card, online bank payments, electronic funds transfer. The world is changing from cash to digital money, and therefore, payment gateways for sustainable e-commerce are needed in the future.

Analysis:
Analytics is the scientific process of transforming data into information to make better decisions. Analytics helps companies collect, organize, analyze and report on everything their customers do. The massive increase in data volume has forced companies to focus on analysis to understand customer behavior. E-tailor must have real-time access to information to measure the return on investment online and optimize the combination of channels.

Social networks
Companies are increasingly using social networks to market their goods and services. Social networks refer to websites and computer programs that allow people to communicate and share information on the Internet using a computer or mobile phone. Social networks have played an important role in creating the brand and in informing various offers to customers.

Autonomous vehicles
An autonomous vehicle is a motor vehicle that uses artificial intelligence, sensors and a global positioning system, coordinated to drive without the active intervention of a human operator. The era of the autonomous car is fast approaching and fast approaching. Autonomous vehicle buyers will have more time to view emails, search the web, buy new products and display advertisements around them. With autonomous cars, extensive experience in digital marketing will be presented. These purchases and search patterns can be monitored to help companies adapt their marketing campaign to acquire this new segment. The scope of big data has become much wider, but it will become so personalized and predictive in the coming years that we will never have to adjust them manually.

E-COMMERCE WITH "5-C MODEL"

Another approach to defining and explaining, what is electronic commerce, derives from the so-called 5-C model. Define e-commerce for five business sectors whose names begin with the letter C:

Commerce
• In electronic markets there is correspondence between customers and suppliers, a definition of the terms of the transaction and the facilitation of exchange transactions.
• With the overall move to web-enabled business systems with relatively uniform capabilities over legacy systems, a universal link to the supply chain has been created.

Cooperation
• The Web is a vast nexus or network of relationships between companies and individuals.
• More or less formal collaborations are created or emerge on the Web to come together
People involved in knowledge work in a way that limits the limits of space, time, national borders and organizational belonging.

Communication
• As an interactive medium, the Web has produced a multitude of multimedia products.
• This universal medium has become a forum for self-expression (as in blogs) and
Self-presentation
• The rapid growth of M-Commerce (see below) allows connectivity in context, with location sensitive products and advertising.
• In the communications domain, the Web also acts as a distribution channel for digital products.

Connection
• Common software development platforms, many of which in the open source domain, enable a broad spectrum of companies to take advantage of the benefits of developed software, which is also compatible with that of your company ecollaborating partners.
• The Internet, as a network of networks that are easy to join and outside of which it is located
relatively easy to create virtual private networks, they are universal telecommunications
network, now expands widely in the mobile domain.

Calculation
• Internet infrastructure enables large-scale exchange of processing and storage resources,
thus leading to the realization of the idea of decades of information technology for public services.

DIFFERENCE BETWEEN TRADITIONAL COMMERCE AND ELECTRONIC COMMERCE

The days when commercial activities such as the exchange of goods and services for money, between the parties, are carried out only in the traditional way, that is, the customer must go to the market, look at the variety of products, choose the required items and buy by paying the specified amount. But with the advent of e-commerce, people can buy goods, pay bills or transfer money with a single click.
Many people still prefer traditional commerce to electronic commerce because of their dogma that the latter is not secure, however, this is just a myth. Both modes have their pros and cons, so we've simplified the difference between traditional and e-commerce.

Definition of traditional trade
Traditional or commercial commerce is part of the business, which covers all those activities that facilitate exchange. Two types of business activities are included, namely commercial and commercial assistants. The term trade refers to the purchase and sale of goods and services in cash or in kind and commercial assistants, implies all those activities such as banks, insurance, transportation, advertising, insurance, packaging, etc., which help to complete successfully Exchange between the parties.

Key differences between traditional and electronic commerce

The following points are noteworthy regarding the difference between traditional commerce and electronic commerce:

- A part of the business, which focuses on the exchange of products and services, and includes all those activities that encourage exchange, in one way or another, is called traditional trade. Electronic commerce means making commercial transactions or exchanging information, electronically on the Internet.
- In traditional commerce, transactions are processed manually, while, in the case of electronic commerce, there is automatic processing of transactions.
- In traditional trade, the exchange of goods and services for money can only take place during working hours. On the other hand, in e-commerce, the purchase and sale of goods can take place at any time.
- One of the main disadvantages of e-commerce is that customers cannot physically inspect the products before purchase, however, if customers do not appreciate the products after delivery, they can return them within the expected time. On the contrary, in traditional trade physical inspection of goods is possible.
- In traditional commerce, the interaction between buyers and sellers is direct, that is, face to face. On the contrary, there is an indirect interaction with the customer, in the case of e-commerce, because it may be possible that the customer is miles away from where he places an order for the purchase of goods.

- The scope of business in traditional commerce is limited to a particular area, ie the scope of business is limited to the nearby places where it operates. On the contrary, the company has a worldwide reach in the case of electronic commerce, thanks to its ease of access.
- 7. Since there is no fixed platform for the exchange of information in traditional trade, the company must rely entirely on intermediaries to obtain information. Unlike electronic commerce, where there is a universal platform for the exchange of information, or an electronic communication channel, which reduces people's dependence on obtaining information.
- 8. Traditional trade has to do with the supply side. In contrast, the e-commerce resource approach is the demand side.
- 9. In traditional commerce, the commercial relationship is vertical or linear, while in the case of electronic commerce there is a directness in the command that leads to a horizontal commercial relationship.
- 10. In traditional trade, due to standardization, there is massive / one-way marketing. However, in e-commerce there is a personalization that leads to one-to-one marketing.

BASIC MODELS OF E-COMMERCE:

BUSINESS TO BUSINESS (B2B)
B2B e-commerce refers to all electronic goods and sales transactions between two companies. This type of e-commerce generally explains the relationship between the manufacturers of a product and the wholesalers who advertise the product for purchase to consumers. Sometimes this allows wholesalers to keep up with the competition.

CONSUMER SOCIETY (B2C)
Perhaps the most common form of electronic commerce, B2C electronic commerce deals with electronic commercial relationships between businesses and consumers. Many people appreciate this e-commerce channel because it allows them to search for the best prices, read customer reviews and often find different products to which they would not otherwise be exposed in the retail world. This category of electronic commerce also allows companies to develop a more personalized relationship with their customers.

CONSUMER CONSUMER (C2C)
This level of electronic commerce covers all electronic transactions that take place between consumers. In general, these transactions are provided by online platforms (such as PayPal), but are often performed through the use of social networks (Facebook market) and websites (Craigslist).

COMPANY CONSUMER (C2B)
It is not the most traditional form of electronic commerce, C2B electronic commerce is when a consumer makes his services or products available to companies to purchase them. An example of this could be a graphic designer customizing a company logo or a photographer taking photos for an e-commerce website.

BUSINESS ADMINISTRATION (B2A)
This category of electronic commerce refers to all transactions between society and public administration. This is an area that involves many services, particularly in areas such as social security, employment and legal documents.

ADMINISTRATIVE CONSUMER (C2A)
Another popular category of electronic commerce, C2A electronic commerce covers all electronic transactions between private and public administration. Examples of this include taxes (filing tax returns) and health (planning an appointment using an online service.

BENEFITS OF E-COMMERCE

FOR CONSUMERS
Electronic commerce offers the following advantages to consumers.

;

- **Wide range of products and services**.
  Electronic commerce via the Internet allows customers to choose a product or service of their choice from any supplier anywhere in the world. Due to limited space, a supplier can only store a minimal amount of products in the physical store.
  A virtual store allows a business organization to store many assets regardless of the cost of the inventory.
- **Convenience**
  Customers can purchase any product from anywhere in the world without leaving their workplace or home through the Internet. Due to bad weather, people can limit their purchases, even in case of need. Electronic commerce offers the convenience of purchasing goods or services without causing physical restrictions to consumers.
- **Saving**
  The costs incurred by the company in intermediaries are generally borne by the consumer. Since the intermediaries are eliminated, the customer cannot bear the cost of the intermediaries. To attract customers and fight competitors, several commercial organizations offer products and services at a lower price.
- **Save time**
  Saving time is one of the main advantages of online shopping. The time required to select, purchase and pay for a product online cannot take more than 15 minutes; Products are delivered to customers' door steps in a week. Save delivery times for buyers.
- **Adequate information**
  The Internet is used as the primary vehicle for transacting in electronic companies. The Internet allows customers to search for product information, compare prices and benefits, and finally evaluate their value before committing to purchase.
  Through the Internet, customers can clarify their questions and track their delivery status when products are sent to them. If you have questions about product management, customers can easily contact the company via the Internet.

FOR SOCIETY

Here are some of the benefits that e-commerce offers society.

- **Provide job opportunities**.
  E-commerce bridges the gap between jobseekers and those working in society. Human resources can be located in any organization by publishing resumes through the Internet. Some organizations also allow people to work from home.
- **Provide entertainment**
  E-commerce helps people download music, videos and review the latest updates and reviews. It allows people to book movie tickets online.
- **Less pollution**
  People can purchase any product or service from anywhere through the Internet without traveling from home or the workplace. Business partners can contact each other from their office. It reduces traffic and air pollution and helps reduce global warming.
- **Healthcare**
  Medical assistance and advice is also provided through the Internet to people in need. Doctors and nurses can obtain professional information and be updated with the latest health technologies through the Internet.
- **Promote a cordial relationship**.
  E-commerce allows people to send gifts, greetings and gift certificates to friends and relatives anywhere in the world. This promotes a cordial relationship between individuals in society.

FOR AN ORGANIZATION

- **Reach and attract new customers**
  And business gives you the opportunity to reach more and more new customers. In a traditional market, retailers manage most of their businesses with personal relationships, brands and references. Although because of SEO, it is quite common for any ecommerce portal to get unique visitors who come to your page just because they were looking for a specific product or service online, not because they were browsing that particular site.
- **Accessibility and ease**
  Availability is another important advantage of having an e-commerce website. For many people in the world, e-commerce becomes one of the preferred ways of buying, as they enjoy their purchases for their ease and conviction. The best thing for e-commerce is to buy options that are fast, easy to use and affordable.
- **Worldwide sale**
  Online stores are not limited to geographic boundaries like a physical store, so it provides a platform to sell your products and services around the world and target your customers with no limitation of position and restriction.
- **Platform for real-time interaction and feedback**
  E-commerce offers retailers the opportunity to receive comments, suggestions and testimonials from their customers in real time. Positive reviews will create a solid brand image and create confidence that more customers will buy that product.

- **Stays open 24 * 7**
  One of the most important advantages of e-commerce is the availability of products for 24 * 7/365. In this way, the seller can increase his sales by increasing the number of orders.

LIMITATIONS OF THE E-COMMERCE

Although e-commerce offers many benefits to customers, businesses, society and the nation, there are still some areas of concern that need to be addressed. Below are some of the limitations or disadvantages of e-commerce.

- **security**
  The biggest drawback of e-commerce is the issue of security. People are afraid to provide personal and financial information, although numerous improvements have been made to data encryption. Some websites don't have the ability to perform authentic transactions. Fear of providing credit card information and identity risk are limiting the growth of e-commerce.
- **Lack of privacy**
  Many websites do not have high encryption for secure online transactions or to protect online identity. Some websites illegally collect consumer statistics without their authorization. Lack of privacy discourages people from using the Internet for commercial transactions,
- **Tax issue**
  Sales tax is another big problem when the buyer and seller are in different places. Calculating sales tax poses problems when the buyer and seller are in different states. Another factor is that physical stores will lose business if web purchases are tax free.
- **Fear**
  People fear operating in a paperless and faceless electronic world. Some business organizations have no physical existence. People don't know who they are trading with. This aspect makes people opt for the purchase of physical stores.
- **Suitability of the product**
  People have to rely on electronic images to buy products. Sometimes when the products are delivered, the product may not correspond to the electronic images. Finally, it may not meet buyers' needs. The lack of "touch and feel" prevents people from shopping online.

- **Cultural obstacles**.
  Electronic commerce attracts customers from all over the world. People's habits and culture differ from one country to another. They also pose linguistic problems. Therefore, cultural differences create obstacles for both businesses and consumers.

- **High labor costs**
  A highly talented and technically competent workforce is required to develop and manage the organization's websites. Since the Internet offers many job opportunities, business organizations have to bear a lot of expense to retain a group of talented employees,

PROXIES CREATED FOR E-COMMERCE

Luminati is the world's first proxy network created for your e-commerce needs. Connect with your expert proxy to help you get your operations up and running. The Luminati 24/7 support team is always available to help in different languages. Regardless of its location, we covered it. The Luminati networks and the proxy administrator have been created taking into account your e-commerce needs. By offering access to competition around the world, you can always focus on your business, your competitive advantage and your customers. Collect accurate pricing data that is never blocked or lost again!
The Luminati network is monitored for safe use and should only be used in accordance with the Luminati License Agreement and in compliance with all applicable laws.

How does a proxy work?
Typically, client requests are forwarded to one or more proxy servers that handle the request. The proxy server's response is returned as if it came directly from the original server, leaving the client unaware of the origin servers.

WATCH OUT FOR SECURE E-COMMERCE

Thousands of businesses are compromised every year by security attacks. It is difficult to protect your digital assets from rebel forces. Therefore, it is important to keep the checks and balances that will help you protect your e-commerce business from attacks.

Implement SSL security

SSL means Secure Sockets Layer. Implementing an SSL certificate on your site can help you create the first line of defense against hackers.
Without SSL, communication between a website and its user is easy to intercept. A third party can listen to this communication and find important information such as passwords and credit card numbers.

Choose a safe and reliable e-commerce platform

Not all platforms are created equal. Some platforms may offer brilliant gadgets or features that may introduce security vulnerabilities.
Before choosing a platform, it is a good idea to consider a platform's reputation for security and reliability.

Plan a multi-layered security architecture

When choosing an e-commerce platform, it is a good idea to analyze its architecture. Layered architecture is a better option in terms of security it provides. A platform that attempts to complete all activities and functions from a single module is more vulnerable. Good security design groups similar tasks and functions into modules and places them in different levels.

Configure security alerts

Configuring smart security alerts can provide a line of defense against unexpected behavior. Security alerts can be implemented in different layers of architecture. The sales level can monitor if there are potential customers who use multiple credit cards from the same account.

Integrate secure and reliable payment gateways

Due to the expansion of e-commerce, there are several gateway options available for an eMerchant. Payment gateways differ in fees and processes. You can use multiple gateways to cover different types of payment methods.

Restrict third party links and advertisements

Defective third party links and advertisements can damage your business in several ways. They can attract users to sites with unpleasant business practices, use phishing scams or they may simply be against your company's values. The limitation of links and advertisements protects your company from any harmful process or code that these companies could use.

STATUS OF E-COMMERCE IN THE WORLD

We estimate that the global retail market will reach $ 25.038 billion in 2019, an increase of 4.5% and a slight acceleration of growth compared to the previous year. At the same time, it represents a sharp drop from the previous five years, when global retail sales grew between 5.7% and 7.5% annually.
The main e-commerce companies
It seems like yesterday when the idea of online shopping hit Internet users around the world. Since then, the e-commerce industry has grown to 24 million online stores, of which only 650,000 stores are generating annual sales of over $ 1000.

THE TOP E-COMMERCE COMPANIES

Amazon- Amazon needs no introduction. In 1994, Jeff Bezos founded the company (the richest man in the world) as a book market. From this modest start, Amazon has become the e-commerce company that generates the highest income and can be said to be the largest online conglomerate in the world.

Fig5. Logo of amazon

In 2017, Amazon generated $ 177.9 billion in net sales, and that's not just for the sale of books. Amazon has now become a complete online store with a product range that includes electronic products, clothing, software, pet supplies and, of course, books.

Alibaba- When it comes to the major e-commerce companies, we simply can't forget Ali Baba. Founded in 1999, this e-commerce giant was born in China.

Fig6. Logo of alibaba

Jack Ma started Alibaba to make it the largest online wholesale market. It serves not only consumers, but also retailers. Think about a product and Alibaba is likely to have multiple vendors offering that product in multiple versions.

EBay- Headquartered in San Jose, California, eBay is one of the world's leading e-commerce companies. Founded in 1995, the company was one of the first point bubble survivors that revolutionized online shopping. That's why your logo has a red-blue-green-yellow combination. The e-commerce platform offers a market for C2C and B2C transactions.

Fig7.logo of ebay

People can come together and publish their products for sale, so that others can see them. eBay has a range of product categories that cover almost everything.

Jingdong- Jingdong is essential in any list of major e-commerce companies. It operates outside of Beijing and, given its rapid growth, many of the major e-commerce stores (including Alibaba) consider it a worthy rival. It started in 1998 and started operating online in 2004, almost six years later.

Fig8. Logo of jingdong

Although JD is not that big compared to Ali Baba's portfolio, in 2017 it recorded more revenue than Ali Baba ($ 15 billion more!). JD also has many more employees than Ali Baba. (JD has 137,000 and Ali Baba has about 65,000).

Zappos- Zappos is an extremely popular online shoe store for its customer service. They are one of the leading e-commerce companies with the best customer service in the world. The purpose of this company was "WOW" for its customers with exceptional unconditional customer service.

Rakuten- Formerly known as Buy.com, the e-commerce market was renamed after Rakuten.com purchased it. It is one of the leading e-commerce companies and the largest e-commerce website in Japan. It is also known as "the Amazon of Japan".

Fig10. Logo of rakuten

Let me give you a clue as to the size of this huge e-commerce website: 90% of Internet users in Japan have registered for an account on Rakuten. It houses 40,000 companies and has purchased numerous foreign assets and transformed them into branches in Rakuten (abroad).

The deposit Depot- Home Depot is the largest retail chain of household items and one of the leading e-commerce companies in the world today. With 2,200 physical stores in three countries, 40,000 employees and around $ 90 billion in annual revenue, Home Depot is a huge force in the retail sector.

Fig 11. Logo of home depot

Founded in Atlanta, GA, Home Depot has expanded its operations to Canada, where they have more than 200 stores in the 10 provinces. They also extended their operations to Mexico, where they have over 100 stores.

Flipkart- Flipkart is an online retail store in Singapore that operates in Bangalore, India. Sachin Bansal and Binny Bansal, graduates of the Indian Institute of Technology, founded it in 2007. After working for Amazon, the couple decided to launch their online store.

Fig 12. Logo of flipkart

Like Amazon, Flipkart initially focused on being a successful online bookstore. After making its mark on the Indian market as an online bookstore, Flipkart made a series of acquisitions to expand its operations.

Zalando- If you like fashion or aspire to be a stylist, then Zalando is the right place. Based in Berlin, Germany, Zalando, one of the world's leading e-commerce companies, focuses on selling fashion clothes worldwide with a large number of brands that make their presence felt there.

Fig13. Logo of zalando

In addition to accessories and fashion trends, Zalando also offers gift certificates, coupons; coupons and online sales that help attract millions of users around the world.

Otto- Based in Europe, Otto is not only one of the world's leading e-commerce companies, but it is also classified as one of the largest e-commerce companies in the world. Not to mention one of the most successful.

Fig14. Logo og otto

It is known for its innovation and the ability to constantly reinvent itself over time, keeping up with the latest and best technological trends in the world.

Otto, a fashion, sports, electronics and home equipment marketer, is one of the most visited platforms in the world to buy almost anything you want, through an innovative and easy-to-use interface presented on its website.

ELECTRONIC COMMERCIAL SECURITY STRATEGIES

Fig 15. Security

INSTALL HTTPS PROTOCOLS

These protocols have increased their popularity in recent years, compared to traditional HTTP, more vulnerable than HTTPS. The HTTPS protocol was normally used in some parts of the website intended for payments, due to the need to protect customer and company information.

Currently, however, the use of these protocols has become widespread.

IMPLEMENT CVV AND AVS VERIFICATION SYSTEMS

Payment processing is one of the most delicate aspects of e-commerce cyber security. Companies need to be very careful, especially when it comes to credit or debit cards.

Requesting the CVV (card verification value) is a highly recommended practice. And it is for two reasons

- Increase security in online payments. Requesting CVV codes makes it much more difficult to process a fraudulent transaction.
- Cybercriminals may have stolen a credit card number, but not a physical card (although the latter scenario is possible, it is a minority).

MAKE PERIODIC SECURITY COPIES

This is another of the most effective e-commerce security strategies. And it certainly doesn't require hiring professionals.
Just install UpdraftPlus, BackupBuddy, BoldGrid Backup, BackWPup and other add-ons for security and make regular copies of e-commerce databases.

USE OF MULTI-LAYER OR MULTI-LAYER SAFETY

Layered security means using several measures, such as installing a firewall, which provides an initial defense against cyber threats.
In addition, the use of a CDN (content delivery network) allows you to add an additional level of security, as this system diversifies copies of data in various geographical points.

AVOID TO STORE INFORMATION ON CREDIT / DEBIT CARDS

In addition to e-commerce security and encryption techniques and tools, the best online stores use common sense to protect their customers.
The best way to avoid losing credit and debit card information is to not store it. We know that credit card numbers and customer names are essential to facilitate quick payment. However, it is not necessary to store them on online servers.

FUTURE TRENDS OF E-COMMERCE (2020)

Companies that adopt e-commerce marketing strategies are experiencing rapid growth. In 2017, there were 1.66 billion online shoppers. This number is expected to reach 2.14 billion by 2021.
Prepare for the exciting future of e-commerce by implementing the emerging trends of 2020.

AI, assistants and chatbots

In 2019, robots will invade e-commerce stores. Well, robots like chatbots and artificial intelligence (AI) designed to improve a customer's overall shopping experience.
AI assistants can handle a variety of tasks typically assigned to a human being, such as inventory management or question management.

B2B e-commerce is exploding

Who said e-commerce was only for B2C brands? B2B companies are also taking advantage of upcoming e-commerce trends. B2B e-commerce sales have also been predicted to rise to $ 6.6 billion worldwide by 2020.

Interactive product display

We have all hesitated to press the "Buy" button when shopping online. Before entering your payment information, start asking yourself:
"Is this product going to be exactly what I need?"
“Is this a quality product? Or is it an imitation?
As a result, we have a great need to interact with a product before committing to a purchase. Online reviews and influence trends are not enough. We want to see the product, feel it, hold it in our hands and eliminate any doubt before buying.

CONCLUSION

Web based business has now become a key segment of numerous association in the everyday running of their business .as the web and thusly web based business has created and continuous to advance and develop, it is essential that any association, in a specific industry, must base its techniques arranging around such a quickly developing medium.
The web based business has changed the relative significant of time, however as the mainstays of pointer of the nation's financial express that the significance of time ought not to be overlooked.
It was clarified that web based business was not another business, rather another method for working together.
Structuring and real web based business website was unquestionably more costly and involved more than anticipated doing at first.

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