Lecture Notes in Networks and Systems 197

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Computer Communication, Networking and IoT

Proceedings of ICICC 2020

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IOT-Based Occlusion Invariant Face Recognition System

Ch. Rathna Jyothi and K. Ramanjaneyulu

Abstract Nowadays, one of the most important challenges of any face recognition system is partial occlusion. The paper addresses face recognition in the presence of sunglasses and scarf occlusion. The method that proposed is a robust approach which consists of detecting the face region that is not occluded and uses this region to obtain the face recognition. Face images are captured from the USB web camera on the Raspberry Pi. To segment the occluded and non-occluded parts, fuzzy C-means clustering is used, and for recognition, block-based mean weighted local binary patterns (MWLBP) are used. The input image is divided into number of sub-blocks, and each block is checked if occlusion present or not, and only from non-occluded blocks MWLBP features are extracted and are used for classification. Experiment results show that our method is giving promising results when compared to the other conventional techniques.

Keywords Face recognition · Occlusion · Fuzzy segmentation · SVM · IOT · Mean weighted LBP

1 Introduction

Due to the rapid growth in the technology, there is a high demand for high level of security for persons and organization to sustain their privacy in the business world. So in order to secure assets and privacy, one needs more secure system called biometrics. If the number of images exceeds certain limit, humans fail to identify correctly, but today the face recognition system is achieving good accuracy of 92% in 1.6 millions of faces as stated by National Institute of Standards and Technology (NIST) [1]. But it is observed that when the database size increases, its accuracy decreases linearly.

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V. Bhateja et al. (eds.), *Computer Communication, Networking and IoT*, Lecture Notes in Networks and Systems 197, https://doi.org/10.1007/978-981-16-0980-0_39

Secured IoT Based Health Monitoring System

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Abstract: Health Monitoring is the pivotal part of human well being. In Today's world of automation the field of biomedicine is no longer a distant part. Application of Technology has gained its importance in the field of biomedicine. It has improved the total process of medication. Earlier detection of diseases is possible through continuous monitoring of the patient. Health Monitoring has gained its importance from the past decades. Health monitoring systems are about to revolutionize the life of human by fast detection and real time monitoring of the patients. Continuous Monitoring of the patient is essential for earlier detection of diseases and taking the preventive measures possible. Continuous Monitoring of the patients by doctors is not always possible. To overcome this problem an IoT based continuous monitoring system is proposed in this paper where the data i.e.; the patient parameters are collected from the patient using the sensors and the data that is collected is processed at the processor. The processed data is updated to the cloud. Utilization of IoT innovations has arranged doctors and patients for connecting them to restorative regions in medicinal services environment. In this method the information collected by the wearable devices i.e.; sensors in real time are stored in database which connects doctors and people at the time of an emergency for the right information. Mostly, the health care systems concentrate on integrity and confidentiality of the data. Data Privacy, Data Integrity, Data Freshness, Authentication and Anonymity are the security requirements in IoT based health care systems. Cryptography is used to provide confidentiality to the data. In this paper we propose an Advance Encryption Standard Algorithm (AES) to provide security to the data that is updated into the cloud to finish the required prerequisites.

Keywords: IoT, IMoT, AES, Encryption, Cipher, Decryption, Authentication.

1. Introduction

Better Health is essential for the human happiness and better living of a human being. It is one of the important contributions to economic development of the society as healthy populations live longer, are more productive and save more. Health is one of the crucial assets to be taken care of by the human being. Health Research can provide important information about disease trends, risk factors and outcomes of treatment or public health interventions, functional abilities and its use. It is important to record and assess experience in clinical practice in order to develop guidelines for best practices and to ensure high quality patient care. Advancements in technology are enabling a transformation in health research that could facilitate studies that were not possible in the past. Unlike in the past centuries most of the people used to face the problems with the lack of facilities. Today with advancements in technology, improved facilities and newer opportunities have come up to serve the existing population. Internet has become the new catalyst in technical innovations.

Internet of Things (IOT) is one of the emerging technologies in the present world which connects the physical objects together [1]. It is an ecosystem of physically connected objects which can be connected together and can be accessed through internet. The term "Things" in Internet Of Things relates to a person who is to be monitored (or) the objects that have be assigned an IP address and have ability to collect and transfer the data without manual assistance. Now Internet of Improvement of Radio Hardware and different communication protocols bought into the picture different wireless sensor measurements [11]. Remote Health Monitoring is one of the emerging technologies among them which made the continuous monitoring of the patients in remote places i.e.; homes, hospitals and work places easier. Early Detection Of diseases has become possible only with continuous monitoring of patient and preventive measures can be taken in-order to reduce the adverse effects of the situation on the patient. This helps us in preventing the things to become worse. Health Monitoring enable us to know about health problems caused and to look into prevention measures to prevent the problems.

Saving Lives requires monitoring of health conditions of people who have various diseases daily. Detecting the problems can extend the life span and reduce the rate of the disease in the population i.e. life span increases thus reducing the death rates. Even, though the healthcare industry has been slower to adopt Internet of Things technologies than other industries, the Internet of Medical Things is poised to transform how we keep people safe and healthy especially as the demand for solutions to lower healthcare costs increase in the coming years [2].

It can help monitor, inform and notify not only care-givers, but provide healthcare providers with actual data to identify issues before they become critical or to allow for earlier invention.

Internet of Things can be used in medical industry [1] to process various values related to health and notify them with an alert when the values exceed the ranges of the prescribed values. In this paper we take the different parameters of human body and process it at the processor level based on the optimal set values a sms alert is sent to the person.

As usage of Internet has been increased to exchange the data, this data may contain the confidential data which needs to be secured [3]. Similarly in Health Monitoring Systems there are many security threats that can endanger the life of the patient and even at times cause death of the person. An efficient security framework must therefore provide us with the following prerequisites such as Privacy, Confidentiality, Authentication, Availability and Authorization [3] etc. Data Confidentiality and Data Integrity is to be maintained in case of secure health data transmission.

In this paper the aspects of Security Issues related to the health data in Section III and providing the data security using cryptography techniques. Cryptography is one of the key concept in transforming the plain text into an encrypted format i.e.; into an unreadable format. Cryptographic Technology can provide with data security for Internet of Things. There are two types of Cryptographic methods they are namely Symmetric Key Cryptography and Asymmetric Key Cryptography. Symmetric Key Algorithms uses the same key for both encryption and decryption of the data. In Asymmetric Key Algorithms different keys are used in case of encryption and decryption. Asymmetric Key Algorithms are 1000 times slower than Symmetric Key Algorithms as it is impractical when large amount of data is to be encrypted.

Cryptographic Algorithm based on the demands of the application being used. Different Evaluation Metrics are taken into consideration when selecting a cryptographic algorithm are Encryption Time, Decryption Time, Memory used, Avalanche Effect, Entropy and

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Number of Bits required for optically encoding the data. Based on the evaluation metrics met and the application to be met the algorithm is chosen and implemented. If Confidentiality and Integrity are the major areas to be met Advanced Encryption Standard (AES) Algorithm [9][10] is to be used which is mentioned in Section IV.

This paper has been organized into the following sections. Section I consists of Introduction of the paper. Section II consists of the Related Work and Motivation towards choosing the project. Section III deals with the various requirements in IoT based Health care systems. Section IV includes the AES (Advanced Encryption Standard) Algorithm where the plain text is converted into cipher text during encryption and the cipher text is decrypted to obtain the original plain text using decryption. Section V includes the proposed methodology to implement the project. Section VI consists of the results obtained and Section VII consists of the Acknowledgment.

2. Related Work and Motivation

Alvee Rahman et al to implement the project [4] have presented the implementation of health monitoring system that includes ECG sensor and digital thermometer for real time monitoring of patient. This system also sends notification to doctors or relatives based on the optimal values of the sensors.

Neel Kamal et al. [5] have proposed a Three Tier Architecture for IoT driven health monitoring system where the three tiers include Wired Sensor network, Local Processing unit and Hardware control unit. This system is efficient to generate different reports in different modes i.e. precision mode as well as in fast mode.

A'isya Nur Aulia Yusuf et al. [6] proposed a system to develop a health information system that is able to provide patient health information to the health workers using android platform. Code Blue [12] is a popular healthcare research project developed at Harvard Sensor Network lab is a wireless continuous monitoring system where several biosensors are placed on the body and these sensors collect various physiological parameters from the human body and sends it to the central node. This project acts as personal digital assistant where the doctors respond it to the queries of the patient. Though it is a popular research project security is still a pending issue to be solved. Provision of security to the data is being considered as the most critical aspect.

Alarm-Net [13] is a heterogeneous network architecture developed at University of Virgina is a patient health monitoring system in assisted living and home environment. Network and data security is provided to the physiological, behavioral and environmental parameters but the drawback of the system it has confidentiality attacks on the location of the residents and the data was leaked.

UbiMon [14] is a project developed by department of computing, Imperial College, London for analyzing and providing solutions to the issues that are related to usage of implementable and wearable sensors which was widely accepted all over the world without considering security of the data.

Mobi-Care [15] is a mobile patient care monitoring system which deals with all the parameters of the patient continuously which was developed in 2006 by Chakravorty. It has dealt with continuous and timely monitoring of parameters .He has acknowledged the security issues in paper but never dealt with them. Several security issues are to addressed.

MediSN [16] is a recent health care system developed at John Hopkins's University which involves continuous monitoring of the patient. In this system the data is collected from the sensors in terms of battery powered motes. In their project description author acknowledged that data security must be provided o the powered motes. They have not mentioned which crypto system has been used in their description of project. Though some sort of security has been provided to the data the implementation has not been mentioned in their works.

All the above projects mentioned involve continuous monitoring of the patient and automatically gets the health data from the sensors. These systems provide with qualitative monitoring of the health without disturbing the patient comfort. All projects concentrated on cost effectiveness, reliability and power related issues but none addressed the security issues in their projects. Few projects have acknowledged with security issues but implementation and mechanisms have not been discussed in detail. In-Depth Analysis of Security and privacy related issues in real time health monitoring systems is required and need to be addressed by us. This lead us to take up a project and propose a Secured IoT based Health care monitoring System which provides the data security using AES (Advance Encryption Standard) Algorithm and its implementation[10].

3. Security Requirements In Iot Based Health Care Monitoring System

Security is one of the crucial aspects of an IoT based system [11]. One of the greatest threats in IoT based system is it doesn't provide proper secure to the data in the cloud. Clouds are not having proper security when compared with other technologies. Providing Security to the data in cloud is one of the most important aspects in today's world. Following are the key security requirements in IoT based Health Care System

3.1 Data Privacy

Data Privacy is one of the most important issues in Sensors. It is important to protect the data from disclosure. An eavesdrop of information can overhear critical information. This eavesdropping may cause severe damage to patient since it can be used for many illegal purposes.

3.2 Data Integrity

Data Confidentiality is to be maintained in case of secured health care system. Data Confidentiality is must to protect the external data from being modified. The data can be manipulated by adding some fragments. This manipulation of data and Lack of Integrity is very dangerous to patient especially in critical issues. Data Loss can also occur due to bad communication environment.

3.3 Data Freshness

Data freshness is one of the critical aspects in IoT systems where new data is to be maintained and this new data is to be replied with new messages and not with the old messages.

3.4 Authentication

It is one of the most important requirements in IoT based healthcare systems which can efficiently deal with attacks. The sensors send the data to the coordinator. The coordinator needs to send the periodic updates of the data of the patient to a server. Authentication confirms their identity to the coordinator and the sensors.

4. AES Algorithm

AES is a symmetric encryption algorithm recommended by NIST to overcome loopholes of small key size and slow speed in existing symmetric encryption algorithm. AES is an algorithm which considers input data in blocks (128 bits). Encryption keys used in AES are of 128 bits, 196 bits or 256 bits. AES is having fixed packet length of 128 bits and key length can be 128 bits, 192 bits (or) 256 bits. AES is a round based algorithm where number of rounds depends on key length or key size as tabulated below.

Table 1. Indicating Number of Rounds required in AES Algorithm based on Key Size

Key Size	Number Of Rounds
128	10

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192	12
256	14

AES Encryption and Decryption as shown in Figure4.1 includes the following steps:

4.1 Substitute Byte Transformation

This is the process of substituting each byte of the state non-linearly with the look up table. This look up table is generally known as an S-box. S-box is a 16*16 matrix which is computed using multiplicative inverses in the Galois Field GF ($2^{8)}$. Affine Mapping concept is used for finding out multiplicative inverse in the process of encryption. In decryption the inverse affine transformation is used. S-box is computed either using computing substitution or by using the lookup tables. Look up tables are faster and inexpensive in terms of power consumption

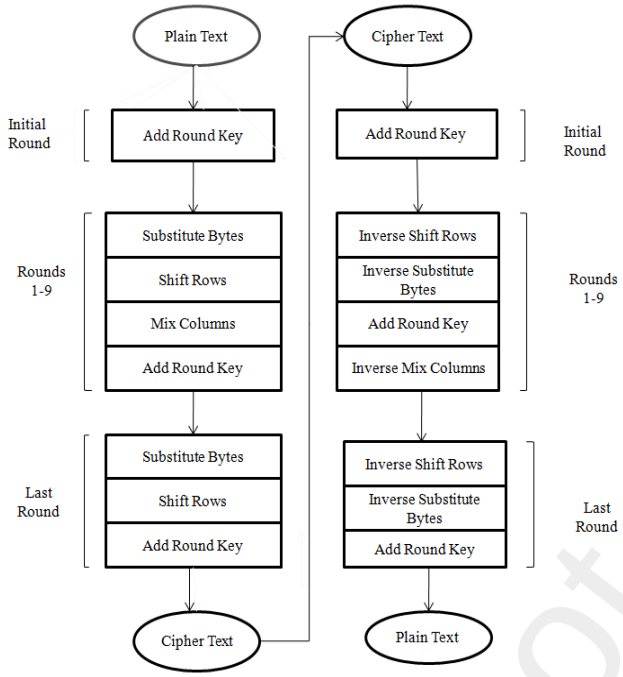

Fig. 1: AES Encryption and Decryption Flow

4.2 Shift Rows

Circular Left Shift is performed on each byte of the row of state matrix by shifting the bytes in last three rows of the state matrix by offset value from one to three bytes respectively on each row. Shift Rows Transformation consists of not shifting the first row of state array, circularly left shifting the second row by one bit, circularly left shifting the third row by two bits and last row by three bits.

4.3 Mix Columns

Matrix Multiplication is done on each byte of state matrix with each byte of fixed matrix. Each column of four bytes is now transformed into new matrix. Four Bytes of one column is taken as input and completely four new bytes will replace the original bytes. This results in 16 new bytes matrix. This step is not performed in last round.

4.4 Add Round Keys

The resulting 16 bytes of the mix column operation is taken as 128 bits and XORed with 128 bits of Round-key. If this is the last round the resulting output is taken as cipher text. The number of rounds is based on key size and last round excludes the mix columns operation. Decryption follows the reverse order as done in encryption such as Inverse Shift Rows, Inverse Sub Bytes Substitution, Add Round Key Transformation and Inverse Mix Columns Transformation.

AES Decryption [9] is similar to AES Encryption method which converts the cipher text into the plain text using the same steps as mentioned above but in a reverse process. The steps followed in decryption are Inverse Shift Rows, Inverse Substitute Bytes, Add Round Key and Inverse Mix Columns. Inverse Substitute Bytes makes use of Inverse S-Box.

5. Proposed Method

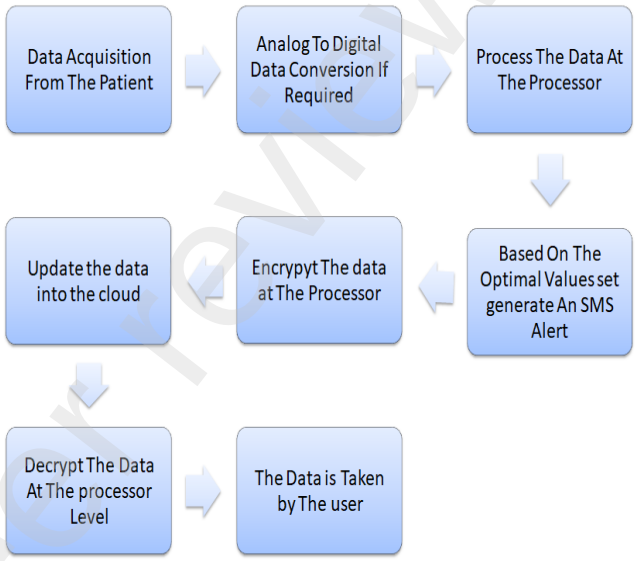

Fig. 2: Step by Step Implementation of the System

Fig. 2 we propose to implement a secured health monitoring system. The above block diagram i.e. Figure 2 basically consists of four main stages. The First stage includes the data acquisition from the patient. This data acquisition is done with the help of body sensors. Different sensors are used that include Body Temperature Sensor, Heart Beat Sensor, ECG Sensor, Fall Detection Sensor, Respiratory Sensor, Temperature Sensor and Air Pollution Detection Sensor. In the second stage the data acquired from the patient is processed at the processor based on the optimal values of the sensor an SMS alert is set if the values are out of optimal range. In the Third stage the processed data is encrypted using AES Encryption Algorithm which is mentioned in the earlier parts of this paper. The Final stage is decrypting the data using AES Decryption Algorithm which is similar to Encryption Algorithm and a reverse process of it.

Raspberry Pi3 is an ARM based credit card size computer developed in UK in Raspberry Pi foundation. It is a 64 bit Broadcom BCM2837 Quad Core Processor. It can be considered as a single board computer that works on LINUX operating system. This model includes 802.11nWiFi, Bluetooth 4.0, and a quad-core 64 bit ARM Cortex A53 running at 1.2 GHz.

Body Temperature Sensor measures the body temperature of a human body. The normal range of body temperature is 37^0 C. If the temperature goes above 40^0 C or below 33^0 C the person is not in comfort and need some medication. We have used DS18B20 as a means to measure the human body temperature. The following are the specifications of DS18B20 sensor:

- Programmable Digital Temperature Sensor.
- Communicates using 1- wire interface method.
- Operating voltage: 3-5V.
- Temperature Range: -55^0C to $+125^0$C.
- Accuracy:$\pm 0.5^0$C.

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- Output Resolution: 9 bit to 12 bit (Programmable).
- Unique 64 bit address enables multiplexing.
- Conversion Time: 750 ms for 12-bit.
- Programmable Alarm Options.

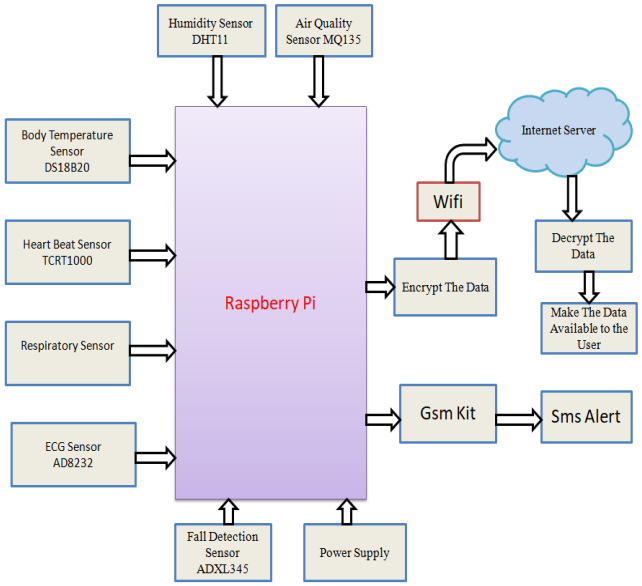

Fig. 3. Secured IoT based Health Monitoring System

TCRT1000 also known as "Easy Pulse" is a Reflective Optical Sensor for Photo-Plethysmography. The use of this sensor simplifies the build process of sensor part of project as both infra red light emitter diode and the detector arranged side by side in a leaded package which thus blocks the surrounding Ambient Light. The Output of this sensor is a digital pulse which is in synchronous with heart beat of a person. This Output pulse is either fed to Analog to Digital Converter Channel or the digital pin of microcontroller for further processing and retrieving the heart rate in beats per minute (bpm).

The following are the specifications of TCRT1000 Sensor:

- Sensing Distance: 4mm.
- Current – Dc Forward: 50 mA.
- Operating Temperature: -40^{0}C to 85^{0}C
- Power Dissipation: 200mW.
- Output Type: Photo Transistor.
- Package Type: Leaded.
- Number of Pins: 4

AD8232 is an integrated signal conditioning block for ECG and other bio-potential measurement applications. It is designed to extract, amplify and filter small bio-potential signals in presence of noisy conditions created by motion or remote electrode placement. This design allows for an ultra low power ADC or embedded microcontroller to acquire output easily. The following are the specifications of AD8232 Sensor:

- Fully Integrated single-lead ECG frontend.
- It is used to measure the electrical activity of the heart.
- Low Supply Current: 170uA (Typical).
- Common Mode Rejection Ratio: 80 dB (dc to 60Hz).
- Two or Three electrode Configurations.
- High Signal Gain (G=100) with dc blocking capabilities.
- Signal Supply Operation: 2.0V to 3.5V.
- Two pole adjustable High-pass Filter.
- Three pole adjustable Low-Pass Filter.

ADXL345 is an ultra-powered, small, thin,3-axis accelerometer with a high resolution (13-bit) measurement up to ±16g. ADXL345 is mostly used for mobile device applications. It is used to measure the static acceleration of gravity in tilt sensing applications as well as dynamic acceleration resulting from motion or shock. The Following are the specifications of ADXL345 Sensor:

- Ultra- Low Power: as low as 23 uA in measurement mode and 0.1 uA in standby mode at V_s=2.5V (Typical).
- Power consumption scales automatically with the Band width.
- User Selectable Resolution.
- Fixed 10 bit resolution,
- Embedded Memory with FIFO Technique that minimizes the Host Processor Load.
- Voltage: 2.0V to 3.6V.
- I/O Voltage Range: 1.7 to V_s.

DHT11 is used both as Temperature as well as Humidity Sensor. It features a Calibrated Digital Output. DHT11 calculates relative humidity by measuring the electrical resistance between the two electrodes. DHT11 Sensor as a whole consists of a Capacitive Humidity Sensing element and a Thermistor for sensing the Ambient Temperature. The following are the features of DHT11 Sensor:

- Operating Voltage: 3.5V to 5.5V.
- Operating Current: 0.3 mA for measuring and 60uA in stand-by mode.
- Output: Serial Data.
- Temperature Range: 0^{0}C to50^{0}C.
- Humidity Range: 20% to 90%.
- Resolution: 16 bit.
- Accuracy: ±1^{0}C and ±1%.

MQ135 Sensor is a gas detecting sensor which is used to detect the toxic gases in the surrounding atmosphere. This sensor conductivity is generally low. As the gases increases.MQ135 is highly sensitive to Ammonia, Sulfide and Benzes steam, and also sensitive to smoke and other harmful gases. It is of low cost and being used for different applications. The following are the specifications of MQ135 Sensor:

- Wide Detecting Scope.
- Fast Response and High Sensitivity.
- Stable and Long Life.'
- Operating Voltage:+5V
- Detects and measures NH_3, NOx, alcohol, Benzene, Smoke, Co_2etc…
- Analog Output Voltage: 0 to 5 V.
- Digital Output Voltage: 0Vor 5V (TTL Logic).
- Preheat Duration: 20 sec.
- Can be used as a Digital or Analog Sensor.
- The sensitivity of digital pin can be varied using the potentiometer.

The data that is obtained using all the above mentioned sensors is to be encrypted. Thus, the data is encrypted using AES Algorithm as mentioned in the Section IV of this Paper. Later when the data is to be provided to the user it needs to be decrypted this is the reverse process as of AES Encryption.

In Figure 5.3, the step by step procedure is described to perform the project. At the start we initialize all the sensors and GSM kit. The data is processed at the processor and the based on the optimal values set the sms alert is sent to the mobile when the values cross the optimal values. The data is then encrypted and the encrypted data is updated into the cloud using a wifi. Module. When the data is to be retrieved the data is decrypted at the processor and the data is made available to the user.

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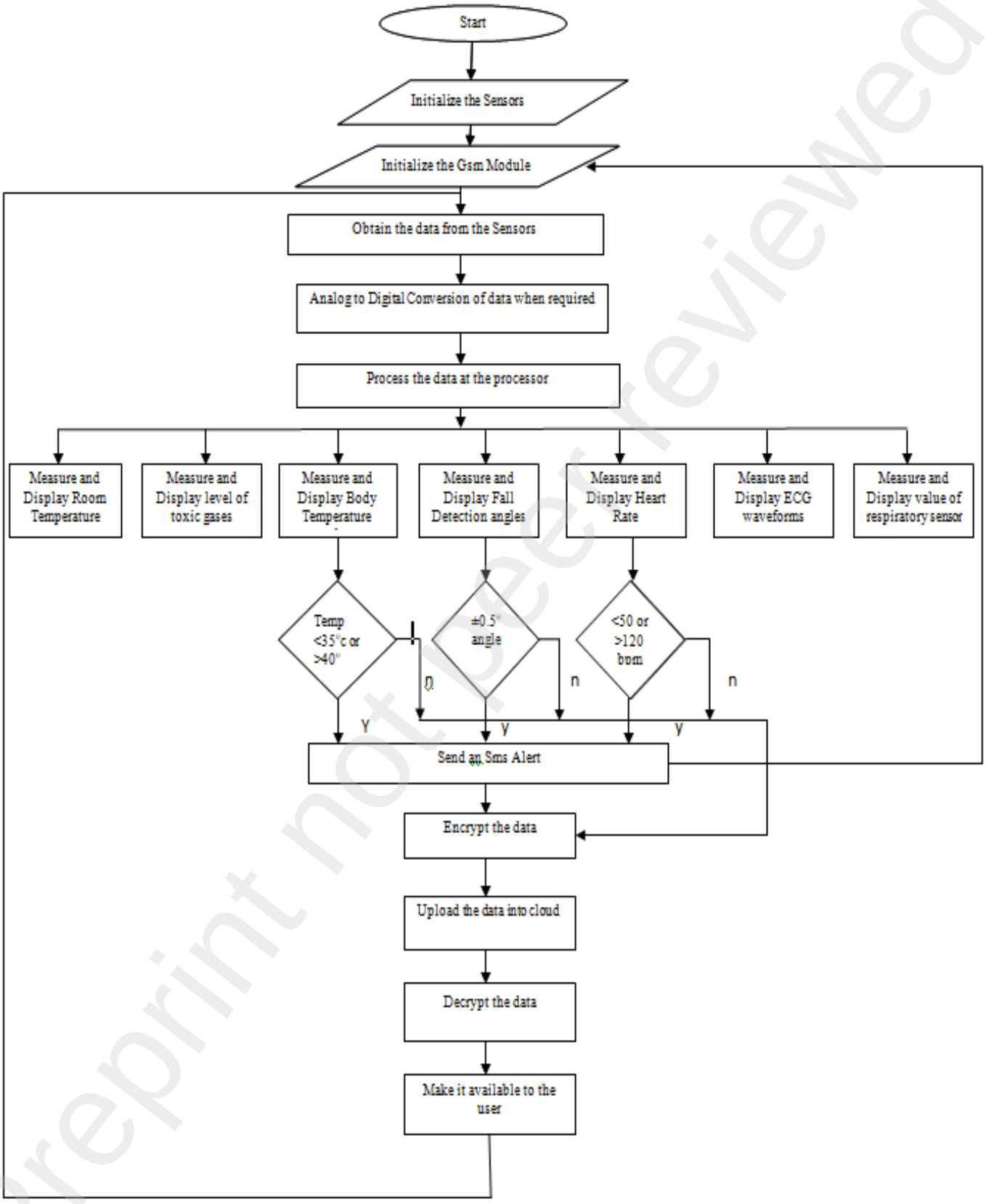

Fig. 4. Flowchart representing the entire working of project

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Fig.5. Pictorial Representation of Implementation

Figure 5, represents the pictorial representation of implementation of this project. First the data is acquired from the entire sensors namely Respiratory sensor, ECG Sensor, Heartbeat sensor, fall detection sensor. All these sensors are connected to the raspberry pi board where the data is processed and based on the optimal values a sms alert is sent if required to the doctor and a family member. The data is encrypted and sent to the cloud and then decrypted at the processor level to obtain the results and these are made available to the doctor and the users available.

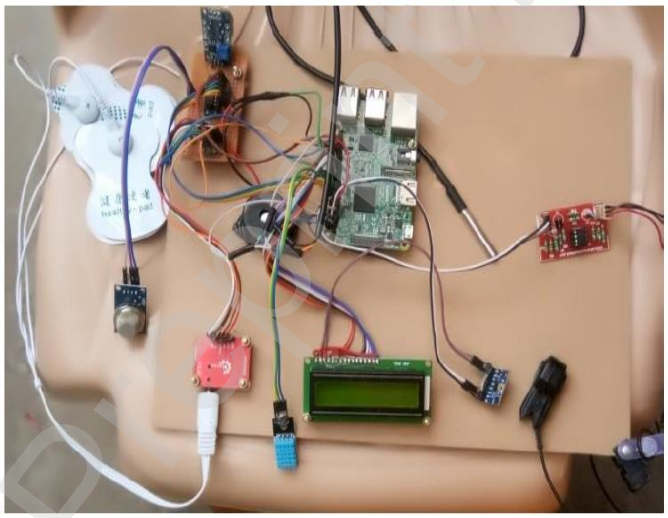

Fig. 6: Health Monitoring System Hardware Setup

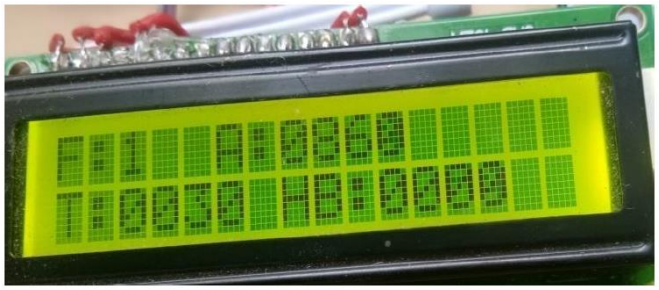

Fig.7: LCD showing the results

6. Conclusions

Hence the data is secured using the AES algorithm in the proposed system and the health monitoring is done continuously. This paper presents a design and implementation of health monitoring system based on IoT environment. This facilitates constant health monitoring for the patients remotely from any place. Thus, data security is provided and this system can be set up in hospitals and massive amount of data can be obtained and secured in the cloud-based environment. Even the results can be accessed from mobile through an application.

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Preprint not peer reviewed

This preprint research paper has not been peer reviewed. Electronic copy available at: https://ssrn.com/abstract=3643863

Smart IOT System for Monitoring and Controlling Livestock Parameters

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Abstract: In this paper we consider the products like quality and welfare of animals which are closely related to the environment parameters in livestock building. A monitoring and control method of environmental parameters in livestock buildings based on wireless sensor network is proposed in this system. The parameters like temperature, humidity, light intensity, carbon dioxide concentration, ammonia concentration, and hydrogen sulfide concentration can be monitored and controlled in real time by this method. These parameters can be adjusted and controlled through WLS algorithm and also can minimize the deviation criteria. Along with this, the system can also track the location of the animals in the livestock building using several tracking nodes placed around the neck of the animal. In addition, the system proposes the ALEXA based voice assistant which is a user friendly system that can assist us to control and monitor the livestock parameters. Compared with the traditional method, the proposed method reduces the high labour cost and energy consumption will be decreased.
Keywords: Wireless sensor Network, Tracking, ALEXA, GPS, GSM, Zigbee, MYSQL.

1. Introduction

From [1] Livestock husbandry is also an important sector which place a key role in economy employment. Recently most of the livestock forms are get effected by the environmental parameters such as temperature, humidity, light intensity, Carbon dioxide(CO_2), Ammonia(NH_3), Hydrogen sulfide(H_2S). The environmental condition of the poultry house and livestock stall has become an important factor in the development of poultry house and livestock production. In the process of poultry and livestock breeding, controlling the poultry environment has an important significance to the animal health growth to maximize the use of its growth performance. The proposed system of livestock and poultry production have shown that the growth, health, reproduction status, and forage utilization of livestock and poultry are restricted by the environment its house and stall.

According to The Latest Agriculture Industry Standard of India, it is the main environment parameters in livestock building such as temperature, humidity, light, carbon dioxide concentration, ammonia concentration, and hydrogen sulfide concentration. In [2], Most of the research results, at present are only in the theoretical stage and the experimental stage, few of them have been tested for a long time, and the accuracy and stability of data acquisition and system still cannot be verified before having mass field testing in livestock building.

From [3] for improving the management of livestock husbandry, there is a need for tracking the location of animals in livestock building using an automated system. Since the animals are in the closed environment but still there may be a chance of missing of animals or may be a chance of theft of animals by some other persons. Therefore livestock farm may need this tracking system. The Range will be created according to the physical area of the livestock building.

For user friendly, AMAZON ALEXA was introduced in this system. According to the commands given by the user, it will control and monitor the livestock parameter in the real time.

The rest of the paper deals with the following concepts

Related work--gives a comparison between proposed systems with other References.

Measuring Parameters--deals with the parameters that are going to measure and also about the nodes that are being placed in the livestock Farm.

Proposed System--deals with the Pictorial Representation of the system with proper description.

Algorithm and Flowchart—deals with the WLS algorithm and it's Flowchart with proper required equations.

Conclusion—it represents what the proposed system finally achieved compare with Past systems.

If any animal crosses that range, alertness will be obtained to the user in the form of alarm and Message to mobile with the help of GSM and controller.

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2. Related Work

Let us consider [1] i,e. Yu Zhang's Environmental Parameters control Based on Wireless Sensor Network in Livestock Buildings, Monitoring and controlling is done automatically using server. But, estimation of environmental Parameters are not done. Similarly in Addition to this we Proposes the Tracking of cattle in Livestock building. Along with this we Includes the Amazon's Alexa Voice Assistant system for better Accessing and Controlling of Parameters by the User.

Similarly consider the [2] i,e. WenJie Tian's Environmental Monitoring system of Household Security Robot Based on Wireless Mesh Network, Monitoring is only achieved using Wireless mesh Network. From [3] i,e Sung-Gi Choi's Design and Implimentation of a GPS-enables Mobile Wireless sensor Network for Livestock Herd Tracking in Mangolian Nomadic Herding, Tracking of animal location is achieved.

Table 1: Comaprison between proposed system and others

PARAMETERS	REFERENCE1	REFERENCE2	REFERENCE3	PROPOSED SYSTEM
Sensors	Temperature Humidity,light Illumination, Gas concentration Sensor.	Temperature, Distance sensor,video camera.	_____	Temperature, Humidity,ammonia, CO_2,H_2S,light Illumination sensor.
PROCESSING UNIT	_____	ARM920T	Normal MCU unit	ARM cortex-A53
COMMUNICATION MODULE	Zigbee	Zigbee	Zigbee	Zigbee
PROTOCOLS	http protocol	HWMP, http Protocol.	TCP/IP	TCP /IP, http protocol
PLATFORM	_____	Embedded C	PYTHON	PYTHON V3.7,Embedded C
SERVER	SQL server	Web Server	Web Server(Apache)	MYSQL server
DATABASE	SQL data base	____	MYSQL database	MYSQL data base

3. Measuring Parameters

3.1 Air temperature

From [1], the sunlight varies with the seasons and time, so temperature changes, in the livestock building is not set in stone. When temperature changes, livestock will react accordingly. Take the temperature dropping, for example; livestock will make spontaneous activity weakened decrease sweat glands respiratory

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activity, in order to reduce the heat loss. At the same time, under the cold condition, livestock and also use the oxidation of nutrients in the body to increase the body's heat peroxide and maintain body temperature regulation.

Temperature sensor makes use of various physical properties with temperature change law of the category of sensor temperature conversion into electricity. According to the principle of work, it can be divided into pyroelectric temperature sensor, thermal resistance temperature sensor, and PN junction temperature sensor. Surface temperature is the important basis of animal epidemic prevention. As per the Indian standards 34.5 to 41C is the standard temperature range.

3.2 Relative Humidity

In [1], it is the most direct impact of air humidity on livestock, which affect livestock thermal regulation. Under the condition of high temperature, livestock regulate their own body temperature by evaporative heat, but high humidity can reduce the temperature difference between skin and air difference to reduce the heat. Humidity is an environmental factor and promotes fattening and growth of livestock with other environmental factors together. The rise of humidity will have a harmful effect on the composition of the breast milk.

Common method to measure humidity is absolute humidity and relative humidity. According to the different devices, the humidity sensor can be divided into two major categories of the resistive one and the capacitive one. It is an important environmental parameters index, and humidity sensors are widely used in green houses and livestock breeding places to monitor the humidity. The standard Relative humidity in India for livestock Farms are ranges from 30% to 60%.

3.3 Ammonia

Ammonia is absorbed by livestock, when the quantity is small, it can be directly transformed into urea and be eliminated from the body, but it also affect the disease resistance of livestock. From [1], if the quantity is large, blood can bring it through the lungs and generate the low iron into the alkaline high iron red element, which influences blood oxygen capacity of livestock, causing symptoms such as anemia and lack of oxygen.

3.4 Hydrogen sulfide

Hydrogen sulfide enters into the livestock by cattle respiratory system. Combined with sodium ions, it can produce sodium sulfide, in respiratory mucosa. Which stimulates mucous membrane, causing inflammation, and even tissue edema.

In [1], Hydrogen sulfide is harmful for the circulation of the blood system. It enters into livestock by alveolar. Finally it affects cell oxidation ability, causing systemic poisoning symptoms of animals.

3.5 Carbon Dioxide

Most of the carbon dioxide comes from animals breathing activity. It is nontoxic substances if carbon dioxide is too much, the concentration of oxygen in the air will drop greatly. Thus inhibit normal breathing and physiological metabolism of livestock.

3.6 Light intensity

Light intensity is the luminous flux in the form of object area and surface, it is indispensable to livestock environmental factor, which plays a key role in the process of external conditions, such as survival, growth, development, and breeding. On the natural conditions, natural light has a high regularity, with the seasons changing, day and night shifting. It makes a lot of functions of livestock and poultry body deal with regular sunlight life activities, such as sleep, tissue metabolism, hormone levels, and immune and nervous system.

In [1], Light intensity sensor is a part of the photoelectric sensor, which can take advantage of the component of the photoelectric effect to convert light flux into electricity. Light is closely related to the physiological cycle regulation of livestock, so the light sensor is widely used in the field of monitoring and control of agricultural production.

3.7 Harmful gas transducer

From [1], Gas sensor is a type of sensor that can convert gas concentration measurement to the amount of voltage or electric current. According to the different principle, gas sensor can be divided into semiconductor gas sensors, electro chemical gas sensors and infrared gas sensor.

Among these, semiconductor gas sensor takes advantage of high sensitivity, fast response speed, good maintainability and low cost. Harmful gases will directly affect the quality of growth and livestock products. Thus most of the harmful gas sensor are used in livestock environment intelligent control field.

Table 2: Type of parameters

Parameters	definition	type	Power supply
Temperature sensor	Temperature sensor is a device, which is used to sense the heat of temperature	digital	3.5V to 5.5 V
Humidity sensor	It is the sensor which measure the amount of water vapour in the surrounding air.	digital	3.5 V to 5 .5V
Light sensor	It is the sensor which measures the light intensity in the surrounding environment.	analog	2 V to 5 V
Ammonia sensor	It is the gas sensor which measures the amount of ammonia present in the air.	digital	3 V to 5.0 V
Co_2 sensor	It is the gas sensor which measures the amount of carbon dioxide present in the air.	digital	3 V to 5.0V
H_2S sensor	It is the gas sensor which measures the amount of hydrogen sufide in the air.	digital	2 V to 5.0

3.8 Wireless sensor network

WSN is a new type of information awareness and network system of collection. It can obtain all kinds of detailed and accurate target data information at any time, any place, and any environment too.

From [2] and [16] Several Sensor nodes are placed at different places around the animals in the Livestock building. These sensor nodes are connected to the master node through the Zigbee protocol (IEEE 802.15.4). The Master node in WSN was equipped with GPRS module, which can send the data via mobile communication network to the Controller.

3.9 WSN for Tracking

From [3] and [15] and for tracking system, the sensor node was equipped with Zigbee module (IEEE 802.15.4), Micro controller unit module and power supply. Where as the master node was equipped with an additional block device called GPS module. Zigbee is the protocol used between the sensor node and master node where as GPRS is for master node and controller.

GSM module connected to the master tracking node to give proper alertness to the user. Each animal in the livestock building was allocated with a unique ID which creates flexibility to identify the cattle in the livestock. The type of cattle is also identified using ID number. The coordinates of latitudes and longitudes at the animal location is sent to the mobile through GSM module.

3.10 Amazon Alexa

Simply known as Alexa, is a vitual assistant AI developed by Amazon. It can control several smart devices as per the requirements by the user. From [4], most devices with Alexa allow users to activate the device using a wake word. It allows a user to say a command, such as "Alexa" or "Alexa wake". Currently, interaction and communication with Alexa are available only in English, German, French, Italian, Spanish, Portuguese, Japanese, and Hindi. The code almost entirely in the cloud, using Amazon's AWS LAMBDA service.

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The format of common NLP (natural language process) contents wake work, invocation name and utterances. Wake work indicates the device coming to the wake (active) from sleep mode. Invocation name indicates skill identifier i.e. name of system. An utterance indicates the way of conversation.

4. Proposed System

The figure 4.1 represents the way of arranging the sensor nodes to different corners in livestock building. These Sensor nodes are connected to the Center node using Zigbee protocol.

Similar to this, Several Tracking nodes are connected to the Tracking sink node using same zigbee Protocol.

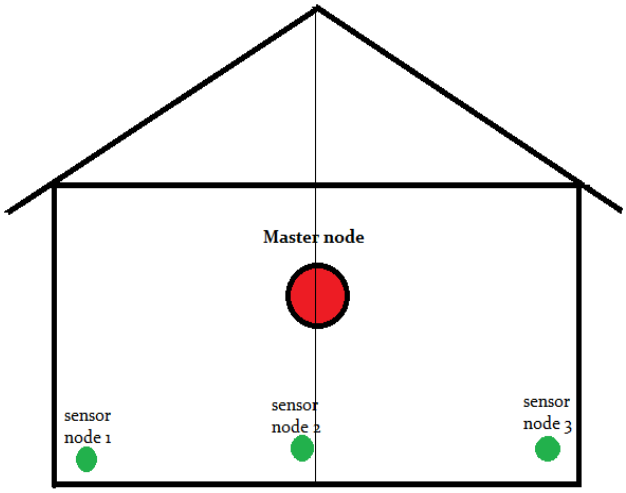

Fig. 1: Position of sensor nodes installed

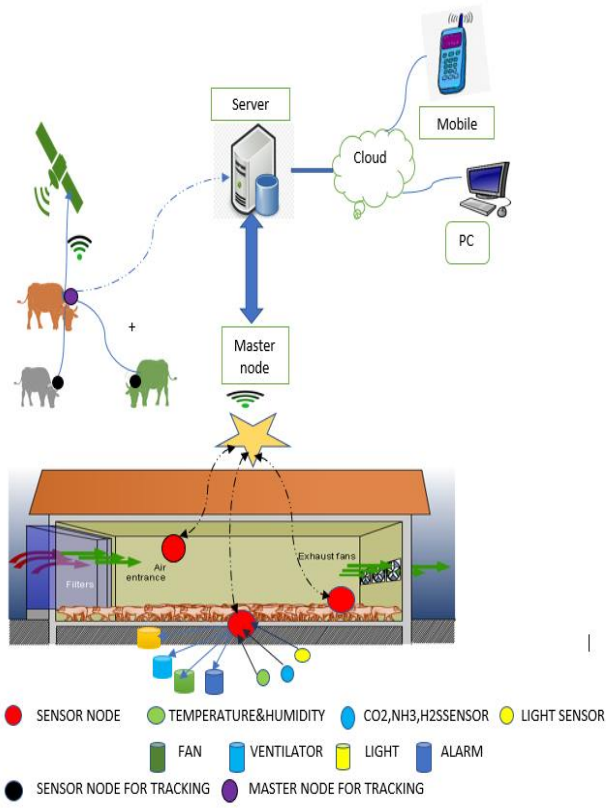

Fig. 2: Overall system Design

The proposed system consists of monitoring, controlling and tracking functions as shown in Figure 4.2. Several sensor nodes are placed at different places in the livestock building. Each sensor node contains sensors such as temperature, humidity, light illumination and gas sensor and each sensor node is connected with different actuators like fan, light, ventilator, alarm etc. Master node contains all the information which were coming from different sensor nodes through zigbee protocol (IEEE 802.15.4). From master node, the information goes to back end server.

By using WLS algorithm, the code is dumped in to the server to attain proper control over the actuators. From [12], if any parameter exceeds the standard range, then the actuators will control the deviation until it has been set.

Similarly, tracking nodes are attached to animals by means of a belt. These nodes are connected to a master node via zigbee protocol (IEEE 802.15.4) which contains multiple hardware components like GPS/Cellular module, ZigBee module, MCU module, power supply module. Here by using GPRS protocol the master node is connected with server. If any animal escapes from the given range, then proper vigilant is generated to the mobile containing the latitude and longitudinal values of that particular locations. According to the area of livestock building, the range is allocated by the user.

4.1 Monitoring and Controlling Using Alexa

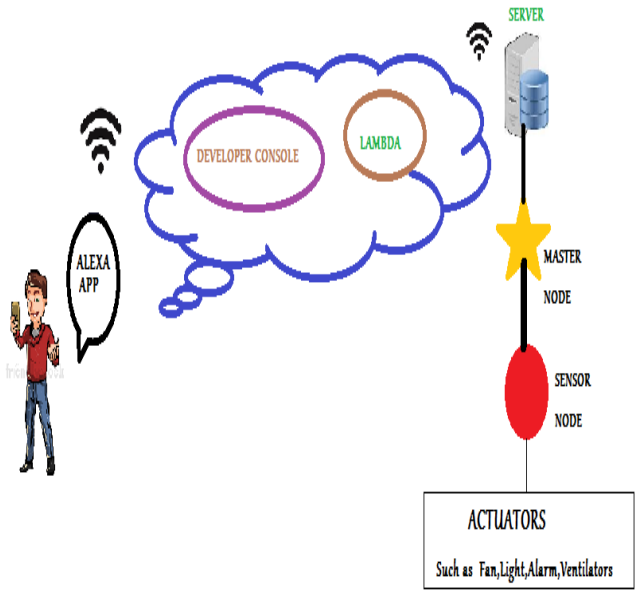

Fig. 3: Working of an Alexa system

The figure3 represents monitoring and controlling environment parameters using amazon ALEXA kit. The commands from us carried to the AWS (Amazon Web service) Cloud through the Amazon Alexa APP. Alexa Device will converts the NLP (Natural Language Process) into Machine Language. Developers Console and LAMBDA Tools are Present in the AWS cloud. Developer Console Provides a Streamlined Experience to help you create, manage, and Publish skills. The following are the Steps that leads you to become an Alexa Developer

1. Design Your Voice Experience
2. Build Your Voice USER Interface in the Alexa Developer console.
3. Build Your Backend to power Your Skill.
4. Test and optimize.
5. Submit, Get Certified, and Publish.

In AWS, Lambda application is a Combination of Lambda functions, event sources, and Other Resources that work together to Perform Tasks. All you need to do, for a custom Alexa Skill, is to upload your code into a Lambda function, which will execute in response to Alexa Voice Interactions. Currently Lambda Supports Node.js, Python, Java, and C#.S

Lambda is Connected to the Server via IOT application and then to the Sensor node. Hence controlling and monitoring is done.

5. Algorithm and Flowchart

Along with monitoring, the controlling and estimating of environmental parameters can be done by using WLS algorithm. The method of weighted least square can be used when the ordinary least square assumption of constant variance in the error is violated is called Heteroscedasticity. The model under consideration is

$$Y = X\beta+€$$

Where, Y = dependent variable

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X = independent variable
β = estimation of parameter
Є = error

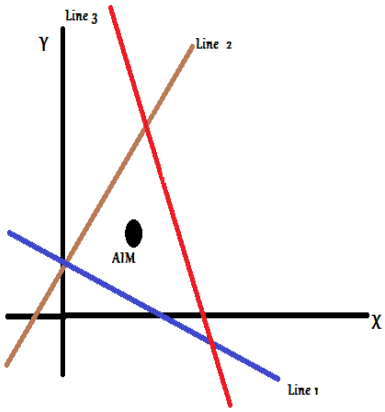

Fig. 4: Multi sensor perceptual information vector equivalent

Where now Є is assumed is to be (multi vibrate) normally distributed with mean vector zero and non-constant variance-covariance matrix

$$\begin{pmatrix} \sigma_1^2 & 0 & - & - & 0 \\ 0 & \sigma_2^2 & - & - & 0 \\ - & - & - & - & 0 \\ 0 & 0 & - & - & \sigma_n^2 \end{pmatrix}$$

If we define the reciprocal of each variance $\sigma_1^{2,}$ as the weight $w_{1=1/}$ $\sigma_1^{2,}$ then let matrix w be a diagonal matrix containing these weights

$$w = \begin{pmatrix} w_1 & 0 & - & - & 0 \\ 0 & w_2 & - & - & 0 \\ - & - & - & - & 0 \\ 0 & 0 & - & - & w_n \end{pmatrix}$$

The weighted least square estimation is then

$$\beta_{wls=\arg\beta_{min}} \sum_{i=1}^{n} \varepsilon_i^{-x^2}$$

Or

$$(x^T\ w\ x)^{-1}\ x^T\ w\ y$$

Residual sum of square

$$R_{ss}(\beta) = \sum_{i=0}^{n} (y_i - x_i * \beta)^2$$

The minimizing deviation criteria of environment parameters control. The control of temperature and humidity it has been a significant problem. Many people attempt to find out an accurate and efficiency way to control temperature and humidity.in order to solve this problem, a useful method will give us some aspiration.

Environment parameters influence each other nonlinearly so that they cannot be adjusted separately. Set S_i and $S_i^{'}$ as standard values and measured values of the monitoring parameters. Define the minimizing deviation criteria of environment parameters control for

$$Q = \sqrt{\sum_{i=1}^{n} \left(\frac{S_i' - S_i}{S_i}\right)^2}$$

If Q tends to be the minimum, the control algorithm works. In practice, usually set the temperature and humidity as a group, and set the gas as the other group.

The basic steps that are involved in the controlling process are as follows

1. Monitor the actual state Parameters.
2. Calculation of Actual Measurements.
3. Compare the actual parameter values with the fixed range.
4. If the obtained difference was large, then automatically controlling action will be takes place along with proper alertness.
5. The controlling still done until the difference was too small.

Internally the WLS algorithm Estimates the future Parameters values by taking the past values. The Estimation values may not be exact. There may be a chance to get slight variation between estimated value and real value.

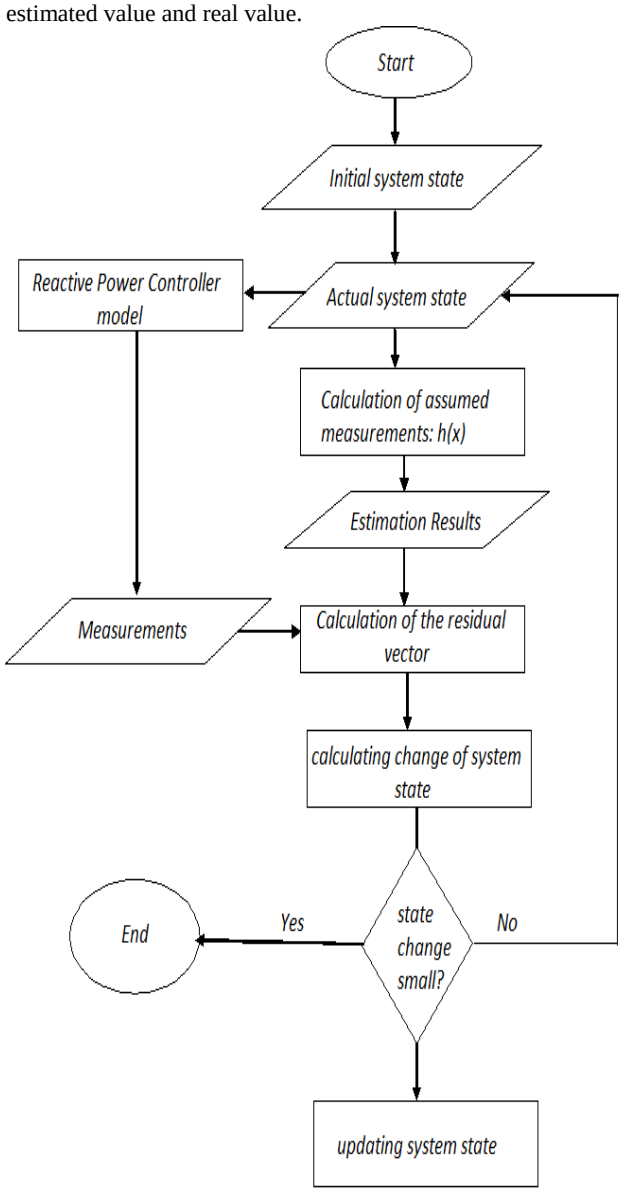

Fig. 5: Flow chart

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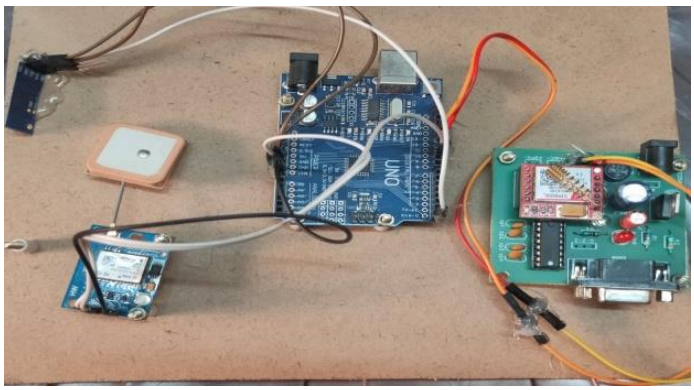

Fig. 6: Tracking Sink (master) node

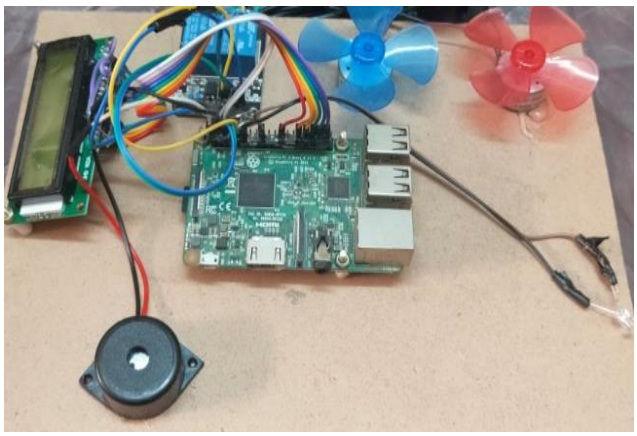

Fig.7: Controlling unit

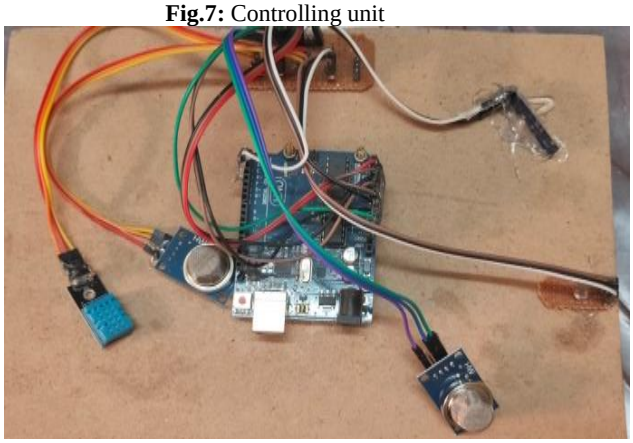

Figure 8 Sensor node

6. Conclusions

In this paper, we presented the smart IOT system for monitoring and controlling livestock parameters the entire system is designed using ARM processor embedded single board with 1GHz processing speed i.e. raspberry pi. Overall several sensor node are created to convert physical data into electrical quantity. The recent advantage in IOT has several benefits and advantages over manual wired/ wireless system. For better management of livestock building, tracking application plays a major key role. In additional, we added ALEXA voice assistant system which makes the controlling and monitoring easily by the user.

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Automatic Arduino Controlled Agribot For Multi-Purpose Cultivation

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Abstract: Agribot is a robot and mainly designed for agricultural purposes. The agribot can be able to do all forming techniques.It is an autonomous proto type robot that will help farmers in the farmland.This is an arduino controlled robot that will be able to plough, sow and water the farmland. And it can be water the farmland with the help of the moisture sensor through identifies how much amount water required to the soil.It can be do the farming techniques with the help of the supply of single switch. The robot will perform farming using the analogy of ultrasonic detection in order to change its position from one farming strip to another within the fewsec.This can be gives the buzzer signals to the farmers when the water level is empty in tank. The robot Thus, will contribute greatly in developing the farming strategies and reduce farmers cost of cultivation and will also increase their profit margins.

Keywords: Agribot,moisturesensor,ploughing, sow,watering, autonomous,Buzzer, profit, land, time saving, cost saving, farming machinery.

1. Introduction

Thinking about how to benefit the farmers and small scale greenhouse cultivators, at the same time to bring innovation to the country's agriculture mechanism we decided and succeeded in making a multi-purpose agricultural robot "AGRIBOT" .This project we developed using local available materials to make it very cost effective and at the same time specialized according to our country's condition. It can do all the functions of farming, the main difference is it does all the things by itself with the on/off of a button.This is an agricultural robot that can be adjusted according to the type of land. The ploughing teeth for ploughing is removable, so if the land type is soft a lightweight teeth can be connected and vice versa.

It can do all the functions of farming, the maindifference is it does all the things by itself with the on/off ofa button. This is an agricultural robot that can be adjustedaccording to the type of land. The ploughing teeth forploughing is removable, so if the land type is soft alightweight teeth can be connected and vice versa. Itsuccessfully didthe job in a controlled scale down replica of a land. It's a working prototype and more functions can be integrated with ease. As a multipurpose robot the projectedcost is mere insignificant when produced in full scale. compared to individual farming machinery.

Agribot is a robot designed for agcultural process.in the 21st century the trends of development on automation and intelligence of agricultural machinery is increasing.all kinds of agricultural robots have been researched ad developed to impleament a number of agricultural products in many countries.this bot can performs basic elements functions like harvesting , planting and spary the pesticides.the gole of agricultural robotis is more is more than just the application of robotics technologies to agriculture.currently,most of the automatic agricultural vehicles used for weed detection.

Agricultural growth is crucial to reducing poverty in Bangladesh. Employing around 47.3% of the country's workforce and contributing to around 22% of the national GDP it is by far the single largest industry in Bangladesh. So much contribution by an industry has seen little technological innovation in past 4 decades, but things are changing. Although Bangladesh has only seen imports as existing solution there is almost no technological innovation within the county.

Throughout history technology has helped make human life easier. The main purpose is it complete all works more efficiently as a result bring down the cost of producing any good. Likewise from the days when field was cultivated using horses and cows which produced very limited amount of crops, now the same field with aid of technology produces more within a short amount of time ensuring food security for people at a much cheaper cost than ever.

In it has been integrated with mapping functions using ultrasonic sensor and obstacle detection technique to move through the field on its own. As it does its other ultrasonic sensor with dedicated Arduino programmed to plough, sow and water the field as it moves along. It uses Battery as power source which has no risk of oil spill and rechargeable too. The recharging of battery can be solved suing existing solar power technology available in the market making it eco-friendly too. It is an electro-mechanical robot that has individual wheel control using relay switching and Arduino programming.

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2. Praposed Methodology

2.1 Methods and materials

In Our Robot there are basically two important things.

2.1.1. Making Lanes ,Mapping &Placing obstacles

In a square land through lanes to make the robot can moves.While ploughing, seeding we placed obstacles manually. Proposed system requires Arduino UNO, Ultrasonic Sensor as main blocks for the design. There are 3 ultrasonic sensors on three sides of the robot, one at front, one at the left side.the 3 sensors can identifies the distance of 3 specified sides. Initially we have to put the robot in the 1st lane which is always the left side of the land as we have programmed it in such a way.

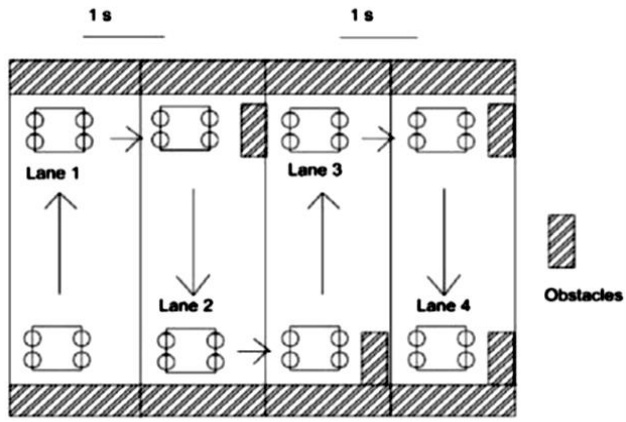

Fig.1: Mapping of the system.

Once it reaches the end of the lane front sensor would detect an obstacle and turn right and move for about 1 second to cross first lane and detect another obstacle in front. Thus it turns right again and starts moving. Now this 1second we have found after a lot of trail and error methods and taking into considerations many terrains or land types. We have seen that the crossing time from one lane to another varies between 0.95s to 1.05s.

Now once the robot moves through 2nd lane it again detects an obstacle at the end of the lane. This time instead of turning right it turns left and moves for 1 seconds. It then again finds an obstacle and turns left and thus starts moving in the third lane. This process will continue on and on until it there are 3 obstacles placed manually, upon detecting those the robot would stop. We have used counter in our programming to alternate between turning right and left.

The important task of Agribot is obstacle detection. Fig depicts the ultrasonic sensor working with the help of wave forms. First wave is trigger, second is 8 consecutive wave pulses and third is time it takes to leave and return.

In ultrasonic ranging module HC-SR04 provides 2cm – 400cm non-contact measurement function and the ranging accuracy can reach to 3mm which can be used for obstacle detection. The module includes ultrasonic transmitters, receiver and control circuit.

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The basic principle is by using trigger is for at least 10us high level signal and then module automatically sends eight 40kHZ cycle and detect whether there is a pulse signal back. If the signal gets returned through high level time duration, test distance can be calculated as shown in equation.

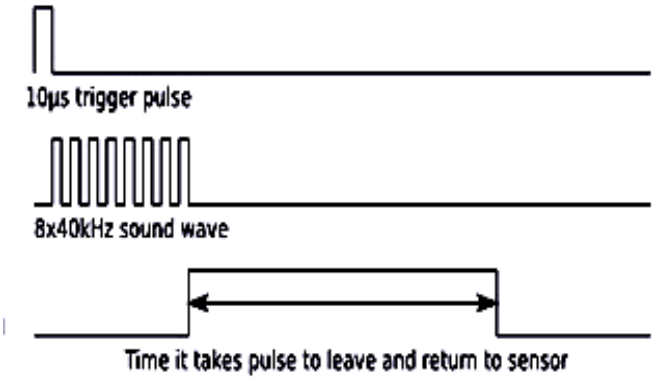

Fig.2: Waveforms of Ultrasonic Sensor

2.1.2. Agricultural Functions (ploughing, seeding, watering)

a. Ploughing Mechanism

The essential objective of ploughing is to revolution over the upper bed of the soil, gather original minerals to the exterior, although burying weeds on the residue of preceding crops and concede them to resolve. As the plough is starved concluded the soil it establish long ditch of fertile soil termed as furrows. In modern employment, a ploughed field is generally left to alleviate, and is then demolished previously planting. Ploughing and farming a soil accommodate and customizes the above 10 to 30 cm of the soil to mode a plough soil into the field. In an abounding soils, the preponderance of expensive plant feeder roots can be established in the topsoil or plough the soil into the field.

When the robot follows the path simultaneously the Agribot has to do ploughing the soil with assistance of plougher. The Agribot has to attach with the servo motor; the servo motor shaft can be attached with the plougher. The plougher can be loosening the soil in different depths. There are different categories of soils are there, on that seeds also different. Particular seeds having different depths for farming the field, based on the servo motor can be given movement to shaft. The shaft can be rotate with certain angle the plougher can be loosen the soil normally. For the heavily crop we have to give more than 60 degrees angle to servo motor.

2.2. Seeding Mechanism

For the application of seeding we are using servo motor. This is nothing but a simple electrical motor, controlled with the help of electromechanism.

In the extension with seed sowing, multipurpose activities such as Plugging are also required. But various issues are sustained by farmers until seed sowing proceeding. Seed sowing is an appropriate essential and paramount process in the agricultural field. A simple seed sowing mechanism is as shown in fig. Also a couple of bullocks is needed to fetch the heavy appliances of identical and seed dropping.

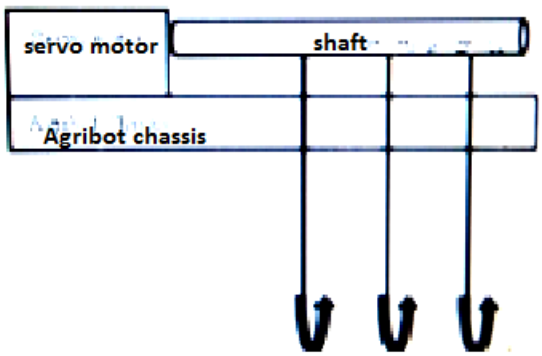

Fig. 3: ploughing mechanism

Another process of seed sowing is to helped tractor in farms. The excessive appliances of seed repository and dropping tool are appended to the tractor to globule the seeds. A ground wheel is connected at the contemptible of the seed sowing tool. The competence transmission ideology is used to convey the action of the turn to the metering appliance.

All the methods are leading to customizing the appliance in cultivating which works consequently without the human competence concerned. The small tool would be assembled from extant mass formed elements without the extremity of specialized idea and tooling. Also exertion desire to this tool is less as related with tractors or any agricultural tool. Seeding formation is our day to day life we utilize tractor in farms. But it utilizes extra time and the human deficiency is opposed continuously.

When the robot follows the path, simultaneously it has distributed the seeds into the field through servomotor. The servomotor rotates the shaft with some delay, on that delay the shaft rotates, while attached to the hopper container the seed has to fall to the soil by moving the shaft.

In farmland, watering can be done after seeding is done, the water can be sprinkling water level through the moisture sensor. The moisture sensor can identify the how much amount of water can be present in soil that can be analysed to proceed watering.

In farmland, at time of winter and rainy season soil requires less amount of water so, that is why we are using the moisture sensor as it requires less power and gives better results.

It can identify given PH value. Its value is compared to sprinkling the water. If water level is empty in the water tank the buzzer is activated.

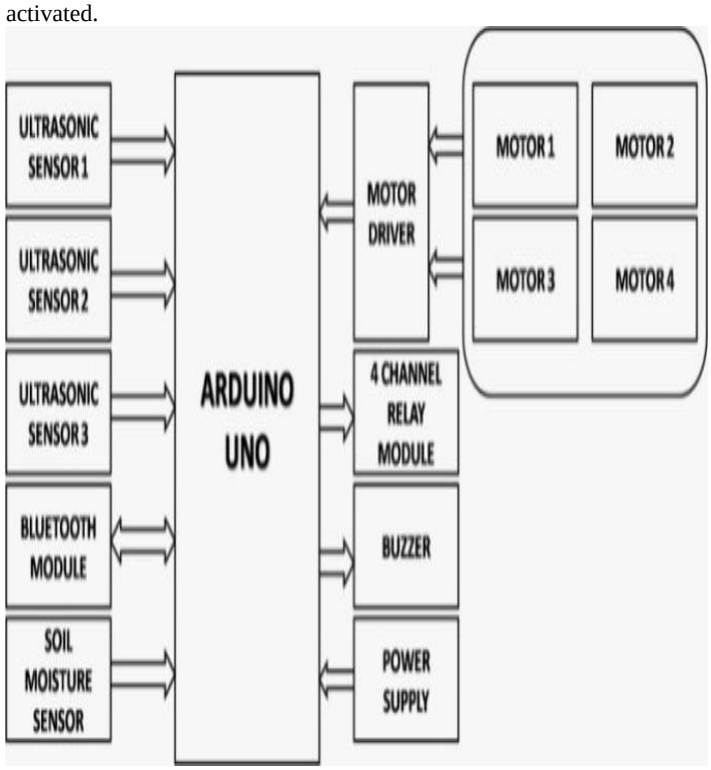

Fig.4: Proposed Block Diagram of the system

Table 1. Comparision Between Traditional, Tractor and Robotic

S.No.	Parameter	Traditional	Tractor	Robotic
1.	Speed	Slow	High	Very high
2.	Time required	More	Moderate	Less
3.	Man power	More	Less	Less
4.	Pollution	No	More	No
5.	Required energy	High	Very high	Less
6.	Sowing technique	Manually	Manually	Automatically

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By compared to traditional ,tractor and robotic, the robotic better because of man power is less ,speed is more ,required energy is less ,pollution is less ,and time required is less.

- no wastage of water
- less man power required
- it is portable
- it works on battery so no harm done to farmland due to oil spill
- Not prone to hazardous chemicals like pesticide.

3. Results

The robot operates on automated mode as well as manual mode.the main purpose of agribot is it do the all functions automatically when power is given and another way is the main purpose of manual mode is, if you require any one function then press particular manual switch. Suppose ploughing is needed ploughing is only ON when ploughing switch is click to ON . It can operates with mobile also by using the blue tooth system. By using the blue tooth system agribot can operates with in the short distance of 10 meters. It also gives the sound signals when the water is empty in water tank.

We are tested the this agribot functions in small farm land and the agribot functions are ploughing seeding and watering. And also tested the robot at the farm land strip. Ultrasonic sensors detecting the obstacles, By using ultrasonic sensors to turning the one strip to another strip. At the end of farmland we are placed the three ultrasonic sensors. This agribot can stop the functioning when three sensors identifies the three obstacles.

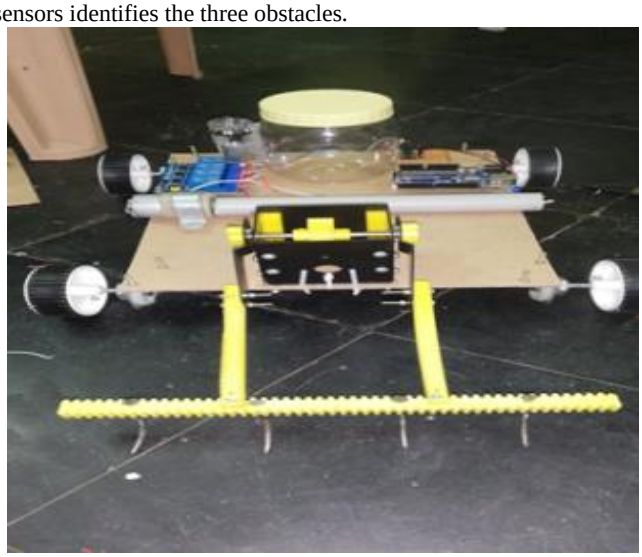

Fig. 5: Proposed agribot

4. Conclusions

The project main aim is minimizing man power and cost of equipment. The advantage of the agribot is reduce the labour cost and time. It is a very simple yet a very effective robot for carrying out farming process in farmland. And also it is very eco-friendly than tractors. By using agribot, we can prevent the oil spill from the tractor into the farmlands.

In future, we have plans to add some more features like camera, fertilization, and fruit picking, harvesting weeding monitoring. The is for ti get live updates about the farmland having crop monitoring system that will tell the farmers if the crops are healthy or not and also guide the farmers to farm

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DGS Based Ultrawide Band Antenna For Wireless Applications

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Abstract: In this paper, a new Ultra Wide Band (UWB) antenna with high bandwidth is proposed. The antenna consists of defected ground structure, patch of different step sizes with irregular shape on an FR4 epoxy dielectric substrate, with a microstrip feed line of 50 ohms. Varying the dimensions of the steps, slots and notch, which enhances the gain and bandwidth of the antenna. Modifications are introduced in the antenna are changing the dimensions of notch, steps and adding two slots on the defected ground plane. The characteristics of antenna design is an improvement from the previous research and is simulated using High frequency structure Simulator (HFSS) 15.0 software.The performance of the designed antenna was analysed in terms of bandwidth, gain, return loss and radiation pattern.

Keywords: Ultrawide band antenna, defected ground structure, stepped patch.

1. Introduction

Ultra-wide band technology has been rapidly developing since the early 2000s. In 2002, the US FCC authorized the unlicensed use of the frequency band [3.1– 10.6] GHz for wireless communications [1]. The ultra-wide band technology plays a key role in wireless communication systems which are operating at multiple frequencies that serves large number of wireless communication applications such as Wireless Fidelity (Wi-Fi), Global positioning systems (GPS), Worldwide interoperability for microwave access (WiMAX), and Wireless local area network (WLAN). Hence, there is a need for compact low-profile antennas with multiple characteristics which can be used in various portable devices like laptops, Bluetooth, mobile phones etc. Such antennas should be physically compact in size, light weight and also have other characteristicslike Omni-directional radiation pattern,gain and bandwidth[2]. The main components of UWB system, are the feasible UWB antenna design which mayface many challenges such as the impedance matching with good radiation stability in the entire frequency band, compact antenna size and low manufacturing cost for consumer electronics applications. In addition to these, many systems will operate in multiple frequency bands, requiring dual-band or triple-band operation of fundamentally narrowband antennas[3]. Ultra-Wideband Technology has many advantages such as less interference with surrounding waves, lessimpact on human health, high precision ranging, robustness in noisy environment, very high data transmission rates, etc.

2. Literature Survey

2.1. Ultra-Wide Band Planar Antenna Using Stepped Patch and Defected Ground Plane

Microstrip patch antennas are the most basic commonly used antennas. They can be designed with different shapes like rectangular, circular, triangular etc. Patch antennas are having low profile, light in weight, low cost, ease of installation and integration with other circuits makes them suitable for wireless applications.

2.2. DGS Based Multiband Frequency Reconfigurable Antenna for Wireless Applications

Defected Ground Structure (DGS) is realized by etching off a simple shape in the ground plane, depending on the shape and dimensions of the defect, the shielded current distribution in the ground plane is distributed, resulting a controlled excitation and propagation of the electromagnetic waves through the substrate layer. The impedance and surface current of the antenna is affected by DGS.

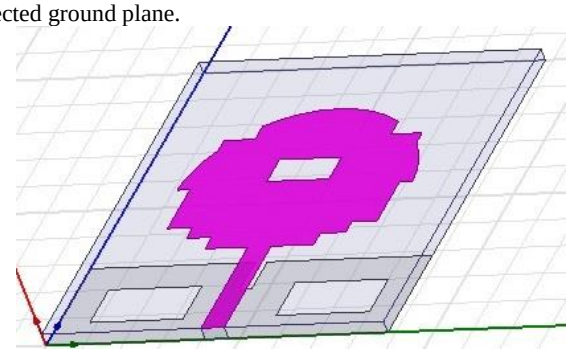
DGS has been used in the field of microstrip antennas for enhancing the bandwidth and gain of microstrip antenna and to suppress the higher mode harmonics, mutual coupling between adjacent elements and cross-polarization for improving the radiation characteristics of the microstrip antenna.

2.3. A Multiband Slot Antenna for Wireless Communication Applications

The basic concept in that a slot in the ground plane behaves as a load which added to the antenna can beused to bring the input impedance point closer to the characteristic impedance (50 ohms). Slots would be represented as a network of impedances and can be designed to give broad band responses. This improves the input impedance match and hence return loss (S_{11}).

3. Design of Antenna

The proposed antennadimensions are obtained through a parametric study in order to maintain a good impedance matching and stable radiation characteristics with high gain over an ultra-wide band frequency range. Therefore, the parametric studies are carried out on the stepped patches and dimensions of the slots and notch on the defected ground plane.



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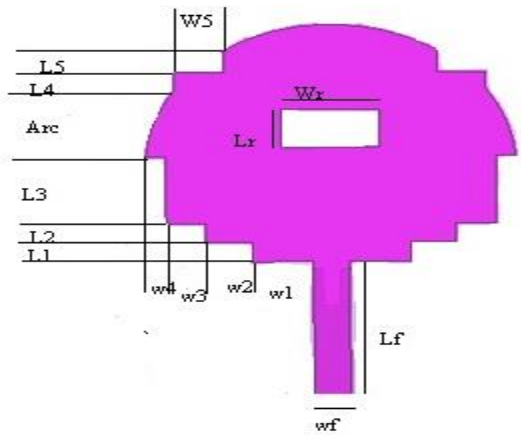

(b)

(c)

Fig.1: Configuration of proposed Ultra-Wide Band antenna. (a) Perspective view. (b) Top view. (c) Bottom view.

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The patch shape consists of different step sizes and a microstrip feeding is to be connected with half circle cut at its end together with a rectangular slot. The feeding line and the radiating patch etched on a FR4-epoxy dielectric substrate with dimensions of the antenna. Defected ground plane consists of a notch and two slots placed on a substrate.

Table 1: Geometric parameters of the antenna on FR4 substrate(h =1 .59mm,εr =4 .4,tanδ =0 .02)

Parameter	Value (mm)	Parameter	Value (mm)
L_f	14.9	L_5	2.3
W_f	3	W_5	4
L_1	2.1	L_r	4
W_1	5.5	W_r	8
L_2	1.95	L_n	5
W_2	3.25	W_n	1.5
L_3	7.15	L_g	14.1
W_3	3.25	W_g	44
L_4	1.85	L_s	50
W_4	1.72	W_s	44
Arc	7.15	Ls1	6
		Ws1	12

The geometry parameters and structural dimension of the designed ultra-wide band antenna for wireless systems is illustrated in Fig. 1. The rectangular shape patch element is backed by an FR4 substrate with a height of 1.59mm and relative permittivity (εr) of 4.4 and a tangent loss (tanδ) of 0.02. Different antenna modifications are introduced in the design in which the patch and the ground plane of the simple antenna are varied to enhance the return losses.

4. Effects of Dimensions of the Parameters

4.1 . Parametric Study for the Notch Element

The effects of varied notch dimensions on scattering parameters are studied. The notch on antenna is constructed by slotting one side of rectangular patch placed on a substrate over the ground plane. The analysis of notch on antenna is crucial owing to irregular shape. The effect of the length of the notch on the antenna matching varies with frequency. The matching improves in almost the entire bandwidth when increasing the length. The return loss graph with respect to frequency for different values of notch length and width has been observed in fig.2and fig. 3.

4.2 Parametric Study for the step Element

The steps has been introduced in order to achieve the ultra wide band characteristics. It can be observed that adding one or more steps with certain dimension in the patch antenna, there has been sudden increment in the bandwidth of the antenna.

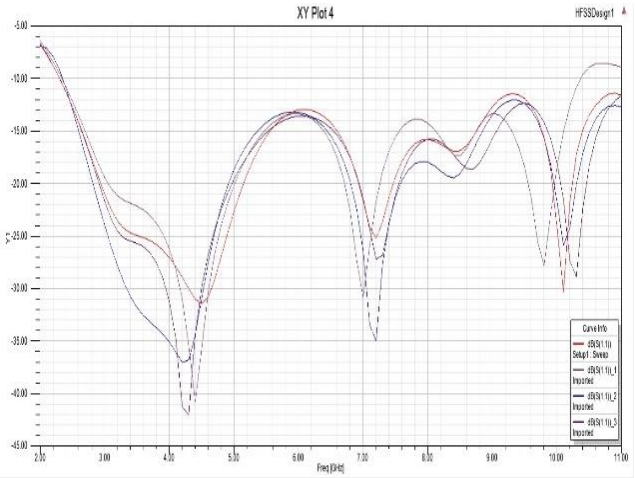


Fig. 2: Simulated return loss S_{11} (dB) for different values of notch length

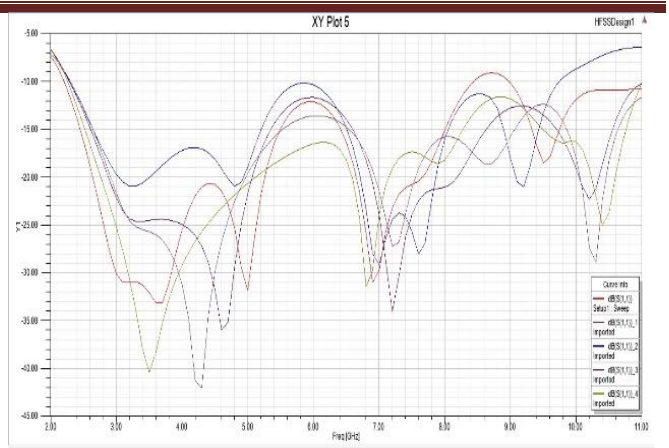
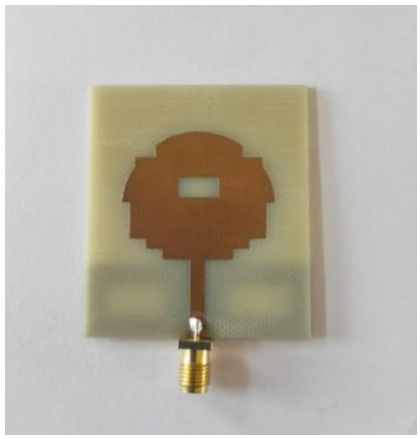


Fig. 3: Simulated return loss S_{11} (dB) for different values of notch width

5. Simulated Results and Measurements

In order to experimentally validate the antenna system is realized on FR4 PCB board with relative dielectric permittivity of 4.4, tangent loss of 0.02, and thickness of 1.59mm. The optimized microstrip patch antenna with dimensions was fabricated as shown in Fig. 4 and tested with a Vector Network Analyzer (VNA). The discrepancies between the simulated and measured results, due to welding of the SMA connector and substrate permittivity loss and tolerance to temperature variations, surface roughness of fabrication, and other factors, which are very difficult to be predicted, but significant at high frequency. The Simulated and measuredreturn loss S_{11}(dB) are shown in the Fig. 5 and Fig. 6. and simulated radiation pattern at different frequencies are shown in the Fig. 7.



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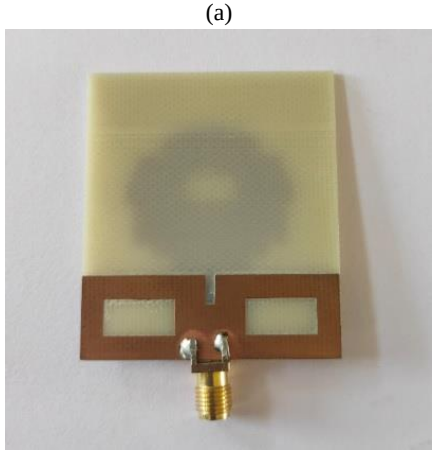

(b)

Fig. 4: The fabricated antenna prototype (a) Top View, and (b) Bottom view.

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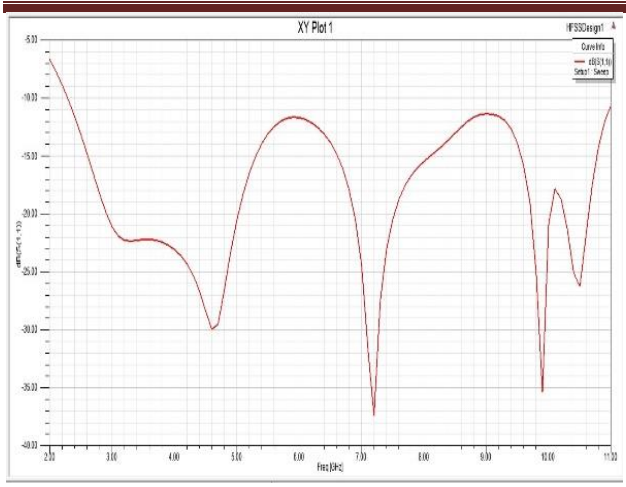


Fig. 5: Simulated return loss S_{11} (dB) for designed antenna

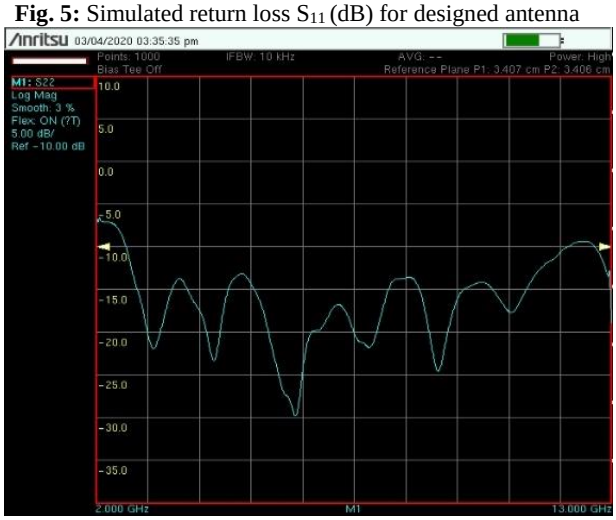
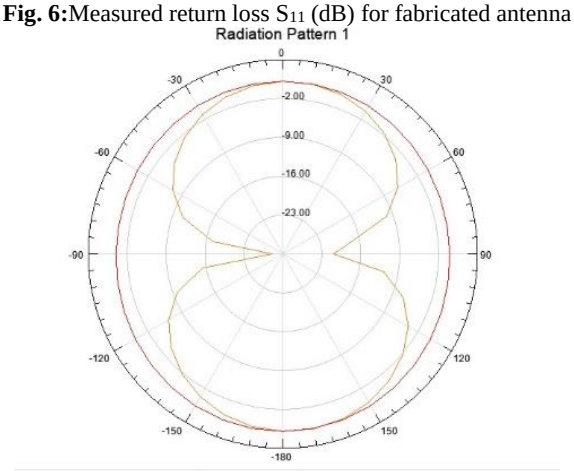


Fig. 6: Measured return loss S_{11} (dB) for fabricated antenna



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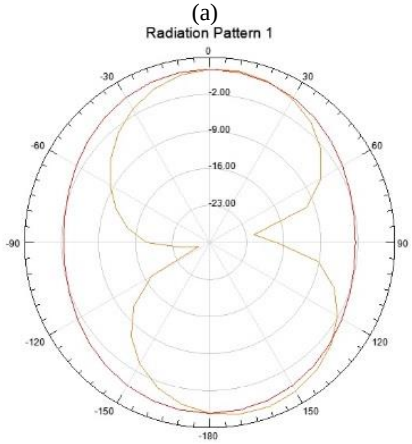

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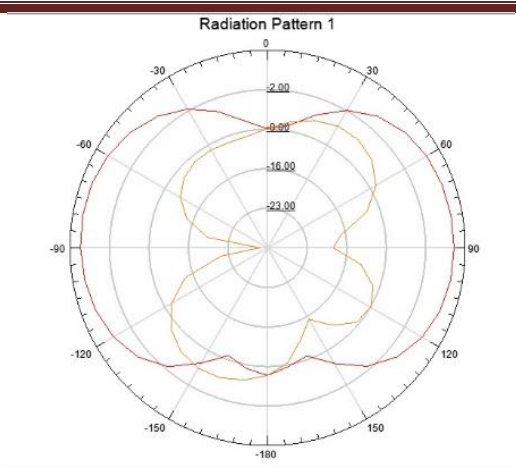

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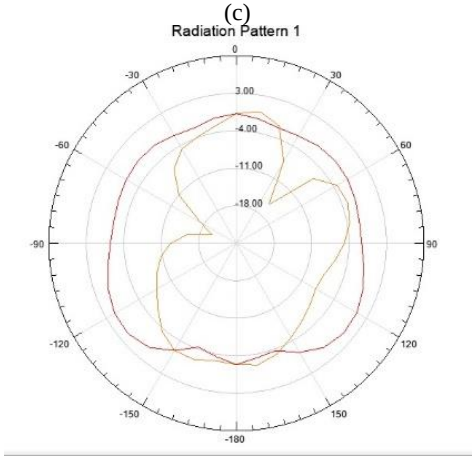

(d)

Fig. 7: Simulated radiation patterns of the antenna in the Φ=0and Φ = 90 at (a) 3 GHz (b) 4.5 GHz (c) 7.2 GHz and (d) 10 GHz.

6. Conclusions

This paper explained the design of DGS based ultra wide band antenna for wireless applications. The antenna is designed byintegrating slots on defected ground plane, varying step, notch dimensions on the patch antenna. The designed antenna will operating in the frequency range of 2.58 – 12.24 GHz.

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A Study on Issues and Challenges of Financial Inclusion in India

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[1, 2] Andhra Loyola Institute of Engineering and Technology Vijayawada, Andhra Pradesh, India

ABSTRACT: *Nowadays innovation and technology have brought a radical change in Indian financial system. India need more support from financial inclusion for providing cost effective financial services to low income people. The objective of this paper was to examine the issues and challenges of financial inclusion in Indian economy. The present study is an attempt to inspect the issues and challenges of financial inclusion in India. The study is based on primary and secondary sources i.e. observation, existing research studies, articles and newspaper coverage's. This study would be useful to the public, policy makers as well as government for effectively executing, reducing invisible parallel economies and strength the economy.*

KEY WORDS: *Financial Inclusion, Financial services, Financial system, Invisible parallel economies.*

1. INTRODUCTION:

The word financial inclusion is the process of ensuring access to appropriate financial products and services required by all sections of the society in general and vulnerable groups such as weaker section and low income group in particular at an affordable cost (*As per the Rangarajan Committee report, 2008).* Financial inclusion is significant priority of the people in terms of economic growth and development of society. It enables to decrease the economic gap between rich and poor in the society. It ensures people who are unable to access organized financial system so far can access it with ease *(Akhil Damodaran, 2013)*. In the world still around 2 billion people do not have access to basic banking services *(World Economic forum Report, 2014)*

2. LITERATURE REVIEW :

According to Demirguc-Kunt et al., (2018) countries with deeper levels of financial inclusion defined - access to affordable, appropriate financial services-have strong Gross Domestic Product growth rates and lower income inequality. Shahul Hameedu (2014) found that the banking industry has shown tremendous growth in volume and complexity during the last few decades. Despite making significant improvements in all the areas relating to financial viability, profitability and competitiveness, there are concerns that banks have not been able to include vast segment of the population, especially the underprivileged sections of the society, into the fold of basic banking services. Bhoomika Garg (2014) conducted a study on financial inclusion and rural development he concluded that large number of small and marginal farmers, women, unorganized sector workers including artisans, self-employed and pensioners. Sayantani Banerjee et al., (2014) the study emphasis the need of financial inclusion for social development, social factors like unemployment and illiteracy are closely connected to the success of financial inclusion. Islam (2012) found microfinance institutions in India have played a key role in enhancing the status of financial inclusion. Beck et al., (2007) studied macroeconomic evidence shows that countries with deeper financial inclusion tend to grow faster and reduce income inequality.

3. OBJECTIVES OF THE STUDY : 1)To study the scenario and overview of financial inclusion in India 2)To investigate the issues and challenges of financial inclusion in India. 3) To offer recommendations for enhancing financial inclusion.

4. METHODOLOGY OF THE STUDY:

The aim of this paper is to study the issues and challenges of financial inclusion in India. The present study is based on secondary data; data was collected from journals, research articles, periodicals, news paper coverage's and annual reports from government of India.

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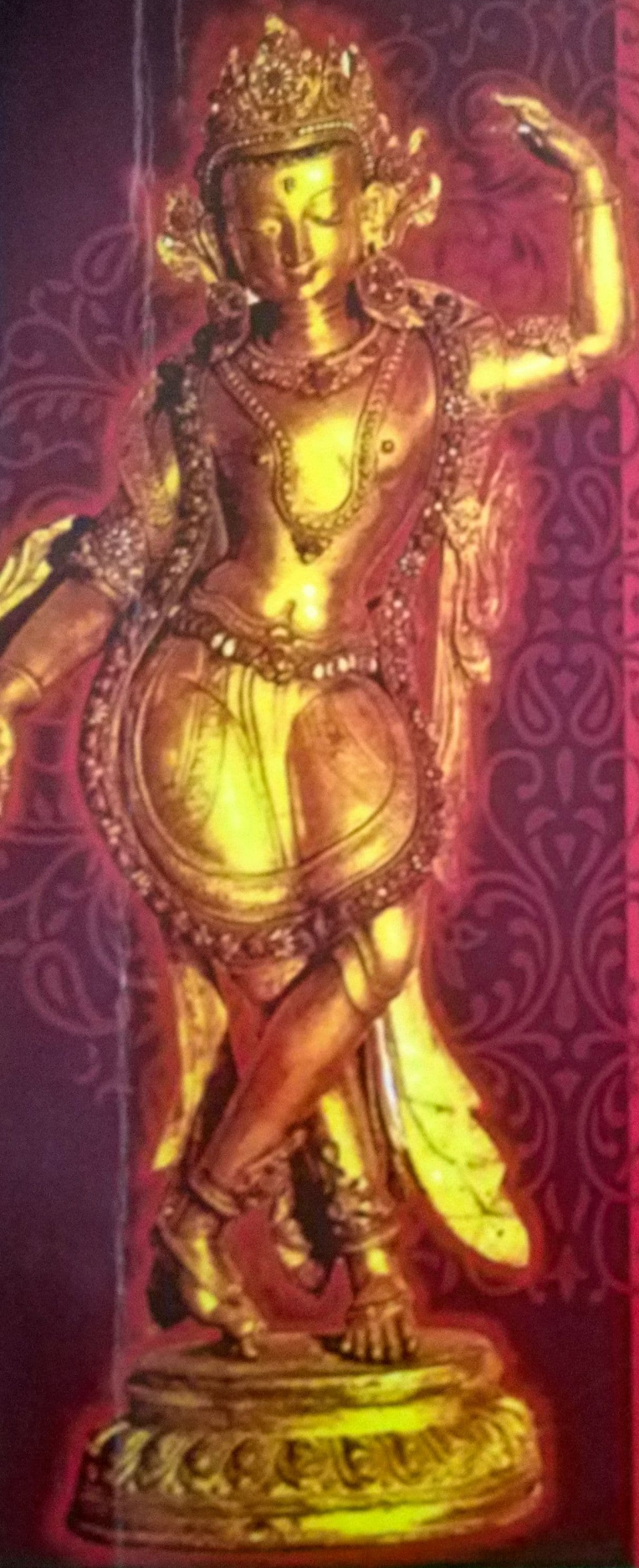

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01. Cultural Eco-Feminism in Margaret Atwood's *The Handmaid's Tale*

Dr. Sr. Candy D'Cunha, Associate Professor of English, Andhra Loyola Institute of Engineering and Technology, Vijayawada

Dr. N Usha, Research Supervisor, Krishna University

Abstract

With the advent of science and technology, human tends to gradually forget his relationship with nature. The most critical problem faced by human today is the degradation of land. On the other hand, the biological essentialism permits human to assert his supremacy over women. In these circumstances, the study of Cultural Eco-feminism comes into picture.

Margaret Atwood's *The Handmaid's Tale* explores the powerful impact of science and technology on culture and nature. The text has several concerns of power and domination which can be directly attributed to the sufferings of women, culture and nature. For this very reason, the theory of cultural Eco-feminism becomes relevant. Atwood's dystopian novel *The Handmaid's Tale,* has cultural ecofeminist insights. The views behind these thematic expressions are to reaffirm and reorient the richness of life by respecting women and culture and nature. This paper is an attempt to explore these Cultural Eco-feministic elements in Atwood's work *The Handmaid's Tale,* and an attempt in proposing a balanced and harmonious relationship between nature and the human so that he is ultimately able to self-realize the cultural - harmony.

Keywords: cultural, eco-feminism, nature, women, male domination, respect, balance and harmony

With the advent of science and technology, human tends to gradually forget his relationship with nature. The most critical problem faced by human today is the degradation of land. His selfish motives and self-centred ideas make the hegemonic domination over nature. On the other hand, the biological essentialism permits human to assert his supremacy over women. In these circumstances, the study of Eco-feminism comes into picture.

Margaret Atwood's *The Handmaid's Tale* explores the powerful impact of science and technology on nature. The text has several concerns of power and domination which can be directly attributed to the sufferings of women and nature. The dystopian vision created by Atwood has its strong roots in Eco-feministic aspects in the text. For this very reason, the theory of Eco-feminism becomes relevant.

Eco-feminism explores the various consequences on human existence that has a parallel link with women and nature. For ages, in various realms of life, women have been suppressed and oppressed by patriarchal domination. The patriarchal hegemony can be analysed through the Eco-feministic concepts voiced out by various Eco-feminist writers.

Simon de Beauvoir, a French feminist critic, in her book *The Second Sex* (1949), tries to highlight the discursive practices that were pertained to the patriarchal domination of women. Beauvoir brought to light not only the inborn inferiority of women but also the real intentions which lay behind these assumptions.

Theoretically, eco-feminism is a relatively new movement that attempts to bring out the multicultural aspects with regard to the domination of the non-human nature over environmental ethics. Eco-feminism or ecological feminism was the term coined by Francois d'Eaubonne in her

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कला एवं धर्म शोध संस्थान, लोक कल्याणकारी ट्रस्ट, वाराणसी

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25. Anthropology of Religion in the select novels of Toni Morrison

N Dyva Krupa, Assistant Professor of English, Andhra Loyola Institute of Engineering and Technology ALC Campus, Vijayawada, Andhra Pradesh, South India

Dr B Karuna, Associate Professor, Department of English, Acharya Nagarjuna University Guntur, Andhra Pradesh, South India

On the face of the earth, it is impossible to trace out a cultural community without any religious faith. Religion is a part of human culture. Culture is considered as a social domain that accentuates the beliefs, practices and discourses of a community. Anthropology is a science that studies diversity in humanity. Cultural anthropology is a branch of anthropology that underscores cultural multiplicity of a community at present and the recent past. Admittedly, cultural anthropology focuses on different realms like Politics, Economics, Kinship and Religion etc., the study of religion through the lens of anthropology provides an enhanced perception of human behaviour. Nobel laureate Toni Morrison captured religiosity in most of her novels to make her readers perceive the efficacy of religion in the African-American community. This paper attempts to study religious anthropology in Toni Morrison's select fiction.

The term anthropology is derived from two Greek root words 'Anthropos' & 'Logos'. The term 'Anthropos' signifies human/ man and 'Logos' stands for word/study. Therefore, anthropology is defined as a study of human actions and interactions in society. It is a science of humanity which is distinctive in its nature. It questions various issues related to humanity like the range of diversity, commonalities in different kinds of humans & source of human diversity etc. Hence, anthropology is said to be the study of human diversity and is not confined to only a study of humanity.

The study of humans can be done in two ways. Primarily, with a focus on the past and the present of humanity based on history; the study of physical and behavioural aspects of humankind comes under secondary dimension. Jack David Heller in his book *Cultural Anthropology: Global Forces and Local Lives* rightly defined anthropology as "the study of the diversity of human bodies and behaviour in the past and the present" (2009:27). The study of human diversity can be subdivided into four different fields namely: Physical or biological anthropology, Archaeology, Linguistic anthropology and Cultural anthropology.

- Physical or biological anthropology studies the heterogeneity of the human body in the past and the present.
- Archaeology is related to the behaviour of human beings in the past.
- Multiplicity of human language in the past and the present is studied through Linguistic anthropology.
- Cultural anthropology focuses on the study of human behaviour in the present.

Cultural anthropology is not merely confined to academic research alone but also expands its horizons to study of various issues related to culture like social relations, race and ethnicity, cross-cultural perspectives, economical anthropology, religious anthropology, cultural dynamics, cultural conflict, cultural survival and revival, Ethnocentrism etc. T.S Eliot in his *Notes Towards the Definition of Culture* states the role of culture:

I mean first of all what the anthropologists mean: the way of life of a particular people living together in one place. That culture is made visible in their arts, in their social system, in their habits and customs; in their religion. But these things added together do not constitute the

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PNEUMATICALLY OPERATED SPRING RETURNED PISTON CYLINDER SHARING MACHINE

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Abstract:

The major concept behind this kind project is to minimize the effort required by human and simultaneously to reduce the time consumption for completing work. For achieving that criteria we are selected the pneumatically operated machine. In our mechanism pressurized air is considered as the working medium. Due to pressurized air which created the motion to spring piston in the cylinder for sheering work. By placing the required sized sheet over the stationary blades and supply the high compressed air in the cylinder to move the spring piston. The main advantage in this type is because of spring attachment the return movement of the piston is done by the spring action hence the quantity of compressed air requirement for return motion is reduced simultaneously the air is one again compressed during return motion of the piston. There four instead leaving the air into atmosphere we can store that air by proving proper path.

The air is freely available source, its cleaning and machine maintenance is also easy and less expenditure to operate. But highly loading is not possible as compared to hydraulic but its very useful for small scale industry and workshops.

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ISBN: 978-93-80831-59-6

SOIL STABILIZATION BY USING HUMAN HAIR FIBERS (PILUS) AND CEMENT

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Abstract:

Soil stabilization is the process of improving the shear parameters of soil and thus increasing the bearing capacity of soil. Soil stabilization is the alteration of soil to enhance its physical properties. Normally clay soil has a low bearing capacity. In order to make it

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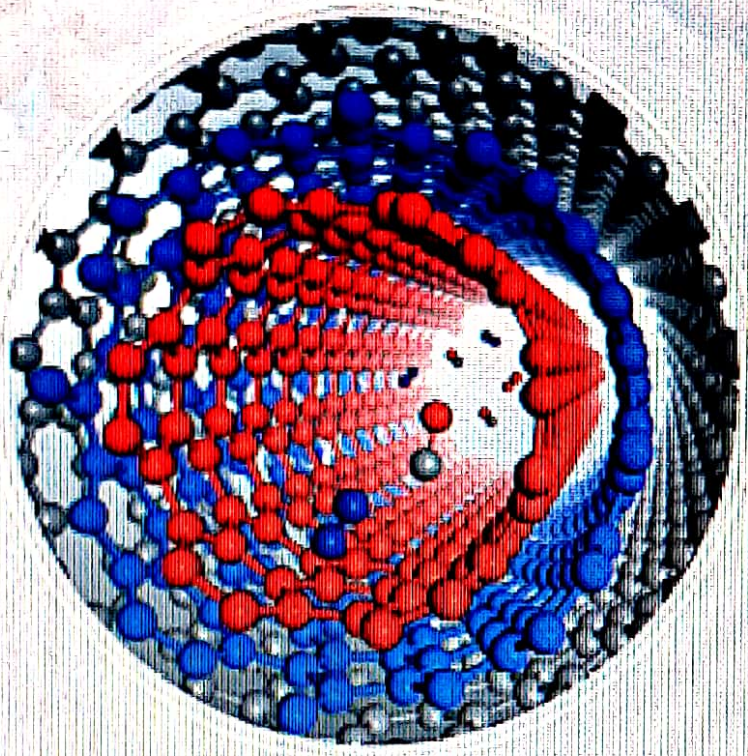

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P-088: Nanocrystalline Electrochromic Tungsten Oxide Thin Films- Effect of Titanium Dopant

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Abstract:

In the present investigation, we have deposited titanium doped tungsten oxide thin films on to silicon wafer, quartz glass and indium doped tin oxide coated glass by using dc magnetron sputtering at different sputtering pressures and substrate temperatures. Emphasis being made on the effect of oxygen partial pressure and titanium doping on different characterizations. The films have good optical transmittance in the visible region of the spectrum and the optical band gap and refractive index of the films changes with deposition conditions. The structural properties of the films become amorphous due to doping with titanium at low substrate temperatures and it improves with the substrate temperature. The films contain both bending and stretching vibrations of O-W-O confirmed by micro Raman spectroscopy. The morphology of films varies between granular to coarse with the deposition conditions analysed from Field Emission Scanning Electron Microscopy and composition of the films contains both the elements of tungsten, oxygen and titanium given by Energy Dispersive Spectroscopy. The electrochromic properties like diffusion coefficients, switching speed and coloration efficiency of the films was evaluated from cyclicvoltammetry, chronoamperometry and chronocoulometry and the coloration efficiency of the films varied between 40.07 to 120.2 cm^2/C.

Keywords: WO_3; UV-VIS; XRD; FE-SEM and Electrochromism

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PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON INNOVATIONS IN PHYSICS, ELECTRONICS & CHEMISTRY – ANDHRA LOYOLA 2019

Oct 21-22, 2019

ISBN 978-93-86435-88-0

Govt of India Approved Conference
(Govt of India Approved: MHA Vide : F.No 42180123/OC-1271 ; MEA : F.No. AA/162/01/2019-1411)

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EFFECT OF DOPNAT ON STRUCTURAL, MORPHOLOGICAL AND ELECTROCHROMIC PROPETIES OF NANOCRYSTALLINE TUNGSTEN OXIDE THINFILMS

V. RAVI KUMAR, K. PANDURANGARAO

Abstract: In the present investigation, we have reported on the effect of titanium doping on structural, morphological and electro chromic properties of tungsten oxide thin films prepared by DC Magnetron sputtering. The optical properties like, transmittance of the films was in the range of 38-76% in the visible range measured from UV-Visible spectrometer and the optical band gap of the films increases from 2.64 eV to 3.04 eV as the sputtering pressure and substrate temperature changes. The films have absorption edge in the range of 320 to 350 nm. The optical refractive index of the films was decreased from 2.39 to 2.23 as the deposition parameters changes, measured from spectroscopic ellipsometry as shown in Fig.1. The bonding nature of the films was analyzed from Micro-Raman studies and the films have both bending and stretching modes. The films are amorphous at lower substrate temperatures and the crstallinity of the films improved as the substrate temperature increases and all the films have containing nano crystals of varying size confirmed by X-Ray Diffraction studies. The morphology of the films was analyzed by FE-SEM and the films have both granular and coarse morphology with nano particles of size 23.59 nm and 38.33 nm on the surface of the film as shown in Fig.2. The films have containing the composition of tungsten, oxygen and titanium elements given by Energy Dispersive Spectroscopy. The topography of the films have containing coarse grains and distributed in different ways over the surface as deposition parameters changes and the size of the grain varied between 113 nm to 27 nm and it was clearly established that all the films have nano grains which are best suited for electrochromismconfirmed by atomic force microscopy. The coloration efficiency of the films was evaluated from electrochemical work station and it was varied between 40.07 to 120.2 cm^2/C with deposition parameters.

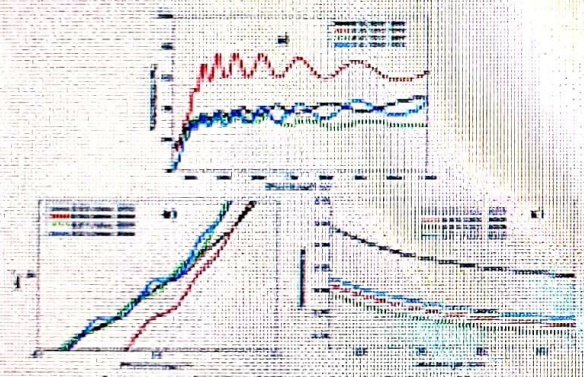

Fig: Optical Properties of the Films

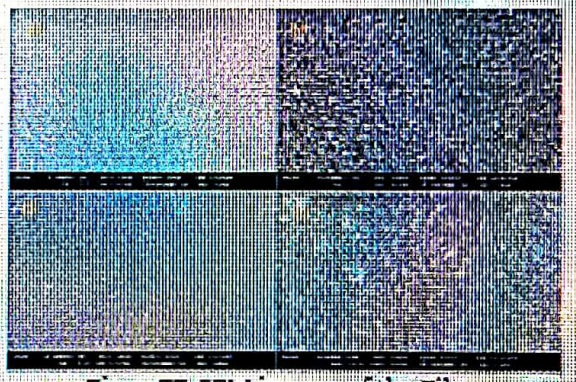

Fig 2: FE-SEM images of the Films

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ISBN 978-93-86435-88-0

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Multi-Keyword Text Search with Merkle Hash Tree for Privacy Preservation over the Encrypted Data

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***Abstract*—In cloud computing, the end user stored their files with minimum maintenance cost, where cloud servers provide the file storage facility to analyze their outsourced data. However, security of the data is a major concern of the end user, because unauthorized person may access the data in cloud. The end-user should encrypt the files for providing data usability and privacy, before outsourcing to the cloud. The main aim of the research work is to secure the outsourced file data in cloud and only the end user can able to access those files from cloud storage system. This research aims to apply Merkle Hash Tree (MHT) to store the encrypted data with the hash value to increase the efficiency of the search process. The application of this method in cloud search engine to search the encrypted data with increasing retrieval efficiency. In multi-user system, to prevent the unauthorized access of data, fine-grained access control plays a major role in cloud. But, some authorized user may leak the secret key purposefully for financial benefits. To overcome these challenging issues, this research work implements the privacy-preserving Multi-keyword Text Search (MTS) with a similarity-based ranking method. Also, two secure index schemes namely known background and cipher text model are developed to enhance the search privacy. When compared with the linear search, the search efficiency is further improved by implementing the MHT. The experiments are conducted to validate the efficiency of the proposed method with existing techniques. The proposed MTS-MHT technique achieved 99.95% retrieval accuracy with minimum searching time (i.e. 80sec) for the various number of files, when compared with traditional encryption techniques.**

Keywords—Access Control, Cloud Computing, Merkle Hash Tree, Multi-user, Privacy, Secret Key.

I. INTRODUCTION

In Cloud Computing (CC), the cloud storage model is used to store the information of data owners, where organizations and large enterprises gained many benefits by outsourcing the data files into cloud. These emerging computing models attract the interests of individual users due to increase of storage space as well as without the need for any storage devices [1,2]. However, the client should encrypt their sensitive information before outsourced to cloud storage because of privacy issues [3-4]. This in turn will lead to the necessity of encrypting the original data to avoid the unauthorization access and preserves the privacy of data using traditional techniques [5,6]. The outsourced data should encrypt to preserve the sensitive data's privacy, which is the major aim of traditional techniques. A keyword-based search is used to retrieves the related data over the Encrypted Data (ED), which is given by end-user [7,8]. The authorized user should communicate with CSPs for retrieving the related files from the server, then the CSP can able to allow the user over the ED for various operations. Instead of getting all files from the server, the most relevant files are sent to user for effective data retrieval. In other words, when the files should be ranked, then only the highest relevant files are forward to end-users, specifically in "pay-as-you-use" cloud model [9].

The main challenging task is that the data should retrieve back in an effective and secure way without extracting the useful information from the cloud. In a CC environment, the privacy of sensitive data should be protected by developing secure and efficient mechanisms [10]. In addition, the major research in cloud applications is to find the necessity and importance of privacy preserving for data search techniques. In the existing techniques, Searchable Encryption (SE) mechanisms have been introduced to reduce the loss of confidentiality by supporting data retrieval [11]. Instead of data owner, a server can able to search over the ED without accessing the query of search content and information, which are allowed by these SE mechanisms [12]. Initially, the file database and its keyword for search are encrypted by user and then uploads to the Cloud Server (CS) in a SE. According to the keyword, the user delivers the tokens to server for retrieving the files, then the corresponding encrypted files are located to the ED by the server [13]. The problem in the construction of flexible and efficient ED search are addressed by this proposed research work, which can support the multi-keyword queries and produces efficient results in ranking and verification. The multiple layers are formed from the long vector index to improve the search efficiency by developing MHT, where a sub-vector is considered as value in a node. The proposed method developed two new models against stronger threat model to prevent the leakage of sensitive information. The two models are developed such as Enhanced secure index scheme (EMTS) under known background model and Basic scheme for MTS with similarity-based ranking (BMTS) under known cipher text model for further enhancing the search privacy.

The organization of the paper is described as: Section II presented recent techniques which are used in the encryption process to preserve the privacy and security of end-user data is presented. The proposed technique with system model, threat model is explained in Section III. The validation of proposed MTS-MHT technique with existing techniques are analyzed and discussed in Section IV. The conclusion of this research work with future work is presented in Section V.

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II. LITERATURE WORK

The process of searching the related documents in the cloud is very difficult due to the increasing number of data in the cloud. The SE technique is used to effectively retrieve the related documents based on keywords and data encryption system is used in the CC to secure the data. Recent method involves in the CC studied [14-19] in this section to analysis its performance.

N. Wang, et al., [14] collected the documents using Hierarchical Attribute-Based Encryption (HABE) technique, where these documents were encrypted only when an integrated access structure was shared. According to documents' attributes and Term Frequency-Inverse Document Frequency (TF-IDF) model, documents were collected by developing an index structure called Attribute-based Retrieval Features (ARF) tree. The search efficiency of large data collections was improved by designing the depth-first search algorithm for the data users. The ARF tree didn't allow to delete the node from it and the number of access trees was increased in a greedily manner.

R. Handa, et al., [15] proposed an efficient clustering technique for performing the search on ED to address the issues of high search time and high cost of cloud usage. The communication overheads were reduced by using the TF-IDF values of keywords, this method incorporated ranking method based on the related search to the query. While collecting the 6000 documents, the clustering technique reduced the searching time for hard documents as 77% and for soft documents as 56%. Sometime, the query was successful, when the search terms were not present in the index and no clusters were formed. The issues were not handled by this clustering technique.

S. K. Pasupuleti, et al., [16] attained the data usage of outsourced ED effectively by implementing Efficient and Secure Privacy-Preserving Approach (ESPPA), which was based on ranked multi-keyword search and probabilistic public key encryption. According to relevance score, the ESPPA method retrieved the top relevant files to end-user instead of sending all files to them, which was automatically increased the system usability. The ESPPA method reduced the computation, communication overheads and ensured the data integrity effectively. The data dynamic operations were not supported by ESPPA method and also unable to handle the ranked keyword search over big data.

Y. Yang, et al., [17] addressed the enforcement of access control and supported the keyword search by developing an Escrow Free-Traceable Attribute based Multiple Keywords Subset search system with Verifiable Outsourced Decryption (EF-TAMKS-VOD). At the time of key generation procedure, the problem of key escrow was solved and flexible MKS was supported. Data user verified the correctness of half-decrypted results and decryption operation was outsourced to CS. After the identification of malicious users, the user revocation was enabled efficiently. In case of system failure, the retrieval of data to end user or any other information about the outsourced data were not available by this EF-TAMKS-VOD method.

R. Handa, et al., [18] developed the efficient concept of bucketization for retrieving the securing information on cloud. According to search terms of the query, the user used the bucket information during the generation of the query. The relevant documents were identified by using the buckets ID, which was used to reduce the search time. In addition, the communication cost was reduced by retrieving the top-k documents from the relevant results by using this technique. The method failed to focus on privacy and security of the end user's data, which leads to leakage of data to unauthorized person.

W. Song, et al., [19] implemented a word-based hierarchical Bloom filter tree index for addressing the issues of unauthorized user to execute full-text retrieval in cloud. The membership entropies of index words were developed to fine-tune the similarity between encrypted and query documents. An extensive experiment was conducted to validate the effectiveness and efficiency of Bloom filters over ED. The system was affected by the offline attacks due to large size of search tokens, which lead to loss the expressiveness.

To overcome the issues of existing techniques and to improve the performance of retrieval techniques, this research work developed the privacy-preserving MTS scheme supporting similarity-based ranking. The related documents are searched based on keywords by using MHT algorithm and retrieves to the end-users.

III. PROPOSED METHODOLOGY

The user's data are stored and analyzed by using the CC tools, which is commonly used in storage modules. The management cost is reduced and accesses are made as an easy process, the CC applications outsourced the vast amount of end user's data to CSs. However, the main challenge is to search the secure functions over ED in an effective way, even though data confidentiality is protected by using encryption techniques. To overcome the issues, this research work proposed the privacy-preserving MTS to improve the accuracy of encryption techniques. The below sections describe the system model and the functionality of the proposed scheme, which are described as follows.

A. System Model

The proposed method considered the three resources as entities such as data owner, the CS and data user and these are represented as system model, which are shown in Fig. 1. The huge size of document collection $DC = \{d \mid d_1, d_2, ..., d_m\}$ in the encrypted form $C = \{c \mid c_2, ..., c_m\}$ are outsourced by the data owner, then the $h - level$ searchable MHT I is combined with encrypted from DC to the CS.

Let, consider that there is a mutual authentication capability are belonging to the data user along with data owner. Then, the mechanisms for search control are applied over there, i.e. broadcast encryption [20], where the encrypted search query Q are obtained by data user. Upon the receipt of Q , the data are searched and then corresponding encrypted documents are returned by CS. The CS can able to return the $top - k$ most relevant documents, when the search query Q along with searching parameter k are send by data user.

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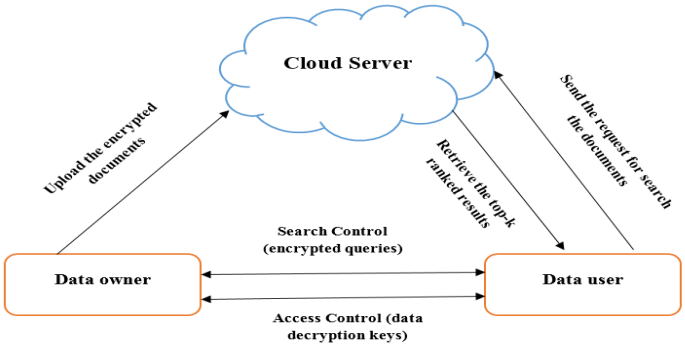

Fig. 1. System Model of Proposed Method.

B. Threat Model

The existing related works are also implemented the CS on secure cloud data search, where these servers maybe act as "honest but-curious" manner. In other words, the definition for CS is that he/she may follows the protocol execution honestly but sometimes, they can have revealed the secure data of end user to unauthorized access due to financial benefits. Two threat models are discussed and described in the below section, based on the information to CS.

1) *Known Cipher text Model:*

From the data owner, the data includes encrypted query vector Q, searchable MHT I and the encrypted document set C are outsourced to CS. In general, the main aim is to protect the index information or plaintext query from the CS and keep the secret as the dictionary of n keywords $T = \{t \mid t_1, t_{2,\ldots,} t_n\}$, which are used to make the MHT I (The method also use T *and* T_i to indicate a subset of T, where T is the keywords in a search request and T_i constitutes the i^{th} level of l, $l = 1,\ldots,n$).

2) *Known Background Model:*

When compared with known cipher text model for accessing, the CS is equipped with more knowledge in this stronger model. Because of the similar nature of the target dataset, the extraction of statistical information is carried out by the attacker from the known comparable dataset, e.g., the specific keyword information is distributed by TF. In the query, the specific keywords are identified or deduced by launching the statistical attack, where this information can access by CS.

C. Design Goals

The main aim of the proposed MTS-MHT scheme is to enable the efficient, secure and effective mechanism over encrypted cloud data by achieving the design goals, which are mentioned as below:

Improve the accuracy by using Multi-Keyword Ranked Search: The effective multi-keyword search functionality and accuracy for similarity-based search results are achieved by adopting the vector space model and designed an encrypted data search scheme.

Search Efficiency: Instead of linear search, this method explores a MHT based index structure and an efficient search algorithm to achieve better practical search efficiency.

Authenticity of Search Result: The authenticity of data user's returned search results are verified and these authentications are provided by proposed ED search scheme.

Privacy Goals: The CS should not access the information of index tree, queries and document set and protecting the user privacy is the general goal of proposed MTS-MHT method. The specific keyword in that query or index tree or document set is identified by the proposed method, which is the main concern in search privacy requirements. In addition, the goal is to predict whether two or more encrypted queries are from the same search request.

D. Secure Index Scheme

The similarity scores are calculated by adopting the cosine measure for achieving accurate multi-keyword ranked search. In particular, consider D_d as index vector for original long document are split into various multiple sub-vectors. In each sub-vector, a subset of keywords T_i *of* T are described as $D_{d,i}$ that becomes one of the part of the i^{th} level of the index tree I. Like the splitting of documents D_d, and the query vector Q are divided. At the i^{th} level, the query sub-vector are represented as Q_i. Then adding the scores from each level, the final similarity score for document d are obtained. The relevance of document d are identified to the query Q by the CS, which is based on the these similarity scores and then forward the $top-k$ related documents to data user. The document index vector $D_{d,i}$ and the query vector Q_i are well protected by using the level-wise secure inner product scheme.

1) *BMTS in Known Cipher Text Model*

The cosine values (i.e. similarity scores) are revealed to CS to facilitate the rankings for relevance. The other definitions are stated as: In known cipher text model, the basic scheme are not applied into dimension extension technique. The scheme of BMTS are described below for the each level i of I :

Setup: In this initialization phase, the secret key SK_i is produced by the data owner, including: 1) a $|T_i|$ -bit randomly generated vector S_i, where $|T_i|$ is the length of T_i; 2 two $(|T_i| \times |T_i|)$ invertible random matrices $\{M_{1,i}, M_{2,i}\}$. Hence, SK_i can be denoted as a 3-tuple $\{S_i, M_{1,i}, M_{2,i}\}$.

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GenIndex (DC, SK_i) **:** Based on T_i, the index vector $D_{d,i}$ are generated for each document d by data owner and TF weight $w_{d,t}$ are normalized in each dimension. Next, the splitting procedure is applied to $D_{d,i}$, which splits $D_{d,i}$ into two random vectors as $\{D_{d,i}', D_{d,i}''\}$. Finally, the encrypted index vector $\widetilde{D_{d,t}}$ is built as $\{M_{1,i}^T, D_{d,i}', M_{2,i}^T, D_{d,i}''\}$.

GenQuery $(\overline{T}, SK_i)$: There is a generation of query vector Q_i with the keywords of interest in $\overline{T}$, where IDF weight $w_{q,t}$ are normalized in each dimension ($w_{q,t} = 0$ for any keyword, t not present in Q_i). Subsequently, Q_i is split into two random vectors as $\{Q_i', Q_i''\}$ with the similar splitting procedure. Finally, the encrypted query vector $\widetilde{Q}_t$ is yielded as $\{M_{1,i}^{-1}Q_i', M_{2,i}^{-1}Q_i''\}$.

SimEvaluation $(\widetilde{D}_{d,l}, \widetilde{Q}_i')$: Eq. (1) shows the evaluation for similarity with query vector $\widetilde{Q}_t$, which are executed by CS. At the ith level, the similarity score is:

$$\begin{aligned} Cos(\widetilde{D_{d,t}}, \widetilde{Q}_t) &= \{M_{1,i}^{T'}, D_{d,i}', M_{2,i}^T D_{d,i}''\}. \\ &\quad \{M_{1,i}^T Q_i', M_{2,i}^{-1} Q_i''\} \\ &= D_{d,i}'.Q_i' + D_{d.i}''.Q_i'' \\ &= D_{d,i}.Q_i \end{aligned} \tag{1}$$

Hence, the $\sum_{i=1}^{h} D_{d,i}.Q_i = D_d.Q$ shows the final similarity score for document d. In the searching process, when user-intended keywords reside, the execution of search evaluations are carried out only at certain levels to increase the efficiency of boost search and security, for the other levels, these similarity scores are render to some fixed values, e.g., 0, at the time of executing the similarity score prediction.

2) EMTS in Known Background Model

There is a possible of keyword privacy breach because of BMTS's property in distance preservation, where the other security analysis is shown in the known background model. In other word, the cosine value calculated from $\widetilde{D_{d,t}}$ *and* $\widetilde{Q}_t$ is equal to the one from $D_{d,i}$ *and* Q_i. The similarity score evaluations are introduced with some tunable randomness to break such equality; hence the keywords are unable to differentiate by CS from the distribution of similarity scores. When compared with privacy of better-protected keyword, the user prefers the accurate ranked search results by calibrating this randomness. Specifically, U_i phantom terms are added into the query vector Q_i, and extend the index vector $D_{d,i}$ from $|T_i|$ dimensions to $|T_i| + U_i$ dimensions. Here, denote the subset of h levels where the keywords of interest reside as w and its size $|w| \le h$.

As like BMTS expect at i^{th} level, the performance of EMTS scheme are described in following four major steps:

- The values of $(|T_i| + U_i)$ becomes bit long, because of S_i in the setup phase. $(|T_i| + U_i) \times (|T_i| + U_i)$ dimensional matrices are represented by $M_{1,i}$ *and* $M_{2,i}$;
- Out of U_i the phantom terms chose the V_i in GenIndex phase, then the dimensional index vector $D_{d,i}$ are set to 1 in the corresponding entries of $(|T_i| + U_i)$;
- $j \in [1, U_i]$ is set to a random number $\varepsilon_{i,j}$ in the $(|T_i| + j)^{th}$ entry in Q_i at the time of generating the encrypted query;
- The evaluation for similarity are executed by CS and the final similarity score for documents d are obtained, which is equal to $\left(D_d.Q + \sum_{i \in w} \sum_{j \in \overline{V}_i} \varepsilon_{i,j} \right)$, where $\overline{V}_t$ is the set of the V_i selected phantom terms, and it is different for each index vector at level i.

E. Efficiency of Merkle Hash Tree-based Search Algorithm

The MHT is a binary tree data structure, where each node is an integration of leaf node. The node at the top of MHT is root node and the hashes of the data are represented as leaf nodes. The root node authentication delivers integrity declaration of all the leaf nodes. Fig. 2 denotes the MHT with eight leaf nodes [21]. For instance, if the auditor requests the data-owner for data integrity verification at position one. The data-owner shares the auxiliary information as $AI(d[1]): \{(H_D, R), H(d[1], H(d[2])R)(H_B, R),\}$ to the auditor. Then, the auditor generates the root H_R as follows,

- Calculate $H_D \leftarrow (H(d[1]) \| H(d[2]))$
- Calculate $H_A \leftarrow (H_C \| H_D)$
- At last, determine the root $H_{Root} \leftarrow (H_A \| H_B)$

All the blocks are automatically authenticated by verifying the authenticity of root node. Generally, each node in MHT have two information such as, relative index and hash value. The MHT contains three stages: set up stage, challenge-prove stage and updated stage. The brief description about each stage is detailed below.

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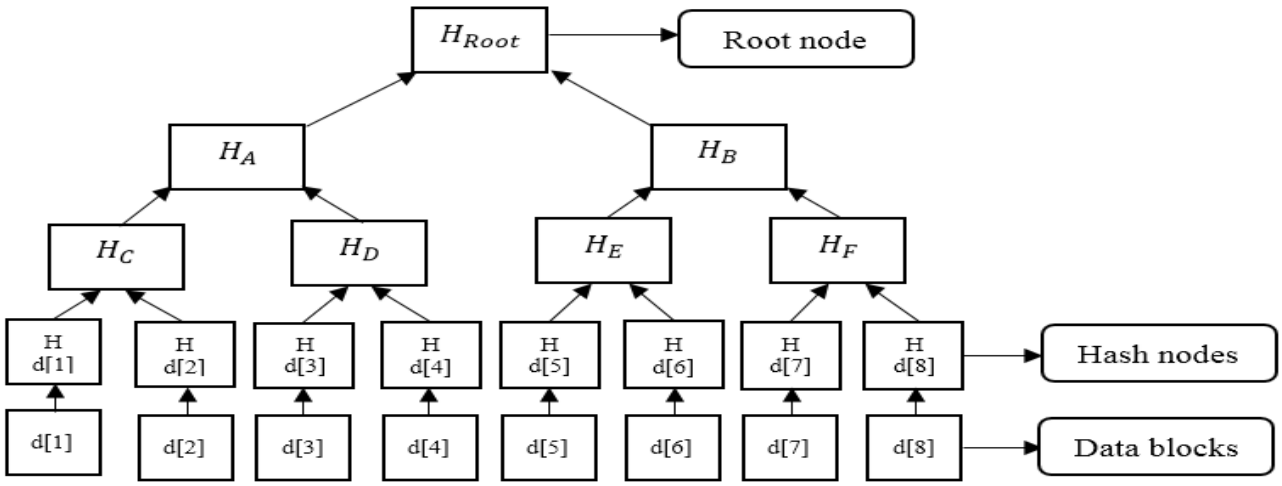

Fig. 2. Merkel hash tree with eight leaf nodes

1) Set-up stage

The set-up stage is a series of operation at the client end for initializing the system. This stage includes three functions,

- Key generation $\left(1^{key}\right)$: This section includes probabilistic key generation methodology $\{skey, pkey\}$, which considers security parameter *key* as an input. The inputs are considered as a private key *skey* and the outputs are denoted as a public key *pkey* . The data-owner publishes public key *pkey* , and keeps private key *skey* as a secrete key for decrypting the respective data.
- Tag generation $(skey, pkey, m \rightarrow mata\,data)$: The meta-data considers the client document $skey, pkey, m$ as an input and the outputs (meta-data tags δ) are stored locally by the client. At the server end, the corresponding documents *m* and tag δ are remotely stored by the client.
- Block-sig-generation: After generating the tag document δ , the data-owner creates signatures for each data block using cryptographic hash function. Generally, message digest is used as a hash function in cloud data storage authentication.

2) Challenge-prove stage

The challenge-prove stage is an interaction process between the server and client. The client determines the issues and sends the challenges to the server. The server evaluates the corresponding challenges and replies output to the client. The challenge-prove stage contains three operations, which are listed below.

- Gen-challenge $(c) \rightarrow \{chal\}$: This operation considers the client's private parameter *c* as an input and the output challenge *chal* for the future query.
- Gen-proof $(p_s, m, \delta, chal) \rightarrow \{G\}$: It takes user public parameters p_s , meta-data δ , document *m* and challenge *chal* as an input and the output *G* is given to the user for verifying the server, whether it out-sourced the document correctly or not.
- Check-proof $(pkey, chal, meta, data, G) \rightarrow \{\text{"reject"}, \text{accept}\}$
- This operation is used to check the server possession of the target documents. It considers the user public key *pkey* , challenge *chal* made by the client, evidence *G* and meta-data δ as an input. By analyzing the evidence *G* , the function results as either "accept" or "reject".

3) Updated stage

In MHT, update stage is a verification stage for retrieving the related data according to keywords given by end user. The key functions of this stage are determined below.

- Perform update $(pkey, m, update) \rightarrow \{m', \delta', G_{update}\}$: This operation is performed after the server gets *update* requirement from the client. It considers public key *pkey* , meta-data δ , update and document *m* as input and the updated document m' , new tag δ' and updated evidence G_{update} as an output for future checking.
- Verify-update $(pkey, update, metadata, G_{update}) \rightarrow \{(matadata', \text{"accept"}), \text{"reject"}\}$: This operation gives a verification process to the client for checking the correctness of the

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dynamic operation outcomes at the server end. The verification function is triggered by update and considers public key *pkey* , meta-data δ and G_{update} as input. If the server evaluates the updates correctly, it results as "accept" and retain the new metadata locally, otherwise, the process output as "reject". The MHT protocol effectively retrieves the accepted documents to the data users based on their searching keywords.

The data user can able to verify the ranking order of the returned document, once the sub-tree is verified by using the same search algorithm. The user not only able to check the ranking order, but also check whether all the qualified documents are correctly retrieved or not. From the above verification process, the proposed MTS-MHT method achieved the defined objectives of Completeness and Correctness. Finally, the information with encrypted query from the owner are obtained by the data user. The whole secure search system is verified by this proposed method and the obtained search results are also verified, which satisfies the design goal of MTS-MHT method.

IV. Experimental Analysis

In this section, the performance of MTS-MHT algorithm is validated with various existing techniques in terms of time for encryption, decryption, searching, precision, accuracy and False Acceptance Rate (FAR). The experiments are implemented using JAVA 1.8 Netbeans 8.2 MySQL 8 on a computer with Intel Core i5 CPU 2.2 GHz with 8.00 GB RAM. The existing techniques such as HABE [14], clustering technique [15], ESPPA [16], EF-TAMKS-VOD [17] and bucketization [18] are used to compare the performance of MTS-MHT algorithm in this experimental analysis, where their results are presented with graphical representations are explained as below.

A. Performance of MTS-MHT over Encryption Time

In this section, the proposed MTS-MHT is validated against HABE, ESPPA and EF-TAMKS-VOD algorithms in terms of encryption time. Table 1 shows the validated results for encrypting the various number of files using MTS-MHT are described.

TABLE I. Encryption Time over Proposed MTS-MHT

Methods	Number of files					
	10	20	30	40	50	60
HABE [14]	95	118	169	180	195	215
ESPPA [16]	90	120	160	185	209	225
EF-TAMKS-VOD [17]	70	105	142	159	189	206
Proposed MTS-MHT	**60**	**84**	**112**	**129**	**164**	**187**

From the Table 1, the encryption time of proposed MTS-MHT for various files are explained, and it is clearly showed that the proposed method encrypts the files in a less number of time, when compared with existing techniques. The graphical representation of encryption time is shown in Fig. 3.

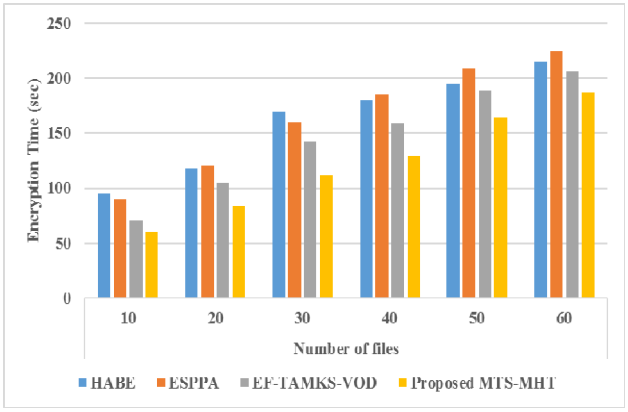

Fig. 3. Encryption time over Proposed MTS-MHT algorithm

The proposed method encrypts the ten files within 60sec, whereas other existing techniques took nearly 90-95sec for the same ten files. When the number of files increases, the time for encrypting the data also increases, which showed that the proposed method achieved 187sec for encrypting the total 60 files in a cloud database. Apparently, the proposed scheme is much more time-efficient than all other existing techniques. The collected documents are not effectively encrypted by the existing systems namely HABE [14] and ESPPA [16] due to large number of integrated access tree. But, the MTS-MHT algorithm considered only less number of access tree, which leads to less encryption time for data.

B. Performance of MTS-MHT over Decryption Time

The decryption time of proposed method against existing techniques for various number of files are described in Table 2, whereas the graphical representation for the decryption time is presented in Fig. 4.

TABLE II. Decryption Time of Proposed MTS-MHT Algorithm

Methods	Number of files					
	10	20	30	40	50	60
HABE [14]	105	118	134	167	189	218
ESPPA [16]	110	125	150	180	215	250
EF-TAMKS-VOD [17]	95	105	129	149	179	205
Proposed MTS-MHT	**83**	**94**	**107**	**125**	**145**	**179**

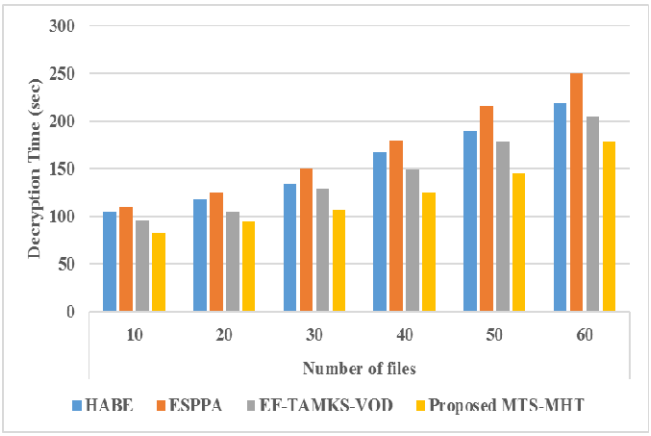

Fig. 4. Decryption Time of Proposed Method

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As like encryption time, the decryption time for large number of files also increased, while the number of files increases accordingly. When compared with other existing techniques, the ESPPA [16] methods provides poor performance in both encryption and decryption. When the number of files is 60, the decryption time for HABE [14] and EF-TAMKS-VOD [17] achieved nearly 210sec, whereas the ESPPA achieved 250sec for the same number of files. But, the proposed MTS-MHT achieved very less decryption time for various number of files. This better performance of MTS-MHT is due to fast decryption process of MHT, where the hashes are divided according to the tag generation values. This analysis clearly explained that the proposed method provides better performance than other traditional techniques to decrypt the files.

C. *Performance of MTS-MHT over Searching Time*

The searching time for various number of files are analyzed and compared with existing techniques namely HABE [14], MRSE [14] and bucketization [18]. The validated results for searching time is tabulated in Table 3, and the graphical representation for searching time over proposed MTS-MHT algorithm is presented in Fig. 5.

TABLE III. SEARCHING TIME OF PROPOSED METHOD OVER EXISTING TECHNIQUES

Methods	Number of files					
	10	20	30	40	50	60
MRSE [14]	98	81	76	124	150	170
HABE [14]	65	60	70	110	120	140
Bucketization [18]	52	55	61	80	95	120
Proposed MTS-MHT	40	45	50	65	70	80

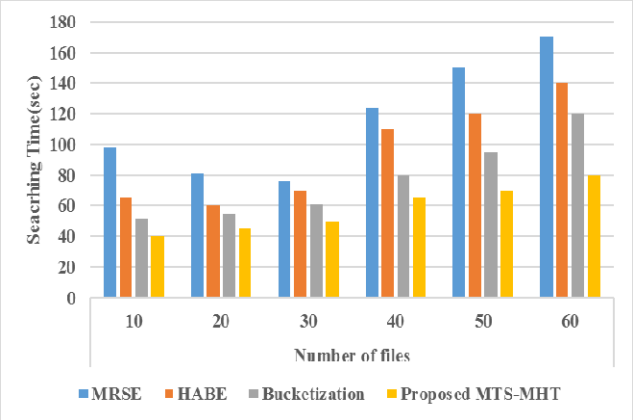

Fig. 5. Searching Time over Proposed MTS-MHT

The proposed MTS-MHT method has the lower searching time compared to the other existing method. The searching time is low for the various file size, where the searching time during verification of the proposed MTS-MHT is 80sec for the 60th file, while existing method has the 120sec for the same block size. In this searching time, all other methods are constant at certain point, but MRSE [14] alone varies the searching time depends on number of files. For instance, MRSE [14] achieved 98sec for 10th files, 124sec for 40th files and 170sec for 60th files. According to the random organization of document vectors, the searching time of both MRSE [14] and HABE [14] are linearly increases and then, these document vectors are scanned only for one time. However, the proposed method organizes the files based their similarities which greatly improve the search efficiency.

D. *Performance of MTS-MHT on other parameters*

In this section, the performance of MTS-MHT are compared with existing clustering technique [15] and bucketization [18] in terms of accuracy, precision and FAR, which are tabulated in Table 4. The mathematical formula for accuracy, precision and FAR are given in Eq. (2-4),

$$Accuracy = \frac{TP + TN}{TP + TN + FN + FP} \tag{2}$$

$$\Pr ecision = \frac{TP}{TP + FP} \tag{3}$$

$$FAR = \frac{FP}{FP + TN} \tag{4}$$

Where, TP is true Positive, TN is True Negative, FP is False Positive and FN is False Negative.

TABLE IV. PERFORMANCE OF MTS-MHT ALGORITHM

Parameters	Existing Clustering technique [15]	Bucketization [18]	Proposed MTS-MHT
Accuracy	99.89%	Not Available	99.95%
Precision	82.4%	82.86%	89.07%
FAR	0.128%	Not Available	0.102%

From the above table 4, it is clearly stated that the performance of MTS-MHT algorithms provides better performance in terms of accuracy, FAR and precision, when compared with existing techniques. The proposed method achieved 99.95% accuracy with low FAR, whereas the clustering technique achieved 99.89% accuracy. In proposed method, false positives reduced by decreasing the number of documents compared to search query. But, the clustering techniques [15] searches the query with high encryption time because the number of documents are repeated and lead to high positive rates. The security of the method and the retrieval accuracy is increased by using the secure MTS-MHT method. The proposed MTS-MHT method has the lower computation time than the other existing methods. Hence, the proposed method can be applicable for practical use in the secure file storage in cloud auditing system for end user.

V. CONCLUSION

In secure cloud storage system, there are two major issues namely support of keyword search and enforcement of access control. In this research work, a secure information retrieval over ED are carried out by developing an efficient tehnique in the cloud. The privacy requirements are addressed in the two threat models by developing two secure index schemes. By using this research work, the sensitive information leakage is avoided and the search efficiency is improved by implementing the MHT for whole document set. The three essential factors which are related to efficiency are identified from the prototypes of the secure search system to improve the MTS algorithms' efficiency significantly. If the user wants to ensure the authenticity of retrieved search results, this

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method can able to make the whole search process verification. The experimental results stated that the proposed method achieved better performance in terms of efficiency, privacy and search effectiveness, when compared with existing methods. The proposed MTS-MHT achieved 99.95% retrieval accuracy with 0.102% FAR and searched the more number of files in less time. The contribution of the method is that the proposed MTS-MHT has the higher retrieval accuracy compared to the other existing method in encrypted data search. The sequence of returned documents (i.e. protecting access pattern) is extremely expensive, hence the proposed method needs to protect it for efficiency concerns in future work.

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26th – 27th
JULY 2019
AIMS, MUMMIDIVARAM

ICSET 2K19

INTERNATIONAL CONFERENCE ON
SCIENCE ENGINEERING AND TECHNOLOGY-2019

ISBN: 978-93-89107-25-8

Survey of VANET Attacks

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Abstract:--

Vehicle ad hoc networks (VANETs) has become most research area from last decade years to increase different types of network parameters with respect to performance and security issues in VANETs. VANETs are mainly applicable to improve variety of different value added services in real time scenario. So that, it is very important to make these applications very privacy in order to increase dependable services to support human life. In VANETs, nodes/vehicles are not fixed they are moved from one to another location with respect to their co-ordinate values. There is a lot of research present in VANETs, particularly routing, broadcasting, surveillance with respect to quality of service and security. In this paper, we describe about different types routing scenario's and security attacks and discuss about corresponding security solutions which can be implemented to prevent security attacks in VANETs. We mainly discuss about security challenges in VANETs and comparative study regarding different security benchmarks in VANETs.

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APPLIED COMPUTATIONAL ELECTROMAGNETICS SOCIETY JOURNAL

September 2020
Vol. 35 No. 9
ISSN 1054-4887

The ACES Journal is abstracted in INSPEC, in Engineering Index, DTIC, Science Citation Index Expanded, the Research Alert, and to Current Contents/Engineering, Computing & Technology.

The illustrations on the front cover have been obtained from the research groups at the Department of Electrical Engineering, The University of Mississippi.

THE APPLIED COMPUTATIONAL ELECTROMAGNETICS SOCIETY JOURNAL

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A Hybrid Approach on Metamaterial-Loaded Fractal Antenna Design

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Abstract **–** The paper provides the interoperable hybrid Grasshopper–Grey Wolf optimization (GHGWO) of the Square Split-Ring Resonator (SRR) metamaterial unit cell. This paper discusses the complex phase strategies of the electric and magnetic interplay of the charged microstrip line of the split ring resonator (SRR). Optimized unit of metamaterial cells for their bandwidth enhancement is packed into a new square fractal antenna. In the interim period of dual band efficiency, a new design is introduced for a microstrip line-feeding square fractal antenna with a faulty ground composition. In the second stage, a quasi-static SRR model is being used to streamline its structural parameters in an effort to reinforce the bandwidth so that optimized composition resonates at the required intensity area. In the GHGWO hybrid algorithm, SRR unit cell size limitations should be optimized and the convergence actions of the algorithm improved. Certain evolutions termed modified hybrid BF-PSO classical BFO, chaos PSO and IWO are being tested for efficiency of the Hybrid GHGWO algorithm. In the final stage, optimized SRR unit cells are stacked into a square fractal antenna that provides bandwidth output suited to wireless usages with upper and lower band. The prototype square fractal antenna without and with SRR unit cells is efficiently evaluated by trial results.

Index Terms **–** Grasshopper–Grey Wolf Optimisation (GHGWO), metamaterial unit cell, quasi-static SRR model and microstrip line, Split-Ring Resonator (SRR).

I. INTRODUCTION

An antenna is known as a broadband unless its impendence or configuration varies considerably over about one octave or more [5]. In contemporary wireless transmission networks the miniaturization of antenna layout focused on fractal geometry is of significant importance [1].

In this study, we are proposing a new model of a three-step square fractal antenna. The bandwidth of the planned fractal antenna is increased by partial ground plane on the reverse side of a substratum. Secondly, we prioritize bandwidth in the built fractal antenna with the use of MTM unit cells with optimized split-ring resonator. A hybrid Grass Hopper [2], and grey wolf optimization [2] (GHGWO) algorithm are used to optimize structural variables in split ring resonant unit cells. However, a disadvantage of these techniques is the extensive amount of CPU times utilized in determining the numerical solution compared to the fully explicit methods for the same selection of values. Thus if we were to write them in matrix form, the coefficient matrix would be penta diagonal. The rest of paper is structured as follows: Section II discusses the brief review of hybrid GHGWO algorithm is proposed, Section III comprises of experimental results, and Section IV gives a brief conclusion.

Bilal Babayigit et al. [3] developed a Taguchi Method (TM) to model a non-side lobe level deletion (SLL) optimization for the CAA (non-uniform circular antenna array). TM, a rigorous design strategy, incorporated the numerical nature of experiments as a signal to noise ratio and orthogonal array devices. Such methods decrease the design parameters rather than complete factor evaluation, thus increased the rate of convergence and produced more precise solutions. TM's high output in achieving reduced SLLs was demonstrated by experimental results.

Although the methods mentioned above often focus on the problem of the fractal antenna design more effectively for various kinds of problems, there exist some obvious shortages when compared with other algorithms.

Submitted On: January 4, 2020
Accepted On: June 25, 2020

https://doi.org/10.47037/2020.ACES.J.350907

1054-4887 © ACES

2020 International Conference on Computer Communication and Informatics (ICCCI -2020), Jan. 22-24, 2020, Coimbatore, INDIA

A Novel and Smart IoT System for Real Time Agriculture Applications with IaaS Cloud Computing

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Abstract— In this paper, we have designed an IoT system for real time agriculture application with IaaS cloud architecture. Overall system design involves, preparation of six Wi-Fi enabled sensor nodes, design of server with In this agriculture sector, to improve the database including dedicated IP, for visualization we have designed an application with data processing ability, finally all section's are interfaced to create eventual agriculture IoT system. In the first phase, we have designed six Wi-Fi enabled sensor node's each node is connected with five sensor's i.e., temperature, humidity, pH, pressure and flow sensors. Each sensor is connected to ARM11 processor with 1GHz clock speed. In second phase, created server with predefined database. Database is generalized as a organizing the collection of data. This database which is created, only authorized persons are allowed to access the database. Database can be created by using the MySQL which is an oracle backed open source relational database The database management system(RDBMS). Database is mainly used for storing the corresponding output values which are obtained from the sensors and analyze the data for day by day. Server is a networked computer that can be run a database. Here the sever is a web server which is allocated with public IP (i.e., internet protocol) which website can host. IP is mainly two types public IP and private IP, here we are using public IP which can be accessed over the internet. Public IP is generally having unique address that can be allocated to a computing device. Web application is designed by using HTML (hypertext markup language) programming for creating web pages with text, images. PHP (hypertext preprocessor) it will be embedded in a HTML code and it can supported in a webserver. Here, using protocols are HTTP(hypertext transfer protocol) protocol it provides communication to the world wide web.

Keywords--- Internet of Things (IoT), sensors, communication modules, cloud computing.

I. INTRODUCTION

In present scenario IoT plays a major role in different fields which are agriculture, finance, smart home, smart vehicles, industrial automation, smart cities, smart retail and health care system. IoT is described as system of interrelated objects (i.e., actuators, sensors etc.) provides with internet and they have ability to transmit the data over a network which being remotely monitored and controlled by anytime and anywhere in real time application. To improve the productivity, efficiency, and to reduce the human errors as well as the time and cost in smart agriculture. There is a lack of number of workers in the farm to cover a large area. Also there is a problem to monitor and provide the conditions for crops in night time. Smart agriculture means the sensors which are connected in the different fields in the agriculture that sensory data can be updated in cloud which is a collection of enormous, dynamic, complex and spatial data. Cloud is a big data storage that can be provides some part of the storage to the data which can be updated on real time access and it is on demand and scalable in nature. In this real time data access can be provide by using the web application or desktop application.Smart objects are the basic blocks of the IoT system which can be communicated to each other through the internet.

A. IoT challenges:

IoT is a new technology in industries and it provides huge opportunities in digital world. IoT is simply described as collection of data and analyse the data then produce an equivalent output. But this system faces challenges those are described as follows.

Security:

One of the greatest threat in IoT is it doesn't provide the better security while designing IoT based system in industry. In 2018 the global risks report declared there is a cyber-attack for the interlinked IoT type of industries. Clouds are not having much security when compared to the other technologies. Providing security for the IoT is a critical process.

Privacy:

Another issue in IoT is privacy. It is important for the providing privacy for the industrial information. This information i.e. sensors' data and their personal information this may include the bank information.

Cloud attacks:

The most of the accessible data in IoT can be stored in cloud. This cloud networks has big data stocks. That may be

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attacked by the cyber-attack.

Accuracy:

IoT services contexts acquisition with high accuracy and efficiency. Context aware services provide functionalities which are personalized for their user's current situation. A main concern of context-aware services is a substantial consumption of resources while preserving a minimal level of accuracy.

Speed:

The response speed of IoT, the Internet of Things, will be practically instantaneous with the implementation of 5G technology. It is the most powerful connection to this day, with a response time of 5 milliseconds and a speed of 10 Gbps.

B. IoT applications:

IoT is used in different fields which are described as follows those can be used in different fields those are explained as follows.

Agriculture:

In this paper mainly focus on the agriculture applications. In agriculture system different parameters are calculated and analysed those are temperature, water flow, air pressure, soil monitoring. Applications of IoT can be based on the different equipment's those are used in the agriculture.

In IoT-based smart farming, a system is built for monitoring the crop field with the help of sensors (light, humidity, temperature, soil, moisture, etc.).IoT based smart farming is highly efficient when compared with the conventional approach.

Medical:

The Internet of Medical Things (IoMT) is the collection of medical devices and applications that connect to healthcare IT system through online computer networks. Medical devices equipped with Wi-Fi allow the machine to machine communication that is the basis of IoMT. IoMT devices link to cloud platforms such as web services, on which captured data can be stored and analysed. IoMT is also known as healthcare IoT.

As is the case with the larger internet of things (IoT), there are now more possible applications of IoMT than before because many consumer mobile devices are built with near field communication (NFC) radio frequency identification (RFID) tags that allow the devices to share the information with IT systems.

Forest:

The "Internet of Trees" (Io Trees) solution aims to use different sensors to measure key parameters in forest areas in regular basis, with no need of human intervention and to send this information via wireless communication to a central platform.

In the forest industry today, tree growth is monitored only once a year at the most. If growth is less than expected, the ideal time to intervene in a forest applies fertilizer. For example, may already have been submitted. So, the forest will never again reach maximum productivity.

Military:

However, the IoT goes beyond the private sector, it has wide-ranging implications and benefits for military logistics and supply chain management connected devices in the military promises to revolutionize modern warfare by leveraging automation, Big Data and analytics.

Industry:

The industrial internet of things originally described the IoT (Internet of Things) as it is used across several industries such as manufacturing, logistics, oil and gas transportation, mining and metals, aviation and other industrial sectors and in use cases which are typical to these industries.

C. Solutions of IoT challenges:

In present days, IoT plays an important role in most of the fields of the world. Although, most of the IoT systems are modeled with less security features, the IoT technology is used to exceed the increment of healthcare, smart farms, factories and oil & gas well monitoring systems. So, IoT needs powerful authentication standards, where data can be encrypted and track all of the information over internet. Since, the IoT system faces some key challenges and the possible solutions are specified below:

Integrating new technologies into existing environments:

In any of the communication devices, every object is interconnected to together to exchange the information. As we know, some of the devices are IoT-enabled and connected. In any of the industrial world, because of the nature of investments if gets more complicated. All of these independent sensors directly connected to existing devices, which helps to operate and collect the data about device performance. And, data should be transmitted and analyzed and used to help to check failures and timeout.

Managing complexity protocol proliferation:

One of the challenges in the classification of IoT is the vast number of protocols. There are some common standards which includes, ZigBee, Bluetooth low energy (BLE), Z-wave, Thread, We-Mo. All these above mentioned standards are wireless technologies, which uses mesh networks to connect wirelessly and network IoT devices without involving a mobile data or Wi-Fi signal. Whereas, We-Mo requires Wi-Fi signal, which eliminates the need for a controller and authorize devices to link directly through internet. Also, there is a disadvantage of that systems is that it requires more processing capacity and more power. Since, there is no particular standard, companies should decide the right protocol for each use and choose suitable with their overall performance.

Bringing data in from the edge networking challenges:

There are some basic networking challenges that must be addressed to make IoT- enabled devices as reality. Here, the

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first step is to make safe that data is moving quickly and reliably. Security problem also difficult, as IoT devices are more often becoming targets for hackers. When devices connected, they should be authenticated, data must be encrypted, and they need to communicate each other. In this scenario where thousands of objects are communicating together, bandwidth should be concern. Transmission speed should be important and as well as battery drain. In this case, minimum and efficient battery usage will be better. And, the goal must be keep IoT data as efficient and manageable.

Too few best practices in evolving areas of IoT:

In the present world, procedures are typically described as well-known and should be accepted to be most effective. There is a lack of best practices to manage the span of certain IoT-related software and hardware. And, we have to deal with instructions that are initiated at the device level.

As the IoT continues to increase rapidly, lots of risks are introduced. Hardware will be improved and software will become more advanced one. As the new technologies, new protocols, new standards, connectivity options will be established. By using this approach, most of the companies can handle the speed of change that comes with the IoT easily.

II. DESIGN OF SYSTEM

In design of the system by three levels which are perception layer, network layer, application layer.

In perception layer, it might be consists sensors, actuators and processors. Those sensors are connected to the ARM processor which can be used to transmit the data to the cloud. Those sensor data it may be analog/digital can be fetched to the ARM processor.

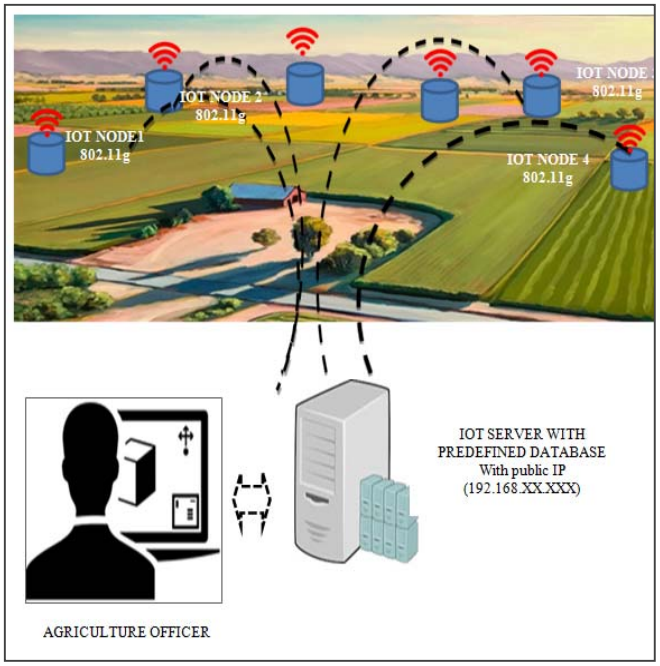

Figure 1:Proposed IoT system model structure.

In network layer, it contains the server and cloud which can be used to integrate the data to the database. PHP and HTML languages are used to create the database. In this communication we are using HTTP protocol.

While application layer provides application services for file transferring and other services. This section mainly consists of the desktop applications and web applications.

A. Database:

MySQL is an open source relational database management systems (RDBMS). The initial release of MySQL was on 23 May 1995. It can be written in C, C++ language, which is available in English. MySQL is open source software under the terms of GNU General Public License and proprietary licenses. SQL is the most popular language for adding, accessing and managing content which is present in database. MySQL is a component of the LAMP web application software stack, which is acronym for Linux, Apache, MySQL, and Python. MySQL is used by many database-driven applications. MySQL is also used by many websites, including Google, Facebook, Twitter, and YouTube.

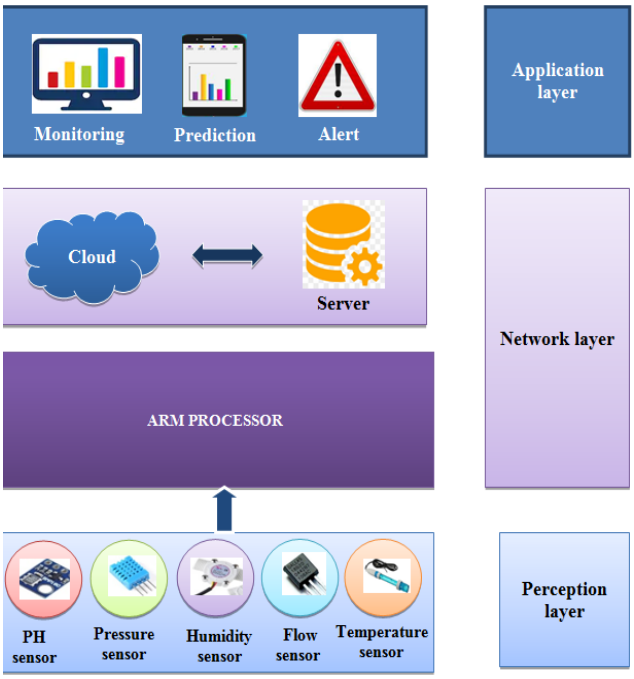

Figure 2: The layers in IoT system.

PHP stands for hypertext pre-processor, designed for wed development. It may be written in C and C++ languages. Thus PHP can be embedded in HTML code, implemented as a module in web server. This web server combines the results of executed PHP code, including images text, with generated web pages. At free of charge, PHP can be supported and deployed on many web servers on most of the platforms and operating systems.

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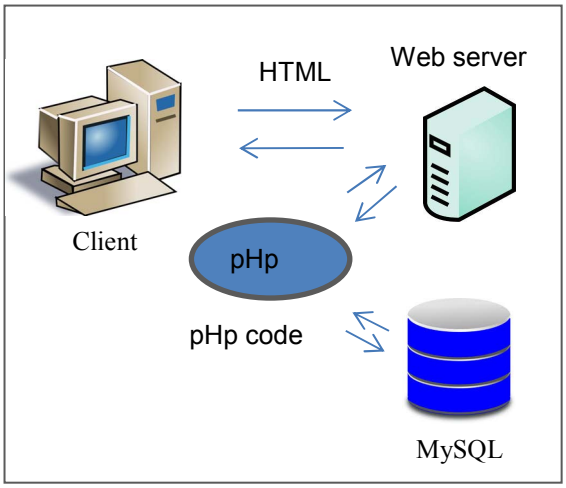

Figure 3 : Database , server and application design flow.

The cloud computing in agriculture or remote servers hosted on the Internet to store, manage, and process data, rather than a local server.

It stands for hypertext markup language, generally used for creating web pages and for web applications. With HTML, images are embedded into a web page. It may be written in a java, which is able to manage the content of web pages.

This layer provides application services for file transferring and other services. This section mainly consists of the desktop applications and web applications.

Desktop Vs Web applications: Desktop applications mean any software that can be installed on a desktop which can be used to perform specific tasks. It doesn't require any internet. Web applications are usually made on a client-server architecture which can be based on internet. This can be used web-browser as the client interface. Visualization of data is equivalent to the visual communication. It involves the creation and study of the data visual representation.

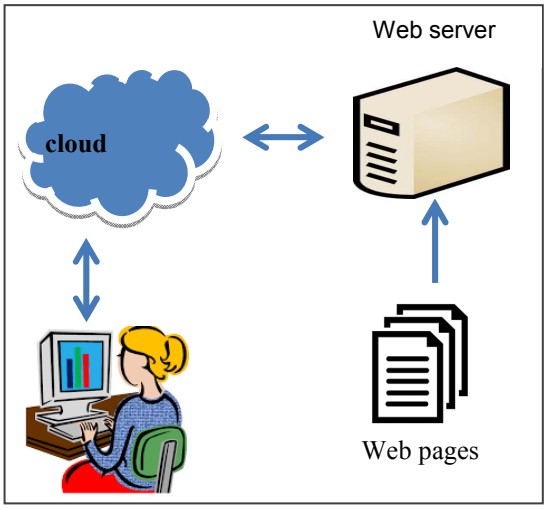

Figure 4: Web application

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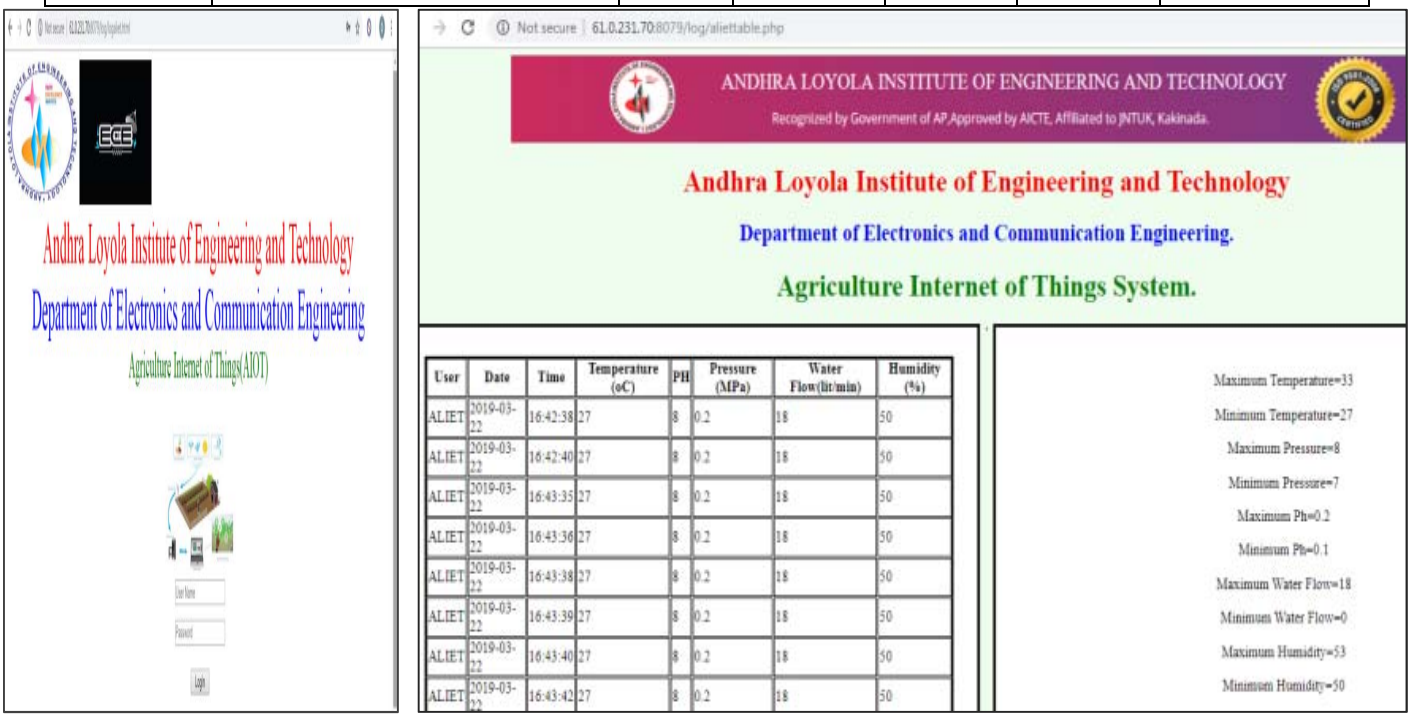
Parameters	Definition	Type	Working voltage range	Sensing range	Accuracy	Units
Temperature sensor	Temperature sensor is a device, which is used to sense the heat or temperature.	Digital	3V to 5V	-55℃ to +125℃	+/- 0.5℃	Kelvin(K), degree Celsius (℃).
Humidity sensor	It is the sensor which measures the amount of water in the surrounding air.	digital	3.5 to 5.5V	20%-90%	±1℃	Grams per cubic meter
Pressure sensor	Pressure sensor is used to calculate the pressure, which is present in the liquids or gases.	Digital	3V to 5V	300 to 1100 hPa	± 2℃	hectoPascals (hPa).
Flow sensor	Flow sensor is referred to measure how much volume or flow of a liquid or gas.	Digital	5V to 18V	1 to 30 L/min	± 0.5	Liters per minute.
pH sensor	pH sensor estimates the activity of hydrogen-ion in the water based solutions.	Analog	5V	0-14 pH	+/- 0.1pH(25 ℃	_



User	Date	Time	Temperature (oC)	PH	Pressure (MPa)	Water Flow(lit/min)	Humidity (%)
ALIET	2019-03-22	16:42:38	27	8	0.2	18	50
ALIET	2019-03-22	16:42:40	27	8	0.2	18	50
ALIET	2019-03-22	16:43:35	27	8	0.2	18	50
ALIET	2019-03-22	16:43:36	27	8	0.2	18	50
ALIET	2019-03-22	16:43:38	27	8	0.2	18	50
ALIET	2019-03-22	16:43:39	27	8	0.2	18	50
ALIET	2019-03-22	16:43:40	27	8	0.2	18	50
ALIET	2019-03-22	16:43:42	27	8	0.2	18	50

(a) (b)

Figure 5: Proposed IoT System Application, a) log in page, b) Data and analytics page.

Table 1: List of sensors properties used in the sensor node design

Table 2: Comparison of present work with literature.

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parameters	Reference 1	Reference 2	Reference 3	Reference 4	Reference 5	Proposed system
Sensors	URD sensor and PIR heat sensor	-	Moisture and Grain quality sensor	Temperature,soil moisture, atmospheric pressure, Humidity, water level, and light detection.	Temperature , water flow, and soil moisture	Temperature, humidity, pressure, flow and pH sensor
Arm processor	-	-	Arm 9 with s3c processor, Arm board with QQ2440	Multiplexer for signal gating	-	Arm cortex-, A53
Communicati on module	Wireless Sensor network	LAN, CAN	MCP2510 Can controller, CDMA modules,	Wi-Fi 802.11g, WS802G modules	ESP8266 WiFi module	Wi-Fi with 802.11g
Protocols	Http protocol	TCP/IP, Http protocol	-	Http protocol	Http protocol	Http protocol
Platform	Python, C language	Html	Embedded visual c++ 4.0	--	C language, Html	PHP, python language
Server	SQL server	proxy, SQL server	-	-	Web server	MySQL server
Database	MySQL database	-	-	-	-	Web database

III. CONCLUSION

In this paper, we have discussed about the design of a novel and smart IoT system for real time applications. The entire system is designed using ARM processor embedded single board computer with 1GHz processing speed i.e. raspberry pi. Overall five sensor nodes are created to convert physical data in to electrical quantity. Those are temperature sensor, humidity sensor, flow sensor, pressure sensor and gas sensor. The recent advantage in internet of things (IoT) has several benefits and advantages over manual wired/wireless systems.

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Design and Performance Analysis of Vivaldi Antenna for Medical Applications

Lakshmi Narayana Thalluri, Anji Reddy Nallapu, Ramakrishna Konda, S. Sai deep and Kata Naga Harsha

***Abstract*—In this paper we have designed and done the performance analysis on Vivaldi antenna for medical applications. We have extended our analysis on the role of materials which are used in the proposed antenna plays a major role in performance characteristics and structural analysis is also done to improve the performance of the proposed antenna. In the proposed antenna, different slots are included in the structure of antenna not only to increase the gain and directivity also for operating in required frequency range. The antenna which was proposed in this paper, has done its simulation for frequency range of 1 to 40 GHz. The designed antenna is obtained multiple resonant frequencies, which will be used for other applications also. The frequency ranges of the antenna which was operated are 6 GHz to 7 GHz, 8 GHz to 10 GHz, 12 GHz to 14 GHz and 18 GHz to 24 GHz. In that different frequency's ranges, the frequency range from 18 GHz to 24 GHz has a better return loss compare to another frequency's ranges. The number of applications has been offered by the Ultrawide band antennas (UWB) are microwave imaging, satellite applications, wireless communications, ground penetrating radars. By the obtained the simulations results, The proposed antenna is better suitable for microwave imaging and satellite communications. But our main focus on microwave imaging Which are used to detect the body tissues which are complex to detect.**

***Index Terms*—Vivaldi antenna, material science, Ultrawide band antennas (UWB),**

I. INTRODUCTION

MICROWAVE imaging (MI) is the advanced technology by the advancement of microwave engineering and signal processing [1-2]. This microwave imaging has attracted the both medicine and industry. By placing the antenna opposite to the object and signals transmitted from the antenna towards the object are scattered by the object and that rays are captured by the receiver antenna [2]. The signals which are received from the receiver antenna are then used to reconstruct the distribution of the dielectric properties of the object [3]. In this microwave imaging, the component which is mainly used is antenna. It acts as interface between the mediums [4]. The important issue of this is accuracy of the resulting image, that can be influenced by the antenna. The antenna posses an wideband characteristics and a stable radiation pattern over a frequency range of operation [5]. The designed antenna has multi-frequency and Ultrawide band characteristics (UWB) because of this reason the proposed antenna has better resolution and accuracy than the mono frequency approaches [6-7]. This tapered slot antenna has some attractive features like it can penetrate through body, non-ionizing radiation and has minimal effect on the human body.

The present technology, which we are using is x-rays for detection of structural changes of tissues in the human body. The advance technology for that is Microwave imaging which will detect the dielectric properties of the tissues in the body and it does not have any isolation properties [8]. For that reason, it is better technology for imaging. And it is safer and less expensive than MRI [9]. To achieve these objectives the antenna which has high directivity and gain antenna is required. The Vivaldi antenna which is known as tapered slot antenna popularly known as high directivity antenna.

The development of ultrawide band antennas, for many applications microwave imaging is one of it. The antenna which having high directivity, good radiation characteristics, low profile size with modified structure is proposed in this paper for better suitable to the application of microwave imaging [10].

To match this, the vivaldi antenna is designed to meet the precision results with that maintaining accuracy for better imaging. To increase the directivity of vivaldi antenna, here included the circular slots and rectangular stripes on the surface of the antenna. This will help out to overcome the issue. In this we designed, Vivaldi antenna with slots and without slots. Comparison of the two antennas is also done.

The paper starts with the mathematical analysis in section II followed by the performance analysis in shown in section III. In section IV the proposed Vivaldi antenna is described. The corresponding simulation results were given in section V. At the end of the section VI the conclusion is given for the Vivaldi antenna.

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II. MATHEMATICAL ANALYSIS

The mathematics involved in the design of vivaldi structure are,

$$y(t) = Ae^{rt} \tag{1}$$

In the above equation (1) denotes the exponential tapered slot of vivaldi antenna. In that equation (1) 'A' is Constant and 'r' is Taper rate.
The evolution of A and r is given below:

$$A = \frac{S}{2} \tag{2}$$

$$r = \frac{1}{L_a} \ln\left(\frac{W_a}{S}\right) \tag{3}$$

The aperture width is denoted by 'Wa' and Throat width at the origin is 'S'. For calculating the parameters, the equation (4) & (5) are used. And 'La' is aperture length is taken according to the operating frequency.

$$W_a = \frac{c}{2\sqrt{\xi_r} f_l} \tag{4}$$

$$S = \frac{c}{2\sqrt{\xi_r} f_h} \tag{5}$$

The above equations are for calculating the aperture width and throat width at origin. where 'c' is the velocity of light, The lower frequency is denoted by 'fl' and higher frequency is denoted by 'fh' And 'ξr' is permittivity of substrate. These are the parameters which are included in the designing of the tapered slot antenna.

III. PERFORMANCE ANALYSIS

In this paper, the tapered slot antenna or Vivaldi antenna with slots and without slots are designed. The Fig. 1 shows the top view of Vivaldi antenna of without slots. The substrate used in the designing of the tapered slot antenna is FR-4 which having a dielectric constant as 4.36 and, the substrate height we are taken is 1.6mm. Instead of ground plane, the proposed antenna has feed line and in-line for feeding. The opening rate or taper rate of the designed antenna is 160. The substrate length (Ls) of the tapered slot antenna is 23.5mm and substrate width (Ws) is 15mm.

The Fig. 2 shows the Vivaldi antenna without slots bottom view. In that shows that the antenna feed line and in-line. The feeding used for this antenna is microstrip line feeding. The impedance between the antenna and feeding should be 50ohms.The next sections include in this paper are role of ground plane in Vivaldi antenna, role of material, role of structure. These three plays an key role in the performance of Vivaldi antenna.

Different material analysis and structural analysis are done for knowing the which is better suitable to give the good results and parameters like gain, directivity, s-parameters or return loss, radiation characteristics, that will result in high accuracy and resolution imaging.

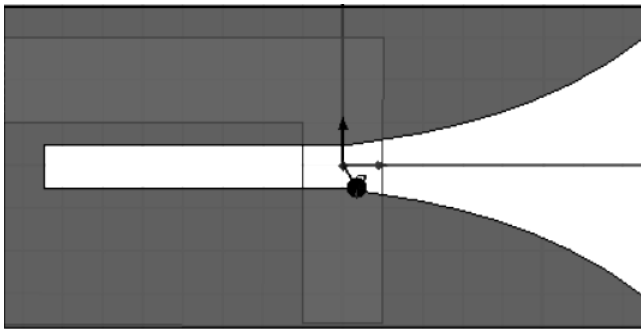

Fig. 1. Top View Of Vivaldi Antenna.

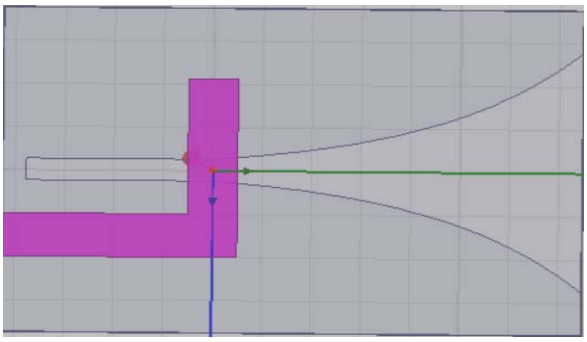

Fig. 2. Bottom View Of Vivaldi Antenna.

A. Role of ground plane

The role of ground plane plays a major part in emitting radiations from the antenna to outwards. By taking ground plane dimensions is same as substrate dimensions, the return loss parameter was not desired result. By replacing the ground plane with the feed line and in-line. After, we changed the widths of in-line and feed line and we done the analysis for feed line and in-line with the width as 1mm,2mm,3mm,4mm.As compare to all designs, the design which have feed line and in-line width of 2mm got the better results than the other designs. The microstrip(feed-line) to slot line(in-line) is the medium best for the feeding the Vivaldi antenna and Both feed-line and in-line have to be coincided with each other at particular point that is show in Fig. 3. For that from the mathematical equations, the feed line and in-line are designed and united by using the HFSS software.

B. Role of material

The performance of the antenna is depending on the material which are used for designing of antenna. Materials which having low dielectric constant will give better performance of antenna. Based on the dielectric constant, The antenna have effective radiation. Here, we used three different types of materials for simulation and observed the performances of the antenna. The three different materials we are done analysis for the substrates are as follows:

1) FR-4 or (FR4) GLOSS EPOXY:

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FR stands for 'flame retardant'. It is a composite material and it has high pressure thermo set plastics with good strength and dielectric strength as 20MV/m. The dielectric constant permittivity as 4.36.A thin copper foil which was laminated to one or both sides of an FR-4 glass epoxy panel. The height of substrate is 1.6mm. This is used as electrical insulator also. By analysed this material as substrate the proposed antenna have better return loss and directivity. the s11 parameter for the FR4 show in the Fig. 3 with blue colour.by using FR4 antenna resonate at two bands they are 12 to 14 GHz and 19 to 24 GHz.

2) ROGERS:

This material is used for high frequency performance of antenna. It has dielectric constant permittivity as 3.4 and the height of substrate is 1.6mm. By analysed this material as substrate we got better performance but having a slight decrease in return loss at the desired frequency. Compare to FR-4 substrate used in the designing of antenna. By using this material, the antenna operates at three bands those are 9 to 11 GHz ,12 to 14 GHz and 19 to 24 GHz.

3) RT DURIOD:

It also a one of the material which is used for the substrate. Having a dielectric constant as 2.2 and height as 1.6mm. After analysed this material we not get desired performance at 20 GHz compare to others. The Fig. 3 shows the performance comparison of different materials used as substrate in the designing of antenna. by using the RT DURIOD, we got better results compared to the other two materials but for the fabrication we are preparing FR4 due to some reasons like cost, availability of the material in the market.

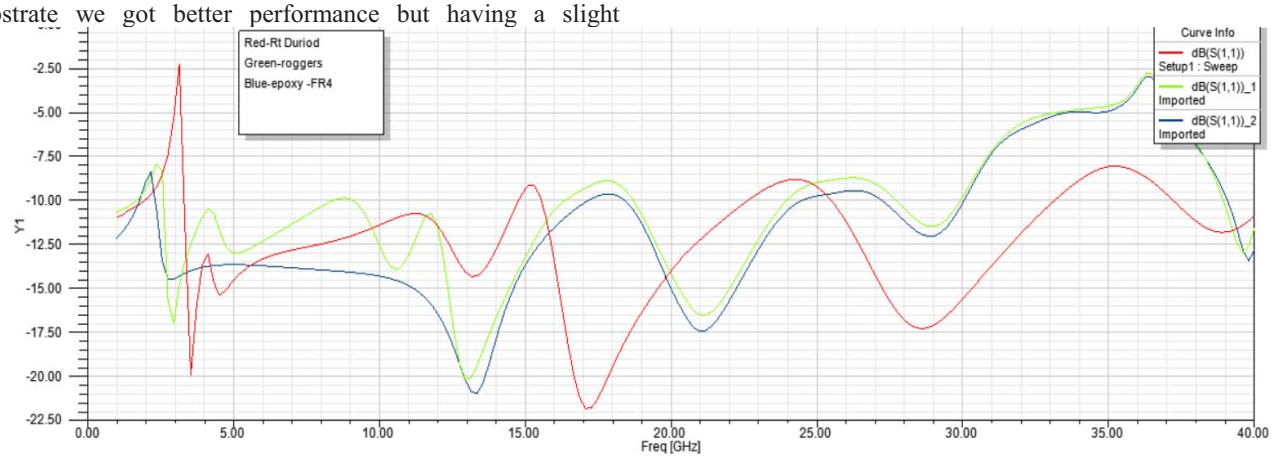

Fig. 3. Performance Comparison Of Different Materials.

The Table I shows the properties of materials by comparing the parameters like dielectric constant, water absorption, loss tangent, tensile strength, breakdown voltage and density.

TABLE I
PROPERTIES OF MATERIALS

Parameters	FR-4	ROGERS	RT DURIOD
Dielectric constant	4.36	3.4	2.2
Loss tangent	0.013	0.002	0.0004
Water absorption	<0.25%	0.06%	0.02%
Tensile strength	<310MPa	141MPa	450MPa
Breakdown voltage	55KV	-	>60KV
Density	1850kg/cubic meter	1790kg/cubic meter	2200kg/cubic meter

The above shown is the properties of different materials used as substrate for proposed antenna. The loss tangent is ratio at any frequency between real and imaginary parts of impedance. The loss tangent value for FR-4 substrate is 0.013 and for ROGERS is 0.002 for RT DURIOD is 0.0004. The water absorption rate in FR-4 is less than 0.25%, for ROGERS is 0.06% and for RT DURIOD is 0.02%. The tensile strength is a resistance of a material to breakdown under tension. It is usually expressed in mega pascals (MPa). The values of tensile strength of materials are shown on the Table I. The voltage which causes the portion of insulator to electrically conduction is known as breakdown voltage. The breakdown voltage for FR-4 is 55kilovolts (55KV) for applying this voltage the substrate become electrically conductive. And for RT DURIOD is greater than 60kilo volts (60KV). There is no breakdown voltage for ROGERS material. The density is also called specific gravity which means that the ratio of one substance to the ratio of another standard substance ant the values for the materials are given. The units for the specific gravity is kilogram per cubic meter.

C. Role of structure

The structure of vivaldi antenna having tapered length of 7.5mm. By taking the length as 7.5m the desired result was not obtained due to the reason the tapered length was often changed to 15mm for the sake of better results. By changing the structure means we are adding the slots like circular slots and rectangular slots on the top surface of patch of antenna.

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The slots are added to operate the antenna in desired frequency range with that the gain and directivity also increases.

We are providing extra slots for the tapered slot antenna to radiate the energy towards the desired direction which improves the directivity, back lobe and side lobe ratio also improves. We added semicircle shapes at the edge of Vivaldi antenna and observed the performance results which are better compared to the basic Vivaldi antenna, but antenna having slots on its top surface of the patch and a circular slot was added at the beginning of the tapered rate or opening rate of two slots and another slots are at the surface edges of the substrate which gives better result compared to semicircles at the edge antenna. A rectangular slot with less length and width as well as more length and width slots were also called as stripes are added to tapered slot antenna to attain high performance.

Comparing to the antenna with slots and without slots. The antenna which has additional slots on the structure have got good results than the other antenna. The Fig. 4 shows the comparison of different structures of tapered slot antenna. Taking the substrate as FR-4 we get the return loss parameter is less than -25db at the desired frequency range.

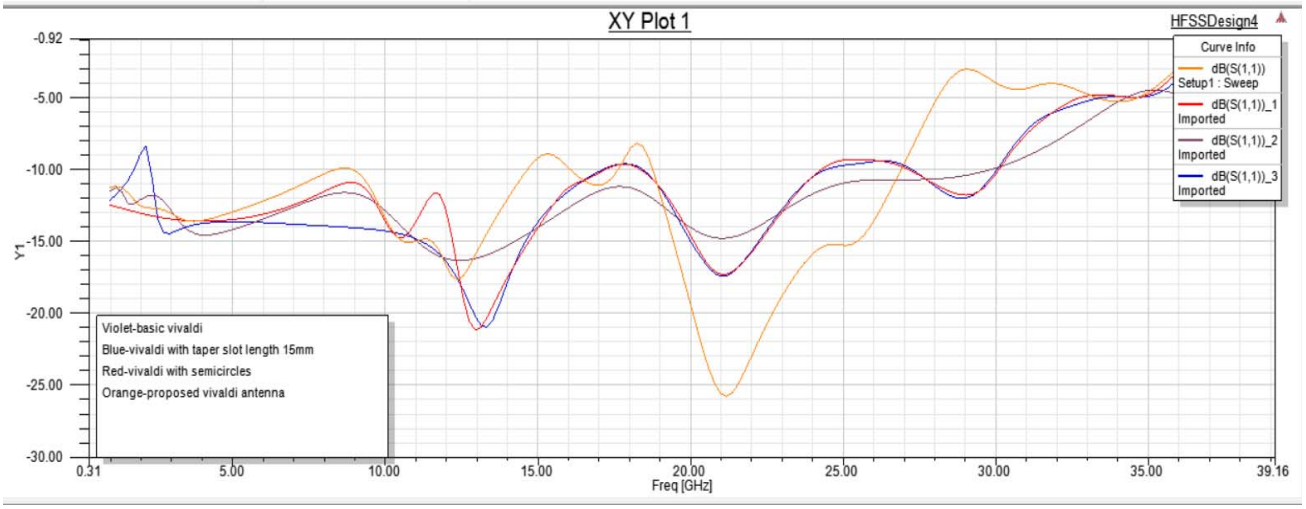

Fig. 4. Performance comparison of different structures

IV. PROPOSED VIVALDI ANTENNA

In the proposed antenna in front of the patch there are two circles opposite to each other with radius 1mm and below 3mm another two circles are added in-order improve the return loss. Further, added the rectangular strips with length of 3mm and width of 1mm and the spacing between these strips is 2mm.

These strips are used to improve the directivity. By this we can achieve our desired application-oriented antenna. The Fig. 5. show the antenna which is proposed and having slots on the substrate. In the Fig. 5. the table on the left side indicates the E-field radiation of the antenna. And at the feed point of the tapered slots antenna shows that how the radiation of antenna was takes place. The substrate height of proposed antenna is taken as 1.6mm. And the tapered rate is 240, the extension between the tapered rate and substrate is 1mm.

The substrate for this is FR-4 which having a relative permittivity of 4.36. This Vivaldi antenna has in-line and feed line for the purpose of feeding. The length for in-line (Lin) is taken as 6.25mm and width of in-line (Win) is taken ass 2mm. The feed line length is denoted as (Lf) is taken as 9.5mm and for the feed line width (Wf) the value is 2mm. The width which is same for both the in-line and feed line. By this adjustment of slots, we get the desired results by that it can achieve the desired application.

TABLE II
PROPOSED ANTENNA DIMENSIONS

Parameter	Value (mm)
Substrate length (Ls)	22.5
Substrate width (Ws)	15
Substrate height (hs)	1.6
In-line length (Lin)	6.25
In-line width (Win)	2
Feed line length (Lf)	9.5
Feed line width (Wf)	2
Opening rate	240

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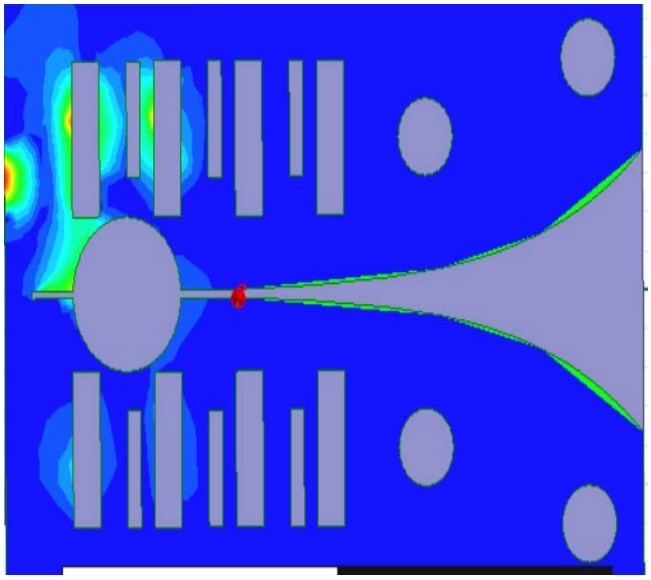

Fig. 5. Proposed Antenna.

The above Table II shows the dimensions which we are taken in designing the tapered slot antenna. The length of substrate (Ls) which we are taken is 23.5mm. The width of the substrate (Ws) is 15mm. Height of substrate (hs) is taken as 1.6mm. As we said before the Vivaldi antenna has in-line and feed line those are having widths and length. The width of the in-line and feed line both are same dimension i.e:2mm. And the length of the in-line (Lin) is 6.25mm, the length of the feed line (Lf) is 9.5mm. the opening rate or tapered rate means the opening of the tapered slots and the rate would be depend on individual here we taken the rate of tapering is 160. The all dimensions in this are taken in mm i.e: milli meters because the antenna must be compactable and optimized one. For that reason, the values expect opening rate are in milli meter(mm).

V. SIMULATION RESULTS

The gain of the proposed antenna is shown in Fig. 6. In this there are two angles called azimuthal angle (Θ) and elevation angle(φ). The azimuthal angle ranges from -180 degrees to 180 degrees. And the plotted gain at elevation angle (φ=0 and 90 degrees).

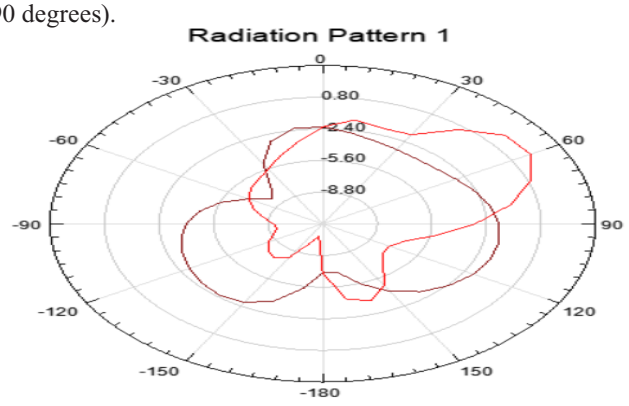

Fig. 6. Gain of proposed vivaldi antenna

The below Fig. 7. shows the directivity of the tapered slot antenna which have high radiation in single directions which means that the directivity of antenna in particular direction is very high. The back lobes of this antenna are less and side lobes are in negligible ratio.

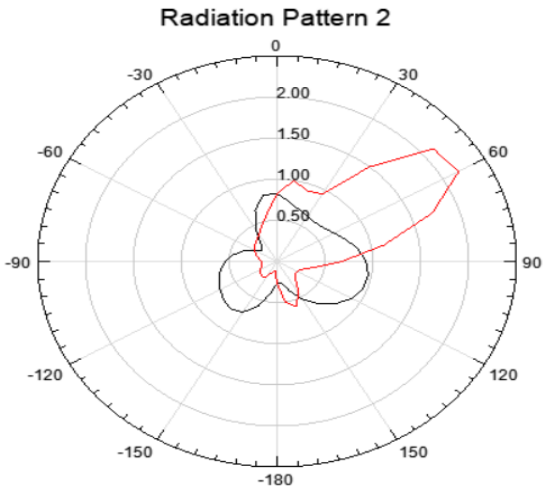

Fig. 7. Directivity of proposed vivaldi antenna

An antenna's return loss is a figure that indicates the proportion of radio waves arriving at the antenna input that are rejected as a ratio against those that are accepted.

The Fig. 8. shows the S11-parameter i.e: return loss which having lesser than -25db (<-25db) around the centre frequency. At the desired frequency from 19 GHz to 24 GHz having less losses. And also, it is resonating in another three bands 6 to 7 GHz, 8 to 10 GHz and 11 to 13 GHz which are having the return losses -15db, -16db and -19db respectively at centre frequency of each band.

The Fig. 9 show the VSWR parameter of proposed Vivaldi antenna. For the better for performances of any antenna VSWR should be below 2 and close to 1. In the proposed antenna we are getting for the four operating bands below 2 which is show in fig9 and at desired band 19 to 24 GHz it also close to 1 which means the reflection of antenna are minimum.

TABLE III
COMPARISON BETWEEN TABLE BETWEEN PROPOSED VIVALDI AND EXISTING ANTENNAS

Reference	Dimensions	Band width (GHz)	Gain (dB)	Directivity (dB)
1	49*48.3*0.8	1	3.5	4.2
2	40*45*0.8	0.5	3	3.8
3	41*48*1.6	2	3.8	4.3
4	31*30*0.8	1	4	4.5
Proposed	22.5*15*1.6	6	3.62	4.61

From the above Table III it is evident that is size of antenna is reduced which is the main requirement in the medical field and also bandwidth (18 to 24GHz) is increased drastically which increase the data rate.

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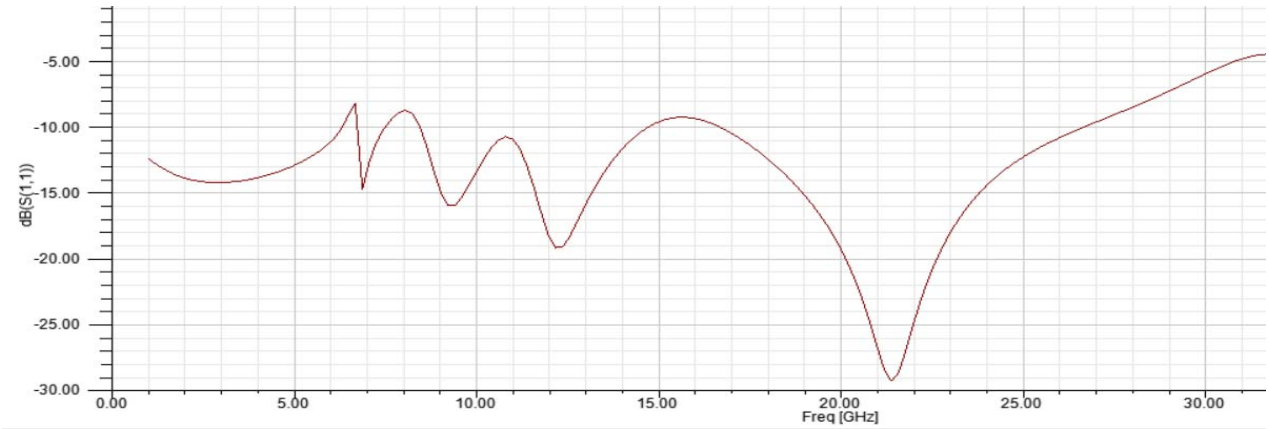

Fig. 8. S11 parameter of proposed Vivaldi antenna

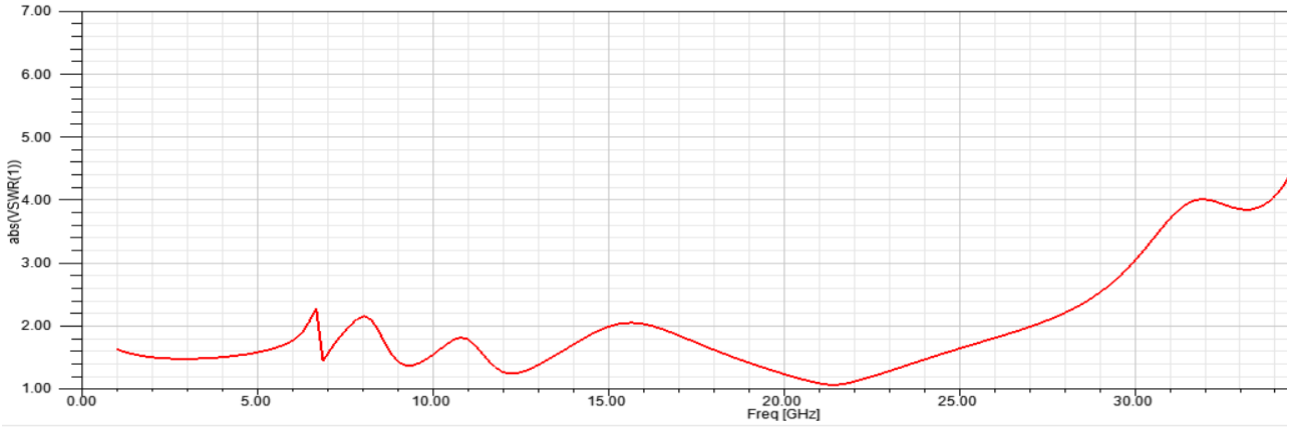

Fig. 9. VSWR parameter of proposed Vivaldi antenna

VI. CONCLUSION

The presented work has done with tapered slot antenna for microwave imaging. The proposed antenna size is reduced and improved return loss, gain and directivity. By using the different materials and structures did analysis for the Vivaldi antenna. The antenna was designed by using HFSS software. The proposed antenna covers the bands of 6 GHz to 7 GHz ,8 GHz to 10 GHz ,11 GHz to 13 GHz and 19 GHz to 24 GHz with S11 parameter less than -10db and the directivity of antenna above 2 at the elevation angle (φ=0) and also back and side lobes are also minimized. The proposed Vivaldi antenna got the best results in the 'k' band and in future there is scope for the improvement of performance characteristics of Vivaldi antenna by adding the different slots with different positioning.

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2020 International Conference on Computational Performance Evaluation (ComPE)
North-Eastern Hill University, Shillong, Meghalaya, India. Jul 2-4, 2020

An Image Processing Approach for Grading of Mangoes based on Maturity

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***Abstract*— Food processing industries plays a vital role for the development of our country. Mango is one of the economical fruit because of its nutrient dense foods. In general, ripening stage classification done by human experts which is strenuous process and a challenging task for food processing industry. A machine learning approach for ripening stage classification has been proposed. A MATLAB based implementation shows that Ensemble classifier outperform their counter parts discriminant classifier in terms confusion matrix, average accuracy, precision, recall, specificity and F-score.So,Maturity index classification of mango plays very important role to get to know about shelf life of mangoes. Thus this paper proposes effective mango fruit grading using machine learning approaches.**

Keywords— Classifier, maturity stage of Mangoes, statistical features, color features, F-score.

I. INTRODUCTION

Food processing industries plays vital role for economic development of our country. Mango plays very significant role because of its wide range of health benefits, rich nutrition. There are 500 varieties of mangoes such as Alphonso, chaunsa, dasheri, kesar, totapuri, himsagar, baginapalli etc. It has excellent flavor, luscious taste and has attractive color. Depending on cultivation, fruits color varies yellow, orange, red, or green. In general, manual grading by visual perception is more prone to errors, time consuming process, inconsistency, inaccurate and non-uniformity. The grading of mangoes is very important in industry for getting high quality of fruits in to the market.

Maturity index classification of fruits and vegetables in food processing industries is very significant for estimating the shelf-life time of mangoes. Thereby a proper preservation technique can be used in advance to prevent the loss of standard quality of the fruit. Most of the food processing centers make use of weight based classification which is laborious, time consuming, tiresome and soporific. Hence automatic grading of mango ripening stage classification is necessary [7][9]. In this paper an image processing based machine learning approach for ripening stage classification has been employed and the quality of classification is evaluated.

For detection of ripening stages, the mango images are taken from Kent [3] dataset, RGB images transformed in to gray and also in to HSV plane. Thirty four features are extracted, out of which ten are statistical and twenty four are color features. Further the values of each feature isstandardized and Neighborhood component analysis (NCA) is performed to get dominant features [17]. Those dominant features are given to the classifier for further processing. Ensemble classifier and Discriminant analysis are employed to evaluate the performance metrics of each classifier with regard to accuracy, specificity, sensitivity, precision, confusion matrix and F-score.

Paper been organized as Module I describes motivation and introduction of the work. Module II describes related work. Module III describes methodology. Module IV describes results and discussion.

II. RELATED WORK

DameshwariSahu et.al [3] has envisioned a technique for identifying defective regions and maturity classification of a fruit using shape, size and color features of an image. They have taken images from Kent dataset uses Low-level processing followed by defect identification uses quality ratio and maturity detection of harvested mangoes which uses contour information and matrix difference.

Megha. P. Arakeri et.al [7] has envisioned a technique for fruit grading system for evaluating the quality of tomato in food processing industry which uses image pre-processing followed by Otsu's method. After segmentation technique feature extraction and selection is done and features fed to Multilayer neural network for identifying the tomato as defective or non-defective. They have reported an accuracy of 96.4% for ripeness detection and 100% accuracy for detection of defective and non-defective regions.

Rahul PralhadSalunkhel et.al [9] has envisioned a ripening stage detection using RGB and HSV which uses shape detection and selection algorithm to remove unnecessary

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parts in an image. Followed by ratios of RGB are computed and reported RGB method outperformed their counter parts of HSV method for ripening stage detection.

III. Methodology

The main aim of this study is to classify mangoes based on maturity index of mangoes from their images in to two stages.

A. Dataset Preparation

The Dataset images are obtained from KENT dataset. The images are acquired using a high quality digital camera with a resolution of 5184 x 3456 pixels and a spatial resolution of 0.03 mm/pixel. These images are resized to 1200 x 800 pixels for effective storage and transmission. A special inspection chamber with four lamps that contained two fluorescent tubes has been used to record the images. The distance between the camera and sample is adjusted to 20 cm for effective sample preparation. The angle between axis of the lens and lighting source is set to 45º to diffuse reflections. Polarising filters are used to reduce the reflections occurring from the curved shapes of the samples. The flickering effect is reduced using high frequency ballast and hence produces a more stable lighting for image recording. Each mango image from both sides were taken (A and B). These images are stored and publicly available as Kent Dataset [14][15].

The authors have taken KENT dataset for classification of ripening stage of mangoes into 2 stages viz. Stage 1: Unripe, Stage 2: Ripe. Fig. 1 describes the preparation of KENT dataset. Fig. 1 describes the preparation of KENT dataset using imaging environment and Fig. 2 describes the flow diagram for classifying ripe and unripe mangoes.

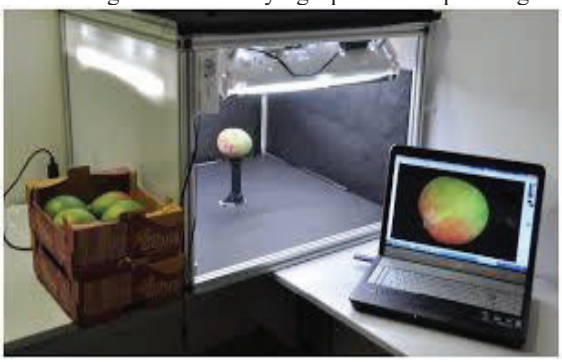

Fig. 1. Preparation of Kent dataset using Imaging Environment.

B. Pre-processing of a mango image

A random mango image is taken from the dataset and resized to 400x600 pixels.

C. Extraction of statistical and color features

Feature extraction is used for dimensionality reduction which maps the regions of interest[23] in an image as a compressed feature vector. This technique is useful when feature vectors are large and reduced to feature representation for quick classification. RGB and HSI color models are used for representing images of mangoes [10][11][12]. The image is modelled as a stack of three planes viz. Red, Green and Blue. The hue-saturation and intensity model separates the intensity component from color information in a color image. Dissimilarities in illumination intensity can be minimized using HSI model [9].

Ten statistical features [7] [16] and twenty four color features [1][2][10] are extracted. Contrast, correlation, energy, homogeneity, mean, standard deviation, variance, Root Mean Square value, inverse difference moment, smoothness are the important statistical features obtained from the dataset.

From the RGB color plane features like highest values of RGB, lowest values of RGB, average values of RGB, median values of RGB (RHV, GHV,BHV, RLV, GLV, BLV, Rmean, GMean and Bmean, RMedian, Gmedian, Bmedian)[20] are extracted. Median values are more robust to outliers if any.

From the HSI plane, features related to highest values, lowest values, mean values, median values for HIS (HHV, SHV, IHV, HLV, SLV, ILV, Hmean, Smean, Imean, Hmedian, Smedian, Imedian) are extracted using the mathematical formulae[20]. Table 1 describes mathematical equations used for obtaining the statistical features used.

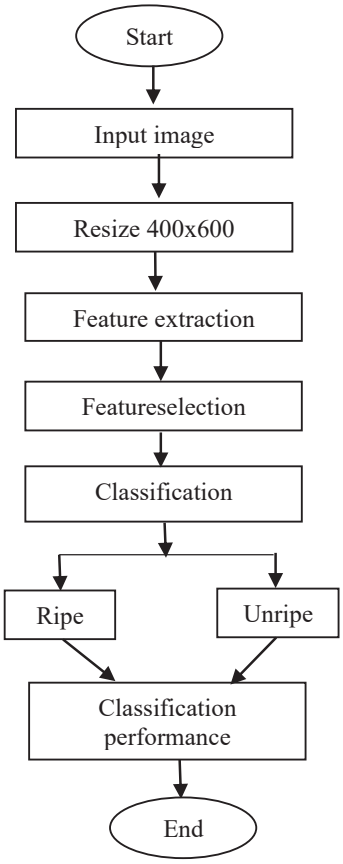

Fig. 2. Flow chart.

D. Standardization and dominant feature selection

The extracted statistical and color features are standardized to have consistency within the data i.e. global mean value of the data is made to zero and standard deviation as one. Dominant feature selection is necessary to speed up the process of classification which employs correlation with other features to find the most significant features. The

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dominant features are found using neighborhood component analysis (NCA) for reducing large set of features onto a new feature subspace of lower dimension without losing high-ranking data results in dimensionality reduction. Contrast, Energy, Homogeneity, Standard deviation, variance, Lowest value of green (GLV), Mean of red color (Rmean) are the high ranking features after Neighborhood component analysis as shown in Fig. 3.

E. Implementation of Classifiers

For ripening stage detection, variousclassifiers such as ensemble and discriminant analysis classifier are used to evaluate the performance metrics of each classifier.

F. Discriminant analysis classifier:

Discriminant analysis[12] is mostly used classification problems under supervised learning. 'diagquadratic' discriminant type function and cross validation of metrics which gave better prediction results.The average accuracy has been evaluated. Fig. 3 describes the extraction of prominent features using NCA.

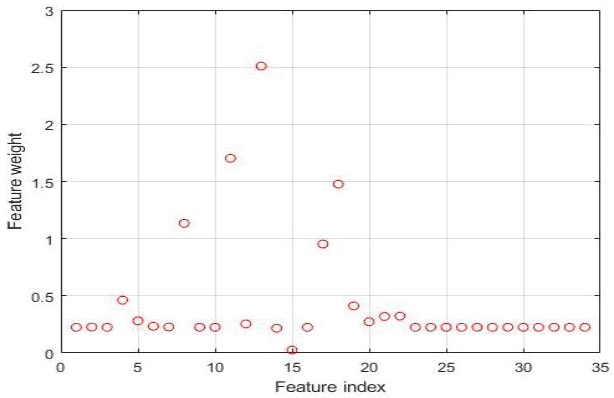
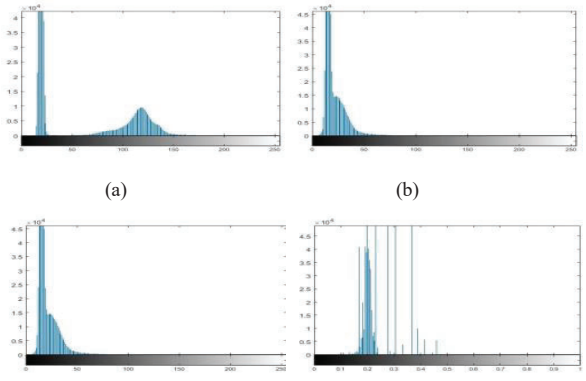


Fig. 3. Prominent features obtained by applying NCA.

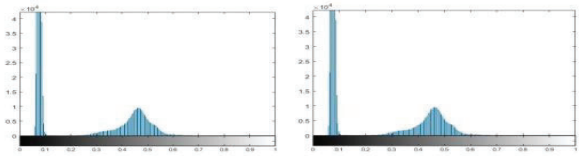
G. Ensemble classifier:

Ensemble classifier combines multiple classification models to improve the overall accuracy of the classifier. This classification approach gives better predictive performance compared to individual model. Reduction in variance and bias are carried out to improve the overall performance and prediction accuracy of the classifier. The combination of decision tree and discriminant analysis is employed and cross validation of metrics to evaluate the results.The average accuracy has been evaluated. Fig. 4 discusses the histograms ofred, green, blue, hue, saturation, and intensity using histogram plots.



(a) (b)

(c) (d)



(e) (f)

Fig. 4. Histogram of (a) Red (b) Green (c) Blue (d) Hue (e) Saturation (f) Intensity.

Table 1. Statistical features.

Name of the feature	Formulae
Mean	$\frac{1}{N}\sum_{i=1}^{N} M_i$
Homogeneity	$\sum_{i,j=1}^{N} \frac{M_{ij}}{1+\lvert i-j\rvert}$
Energy	$\sum_{i,j=1}^{N} {M_{ij}}^2$
Correlation	$\sum_{i,j=1}^{N} \frac{M_{ij}(i-\mu)(j-\mu)}{\sigma^2}$
Variance	$\sum_{i,j=1}^{N} (i-\mu)^2 M_{ij}$
Root mean square	$\sqrt{\frac{1}{N}\sum_{i,j=1}^{N} {M_{ij}}^2}$
Contrast	$\sum_{i,j=1}^{N} \lvert i-j\rvert^2 M_{ij}$
Inverse different moment(IDM)	$\sum_{i=0}^{N-1}\sum_{j=0}^{N-1} \frac{1}{1+(i-j)^2} M(i,j)$
Standard deviation	$\frac{1}{N-1}\sum_{i=1}^{N} [(M_i-\mu)^2]^{1/2}$
Entropy	$\sum_{i=0}^{N-1}\sum_{j=0}^{N-1} M(i,j) * (-\ln(M(i,j)))$

IV. Results and Discussion

A. Classification of ripe and unripe mangoes

The prediction performance of each classifier is described in Table 2, in terms of confusion matrix, accuracy, precision, specificity, sensitivity and F-score.

Table 2. Performance characteristics.

Classifier	Confusion matrix		Accuracy	Specificity	Precision	Sensitivity	F-score	Avg. Accuracy(%)
Ensemble	7	0	0.96	0.95	0.87	1	0.9	96.67
	1	22	0.96	1	1	0.95	0.9	
Discriminant	6	0	0.93	0.95	0.75	1	0.8	93.33
	2	22	0.93	1	1	0.91	0.9	

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B. *Performance measurements*

A confusion matrix for ensemble and discriminant classifier is obtained to evaluate the performance metrics.

$$\text{Accuracy} = \frac{\text{TP} + \text{TN}}{TP + TN + FP + FN} * 10 \quad \ldots\ldots\ldots\ldots (1)$$

"The proportionof total number of correctly classified positive inputs to total number of predicted positive inputs",defined as precision [21][22].

$$\text{Precision} = \frac{\text{TP}}{\text{TP} + \text{FP}} \quad \ldots\ldots\ldots\ldots (2)$$

"The proportionof the total number of correctly classified positive inputs to the total numbers of positive inputs", defined as sensitivity[22].

$$\text{Sensitivity} = \frac{\text{TP}}{\text{TP} + \text{FN}} \quad \ldots\ldots\ldots\ldots (3)$$

TP =True positive, TN=True negative, FP=False positive, FN=False negative[21][22].

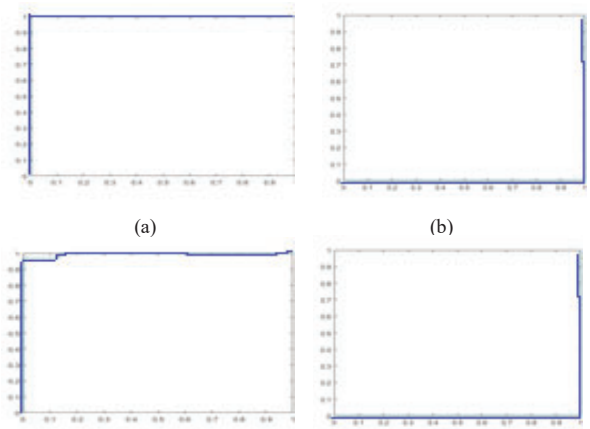
"The measure of weighted harmonics of sensitivity and precision", is defined as F-measure.

$$\text{Fmeasure} = \frac{2}{\text{Sensitivity}^{-1} + \text{precision}^{-1}} \quad \ldots\ldots\ldots\ldots (4)$$

"The proportionof actual negatives which are predicted as true negatives similarly ratio of actual negatives which are predicted as false positive", is defined as specificity [21].

$$\text{Specificity} = \frac{\text{TN}}{\text{TN} + \text{FP}} \quad \ldots\ldots\ldots\ldots (5)$$

Fig. 5 describes the ROC curves for each classifier and Fig. 6 describes the percentage of average accuracy visualized as bar plots for each classifier.



(a) (b) (c) (d)

Fig.5. Receiver operating characteristics (ROC)ofEnsemble classifier for (a) Unripe (b) Ripeand Discriminant classifiers for (c) Unripe (d) Ripe.

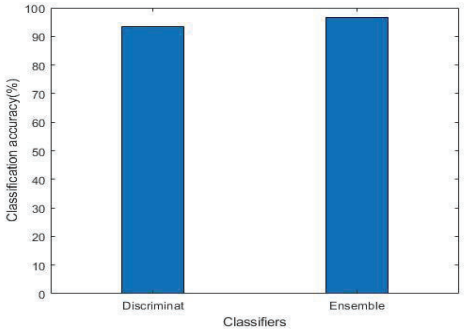


Fig. 6. Classification accuracy percentages with different ensemble and discriminant classifiers plotted as bar graphs.

CONCLUSION

ripening stage classification ensemble classifier outperformed discriminant classifier. The mango ripeness index works well using ensemble classifier with 96.67% where as 93.33% for discriminant classifier. Neural networks can be employed for getting high classification accuracy.

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DGS Based Ultrawide Band Antenna For Wireless Applications

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Abstract: In this paper, a new Ultra Wide Band (UWB) antenna with high bandwidth is proposed. The antenna consists of defected ground structure, patch of different step sizes with irregular shape on an FR4 epoxy dielectric substrate, with a microstrip feed line of 50 ohms. Varying the dimensions of the steps, slots and notch, which enhances the gain and bandwidth of the antenna. Modifications are introduced in the antenna are changing the dimensions of notch, steps and adding two slots on the defected ground plane. The characteristics of antenna design is an improvement from the previous research and is simulated using High frequency structure Simulator (HFSS) 15.0 software.The performance of the designed antenna was analysed in terms of bandwidth, gain, return loss and radiation pattern.

Keywords: Ultrawide band antenna, defected ground structure, stepped patch.

1. Introduction

Ultra-wide band technology has been rapidly developing since the early 2000s. In 2002, the US FCC authorized the unlicensed use of the frequency band [3.1– 10.6] GHz for wireless communications [1]. The ultra-wide band technology plays a key role in wireless communication systems which are operating at multiple frequencies that serves large number of wireless communication applications such as Wireless Fidelity (Wi-Fi), Global positioning systems (GPS), Worldwide interoperability for microwave access (WiMAX), and Wireless local area network (WLAN). Hence, there is a need for compact low-profile antennas with multiple characteristics which can be used in various portable devices like laptops, Bluetooth, mobile phones etc. Such antennas should be physically compact in size, light weight and also have other characteristicslike Omni-directional radiation pattern,gain and bandwidth[2]. The main components of UWB system, are the feasible UWB antenna design which mayface many challenges such as the impedance matching with good radiation stability in the entire frequency band, compact antenna size and low manufacturing cost for consumer electronics applications. In addition to these, many systems will operate in multiple frequency bands, requiring dual-band or triple-band operation of fundamentally narrowband antennas[3]. Ultra-Wideband Technology has many advantages such as less interference with surrounding waves, lessimpact on human health, high precision ranging, robustness in noisy environment, very high data transmission rates, etc.

2. Literature Survey

2.1. Ultra-Wide Band Planar Antenna Using Stepped Patch and Defected Ground Plane

Microstrip patch antennas are the most basic commonly used antennas. They can be designed with different shapes like rectangular, circular, triangular etc. Patch antennas are having low profile, light in weight, low cost, ease of installation and integration with other circuits makes them suitable for wireless applications.

2.2. DGS Based Multiband Frequency Reconfigurable Antenna for Wireless Applications

Defected Ground Structure (DGS) is realized by etching off a simple shape in the ground plane, depending on the shape and dimensions of the defect, the shielded current distribution in the ground plane is distributed, resulting a controlled excitation and propagation of the electromagnetic waves through the substrate layer. The impedance and surface current of the antenna is affected by DGS.

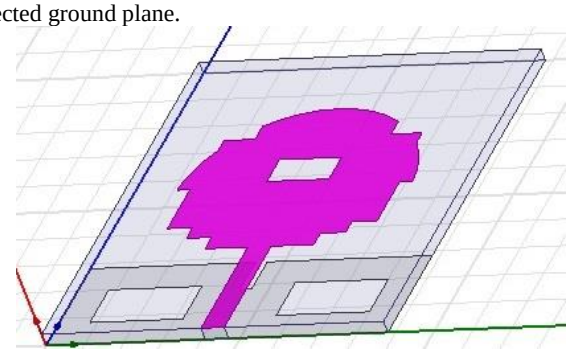
DGS has been used in the field of microstrip antennas for enhancing the bandwidth and gain of microstrip antenna and to suppress the higher mode harmonics, mutual coupling between adjacent elements and cross-polarization for improving the radiation characteristics of the microstrip antenna.

2.3. A Multiband Slot Antenna for Wireless Communication Applications

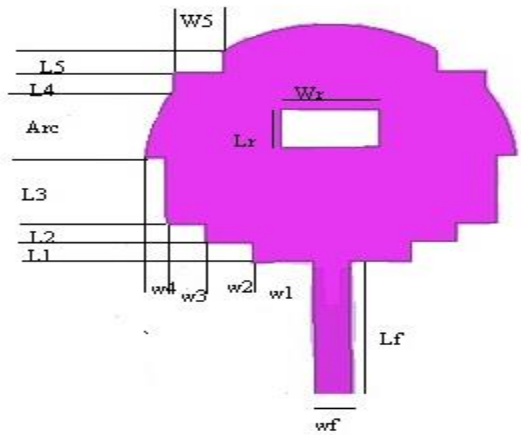
The basic concept in that a slot in the ground plane behaves as a load which added to the antenna can beused to bring the input impedance point closer to the characteristic impedance (50 ohms). Slots would be represented as a network of impedances and can be designed to give broad band responses. This improves the input impedance match and hence return loss (S_{11}).

3. Design of Antenna

The proposed antennadimensions are obtained through a parametric study in order to maintain a good impedance matching and stable radiation characteristics with high gain over an ultra-wide band frequency range. Therefore, the parametric studies are carried out on the stepped patches and dimensions of the slots and notch on the defected ground plane.



(a)



(b)

(c)

Fig.1: Configuration of proposed Ultra-Wide Band antenna. (a) Perspective view. (b) Top view. (c) Bottom view.

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The patch shape consists of different step sizes and a microstrip feeding is to be connected with half circle cut at its end together with a rectangular slot. The feeding line and the radiating patch etched on a FR4-epoxy dielectric substrate with dimensions of the antenna. Defected ground plane consists of a notch and two slots placed on a substrate.

Table 1: Geometric parameters of the antenna on FR4 substrate(h =1 .59mm,εr =4 .4,tanδ =0 .02)

Parameter	Value (mm)	Parameter	Value (mm)
L_f	14.9	L_5	2.3
W_f	3	W_5	4
L_1	2.1	L_r	4
W_1	5.5	W_r	8
L_2	1.95	L_n	5
W_2	3.25	W_n	1.5
L_3	7.15	L_g	14.1
W_3	3.25	W_g	44
L_4	1.85	L_s	50
W_4	1.72	W_s	44
Arc	7.15	Ls1	6
		Ws1	12

The geometry parameters and structural dimension of the designed ultra-wide band antenna for wireless systems is illustrated in Fig. 1. The rectangular shape patch element is backed by an FR4 substrate with a height of 1.59mm and relative permittivity (εr) of 4.4 and a tangent loss (tanδ) of 0.02. Different antenna modifications are introduced in the design in which the patch and the ground plane of the simple antenna are varied to enhance the return losses.

4. Effects of Dimensions of the Parameters

4.1 . Parametric Study for the Notch Element

The effects of varied notch dimensions on scattering parameters are studied. The notch on antenna is constructed by slotting one side of rectangular patch placed on a substrate over the ground plane. The analysis of notch on antenna is crucial owing to irregular shape. The effect of the length of the notch on the antenna matching varies with frequency. The matching improves in almost the entire bandwidth when increasing the length. The return loss graph with respect to frequency for different values of notch length and width has been observed in fig.2and fig. 3.

4.2 Parametric Study for the step Element

The steps has been introduced in order to achieve the ultra wide band characteristics. It can be observed that adding one or more steps with certain dimension in the patch antenna, there has been sudden increment in the bandwidth of the antenna.

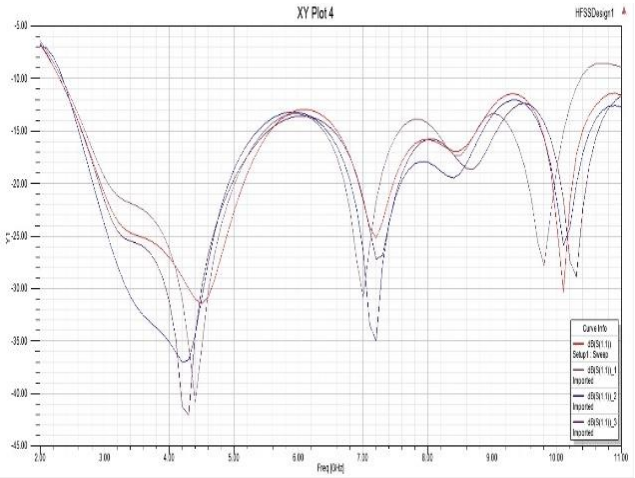


Fig. 2: Simulated return loss S_{11} (dB) for different values of notch length

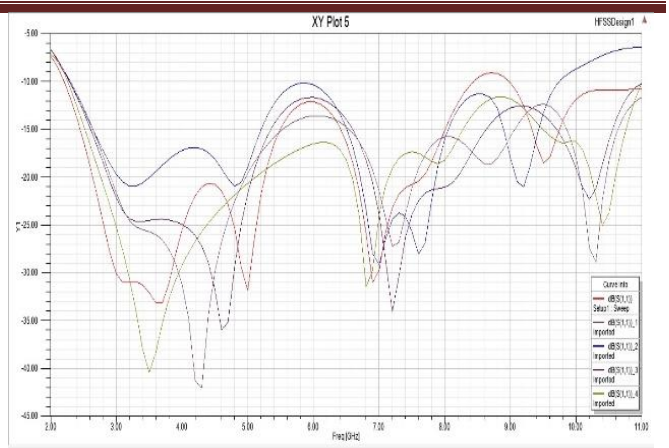
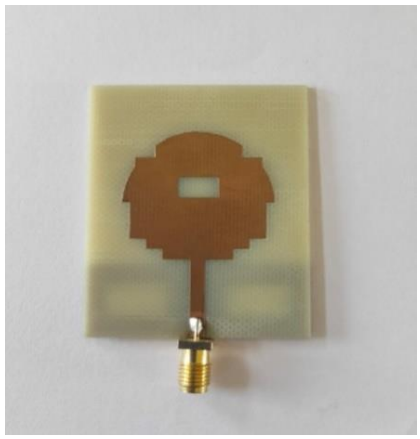


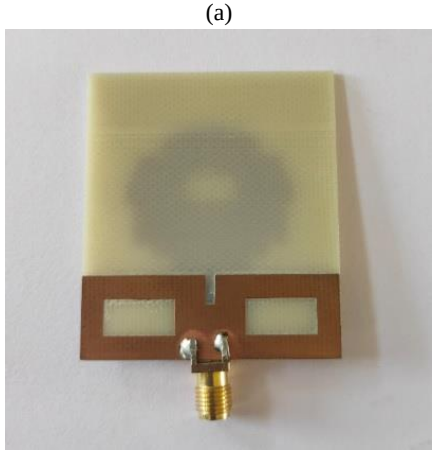
Fig. 3: Simulated return loss S_{11} (dB) for different values of notch width

5. Simulated Results and Measurements

In order to experimentally validate the antenna system is realized on FR4 PCB board with relative dielectric permittivity of 4.4, tangent loss of 0.02, and thickness of 1.59mm. The optimized microstrip patch antenna with dimensions was fabricated as shown in Fig. 4 and tested with a Vector Network Analyzer (VNA). The discrepancies between the simulated and measured results, due to welding of the SMA connector and substrate permittivity loss and tolerance to temperature variations, surface roughness of fabrication, and other factors, which are very difficult to be predicted, but significant at high frequency. The Simulated and measuredreturn loss S_{11}(dB) are shown in the Fig. 5 and Fig. 6. and simulated radiation pattern at different frequencies are shown in the Fig. 7.



(a)



(b)

Fig. 4: The fabricated antenna prototype (a) Top View, and (b) Bottom view.

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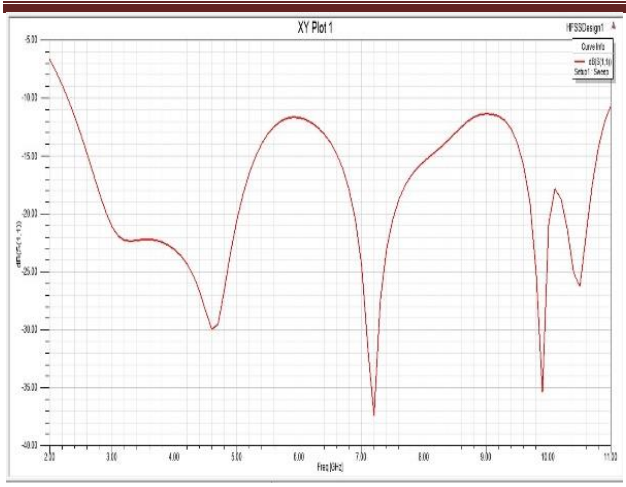


Fig. 5: Simulated return loss S_{11} (dB) for designed antenna

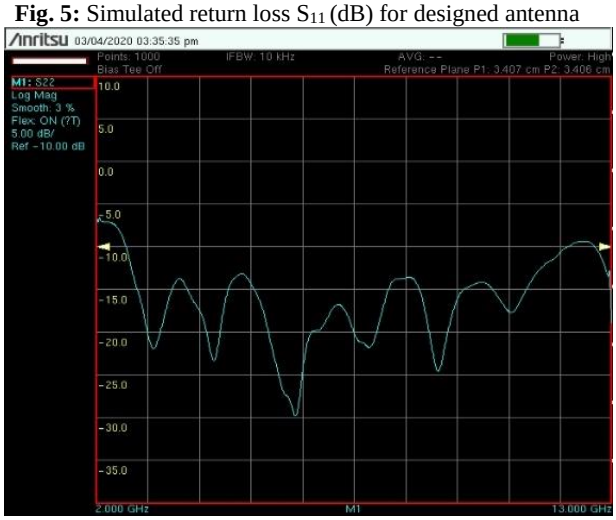
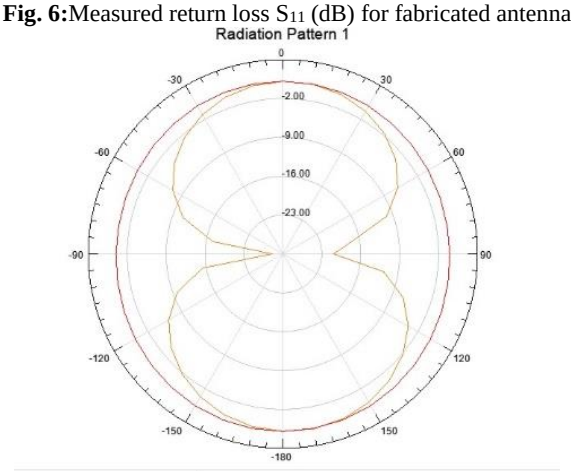
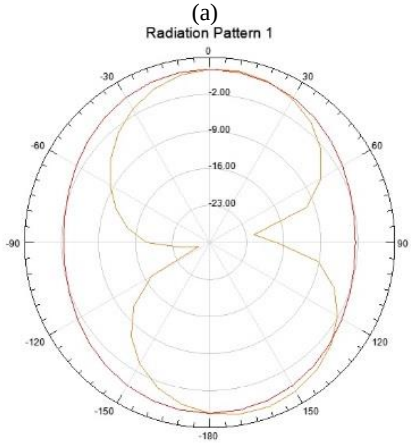


Fig. 6: Measured return loss S_{11} (dB) for fabricated antenna



(a)



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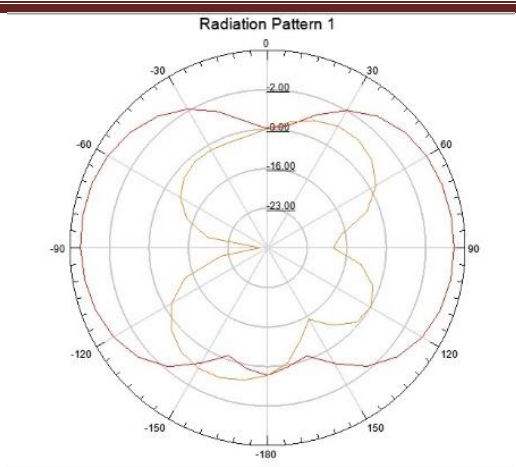
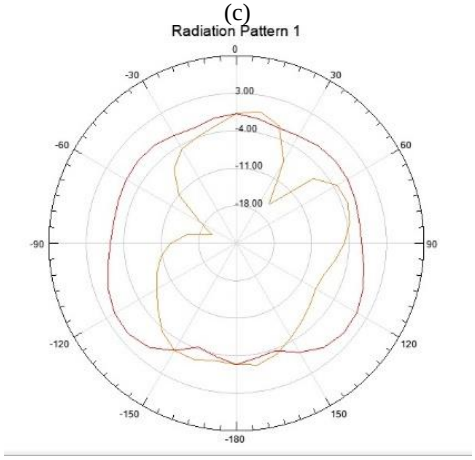


(c)



(d)

Fig. 7: Simulated radiation patterns of the antenna in the Φ=0and Φ = 90 at (a) 3 GHz (b) 4.5 GHz (c) 7.2 GHz and (d) 10 GHz.

6. Conclusions

This paper explained the design of DGS based ultra wide band antenna for wireless applications. The antenna is designed byintegrating slots on defected ground plane, varying step, notch dimensions on the patch antenna. The designed antenna will operating in the frequency range of 2.58 – 12.24 GHz.

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Compact Diversity Mimo Antenna for Satellite Communication

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Abstract: In this Paper we have designed and implemented the compact diversity MIMO antenna for satellite communications. The proposed design is resonated at 7.8 GHzi.e, X-Band which is suitable for satellite communication. As the name MIMO it has two antennas with two ports which are symmetric to each other. These two antennas are separated with equal spacing between them to achieve the polarization diversity. It consists of an inverted L and T shaped monopoles for effective transmission of the current flow. The substrate utilized is FR-4 epoxy with height of 0.8mm which is flexible and easily available than other dielectric materials. The feed used is micro strip feed line in order to reduce the surface radiations. According to the measurements, S11 is less than -27 dB in 8 GHz – 12 GHz with overall gain of 4.4 dB. The size of the proposed antenna is 32mmx24mmx0.8mm.

Keywords: Microstrip antenna, MIMO antenna, polarization diversity, epoxy FR-4.

1. Introduction

The communication between two earth stations with the help of satellite is called satellite communication. At present the communication through the satellites has been increasing day by day and it has become an major part of telecommunication system because of its advantages like higher data rates, increased band width, high efficiency etc.. The purpose of satellite communication is to relay the signal around the curve of the earth, allowing communication between widely separated geographical points.To satisfy these advantages the design of the antenna in the satellite should be more compact, flexible, low cost,and less weight. As the satellite operates at multiple bands we need multiple antennas to make its operation secure.

MIMO(Multiple Input and Multiple Output)is a kind of wireless communication technology that has been increasing rapidly in the present scenario. It utilizes an array of antennas at both transmitter and receiver. It is used to obtain independent replicas of the original signal to avoid channel attenuation such as deep fades. The purpose is to minimize errors and optimize data speeds[5].

MIMO antennas for satellite communications utilizes the different techniques like spatial diversity, polarization diversity, orthogonal frequency division multiplexing. One technique to increase the band width efficiency is orthogonal frequency division multiplexing, another is theantenna diversity technique in which the performance of wireless communication system can be enhanced by reducing the multipath fading and co-channel interference, and in addition it should have low signal correlation between antenna elements and relatively good matching characteristics of input impedence. Power utilization of the antenna must be as less as possible in satellite communication.

To overcome these challenges the dimensions of the proposed antenna is reduced which has better band width efficiency, power utilization of the antenna is over come with the help of Wilkinson power divider principle [2], and by gradually decreasing the width of the monopoles we can expect better radiation pattern.

Polarization diversity transmission and reception where in the same information signal is transmitted and received simultaneously on orthogonally polarized waves with fade independent propagation characteristics [3].

2. Antenna Configuration

The geometry with some detailed dimensions of the Proposed MIMO antenna is illustrated in figure 1.the MIMO antenna consists of two symmetric monopoles to excite in the resonant frequencies. Based on the mode design method a ‘P’ shaped patch is added on the strip to be operated in the required resonant frequency band. The MIMO antenna is Printed on the front side of the commercially utilized substrate i.e., epoxy FR-4 of 0.8 mm with relative permittivity of 4.4 and loss tangent of 0.02. The proposed design consists of two symmetric ‘P’ shaped monopoles, with ‘T’ and inverted ‘L’ stubs inside the curve. The purpose of placing the stubs is for the efficient current flow. When smooth edges are present there is a lagging in the current distribution so to avoid this the curve ‘P’ path is taken in the design, due to this there is an efficient and the fast current distribution.

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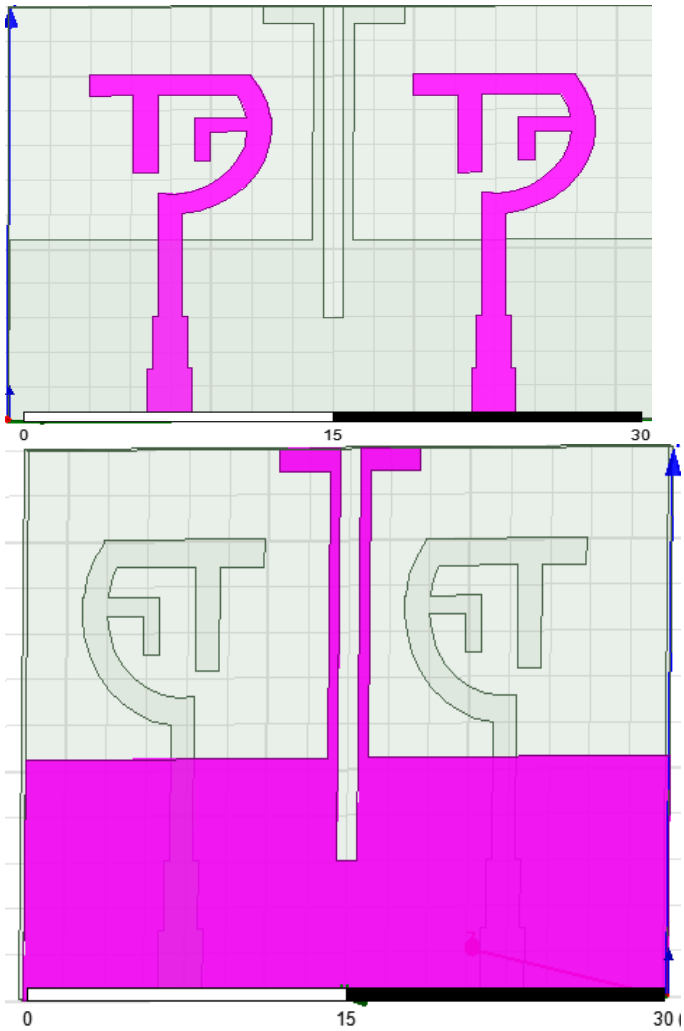

Fig. 1. front view, back view

The width of the patch is reduced in the stepped manner at the place of feeding to satisfy the Wilkinson power divider principle.The MIMO antenna is Printed on the front side of the commercially utilized substrate i.e., epoxy FR-4 of 1.6mm with relative permittivity of 4.4 and loss tangent of 0.02. To avoid the interference between the radiation pattern an isolation is provided between the two monopoles. The proposed antenna structure is designed and analysed by using the Ansys High Frequency Structure Simulator (HFSS).

The figure describes the bottom view of the proposed antenna, in the ground plane an isolation is provided and to obtain the interconnection for current flow between the monopoles the isolation is given at a height of 1.8mm above the feed[1].

3. Simulation Results

From the fig 2 we have the S parameters showing that the frequency range is above 7.8 GHz with, a return loss of less than -27 dB which means we have approximate X-band range(8HHz-12GHz) which can be utilized for the broad band applications. From the graph the S11 is -27dB is expected to be in 8 GHz and 12 GHz for both T shaped and the inverted L shaped stubs in both the monopoles

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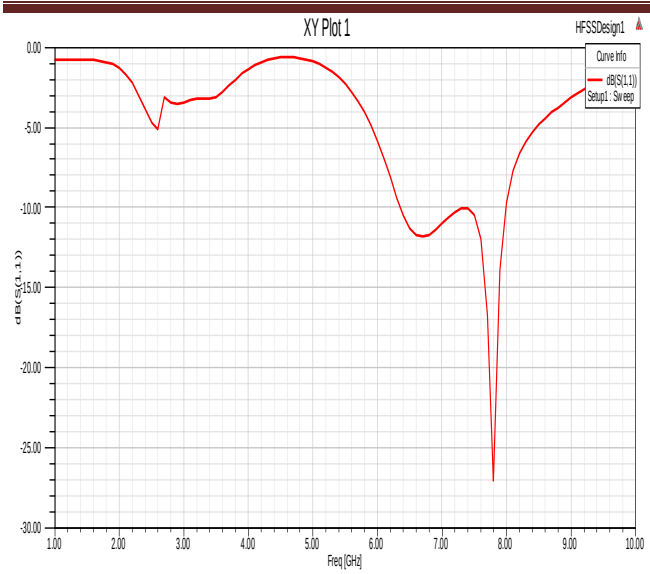

Fig. 2. s- parameter

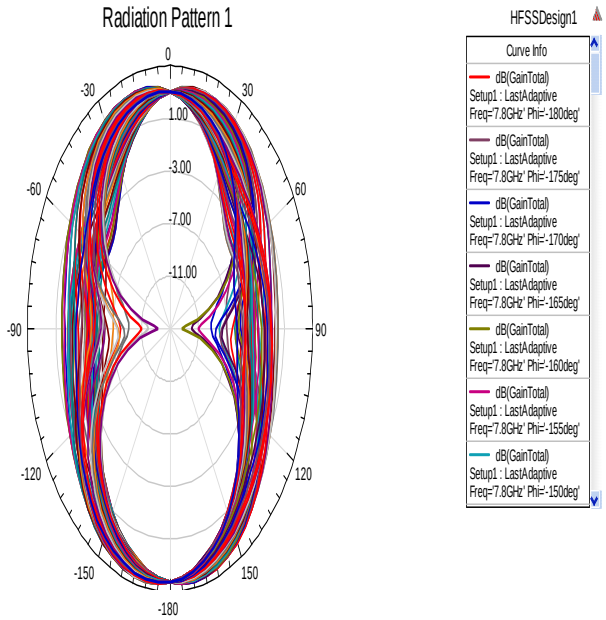

Fig. 3. Radiation pattern

The gain of the proposed antenna shown in fig3.In this there are two angles called azimuthal (Θ) and elevation angles (φ). The azimuthal angle ranges from -180 degrees to 180 degrees and plotted gain elevation at angle (φ=0 and 90)

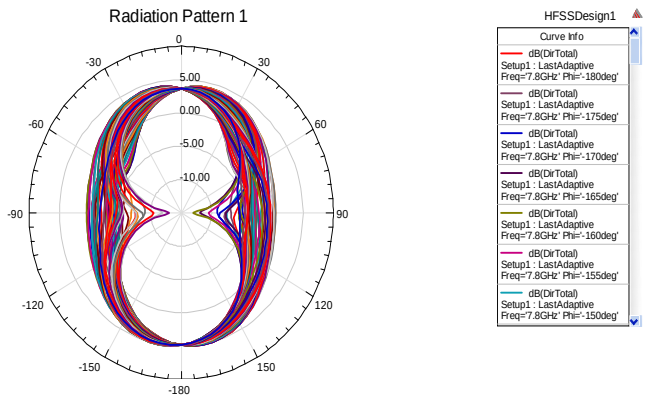

Fig. 4. directivity of proposed antenna

Because of the two monopoles with a common ground which are placed very close, and there exits relatively strong near field and an isolation in ground plane. It can be observed that there is still strong current flowing in the two monopoles and the ground beneath it.

Thus we believe that the near field coupling should be mostly offset by the ground current coupling around it.so the frequency can be determined by the current both from the ground and the near field coupling.

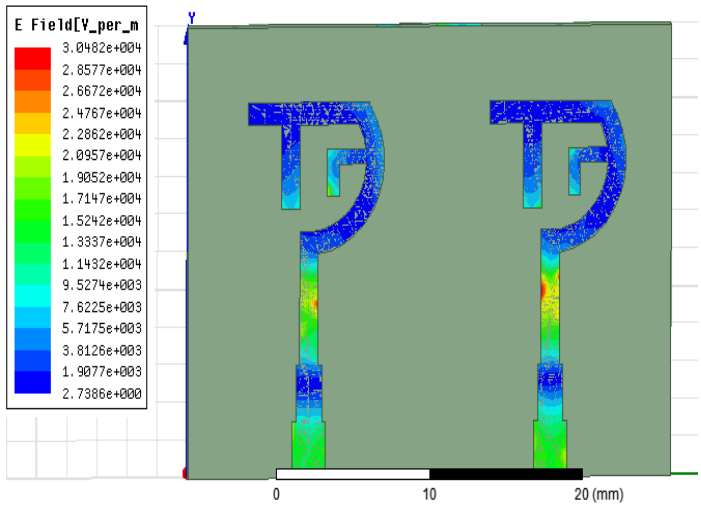

Fig. 5. surface current distribution

4. Fabricated Antenna And The Measured Results

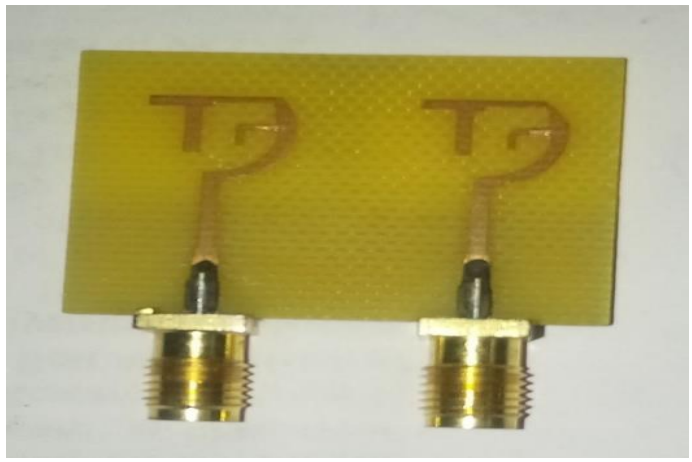

Fig. 6 (a): top view of fabricated mimo antenna

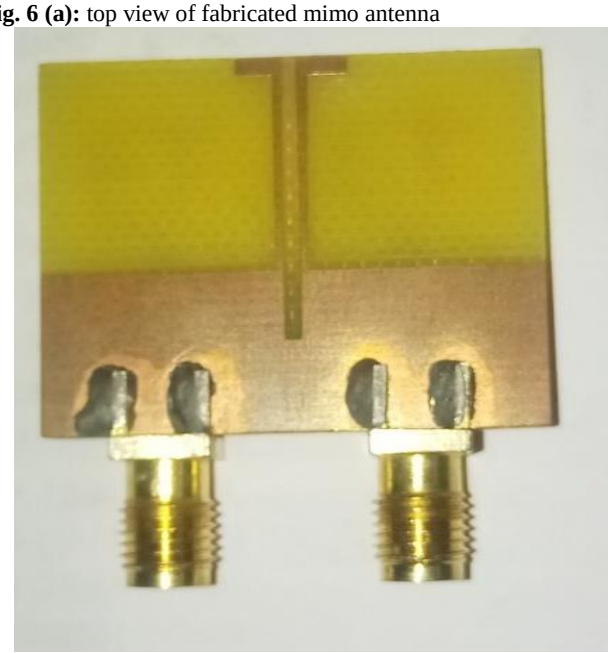

Fig.6 (b): bottom view of fabricated mimo antenna

The proposed MIMO antenna is fabricated on an FR-4 substrate of thickness 0.8mm as shown in figure . The overall dimensions of the proposed MIMO antenna are 32 mm x 24 mm x 0.8 mm. The fabricated antenna is tested using vector network analyser, and the measured results are compared with the simulated ones as shown in

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figure 7. There is a slight difference between measured and simulated results due to copper loss, connector loss.

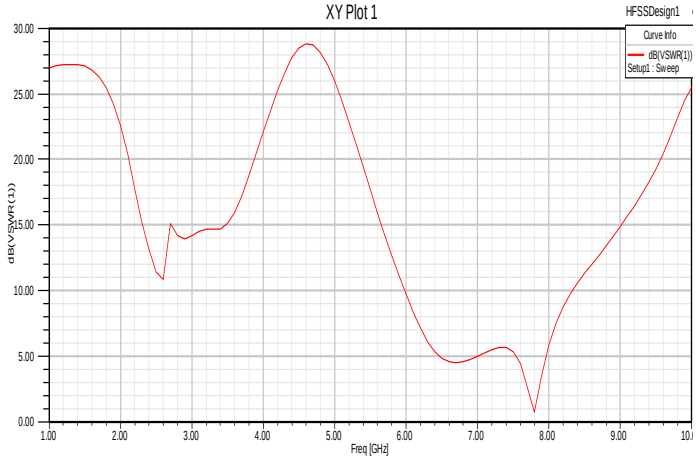

Fig. 7. vswr parameter of proposed antenna

The above figure showsthe VSWR parameter of proposed 'p' shaped antenna. For the better for performances of any antenna VSWR should be below 2 and close to 1. In the proposed antenna we are getting for the one operating bands below 2 which is show in fig9 and atdesired band 7.GHz it also close to 1 which means the reflection of antenna are minimum.

5. Conclusions

The presented work has done with 'P'shaped antenna for The proposed antenna size is reduced and improved return loss, gain and directivity. By using the different materials and structures did analysis for the 'p' shaped antenna. The antenna was designed by using HFSS software. The proposed antenna covers the band 7.8 .S11 parameter less than -10db and overall gain is 4.4db.

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Design and Implementation of Vivaldi Antenna for Micro wave imaging

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Abstract: In this paper we have designed and done the performance analysis on rectangular slot Vivaldi antenna for breast cancer. In this we added rectangular slots and semi-circular on basic Vivaldi antenna to improve the performances of Vivaldi antenna. We are extended our analysis by examine basic Vivaldi antenna by adding different slots like circles, semi circles and rectangular slots implemented in different position on Vivaldi antenna. The proposed rectangular slot Vivaldi antenna is designed with thickness of 1.6mm and FR4 as a substrate which is cheaper when compared to other materials. The proposed antenna is resonated at multiple bands from 19 to 24 GHz (k-band) ,11.5 to 16 GHz (ku-band),9 to 11 GHz(x-band) and 2.5 to 7.5 GHz (c-band). For all the above bands s11 parameter is less than -10dB (s11<-10dB) which indicates 90% of power is transmitted from the antenna. The directivity of antenna is more than 4.5dB

Keywords: Microstrip antenna, Vivaldi antenna, material science, Antennas in medical applications.

1. Introduction

Breast cancer is the most commonly diagnosed cancer in woman. The present technology, which we are using for the detection of breast cancer is x-rays which detects the structural changes of tissues in a human body.

The advance technology for detection of breast cancer is microwave imaging which will detect the dielectric properties of tissues in the body. When compared to the x-ray imaging microwave imaging is best technique and less harmful than x-ray imaging and also less expensive compared to MRI. In the microwave imaging, Antenna is one of main requirement because it acts as an interface between outer environment and microwave imaging equipment. In the medical field, it is preferable when only the size of the equipment is as less as possible and also improving the data rate is a challenge in the microwave imaging due to this the dimensions of the proposed antenna is reduced and date rate is increased with the improved bandwidth of antenna. The challenges mentioned above are achieved by the proposed antenna. One is reducing the size of antenna is achieved by increasing the operating frequency but increasing the operating frequency it is difficult to get better performances to overcome this we added different slots on the basic Vivaldi antenna to improve the performances of antenna and another parameter is increasing the data rate is achieved by increasing the bandwidth.

2. Mathematical Analysis

The included mathematical equations in designing of the vivaldi antenna is shown below:

$$z(t) = ke^{st} \tag{1}$$

The exponential tapered slot of vivaldi antenna indicates the equation (1). from the above equation (1) 'k' indicates Constant and the opening rate is indicated as 's'.

The below shown are formula's for constant 'k' and taper rate 's':

$$k = \frac{r}{2} \tag{2}$$

$$s = \frac{1}{L_a}\ln\left(\frac{W_t}{r}\right) \tag{3}$$

The width of the aperture is denoted by ' W_t ' and Throat width at the origin is 'S'.The equation (4) & (5) are used the calculation of the parameters and the length of aperture is taken as ' L_a ' with respective to the operating frequency of the antenna.

$$W_t = \frac{c}{2\sqrt{\xi_r}\, f_l} \tag{4}$$

$$r = \frac{c}{2\sqrt{\xi_r}\, f_h} \tag{5}$$

The equations above shown are for calculating the width of the aperture and width of the throat at origin. Where 'c' indicates the velocity of light, the lower frequency is denoted by ' f_l ' and higher frequency is denoted by ' f_h ' and substrate permittivity 'ξr'. The shown are Parameters are included in the designing of the Vivaldi antenna.

3. Performance Analysis

In the performance analysis we did analysis in two different ways one is structural analysis and another one is Dimensional analysis. In the structural analysis we added different stripes and slots basic Vivaldi antenna and in dimensional analysis we take different strip sizes and slots of varies radius.

3.1 Structural analysis

In the structural analysis we are analyzed so many structures among those we are finalized three structures based on their performances. from these three structures we are taken the best one as our proposed structure.

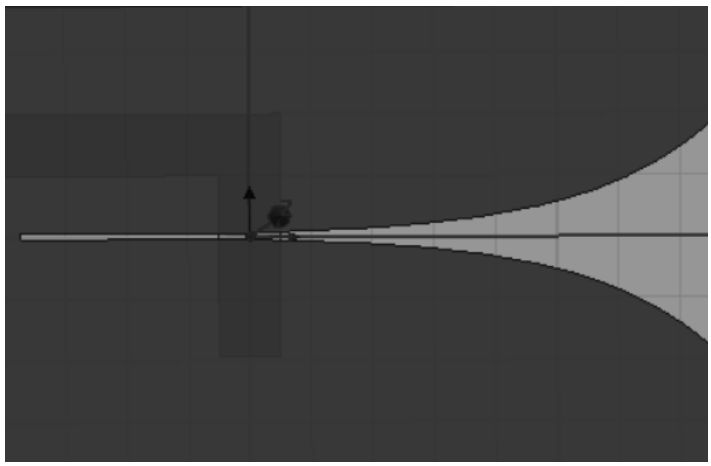

Fig.1: Basic Vivaldi antenna

Figure 1 is the basic Vivaldi antenna for this basic Vivaldi antenna we got gain as 2.06 dB, directivity is 2.6 dB and front to back ratio is 8.46, to improve these parameters we added different stripes and slots on this basic structure.

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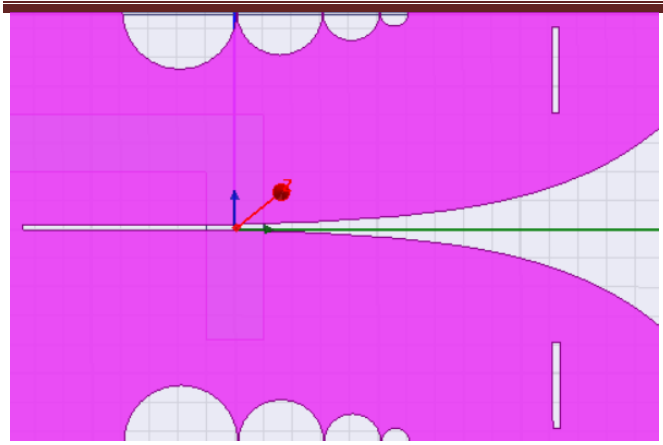

Fig. 2: Semicircle Vivaldi antenna

In this adding semicircles on the sides of Vivaldi antenna by adding semicircles the field produced will focus the energy towards the taper shape which improves the performance and also it resonates at multiple bands. From the slot line the semicircles radius is taken in decreasing order that is 2mm ,1.5mm, 1mm, 0.5mm and two sides there exactly opposite to each other and also the stripe is added at edges of taper shape. By comparing with basic Vivaldi the gain, directivity and front to back ratio are improved by 0.6 dB, 0.51dB and 3 respectively than the basic Vivaldi antenna which show in the table1.

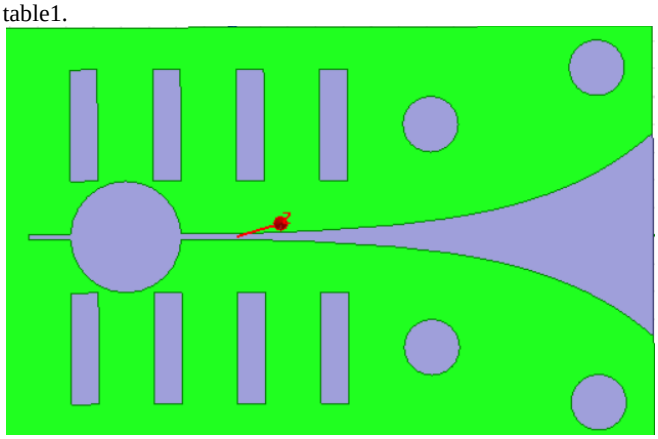

Fig. 3: Rectangular strip Vivaldi Antenna

In the fig.3 shows the rectangular slotted Vivaldi antenna. In this structure we are taken the rectangular stripes on the patch with 4mm length and 1mm width, the spacing between them is 3mm and to improve the performance we also included the circular slots on either sides of tapered shape. To reduce the reflections we added the circle with radius 2mm on slot line. When compared basic Vivaldi antenna the parameters like gain, directivity and front to back ratio are improved by 1.09 dB, 1.35 dB and 4 respectively. And the final proposed antenna has improved the performance than the rectangular strip Vivaldi antenna is discussed in the section IV

Table1: Comparision Results For Different Structures

Structures	Gain(dB)	Directivity(dB)	Front to back ratio
Vivaldi antenna	2.06	2.6	8.46
Semicircle Vivaldi antenna	2.6	3.11	11.45
Rectangular strip Vivaldi antenna	3.09	3.99	13.85
Proposed antenna	3.61	4.61	14.46

3.2 Dimensional analysis

In the dimensional analysis we did the analysis by changing the taper length 15mm instead of 7.5mm the performance improved which show in the fig.4.

Fig. 4: S11 parameter (return loss) of Vivaldi antenna with taper length 7.5mm (green) and 15mm (red)

In the above we analyzed on the taper length after that slots with different radius are tried on the basic Vivaldi antenna we finalized the radius which gives the best performance and also stripes included on the basic Vivaldi antenna with different length and widths and in different positions but the performance of antenna is good at rectangular stripes of length of 4mm and 1mm and in between these rectangular stripes another stripes of length 3mm and width of 0.5mm added these are also taken by using the trial and error method by taking different lengths and widths.

4. Proposed Antenna

This paper presents the Vivaldi antenna with improved bandwidth and reduced the size of the antenna compare to other antennas. The proposed antenna has lesser dimensions and having the better characteristics for the purpose of medical application. The figure.5 shows the top view of proposed antenna structure of Vivaldi antenna which having slots on the patch of the antenna.

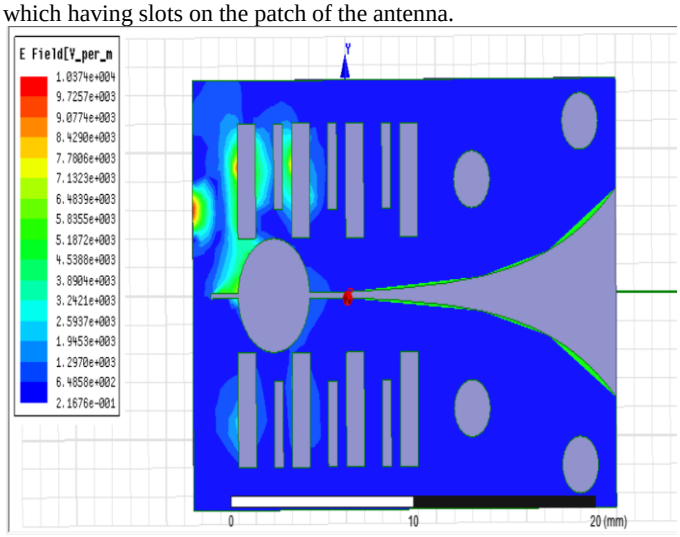

Fig. 5: Top view Proposed Vivaldi Antenna

The above shown figure.5 is the top view of the Vivaldi antenna having slots on the structure. The slots was included in the antenna to improve the parameters of antenna like directivity, gain, and return loss and to maintain the antenna working in the desired frequency.

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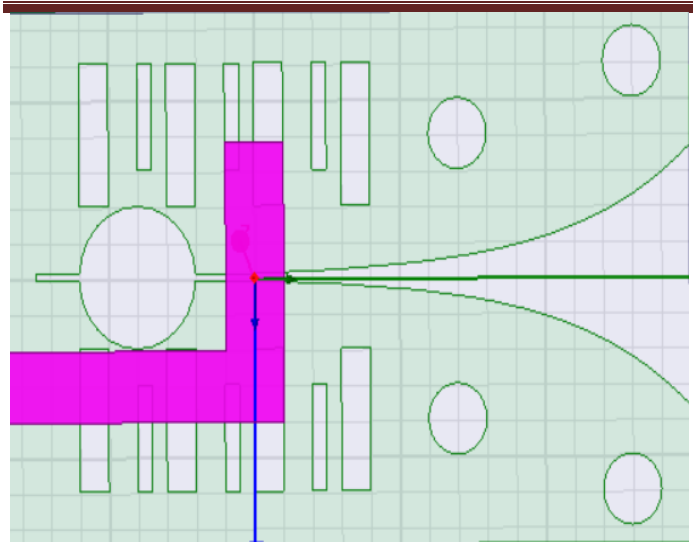

Fig. 6: Back View Proposed Vivaldi Antenna

The figure.6 shows another side view nothing but Back view of the antenna which consists of feed line and in-line with a width of 2mm. The feeding which is given to the antenna is micro strip line feeding. FR-4 is the substrate used for this antenna to get simulation results.

5. Simulation Results

The antenna parameters like return loss, gain, directivity with graphs are shown below:

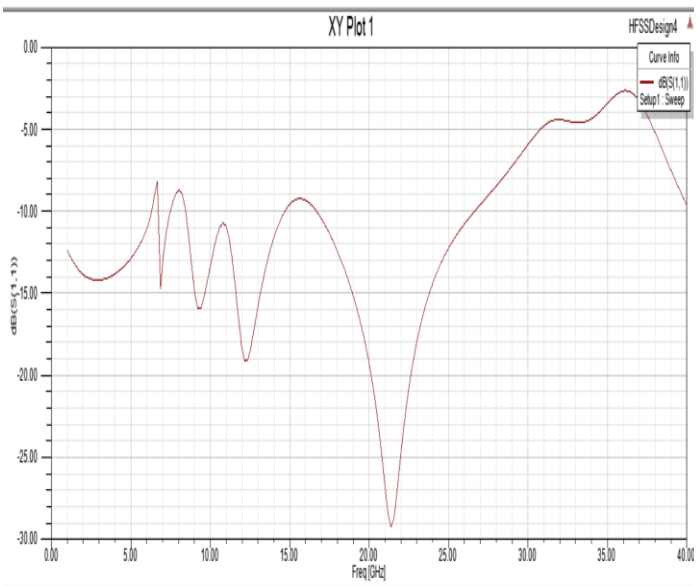

Fig. 7: Return loss (S11 parameter) proposed antenna

The return loss parameter for the proposed antenna is shown in figure.7. The S11 parameter is below -20db means that the losses from the antenna was less. The above graph shown that it was resonating at multiple frequencies.

5.1 Fabrication

Fabrication is the process where the simulated antenna was going to work on real-time environment. The machine which is used to fabricate the simulated antenna is CNC machine which is called as computer numeric control it takes gaber file as input. It can be generated by using software tools. The below figure shows the machine which is used for fabrication.

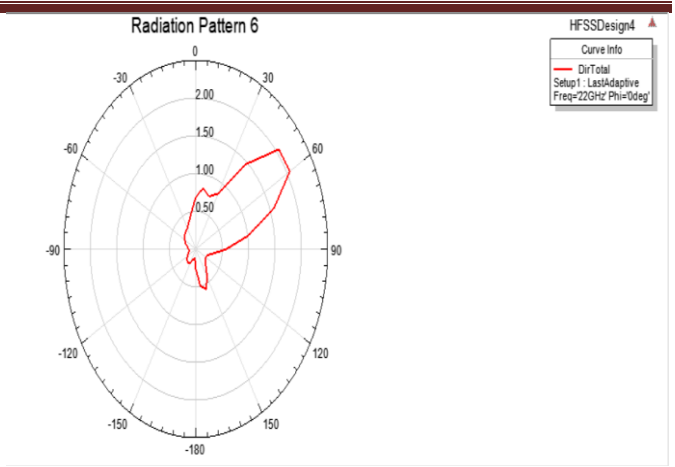

Fig. 8: Directivity of proposed antenna

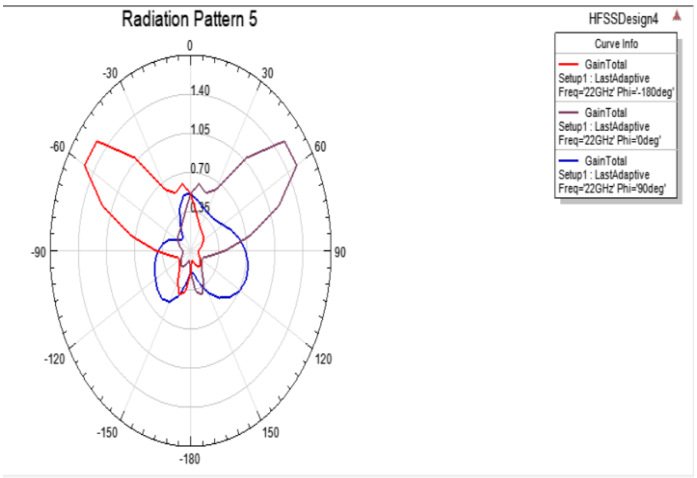

Fig. 9: Gain of proposed antenna

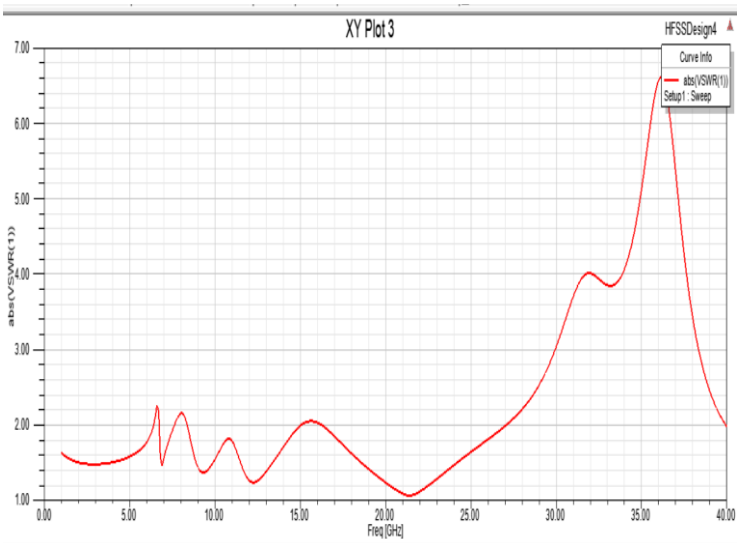

Fig. 10: VSWR of proposed antenna

Figure 11 shows the CNC machine used for fabrication. It takes input as gaber file which design of simulated antenna and gives output as practical design of the virtual design.

After obtaining the practical design of the antenna we have taken the chemicals to remove the excess copper on the single coated substrate. By removing the excess copper on the substrate will give the prefect and equal to simulated design.

Before going to working of practical design of the antenna in real time it will undergoes through testing nothing but characterization. Characterization is the process where testing of antenna was done to antenna is good in practical environment or not.

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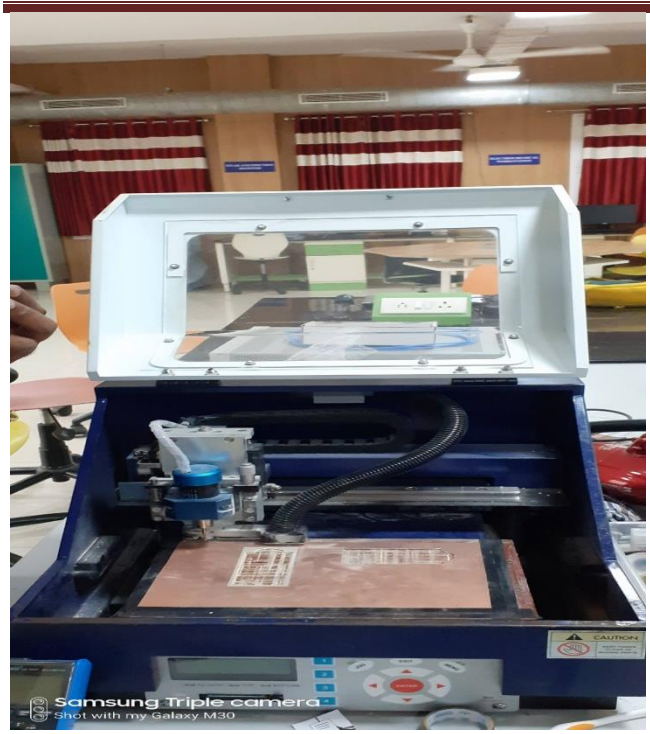

Fig.11: CNC Machine

The device used to test the characteristics of the antenna is vector network analyzer (VNA)which shows the s11-paramter, VSWR, smith chart. By using the ports of the VNA we can connect antenna. The below figure shows the VNA device.

Fig.12: Vector Network Analyzer(VNA).

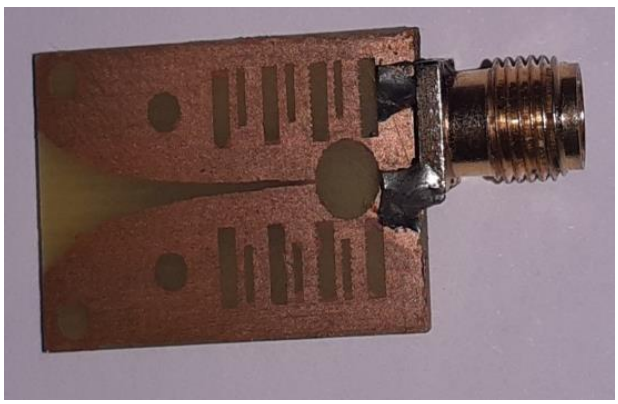

Fig.13 Fabircated Vivaldi antenna.

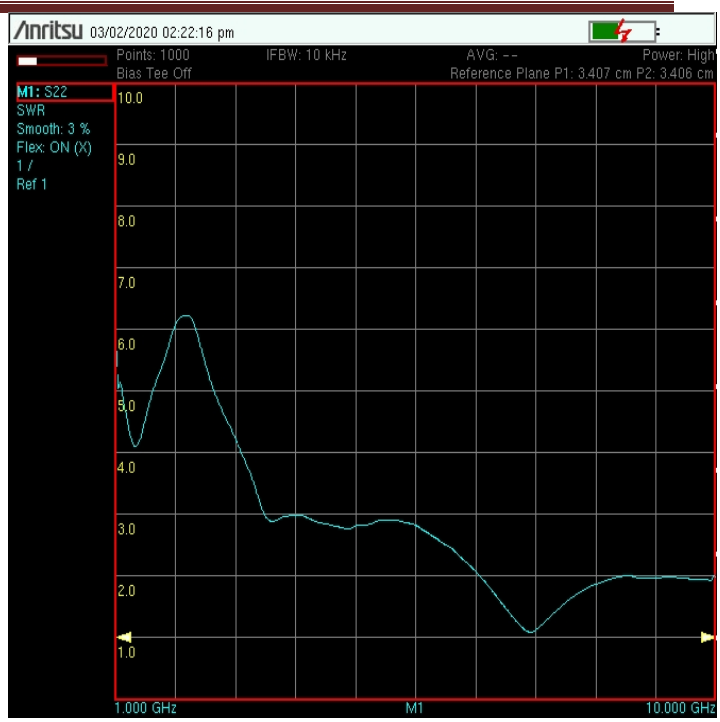

Fig.14: VSWR of the fabricated antenna in VNA device

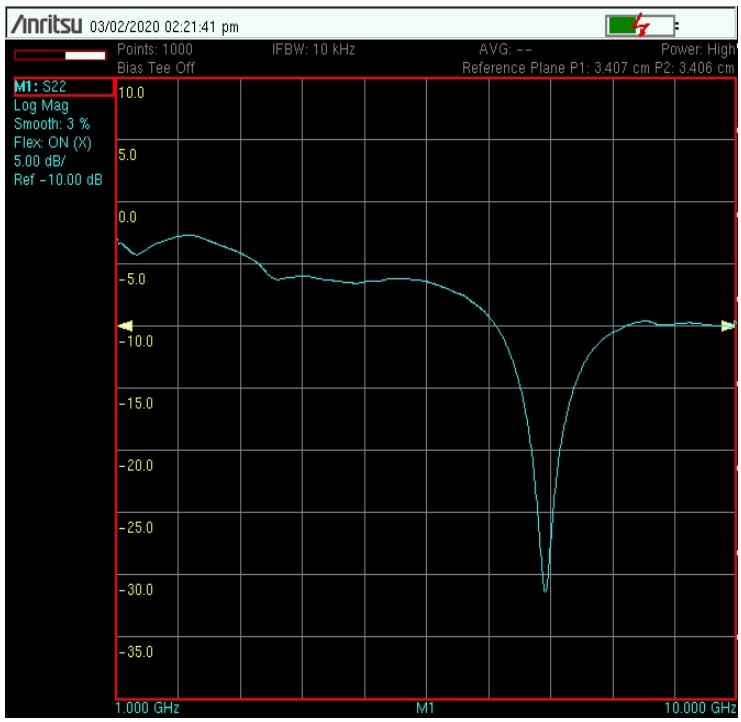

Fig.15.S11- parameter

5.2 Fabrication Results

The practical design of Vivaldi antenna was below on figure.13. which is connected with SMI connector which is used for the feeding power to transmit electro-magnetic waves into free space. By providing the opening of the antenna it will direct the EM waves towards single direction and it will have high directivity in the desired direction.

The VSWR of the fabricated antenna is show in figure.14 if the VSWR is less then 2(VSWR<2) it is good working antenna in real time. The S11 parameter which is also called reflection co-efficient of the antenna. The below fig shows the reflection c0-efficient at port s11.

6. Conclusions

The proposed antenna has lesser dimensions and attain high directivity towards the desired direction which is best usable in micro wave imaging.by including the slots in the structure of the

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proposed antenna it will lead to act the antenna in desired frequency. The gain and return loss parameters also improved according to the application purpose. The antenna was resonating at multiple frequency bands, so not only for this application we can use for other applications and it attains reconfiguration. The proposed work has future scope to improve more directivity and return loss parameter of the antenna for much more better results.

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Design And Implementation Of Bi-Directional Communication For Normal And Challenging People

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Abstract: Every normal human being sees, listens, and reacts to surrounding. There are some unlucky individuals who does not have this important blessing. Such individuals, mainly deaf and dumb, they depend on communication via sign language to interact with others. However, communication with ordinary individuals is a major impairment for them since not every typical people comprehend their sign language. Furthermore, this will cause a problem for the deaf and dumb communities to interact with others, particularly when they attempting to involve into educational, social and work environments. This mainly addresses to facilitate deaf and dumb person's life style. Dumb and deaf people communicate with common people throughout the world using hand gestures. But common people face difficulty in understanding the gesture language. To overcome these real time issues system is developed. This is a user friendly, cost effective system which reduces communication gap between dumb and deaf with ordinary people.The proposed system captures a hand gesture using the high definition camera. Image processing of captured gesture is done on Raspberry pi 3. Amplified audio corresponding to each processed gesture is the final output, also provide the text to speech conversion.

Keywords: Sign-language,gesture detection, GSM module.

1. Introduction

Speech and gestures are the expressions, which are mostly used in communication between human beings. Our work mainly analyses the visual data from a camera. A processing platform of Raspberry pi used for recognizing these signs or gestures. These recognized gestures are further converted into speech.[1][5] The intention of sign language translation is to translate the normal sign language or gestures into speech as well as audio and make easy Communication with dumb and deaf people [1-4]. In order to improve the life style of dumb and deaf people the proposed system is developed. Image processing is the basic technique implemented in this paper [5-9]. Raspberry pi3 act as the processing platform. Processing involves basic image processing techniques such as blurring, masking and eroding along with coded program logic [9] A continuous real time stream of video data captured by the pi camera is the basic input to the processing system. Image processed input visual data is mapped on to its corresponding audio. The audio signal is then amplified using anamplifier.[5] GSM is a mobile communication modem; is stands for Global System for Mobile communication (GSM). The idea of GSM was developed at Bell Laboratories in 1970. In this paper GSM module is used to send a message or convey information through the mobile in the form of message for the people who are close to the challenging people in case of any emergency situation[7-8].

2. Block Diagram and Circuit Diagram

Figure 1, shows the proposed system module. In this system Camera is used to detect the gestures made by the challenging people.Gestures which are detected by the Camera are given as input to the Controller by using Image Processing technique [2].
The Controller process the input which is taken and provides the required output through GPIO pins and Audio Jack which is nothing but text and audio output. Similarly in the case of normal people to communicate with the challenging people they use keyboard as the input to express their information. The given information is obtained as output through audio and display on the required devices [1-6].

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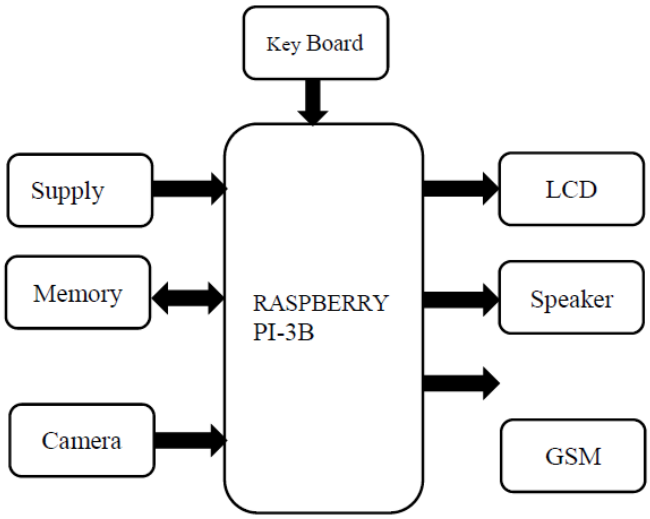

Fig. 1: Block Diagram of Bi-directional communication system

In case of emergency that is if there are no people surrounding the challenging people GSM module is helpful for them to intimate the people by sending the message. [7-8]

2.1 Supply

T he Raspberry Pi 3 is Powered by a +5v micro USB supply. Typically, the model B uses between 700-1000mA depending on the peripherals which are connected to the controller.The maximum power the Raspberry Pi can use is 1 Amp. The GPIO pins can draw 50mA safely, distributed across all the pins; an individual GPIO pin can only safely draw 16mA. The HDMI port uses 50mA, the Camera module requires 250mA, and keyboards and mice can take as little as 100mA [12].

2.2 Memory

A memory card or memory cartridge is an electronic data storage used for storing digital information, A Raspberry-Pi basically uses a micro SD card as hard drive to store any information. For this reason, class 10 micro SD is used in Raspberry-Pi [12].

2.3 Camera

Fig. 2: Webcam

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Rather than using the Raspberry Pi Camera module, in this paper a standard USB Webcam is used to take pictures and video on the Raspberry Pi. The quality and configurability of the camera module is highly superior to a standard USB webcam.[11-12]
Raspberry-Pi camera module is used to take the hand gestures as the input and it will process the detected gestures to the controller.

2.5 LCD Display

A liquid-crystal display is a flat panel display which used to display the output in the form of text with respect to the gestures detected through the Camera. This can be helpful for the normal people to understand the gestures.

2.6 Speaker

The Raspberry Pi has two audio output modes. HDMI and headphone jack the output can be switch between these two modes, the audio can be played over HDMI cable or audio jack port.

2.7 GSM Module

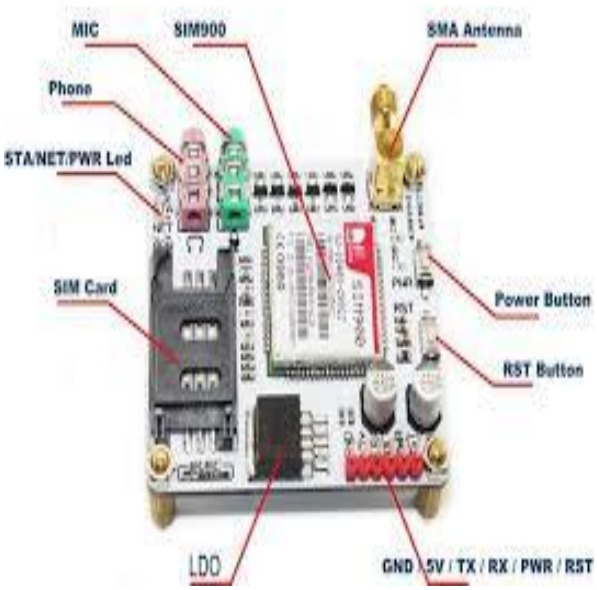

Fig. 3: GSM Module Overview

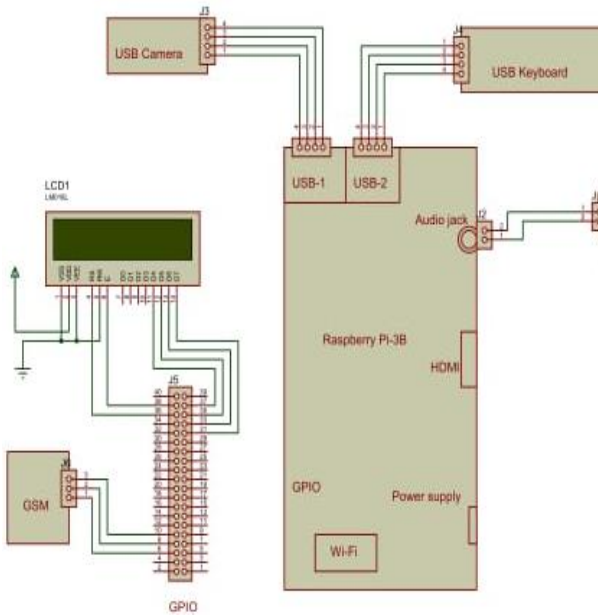

Fig. 4: Circuit diagram

GSM is global system for Mobile Communications. GSM module is chip or circuit that will be used to establish communication between a mobile device and a GSM system [7]. It is one of the commonly used communication module in Embedded Systems. This module is helpful in sending the message in case of emergency Situation. [7-8].

Figure 4, shows the circuit diagram of this paper. The input Camera is connected to the USB port of the Controller. The Output LCD display is connected to the GPIO pins of the Raspberry-Pi. The RS and Enable pins of the LCD are connected to 36, 38 pins of GPIO Port respectively.

The data pins D4, D5, D6, and D7 are connected to 37,35,33and 31 Pins of the GPIO respectively.The Transmitter, Receiver and Ground pins of the GSM module is connected to 6, 8 and 10 pins of the GPIO Port. The Audio Output is taken from the Audio Jack Port.[8]

3. Hardware Implementation

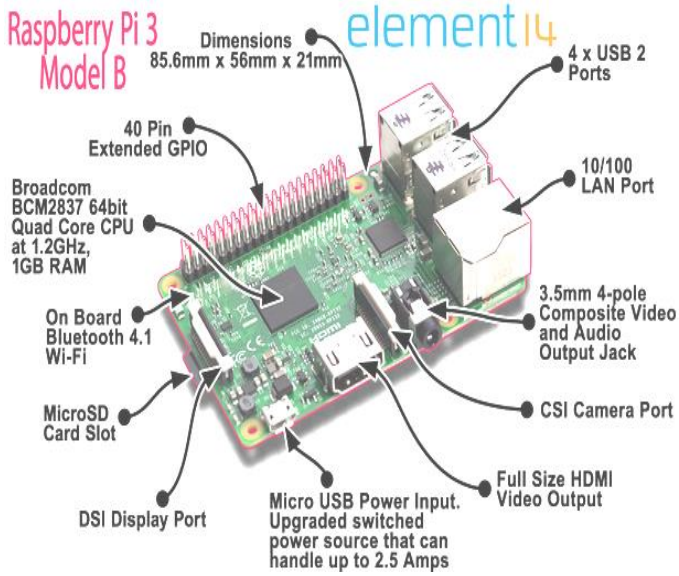

Fig. 5: Raspberry-Pi Overview

Image Processing are used in various techniques, this paper presents the implementation of image processing operations on Raspberry Pi.[9] The Raspberry Pi is a basic embedded system and being a low cost a single board computer used to reduce the complexity of systems in real time applications. This platform is mainly based on python. Raspberry-Pi consist of a Camera Slot Interface (CSI) to interface the Raspberry pi Camera [10].

Raspberry-Pi is the Controller used for this work. USB ports are used to take the input, audio jack and GPIO pins are used to get the required Output.Hand gestures are taken as input from the camera [11].

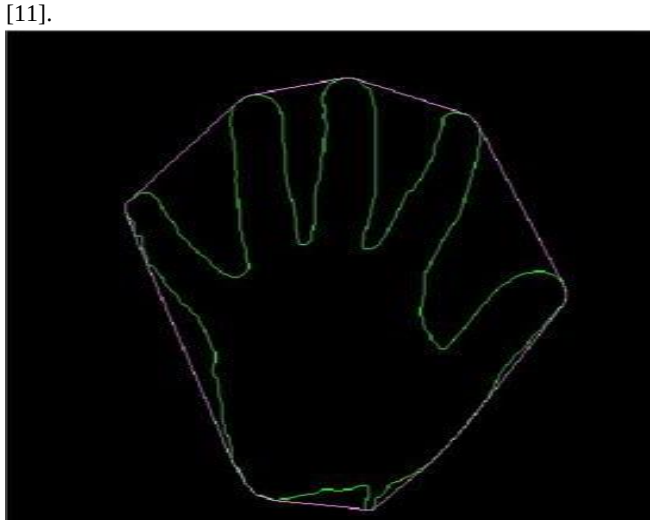

Fig. 6: Identified Hand gesture

Figure 6, shows the identified hand gesture detected through the camera.

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Fig. 7: Thresholded Image

Thresholded image is the image which is having a particular threshold values in order to process the input through the controller, for this Raspbain software is used. The Simplest thresholding methods replace each pixel in an image with a black pixel if the image intensity Ii,j is less than some fixed constant or a White pixel if the image intensity is greater than that constant.[9][5]

Pin#	NAME		NAME	Pin#
01	3.3v DC Power		DC Power 5v	02
03	GPIO02 (SDA1 , I²C)		DC Power 5v	04
05	GPIO03 (SCL1 , I²C)		Ground	06
07	GPIO04 (GPIO_GCLK)		(TXD0) GPIO14	08
09	Ground		(RXD0) GPIO15	10
11	GPIO17 (GPIO_GEN0)		(GPIO_GEN1) GPIO18	12
13	GPIO27 (GPIO_GEN2)		Ground	14
15	GPIO22 (GPIO_GEN3)		(GPIO_GEN4) GPIO23	16
17	3.3v DC Power		(GPIO_GEN5) GPIO24	18
19	GPIO10 (SPI_MOSI)		Ground	20
21	GPIO09 (SPI_MISO)		(GPIO_GEN6) GPIO25	22
23	GPIO11 (SPI_CLK)		(SPI_CE0_N) GPIO08	24
25	Ground		(SPI_CE1_N) GPIO07	26
27	ID_SD (I²C ID EEPROM)		(I²C ID EEPROM) ID_SC	28
29	GPIO05		Ground	30
31	GPIO06		GPIO12	32
33	GPIO13		Ground	34
35	GPIO19		GPIO16	36
37	GPIO26		GPIO20	38
39	Ground		GPIO21	40

Fig. 8: GPIO pin configuration

GPIO pins are the General Purpose Input Output pins which are main pins in the Raspberry-Pi. These pins can be configured to be input or output and can be enabled or disabled. Input values to these pins are readable and output pins are writable/readable. The 4, 6 and 8 pins of the GPIO pins are connected to the GSM module transmitter, receiver and ground pins. 31, 33,35,36,37 and 38 pins are connected to the LCD to display the output. GPIO is a generic pin whose behaviour, including whether it is an input or out pin, can be controlled by the user at a run time. GPIO pins have no special purpose defined, and go unused by default. The idea is that sometimes the system designer building a full system that uses the chip might find it useful to have a handful of additional digital control lines, and having these available from the chip can save the hassle of having to arrange additional circuitry to provide them [10-12].

GPIO capabilities pin may include:

- GPIO pin may be configured to be input or output
- GPIO pin can be enabled/disabled
- Input value are readable(typically high=1,low=0)
- Output value are writeable/readable
- Input values can often be used as IRQs(typically for wakeup events)

4. Results

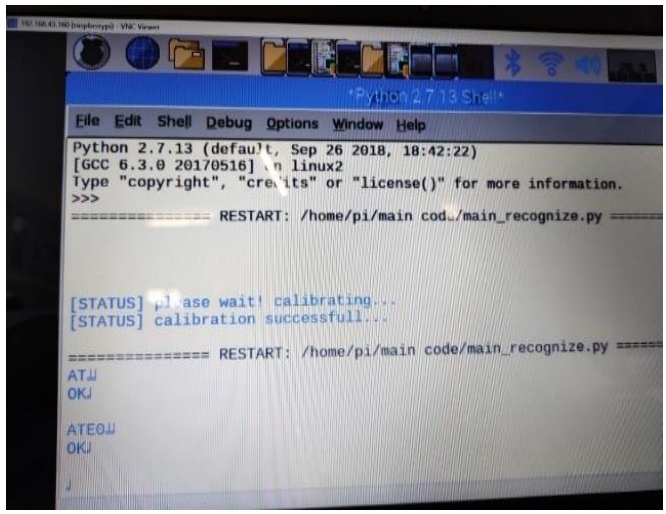

Fig. 9: Calibration output

The above figure shows the calibration output of the system which is nothing but the successful running of the program without any errors.

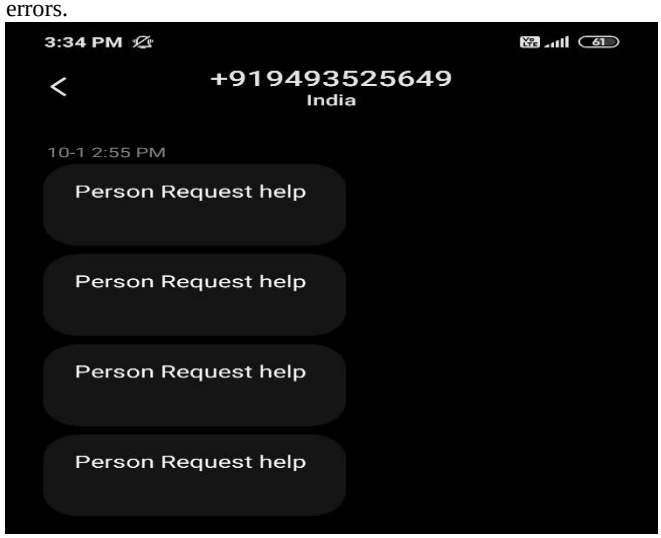

Fig. 10: GSM module output

Fig. 11: Display output

Figures 9, 10 and 11 shows the required outputs obtained from this work. Different types of outputs are shown in the figures.

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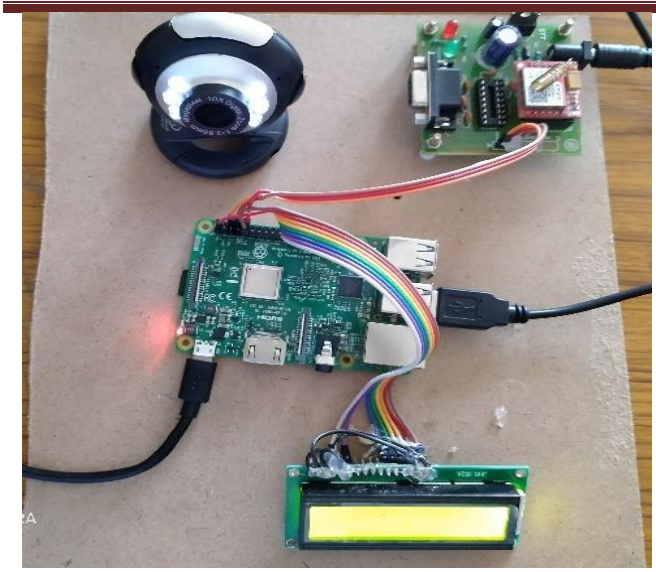

Fig. 12: Prototype of the System

Figure 12, consists of prototype model of the bidirectional communication system which includes Raspberry Pi controller, LCD display, Web Camera and GSM module.

5. Conclusions

This paper is mainly useful for bidirectional communication between challenging and normal people. This device is used to translate sign language into speech as well as text to voice for blind people and in case of emergency message is send to friend or relative through GSM. The main advantage of this paper is to carry away this device easily, it is about less weight. This paper will be beneficial to both challenging as well as normal people.

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A Novel and Smart Wireless Sensor Network System for Real Time Aquaculture Applications

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Abstract: In this paper we have analyzed the network routing for aquaculture dealing with internet of things using network simulator to improve the performance. In the implementation of this system we have gone through three levels. In first level we have analyzed the network topology with 4, 10 and 20 nodes and extracted the parameters like throughput, delay, Transmitted and Received data with the help of network simulation tool. In the level of implementation, we interfaced multiple sensors with the ARM processor which acts as one sensor node then we have incorporated it with the LPWAN technology based Lo-Ra module as a gateway which helps to improve the battery life, cost efficiency and development. Later we used the MYSQL database which is a backed open source relational database management system (RDBMS). Here the database is mainly used for storing day to day output values that are gathered by the sensor nodes and user information. In the final level we have designed a web application using HTML (hyper text markup language) programming for creating the web pages with the text and images. We also used the PHP (hypertext processor) that will be embedded in a HTML code and it can support in a web server. Here we used HTTP (hypertext transfer protocol) that provides communication to the World Wide Web. Finally, to make network as secure as possible we have assigned OTP based login authentication. Only authorized persons are allowed to access the database.

Keywords: Internet of Things (IOT), sensors, network, MYSQL, HTML, HTTP.

1. Introduction

Here in this introduction part of our proposed system we are providing the necessary information that we collected for the usage of our system design and implementation. Now a day the sensory network become an important thing in many fields that they can connect number of sensors are connected to a hub (server) which acts as a sensor node. These sensor nodes are responsible for collecting the data and providing the collected information to particular user. These are segregated into wired and wireless sensor networks. From where these are connected through different servers from which the user is able access the data collected by the sensory networks. This information is used for monitoring purposes in different fields and also helps to take necessary steps in order to correct the faults if any occur.

For the proper assigning of these wireless sensory networks a network topology is need to be identified with which the performance is optimized. Ns3 is a new simulation tool in the networking systems and it provides a huge opportunity in the wireless sensor networking systems. But this simulation tool faces some challenges they are given as follows.*Mobility:*In some sensor networking the simulation values need to change in accordance with the mobility of devices. It becomes a big challenge to provide proper simulation results during mobility.

1.1 Naming and Locating

In the networking systems naming a point or node and locating that node in a particular point is very important. Here in this simulation tool naming and fixing a particular location for a node is difficult.

1.2 Data management

When we consider the wireless sensor network systems it is very important to maintain the proper transfer of data rate. For this a proper connection need to be identified between the two points or nodes. When the connection is improper there may chance of losing of data.

1.3 Two-tier transactions

In the wireless sensor networking system there are chances that access node receives the multiple data at the same time i.e., it receives the data at the same time from different nodes. In this case there is more probability to cause collision and data loss may takes place.

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This simulation tool is currently in use for different sensor networking fields among them a few are given as follows.

1.4 On-Off application

This traffic generator follows an on-off pattern for ‘on’ and ‘off’ states alternatively. The duration of each of these states is determined with the on time and ‘off’ time with random variables. During the ‘off’ state no traffic is generated i.e., no data transfer will takes place where as during the ‘on’ state traffic is generated. This traffic is characterized by specified ‘data-rate’ and ‘packet size’.

1.5 Packet sink

This application was written to compliment on-off application, but it is more general so the name packet sink was selected. Functionally it is more important to use in the multicast situations, so that reception of latyer-2.

Multicast frames are inserted and enabled but it is also useful for unicast as an example of how we can write the code for receiving of data.

1.6 Bulk-send application

It is the traffic generator which is simply sends the data as fast as possible up to max bytes or until the system stops.

Once the lower layer sends the buffer is filled, it waits until space is free to send more data, essentially keeping a constant flow of data. Only for these to establish SOCK_STREAM and SOCK_SEQPACKET are supported for this. For example TCP sockets can be used for this, but the UDP sockets cannot be used.

2. Internet of Things

In present day situations IoT plays a major role in many fields such as aquaculture, smart home, smart vehicles, industrial automation, smart cities, etc. Among all these applications we taken the IoT- based aquaculture. IoT is a nothing but every physical thing on this earth become computerised and it is described as a system that is capable of transferring the data through the means of internet and it can be monitored and controlled at anytime and anywhere in the real time based applications. It is used to improve production and performance of the system with low cost, high efficiency and it reduces human efforts in the smart aquaculture system. As we require continuous monitoring of the aqua fields for observing of the changes in the conditions, more number of workers required to monitor large area aqua fields. Thus it became a big problem due unaware workers and monitoring in the night times is very difficult. Smart aquaculture consists of sensors those are

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connected to different qua field areas in aquaculture, these sensors collects data and update the collected data in the cloud, which is a collection of enormous, dynamic, complex and spatial data.

2.1. IoT challenges

IoT is one of most using technology in different fields and in many industrial applications that provides huge opportunities in current digital world. In simple form it can be described as a system that collects the data/information from different fields with the help of the data collecting devices and analyse the collected data and provides the output of that data. Along with the advantages of this system, it also faces number of challenges among them few are given as follows.

Security : It became one of the greatest threats to the IoT systems .As it was unable to provide better security in designing of some industrial applications. According to the statistics of global risks reports it was declared that there is a chance of cyber-attack for the interlinked IoT type of industries. Clouds are not providing much security when we compared to the other technologies. Providing security for the IoT is a critical process.

Privacy: Another big issue in the IoT system is privacy. It is important to provide privacy for industrial information. Information collected by different sensors and their personal information. This may include the bank information.

Cloud attacks: Almost every accessible data in IoT system can be stored in cloud. This cloud networks consists of big data stocks. That may be attacked by the cyber-attack.

Accuracy: IoT serves the purpose of contexts acquisition with high accuracy and efficiency. Context aware services provide functionalities which are personalized for their user's current situation. A main concern of context-aware services is a substantial consumption of resources while preserving a minimal level of accuracy.

2.2. IoT applications

The different application fields in which IoT plays major roles are given as-

2.2.1 Aquaculture

In this paper, we mainly focused on the aquaculture applications. In the aquaculture system different parameters are needed to be calculated and analysed. Those parameters are temperature, water flow, pressure, pH levels, light intensity in water; water levels etc., and are to be monitored. Applications of IoT can be based on the different equipment's and the sensors those are used in the aquaculture. In the IoT-based smart aquaculture, a system is built for monitoring the aquaculture field with the help of sensors.

2.2.2 Military

However, the IoT system also used in the private sectors and it has a wide-ranging of implications and benefits for military logistics and it supplies chain management connected devices in the military promises to revolutionize the modern warfare by leveraging automation, Big Data and analytics.

2.2.3 Industry

In the industrial internet of things it is originally described the IoT (Internet of Things) as it is used across several industries such as manufacturing, logistics, real time, oil and gas transportation, mining and metals, aviation and other industrial sectors and in use cases which are typical to these industries.

Smart cities: The usage of the IoT system has increased to a great extent and it is currently trying to implementing in many cities in order to make the cities much smarter.

2.2.4 Motivation

Now-a-days the quality of food is reduced to a great extent and in the aquaculture fields the hygiene, quality is decreased and production cost is drastically increased due to lack of manpower in monitoring the fields, and the other reason is without basic knowledge of what are the water conditions that are to be maintained for the healthy growth of aqua animals and the over feeding is provided for fast yields. So production cost increases for these reasons the challenges are came into existence .To overcome these challenges Smart IoT-based Aquaculture is used. IoT is purely based Automation, so it reduces the manpower. It helps in maintaining proper water conditions

3. System Design and Related Work

In this part we discuss about the steps that involved in designing of the system at different layers and the summarised information that we take from the base paper study. In the designing and hardware implementation of the proposed system we deal with the three stages or layers such as perception layer, network layer, application layer namely.

In perception layer, it might be consists sensors, actuators and processors. Those sensors are connected to the ARM processor which can be used to transmit the data to the cloud. Those sensor data it may be analog or digital can be fetched to the ARM processor.

In network layer, we deal with the server and cloud that can be used to integrate the data to the database. PHP and HTML languages are used for creating the database. Here we used the HTTP protocol to establish the communication between the two devices.

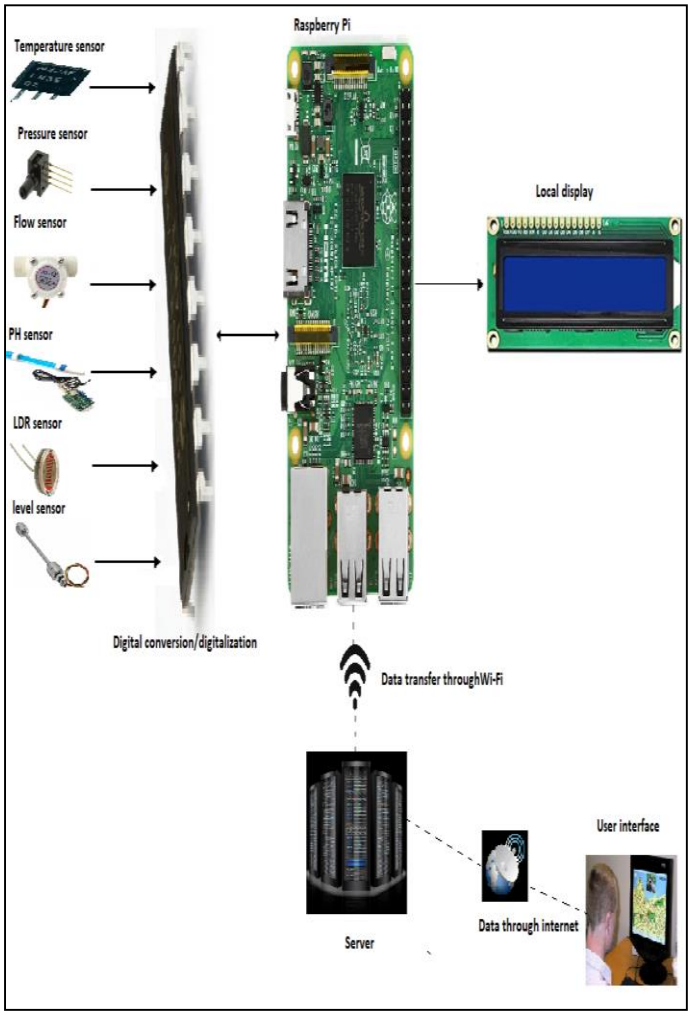

Fig. 1: Basic block diagram of our proposed system

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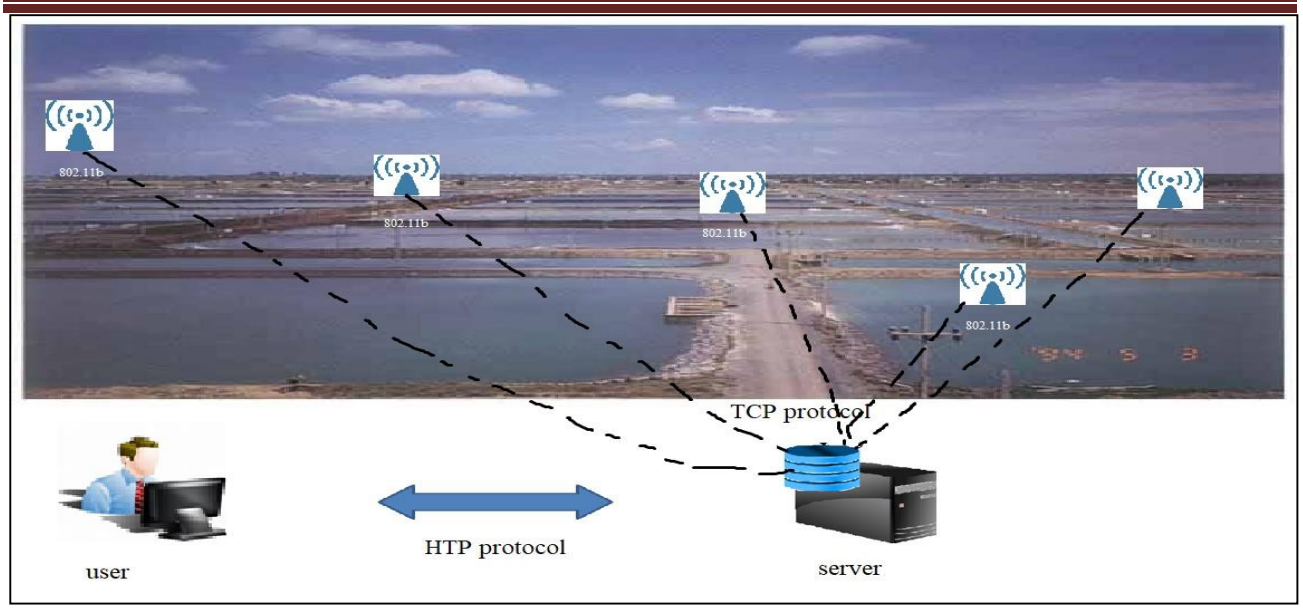

Fig. 2: Proposed IoT system model structure

Where as in application layer file transferring and other services takes place. This layer mainly consists of the desktop and web applications.

Here, in our system we used the MYSQL as a data base which is an open source relational database management systems (RDBMS). Code for it can be written in C, C++ language, which is available in English. MYSQL is open source software under the terms of GNU (General Public License and proprietary) licenses. The SQL is one *of* most popular languages for adding, accessing and managing content that is present in database. MYSQL is used by many database-driven applications. MYSQL is also used by many websites.

PHP stands for hypertext pre-processor, designed for web development. It may be written in C and C++ languages. PHP can be embedded in HTML code and it can be implemented as a module in web server. The web server combines the results that are executed by the PHP code, including images text, along with generated web pages. At free of cost, PHP can be supported and deployed for many web servers on most of the platforms and operating systems.

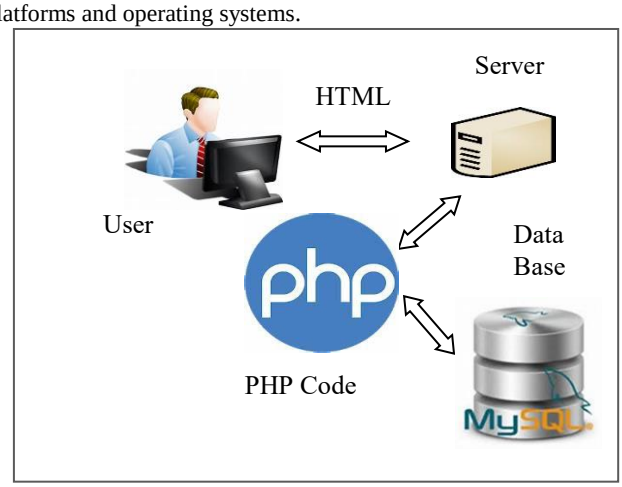

Fig.3: Database, server and application design flow.

HTML stands for hypertext markup language, generally used for creating web-pages and for web applications. With this HTML, images are embedded into a web page. It may be written in a java, which is able to manage the content of web pages.

3.1 Temperature sensor

Temperature is one of the major parameter that affects life of the aqua animals. A proper temperature condition is needed to be maintained according to the re requirement. In order to know the temperature in the surrounding atmosphere and in the water for continuous monitoring of variations in the temperature. We are using a temperature sensor for regular update of the data.

3.2 Flow sensor

Proper amount of water flow required for the aqua animals is to be given to with a proper flow. If the water is overflowed it may damage the life of aqua animals so proper flow is need to be maintained, for the maintenance and continuous monitoring of the water flow in the aqua fields we assign the flow sensor that senses the flow of water continuously and it is capable of maintaining the flow.

3.3 PH sensor

If the water provided for the aqua animal fields or aqua fields is acidic in nature it leads to several effects on the aqua animals. Thus a proper pH value is needed to be maintained in the water that is providing to the aqua fields. For this purpose we used the pH sensor which is capable of measuring the pH levels in the water .It continuously checks the pH value in the water and provides the data that it collected which helps us to take necessary steps in order to maintain a proper pH value and take actions if the value is changed beyond the required value.

In the implementation of the proposed system we interfaced the basic sensors such as temperature sensor, flow sensor and the pH sensor. With the interface of these sensors we verified the outcome results and estimated the performance characteristics of the proposed system.

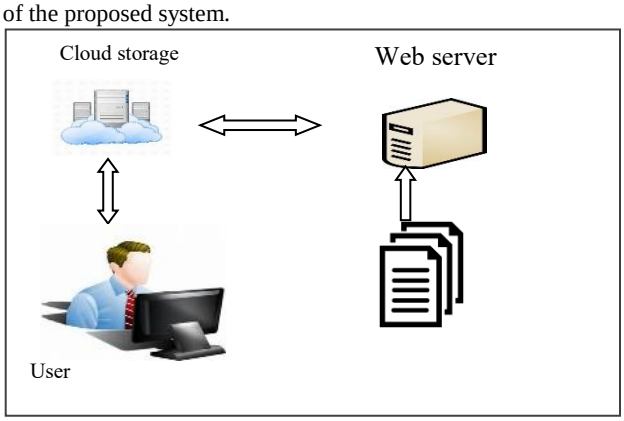

Fig.4: Web Application

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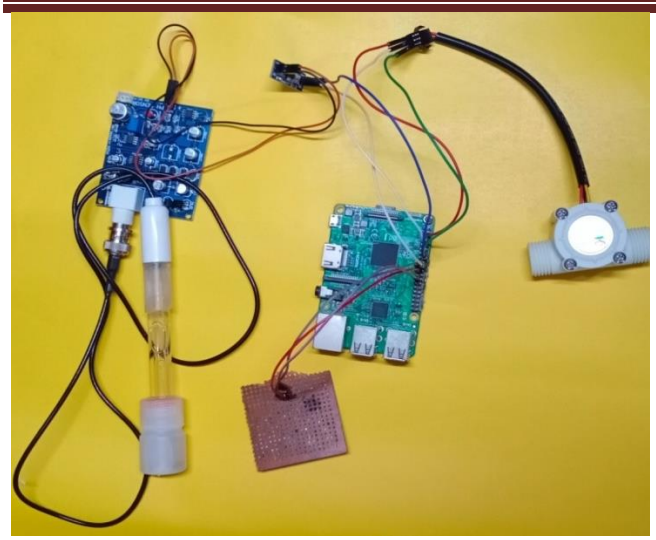

Fig. 5: One of the sensor node models of our proposed system

Table 1: Comprehensive Study of IOT Aquaculture Related Work

Reference	Topic Discussed	Sensors Used	Communication module Used	Limitations
Reference1	Monitoring system	Temperature, pH	Wi-Fi	Suitable for only short range
Reference2	Monitoring and Controlling	Temperature, pH, level	GSM	Maintenance is difficult
Reference3	Feeding system	------	Web interface	Proper precautions need to take for proper feed
Reference4	Controlling system	Temperature, pH, Moisture, Flow	-----	Hard to make changes in water conditions
Reference5	Monitoring system	pH, Temperature, Moisture	Wi-Fi	Long range of monitoring is not possible
Reference6	Spoilage detection	-------	------	Preventing of spoilage is difficult

Table 2: Water Quality Parameters with threshold range

S. No	Water Quality	Parameters Range
1	Dissolved Oxygen (DO)	(4-10)ppm
2	Ammonia	(0-0.1)ppm
3	pH	(7.5-8.5)ppm
4	Temperature	210˚C-330˚C
5	Salt	(0-2)ppt
6	Carbonates (CO32-)	(20-40)ppm
7	Bicarbonates (HCO3-)	(150-500)ppm
8	Nitrates(NO2)	(0-0.3)ppm
9	Sour gas (H2S)	(0-0.4)ppm

3.4 Related study

In paper [1], the authors are described the security issues in aquaculture IoT system. The smart way of automatic farming process referred as smart agriculture. Real-time monitoring in environment is a main factor. By using such automated systems will help in maintaining the safe environment in aquaculture areas. Every aquaculture needs proper monitoring for the healthy growth of the aquatic animals. Here in this paper the author describes about the smart monitoring of this aqua fields without any human efforts.

system in advance to the monitoring system. In this the authors deals with controlling of the water quality.

The authors of paper [3] deal with the feeding system for the fish in the field of the aquaculture. The feeding of the aquatic animals is also one of the major things that affect the production. In this the authors interface the feeding process with the IoT system which will automatically feed the aquatic animals whenever necessary.

In paper [4], the authors are concentrated on sensors, which are used in aquaculture IoT system. It proposes an economical use of arduino based aqua system. It deals with various parameters such as temperature, pressure and pH levels with the help of temperature, pressure and pH sensors. So, that the parameters that can be obtained are temperature sensor, pressure sensor, flow sensor and etc. The raspberry pi collects the data from the ARM processors. We can say that, raspberry pi supports different type of sensors along with ARM processor. Since, raspberry pi having digital pins and 26 GPIO pins so we can connect multiple sensors at a time.

In paper [5], servers of the aquaculture system are described here. A server is a type of device which provides the functionality for other devices; we can call it as “clients”. Stable measurement over a long period of time in wide area is important factor. Each server can consist of thousands of systems, which requires a large amount of power to run and manage. And, mainly server should have backup servers which can take over the function of one particular server in Web servers, application servers, game servers, mail servers and etc.

In all of these papers the authors used to present the development of PHP & MySQL based on online examination system with drop box capability with power failure handling. Now a day, most of the online examination systems are introduced the design of PHP & MySQL web based. PHP is a language, which is used for web development. It is open source and free and PHP is embedded in HTML. It is integrated with MySQL and it can perform many of the system functions. By using PHP, we can control users to access the website pages means data encryption is possible. My SQL is a relational database management system (RDBMS) that uses structured query language (SQL). It is used to add the pages to your website, as well as we can access and manage the data, which is present in the database.

The mixture of PHP and MySQL is used to create any type of website which is either in small or large sites. The authors are developed SQL with HTTP protocol. For the communication with SQL database, this is developed by using a standard HTTP. It is used to fetch the data into the web site. It uses server-client model, the laptop and mobile acts as

Clients and such requests from the clients are take action by web browser. HTTP is used to transfer the data such as audios, videos, pictures, and documents between the systems through the internet. HTTP can be referred as connectionless protocol because, there is no need of any connection to the server to keep information about any user for the span of several request.

4. Results

The software simulation results of our proposed networking system with the best routing topologies that provide the best

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values for all the parameter considerations such as less delay time, low power consumption, required throughput, fast transfer of data with a negligible loss. The following two figures shows the topology results of our Ns3 simulation tool for the four nodes network topology and the ten nodes network topology. The following is the better networking topology that provides good results as per proposed system requirements.

One of the sensor interfaced network results of the proposed system are shown in the figure9. From these results we observed that the designed network topology provides the best and faster results.

For the better outcomes we select two access points for four sensor nodes network topology for efficient transfer of data from sensor nodes to the server. Similarly for the ten nodes network topology we select five access points for accessing the data from the sensor nodes to the server.

Above given are the best network topologies that we identified as best network topologies for four nodes and ten nodes wireless sensory network system in the network simulation tool. By observing these simulation results on the command window of the system, we come to a conclusion that these are the better networking systems.

results when we go for the direct implementation process.

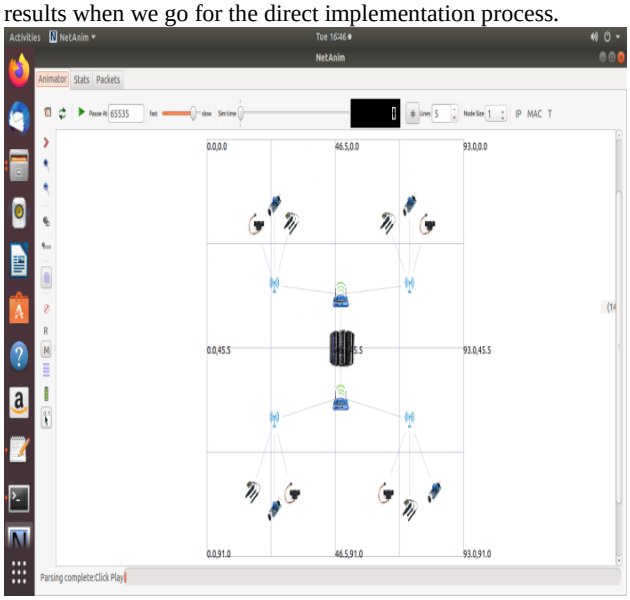

Fig. 6: Four nodes Network Topology Output in Ns3

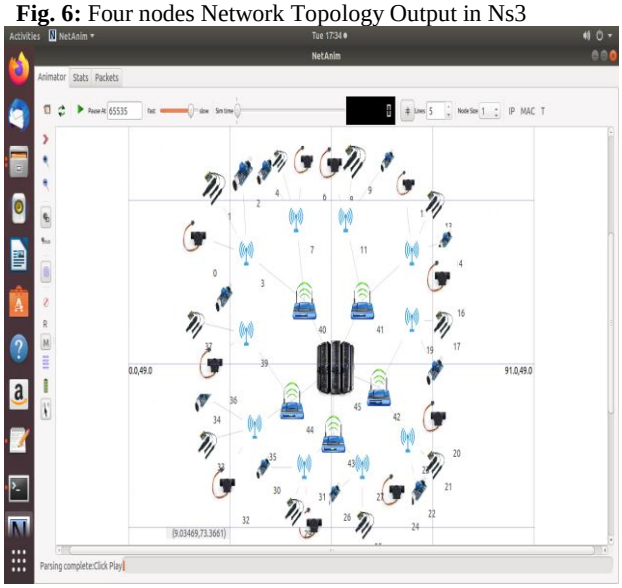

Fig.7: Ten nodes Network Topology Output in Ns3

4.1 Future scope

In future there is a huge scope for this kind of implementation for the wireless sensory network system. There is necessity for implementation for this process in various fields like medical, industrial and other fields. This implementation process will provide better

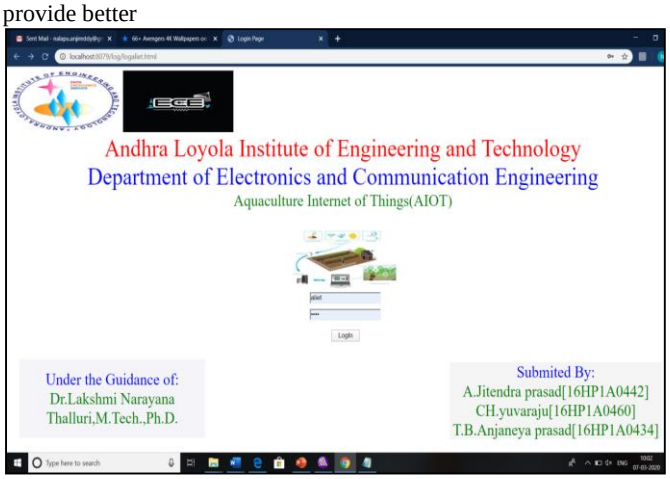

Fig 8: A Smart IoT System for Aquaculture Applications login page

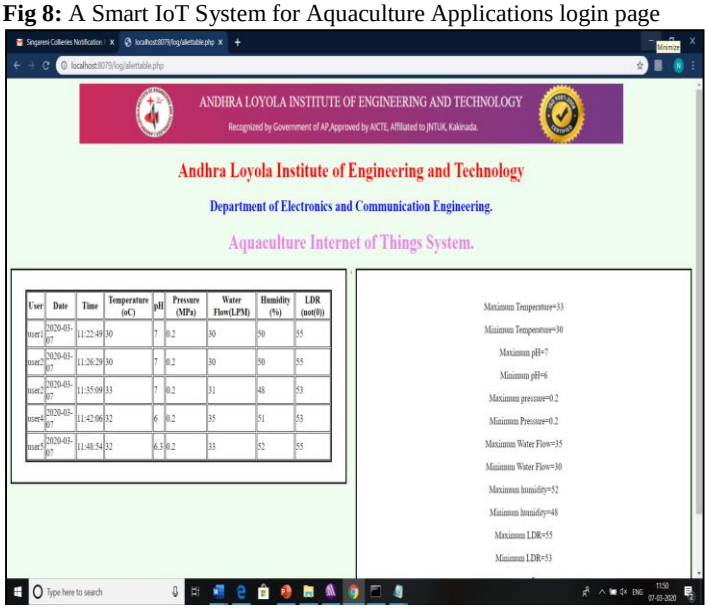

Fig 9: A Smart IoT System for Aquaculture Applications Data in tabular form.

5. Conclusions

In this paper, we have discussed about the design of a novel and smart wireless sensor network system for real time aquaculture applications. The entire system is designed using Ns3 tool in the software and ARM processor embedded single board computer with 1GHz processing speed i.e. raspberry pi for hardware. Various sensor nodes are created to convert physical data in to electrical quantity. Those are temperature sensor, humidity sensor, flow sensor, pressure sensor, pH sensor and level sensor. The recent advantage in wireless sensor network system has several benefits and advantages over manual wired/wireless systems.

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Design and Implementation of Unhealthy Leaves Disease Detection Using Image Processing

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Abstract: Indian economy is dependent on agriculture. Identification of the diseases is the main key to preventing the losses in the yield and quantity of the agricultural product.It is very difficult to identify the plant disease in the field. Leaves are important for fast growing of plants as well as production of crops. The farmer can easily identify the disease by seeing the symptoms but it take lot of time to identify different parts of field. So in these work is explore to design a vehicle it will move randomly in the field and it take video and send the mail as attachment. The video is converted to maximum number of frames and these frames are converted into images. This images are our input for the algorithm. By using image processing technique along with machine learning algorithm convolution Neural Network (CNN).In these work train the CNN algorithm with large number of leaf disease image data sets of different sizes and shapes. The proposed system is to design automatic vehicle to take video and mail it. These work is done by using raspberry pi3B. The video to image convert make some frames. In Convolution neural network algorithm and training process is done windows operating system (OS).

Keywords: Convolution Neural Network, Datasets, Open CV, MAT LAB, Raspberry Pi 3, Python.

1. Introduction

Agriculture industry is key role in our country. Most of the plants are infected by various bacterial and fungal diseases. Farmers estimate the disease by their experience but this is not proper way. In India large number of population lives in rural areas where livelihood of people depends mostly on agriculture. The major challenge is to save the environment.

Plant disease identification by visual way is more laborious task and at the same time, less accurate and can be done only in limited areas. In Current days among this field, the image processing methods are suitable, efficient and reliable fields for disease detection with help of leaf images.

The diseases which are occurring are similar in symptoms with small changes, which are difficult to identify which disease is affected to plant, by using machine learning algorithm.

2. DIFFERENT TYPES OF LEAF DISEASES

In this section, researches can understand type of image processing operation and type of feature need to be considering that plant diseases.

Disease that have infected to the plant leaves is virus, bacteria and it disorders the normal growth of plants. Several types of symptoms are explained in further.

Fig. 1: Alternaria Alternate

This type of Alternaria Alternate has fungus impact the leaf spots of plant. Bacterial Blight is characterized by tiny, pale spots. Anthracnose is a group of fungal illness and it presents some heat in plants. When the leaf affected with curled margin and afterward it withers.

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Fig. 2: Bacterial Blight

Fig. 3: Anthracnose

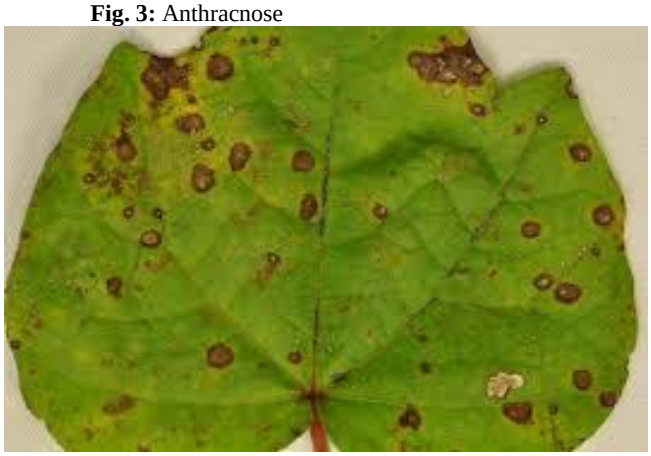

Fig. 4: Cercospora Leaf spot

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Fig. 5: Yellow leaf curl Image

Typical symptoms for this disease in tomato are yellow leaf edges, upward leaf cupping, leaf mottling, reduced leaf size, flower drop. TYLCV can have a severe impact on tomato production. Plants infected at an early stage won't bear fruit and their growth will be severely stunted.

3. Hardware implementation

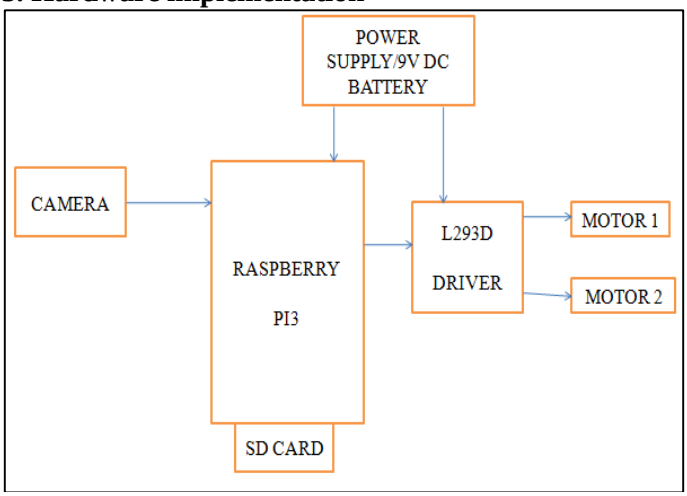

Fig. 6: Block Diagram of Hardware Vehicle

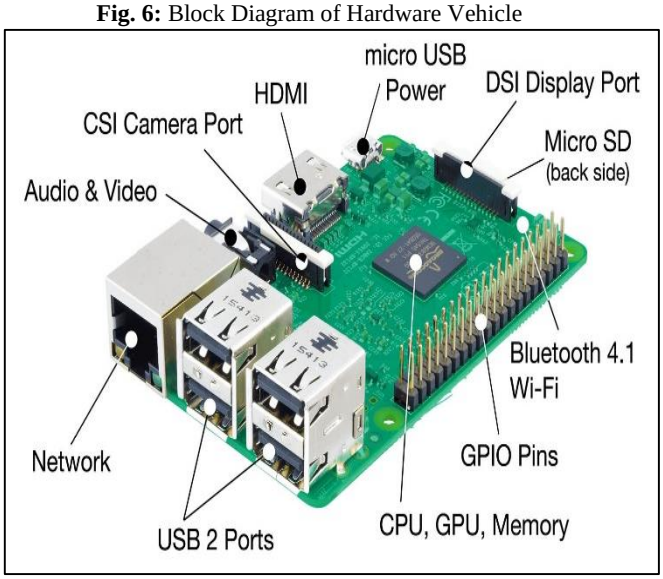

Fig. 7: Raspberry pi 3 Model B

When vehicle is moving in some path, Camera captured the video stream, it can send to mail as attachment. Motors can used to move the vehicle. In SD card attach the some programs to run the vehicle and software of VNC viewer.

Raspberry Pi 3 model B is an ARM based credit card sized SBC created by Raspberry Pi foundation. Raspberry pi board is brain of the system. It can also be made more advanced such that it Raspberry pi wi-fi module can used within banks, large houses etc.

Motor Driver IC L293D is a dual H-bridge motor driver integrated circuit(IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher –current signal. This higher current signal is used to drive the motors mounted on the vehicle.

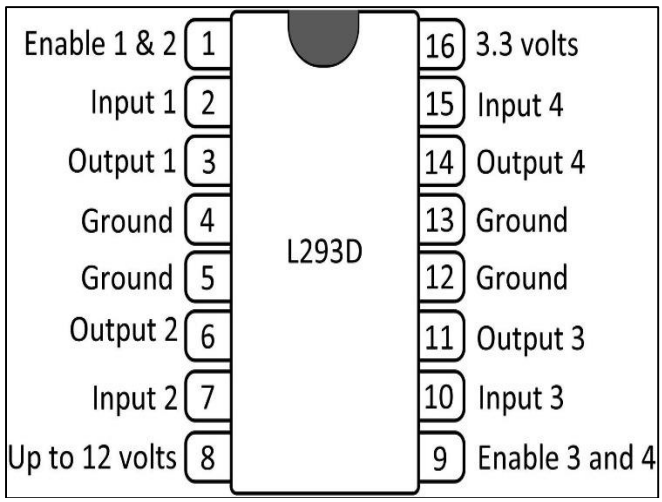

Fig.8: L293D Motor Driver

Fig 9: Camera module

A webcam shown in fig is a video camera that feeds or streams its image in real time. When captured the video stream, it can be send to email as an attachment.

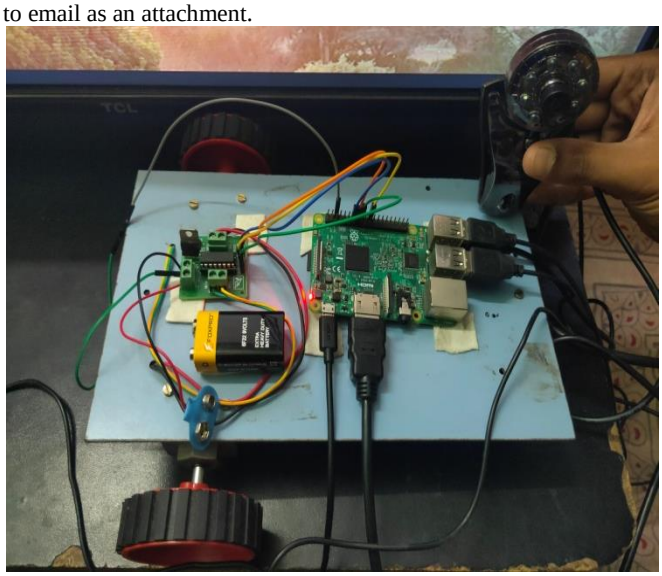

Fig. 10: Assemble model

The above figure consist of the assembled model of the robotic vehicle connected with camera, battery, motor driver L293D,motors and raspberry pi3.

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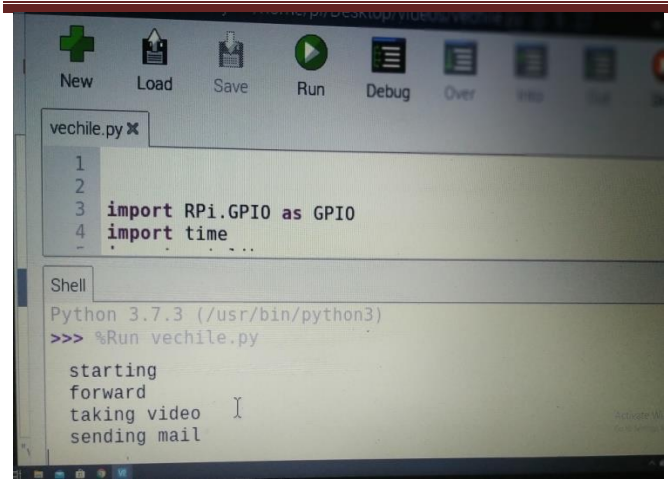

Fig. 11: Result of embedded system

After that Video can make into some frames using Anaconda tool. In that frames can save into jpg format. This tool use Python software. Below figure show how video make frames.

When the program be executed then there display sending the mail, e-mail user name should be mention in python program.

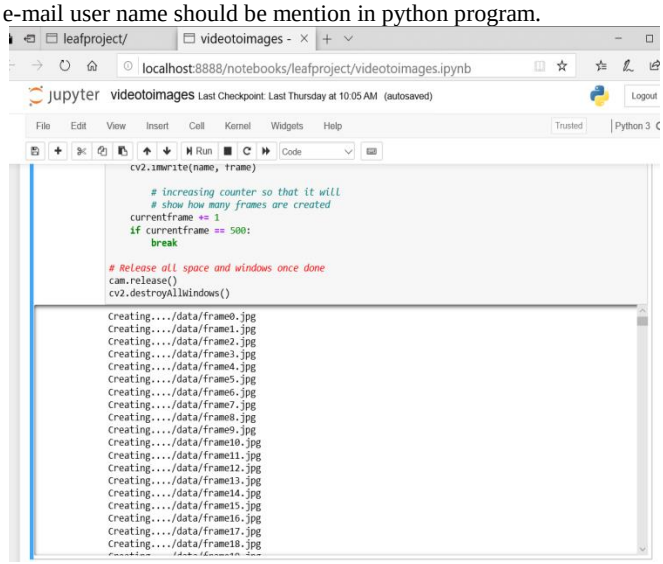

Fig.12: Video to Image frames

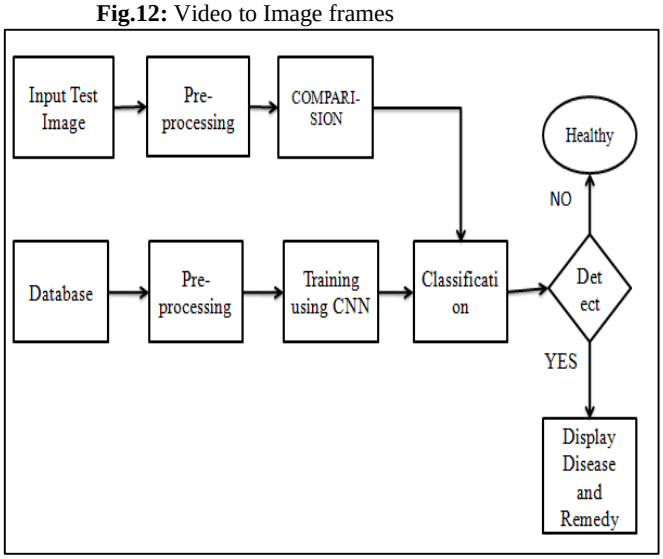

Fig. 13: Flow chart of Disease detection

4. Architecture

To develop a model for plant disease recognition, the approach used is deep CNN [17]. For the purpose of image-based identification which includes, training phase to evaluation phase where the performance of classification algorithm are evaluated. Data is collected from the capturing images with camera. The images have different types of plant Diseases; there is a need to enhance the dataset by adding the images that are argumented. In this work train the network to learn features that differentiates one class from other [17].

Convolution Neural Networks is designed for accurate analysis. Unsupervised Learning classification is used since the input image is unknown and new to the algorithm [17].

Algorithm is based on the feature extraction. It uses to predict the condition of the plant in future based on the training data. Input test image is taken from video frames and after preprocessing technique is used. Comparison block can defined compare between the input and trained data image. Database block can define in that train some images. It can done in the CNN algorithm. After that input image manages the healthy or unhealthy, if it is unhealthy display the disease name and remedies, if it is healthy then display "Healthy". If it is healthy there hasn't any remedy.

5. Results

Fig. 14: Result of Disease Name display

Figure 14 shows that input image status is unhealthy and display the Disease name. It is accuracy above 90 percent.

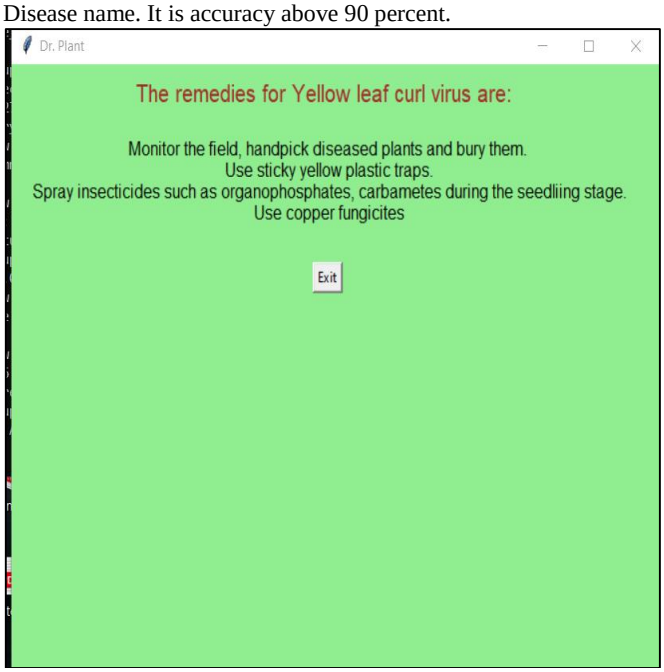

Fig. 15: Result of Display Remedies

In the above figure shows the Result of display remedies which it is unhealthy status. It is healthy status then status display is healthy and it hasn't any remedies.

6. Conclusions

This work implements a sample idea about to identify the crops and detect the leaf. By the using of CNN algorithm, the infected region of the leaf segment and analyzed. Feature extraction technique helps to extract the infected leaf and also to classify the diseases. The embedded system helps to capture the images of leafs and the disease is detected.

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Design and Implementation of Artificial Human Hand Model Based on Eye Blink Detection

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Abstract: This paper proposes two paradigms for controlling a robotic arm by integrating eye blink and IOT based techniques. The purpose of our study is to develop a feasible paradigm for helping disabled persons with their every-day needs."Artificial Human Hand Model (AHHM)" which can precisely follow the real movements of human hand by means of real human eye blinks and IOT based methods. Simple algorithms were implemented for detecting electrophysiological signals like eye saccades, blinking and eye closure events. Interactive resources to integrate *myRIO* into our project increases efficiency of this concept.
Keywords: Infrared Rays, myRIO, disabled people, Internet of Things, Eye gaze, Blinks.

1. Introduction

Technology can be said to be basically application of information for the building and development of devices and equipment that can be used in a lot of plethora ways. Technology is now a very integral part of the day –to-day life for each and every one of us. Even though technology has gone a very long way in making life more convenient for every one of us, but there is no meaning in it when it is not helpful for the people who are in need of it. This paper mainly concentrates on the Persons with Disabilities (PWDs).

These persons can't move their arms and legs but they are accomplished of thinking and they can have electro-oculography. So when we use that eye blinking activity for the persons with disabilities, we can enhance their power to the industrial sector and can bring lot of self-assured in their breathes. This paper labels a manually and virtuallycontrolled Robotic arm based on Eye-Blink revealing and also mouth action.Disability is a universal element in the human condition to which no one is protected. The stereo- typed imaging and consequential action by the society and polity on the persons with disabilities has been their neglect. This neglect bars persons with disabilities from normal economic, social and political activities in their families, communities, essential services and education.Despite automation in machines, sometimes decision-making and precision requirement may require human controlling, considering the degree of unpredictability of a situation [1].Parades an automated outline that is accomplished for both grabbing and discharging micro objects with high Accuracy, reliability and speed. The robot has influenced the capacity to pick the object and place it effectively. By using myRIO, the robot has performed its task flawlessly according to the deliberated program. This system gives the high precision for library administration application[2]. Panels Robotic arm and Robot Movements .used four buttons in VI when press up arrow button a command will send to controller section throw Zigbee Network. That command will instruct the Robot move forward. Used one horizontal slide and one vertical slide to control the robotic arm movements [3]. Instigated the use of IOT in Industrial pollution observing and control. With this it can also preclude any calamitous threats in the industries and provides a keen control over the environmental pollution [4].Implemented eye blink as a command to turn on and turn off motor through wireless communication.Used NeuroSky Mind Wave to record EEG signal, myRIO to control dc motor and Lab VIEW to the program [5].

Presented a combinational setup of hardware and software in order to simulate the lower limbs of human body by exploiting their own eye blinking signals. These signals are composed from their brain and then used to perform the modelling within computer system [6]. Deliberated and employed a robot consisting of a 3 Axis arm with omnidirectional mobility and can be directed to perform a user allocated basic repetitive mechanical tasks such as drilling. The robot can also sidestep obstacles in its path using a sharp sensor which will help the robot to work securely in the industrial setting [7].

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2. Problem Statement

To design an Artificial Human Hand Model to help the Persons with Disabilities (PWDs). To bring some energy assurance in their lives and add their energy to the industrial sector.The following are the objectives that are achieved in this proposed idea:

- To design an Artificial Human Hand Model (AHHM).
- To control the model with movement of eye and mouth.
- To control the model from anywhere based on IOT.

3. Methodology

Modules associated in the system accomplish the anticipated process resourcefully such that all the requirements are satisfied .We have employed the following methods to execute the proposed idea which includes flowcharts and block diagrams.

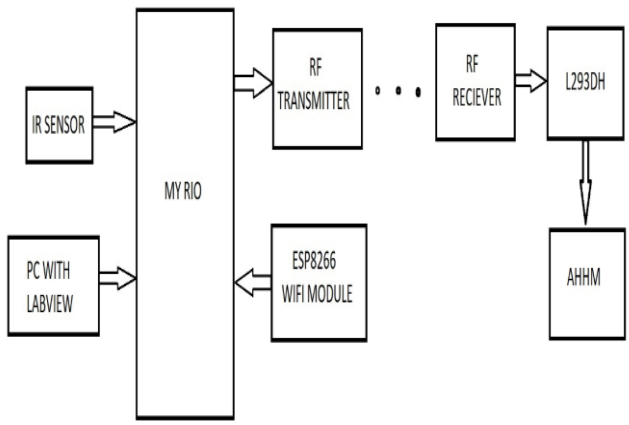

Fig. 1: System Block Diagram

Figure 1 shows a block diagram of all the hardware components used for the AHHM, the core component in the project is the NI myRIO consists of a Xilinx FPGA chip and a dual-core ARM Cortex A9 processor [8]. The AHHM is powered by using a 12V power supply. This supply is given to the myRIO Microcontroller and the motor driver through a DC-DC converter. As the components work on various voltages, a DC-DC converter is used to generate voltage levels of 5V, 9V, and 12V supply. The motor drivers are used to achieve adequate current rating for the motors as signals from microcontroller alone are insufficient to run the motors. The AHHM movement is controlled by using the servomotors.Based on the signals coming from the IR sensors the movement of AHHM will decided. They consists of transmitters and receivers. This whole process is programmed and controlled using a computer system and myRIO.

Table 1: Artificial Human Hand Model Activation based on the movements of Eye and Mouth

Two eyes are closed	AHHM will be closed
Mouth Opened	AHHM will be opened
Left eye blink +Mouth opened	AHHM will moves upward
Right eye blink + Mouth opened	AHHM will moves downward

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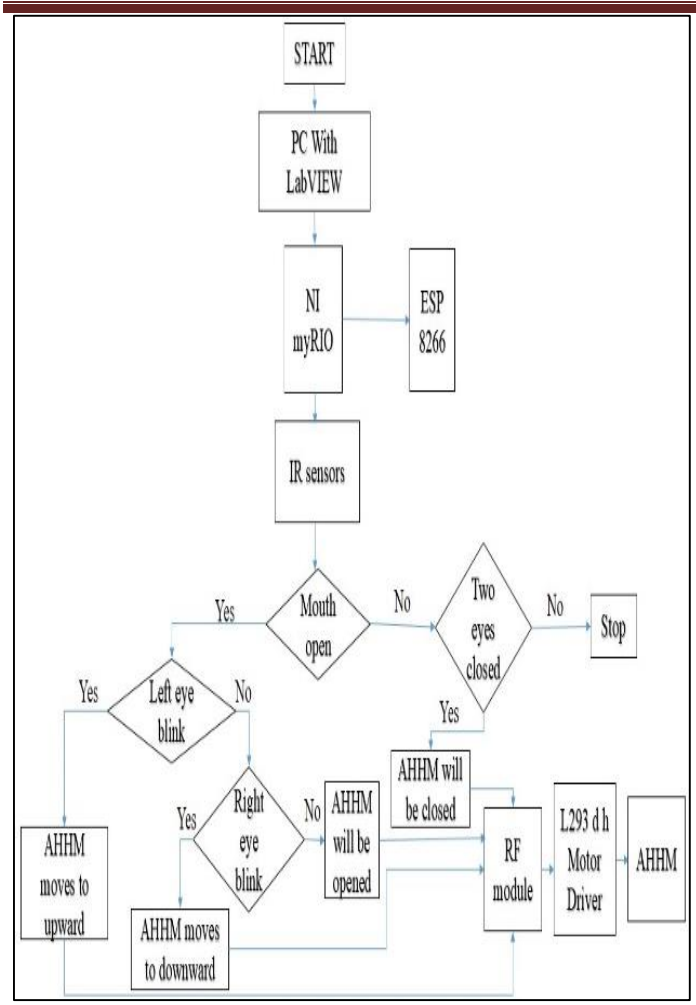

Fig. 2: Flowchart of working

IR sensors are used to monitor the handicapped person eye blink statuses. If any change in eye blink status occurs, automatically My RIO will detects the changes and will do corresponding movement in robotic arm. Not only through this wired communication, but also by using IOT technology, this robotic arrangement is controlled from long distances.

4. Lab VIEW

Fig. 3: Lab VIEW

Lab VIEW is a highly prolific development environment for fashioning custom applications that interact with real-world data or signals in fields such as science andengineering. The net result of using a tool such as Lab VIEW is that higher eminence projects can be completed in less time with less people involved.

To take the three digital inputs which are coming from sensors we need build array element. The Build Array function operates in one of two modes depending on whether you select Concatenate Inputs from the shortcut menu. If you select ConcatenateInputs, the function appends all inputs in order, forming an output array of the same dimensionality as the array input wired.

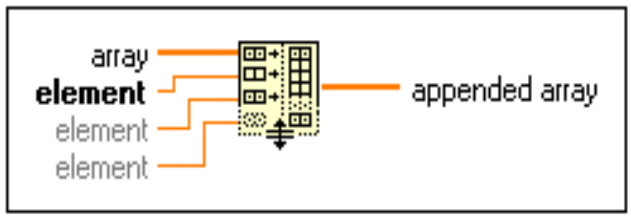

Fig. 4: Build array element

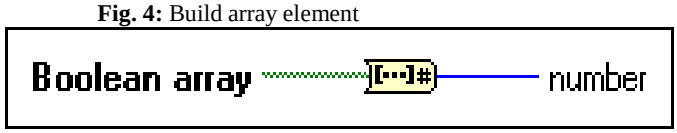

Fig. 5: Boolean array to number converter

Converts a Boolean array to an integer or a fixed-point number by interpreting the array as the binary representation of the number. The first element of the array corresponds to the least significant bit in the number.

5. Lab VIEW myRIO

Fig. 6: myRIO

In order to make this system become a real-time system, Lab VIEW myRIO was used to support the system.The myRIO is the embedded device that has features I/O such as analog IO, digital IO andwith WIFI support. This device can be programmed with Lab VIEW or C language.In this system, myRIO will process the information to control DC motor.Internal WIFI of myRIO will use to interface with laptop via access point in the network. The device will be stand-alone controller by embedded the program into myRIO operating system.

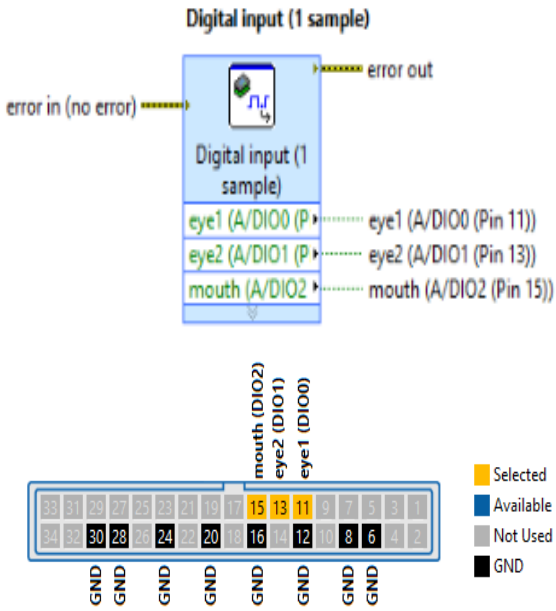

Fig. 7: myRIO Pin configuration for IR sensors

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In this first proposed paradigm using 3 IR sensors we will create a moment in AHHM. So in the Lab VIEW code we are giving the outputs of the 3 IR sensors to the Digital input pins of myRIO 11, 13,15 respectively.

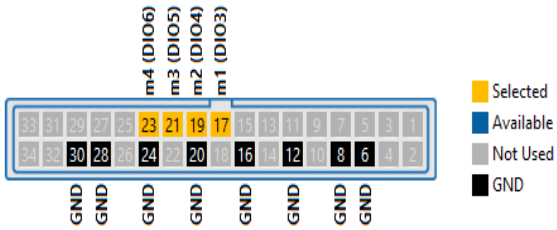

Fig. 8: myRIO pin configuration for RF transmitter

We are using in between a RF module to transmit the collected data from sensors through myRIO to AHHM wirelessly. RF transmitter and receiver are used the RF transmitter pins will be Digital output pins 17,19,21,23.At the end of receiver section it will be connected to four motor pins of L293dh bridge motor driver.The outputs of the motor driver will be connected to AHHM.

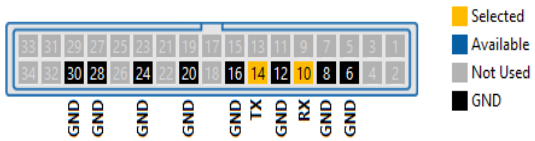

Fig. 9: myRIO pin configuration for ESP8266

In the next proposed paradigm we are using an ESP8266 Wi-Fi module to collect the data from Thing speak server is connected to the TX and RX pins of myRIO.

6. ESP 8266 Module

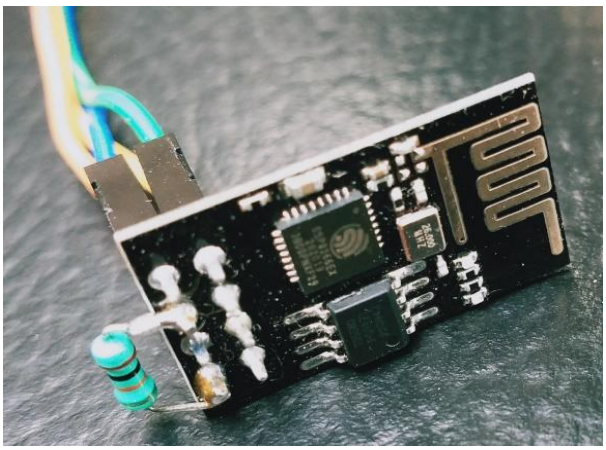

Fig. 10: ESP 8266 module

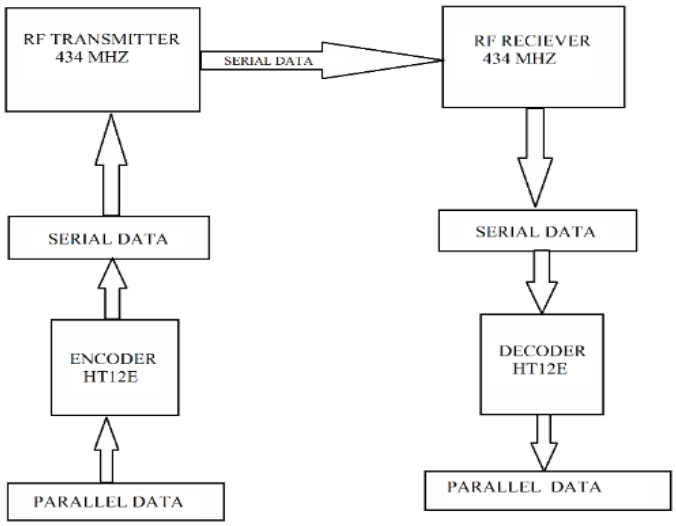

Fig. 11: RF module communication

ESP 8266 EX delivers highly integrated Wi-Fi SoC solution to meet user's continuous demands for efficient power usage, compact design and reliable performance in Internet of Things industry.

7. Rf Module

This circuit utilizes the RF module (Tx/Rx) for making a wireless remote,which could be used to drive an output from a distant place, RF module, as the name suggests ,uses radio frequency to send signals.

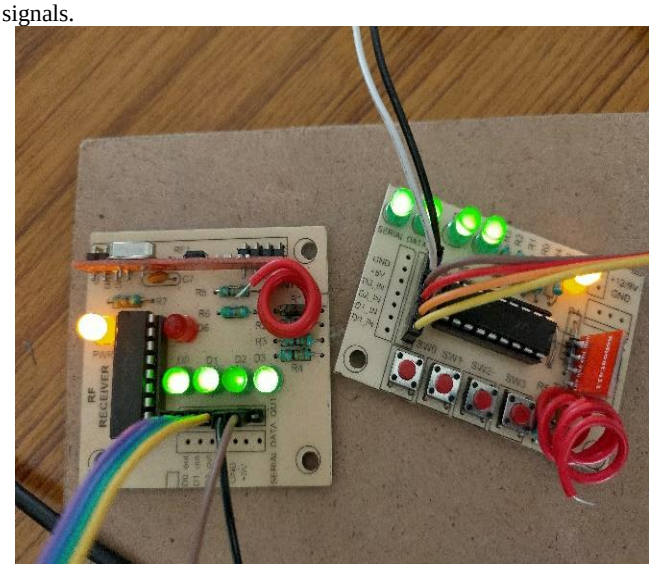

Fig. 12: RF Module

These signals are transmitted at a particular frequency and a baud rate. A receiver can receive these signals only if it is configured for that frequency. A four channel encoder/decoder pair has also been used in this system. The input signals, at the transmitter side, are taken through four switches while the outputs are monitored on a set of four LEDs corresponding to each input switch. The circuit can be used for designing remote appliance control system.

8. Eye Blink Sensor

In this two proposed paradigms first we are controlling hand model manually that a person with disability will wear a setup which includes IR sensors for detection of eye blinks and movement of mouth.

Fig. 13: Eye blink sensor

The eye-blink sensor works by illuminating the eye and/or eyelid area with infrared light, then monitoring the changes in the reflected light using a phototransistor and differentiator circuit. The exact functionality depends greatly on the positioning and aiming of the emitter and detector with respect to the eye. Connect regulated DC power supply of 5 Volts. Black wire is Ground, Next middle wire is Brown which is output and Red wire is positive supply. To test sensor you only need power the sensor by connect two wires +5V and GND. Output wire is connected to the Digital input pin of myRIO. When Eye closed LED is off the output is at 0V.Put Eye blink sensor glass on the face within 15mm distance, and you can view the LED blinking on each Eye blink. The output is active high

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for Eye close and can be given directly to microcontroller for interfacing applications

9. Artificial Human Hand Model

An Artificial Human Hand Model is a type of mechanical arm, usually programmable, with similar functions to a human arm.

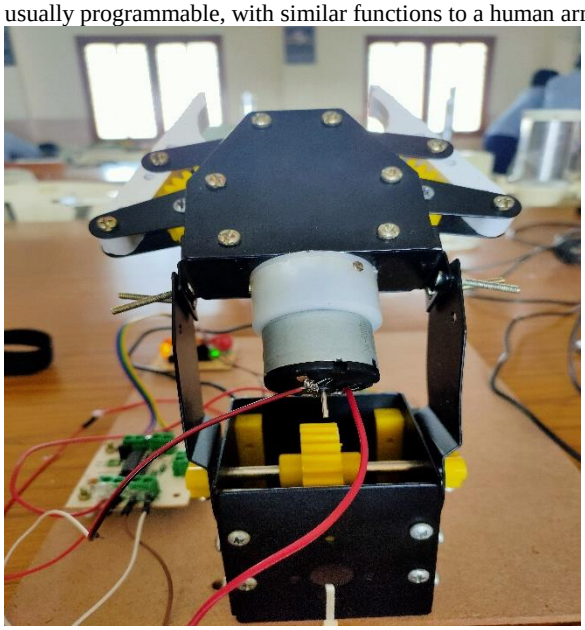

Fig. 14: Artificial Human Hand model

The arm may be the sum total of the mechanism or may be part of a more complex robot.The links of such a manipulator are connected by joints allowing either rotational motion (such as in articulated robot) or translational(linear) displacement. We are going for an IOT approach to help the Persons with Disabilities when we are not nearbythem. To governor the Artificial Human hand model from anywhere we are using Thing speak server which will make conversation with ESP8266. ESP8266 is a Wi-Fi module connected to the internet is dumped with the arduino code and this will be configured with myRIO to support the Lab VIEW.

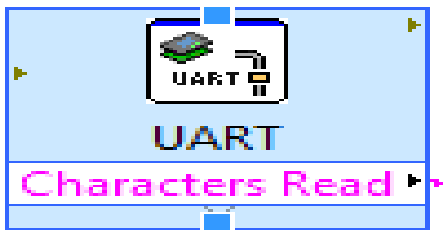

Fig. 15. UART

Fig. 16: Controlling app

Writes data to or reads data from a Universal Asynchronous Receiver/Transmitter (UART) device through the UART channels. Specifies the characters to write to the UART device. This input is available only when you set Mode to Write. Specifies the number of characters to read from the UART device.This input is available only when you set Mode to Read. Returns the number of character that this express VI reads from the UART device. The output is available when you set Mode to Write.Returns the number of character that this express VI reads from the UART device. The output is available when you set Mode to Write. Returns the characters that this express VI reads from the UART device. This output is available when you set Mode to Read.

An App is created to control the AHHM through IOT in this we have 5 buttons namely up lift, Down, Open, Close and Stop. Up button is referred as 1 in the Lab VIEW code and Down as 2 ,Open as 3,Close as 4.At last Stop as 0.It will give the instructions through thin speak server and we can control AHHM from anywhere by this app.

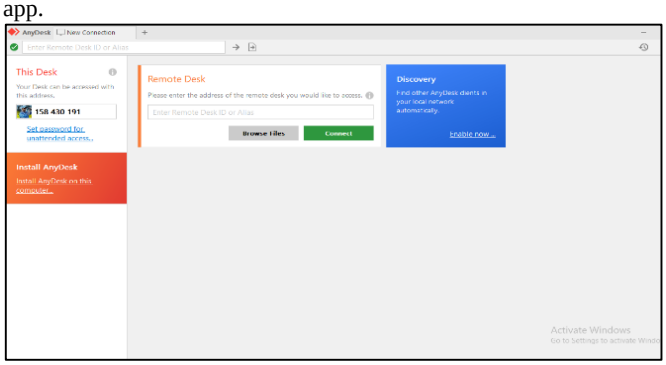

Fig. 17: ANYDESK view

To observe the mechanism of the Artificial Human Hand Model we need a camera access, so here we are using an app called ANYDESK. From this app we can control the system which is interacting with AHHM and we can access the camera of Laptop or any other camera module through our mobile or system.

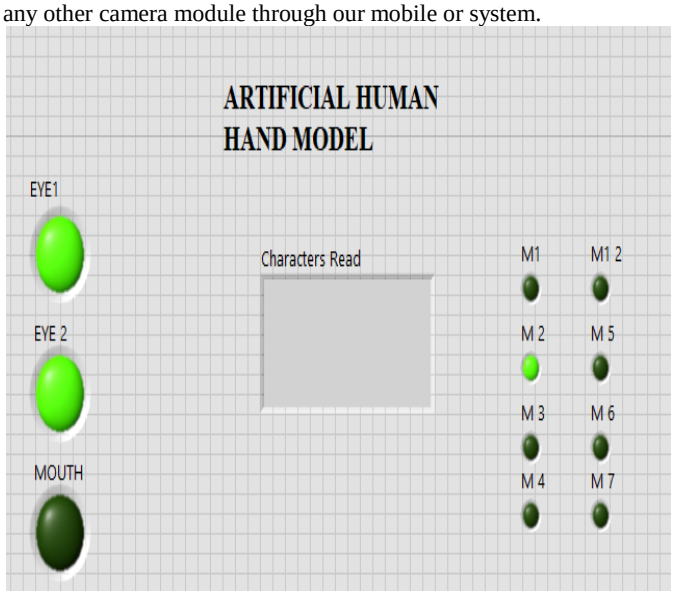

Fig. 18: Front panel Representation

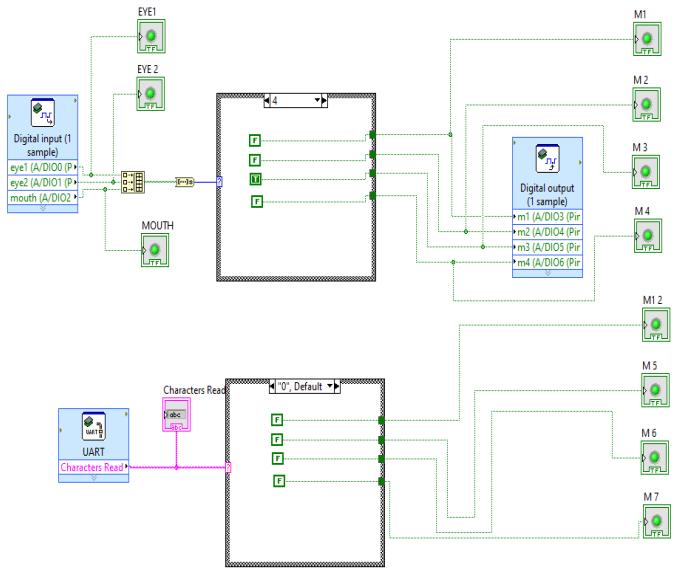

Fig. 19: Lab VIEWBlock diagram

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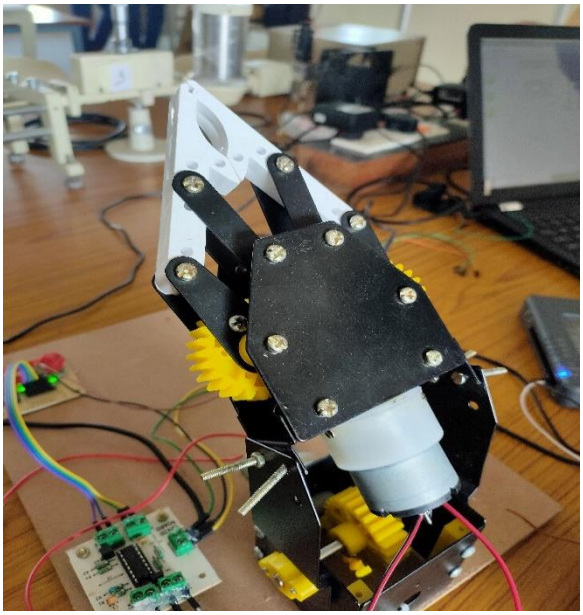

Fig. 20: Movement of Arm in Upward Direction

10. Conclusions

These preliminary results revealed conclusions converted in future possible improvements for presented controlling paradigms. Comparing the two proposed paradigms, we notice a major difference for selection events in terms of accuracy.This real time hand movement controlled robotic hand is more reliable because of its less dependency on mechanical decision-making, faster as well as efficient since only two major functional IRand IOT are mimicked. The motivation of this project has been the improvement in efficiency, control, reliability and security of gesture controlled manual process with simpler and less mechanical processes.

Future work is related to refining developed algorithms, in order to increase recognition accuracy rates. Current system will evolve in an asynchronous one, allowing the user to select a desired object at will. Some new tests will be conducted in order to finally choose the best paradigm for our project, considering also the fact that many objects for selection will be added in the next applications, and also new commands will be integrated.

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Semi Automotive Vehicle Using Raspberry

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Abstract: Voice controlled robotic framework is exceptionally helpful in self driving vehicles and also territories where there is high hazard for people to enter. Voice controlled robotic framework is controlled through voice orders got by means of android gadget. Using the speech as the interface for processes became more important with the improvements of artificial intelligence. Robot direction controlling along with speed control is main motto of this concept. Three speeds are generated using PWM signals based on user speech command. The proposed system allows user to view live video from robot position through General WIFI communication. Raspberry stops its movement if any obstacle comes in its direction. Battery voltage measurement is also done by this amazing robot to alert user.
Keywords: Raspberry pi, PWM, WIFI, Current measurement.

1. Introduction

A Voice Command System basically implies a framework that procedures voice as info, deciphers or comprehends the importance of that information forms it and produces a suitable voice command. Any voice command framework requires three fundamental segments which are discourse to content converter, inquiry processor and a content to discourse converter. Voice has been an exceptionally fundamental piece of correspondence these days. Since, it is quicker to process sound and voices than to process composed content, thus voice command frameworks are ubiquitous in PC gadgets. reconnaissance should be possible through raspberry pi 3 camera in our robot video live gushing from PC or cell phone utilizing android application. The vehicle ought to be generally shoddy and easy to assemble so it can be reproduced by a school or undergrad.

The principle target of this venture is to diminish man power. It is an intuitive robot i.e., It can speak with people and plays out the undertaking given by the client and furthermore perceive the voice and face. The robot can be controlled in two ways. Remote control will get associated with robot through Bluetooth dongle which gives a conventional scope of 10 meters of operation Web IOPi is an electronic remote interface which can control robot through web making this robot IoT.

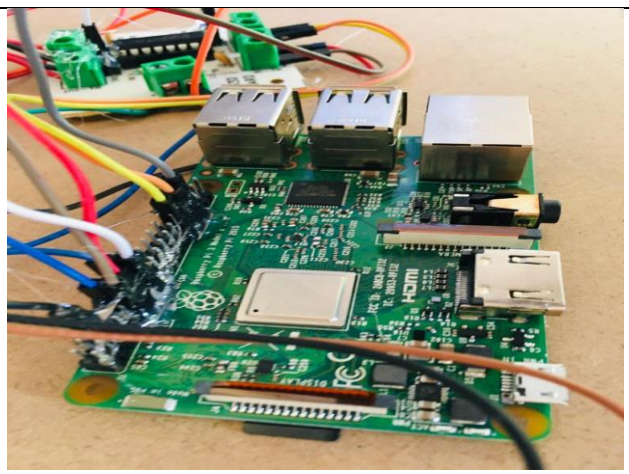

Fig. 1: Raspberry Pi 3 connections

Here we are utilizing computerized reasoning by utilizing raspberry pi PC Controlling devices with voice is more convenient way to control things and in this paper, we have propounded a robot car controlled by voice which can do movement in any direction along with calculative distance to cover if it is stated by the user during command. If anyone need to control this robot for a custom path, it and say “Go 1 meter back”, the robot is intelligent enough to understand the distance to cover. We are using a custom equation where the main distance control is happening. At first, the system need to identify the RPM (rotation per minute) of the motor integrated within the robot car. Then we measured the wheel radius and calculated the circumference of the wheel. We have formulated an equation which is given in the system description part. We can use two languages Hindi and English to demonstrate our system.

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2. Literature Survey

A passive infrared sensor for the detection of human. The human detection process is also voice automated. Moreover, the system can also interact with the user and can reply in the specific language the user asked that robot. The author in[1] build a framework which can recognize Bangla speech but the system recognize bangle text by comparing with English text library which sometimes can generate wrong information. Another process is stated in [2], where they divide this process is two parts. The first stage is speech processing and the second stage is pattern recognition. There will be driver which can control the speed of the motors in three different speeds.

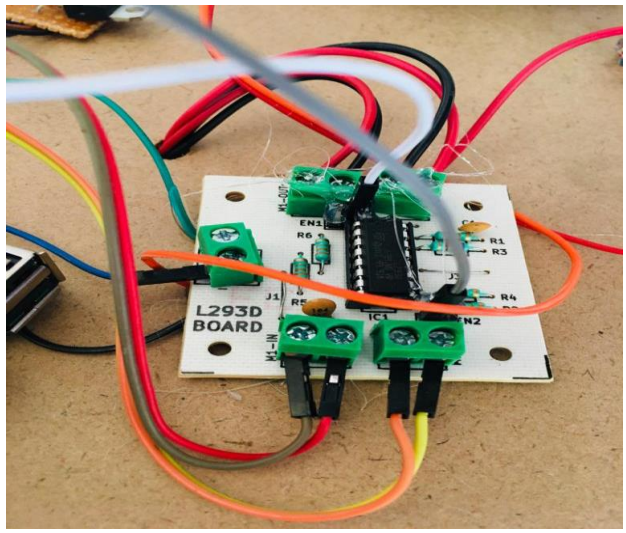

Fig. 2: Motor driver

Trained that robot so that it can recognize commands, interact with the user and perform actions based on keywords. Some related works which have similar approach to our proposed system is described and marginable distinction and advantages of our system are showed in this section. The author in [3] proposed a Tigal Voice recognition where the word capacity is not enriched but in our system there is no limitation of word capacity as we used Google voice recognizer which word capacity is almost unlimited. The author in [4] presented another voice recognition based approach which can only recognize six different languages. Another voice recognition based work is proposed in [5] where the recognition process is handled by ATmega162 microcontroller.

Infrared transmitter is one type of LED which emits infrared rays generally called as IR transmitter. Similarly IR receiver is used to receive the IR rays transmitted by the IR transmitter. The both receiver and transmitter should be parallel to each other. The transmitted signal is given to IR transmitter whenever the signal is high the IR transmitter LED it stops the vehicle and it passes the IR rays to the receiver IR receiver is connected with comparator. The comparator is constructed with LM358 op-amp. In this circuit the reference voltage is given to inverting input terminal. The non-inverting input terminal is connected to IR receiver. This makes the

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vehicle move again after the IR sensor gives the low signal to the receiver.

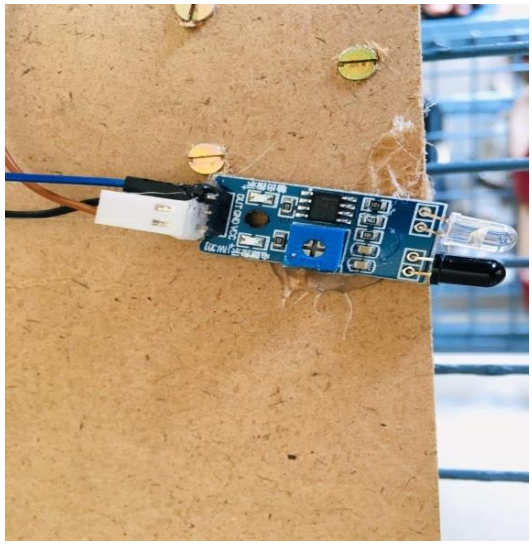

Fig. 3: IR sensor

For recognition of voice, they used an ADC (Analog to digital converter) which can only handle the basic operations, like forward, backward, left and right. In our proposed system, all the recognition process is not only occurring in cloud but also can execute wide range of different languages of commands and also can estimate the distance to cover. A voice record software is used in [6], in which the user creates the vocabulary words. The recorded words should be compressed using quick synthesizer 4 (QS4) from sensory and built. But in our system, vocabulary is stored in cloud with large scale word capacity which can be retrieved in short processing time. Fezari *et al.* [7] proposed a system where the training process is very lengthy and the system can only recognize French Words. In our system, the system is configurable with any language and training process is simple. Sajkowski *et al.* Similarly the authors presented systems and those systems can only accept basic 2-3 commands. But in our system, the robot can perform basic 5 commands, left, right, go, back, forward and detect along with capturing image, interact with user, measurement of distance as well as can notify user in case of any unexpected situation.

Fig.4: Webcam

The camera we used for the live streaming will help us to see the live video from anywhere with the IP address of the camera that can also be seen in the raspberry pi desktop. By entering that IP address in any search engine.

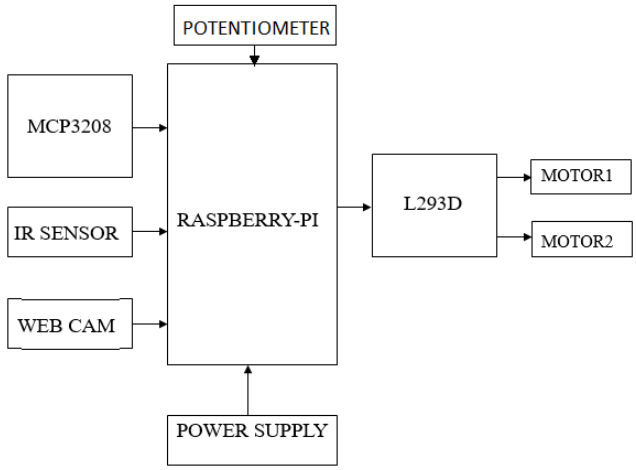

Fig. 3: Block diagram of semi-automotive car

3. Result and Discussions

The voice control vehicle moves when we give the voice commands through our smart phone it takes to Google assistance and then to BLYNK application which can be installed in our smart phone.

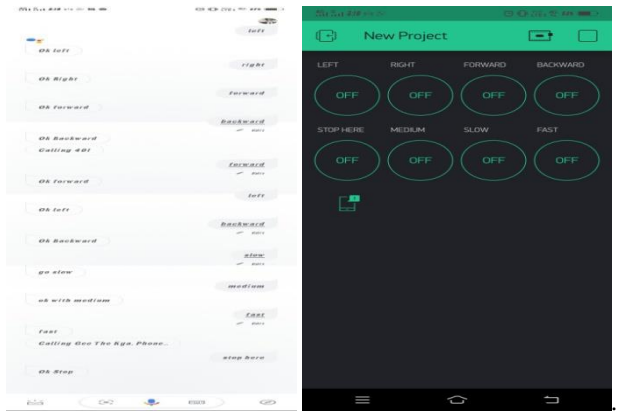

Fig. 4: Applications to give the commands

This communication between these two applications help to give command to the raspberry pi and then it initiates motors and vehicle starts moving. We can also control vehicle manually using BLYNK App. The entire program is written with the help of BLYNK app so that it can also be controlled using that application by creating buttons of our commands. It moves according to our voice commands and manual push buttons. Whenever obstacle comes it automatically stops and we can see the obstacle using the web cam and again give the commands to move away from the obstacle.

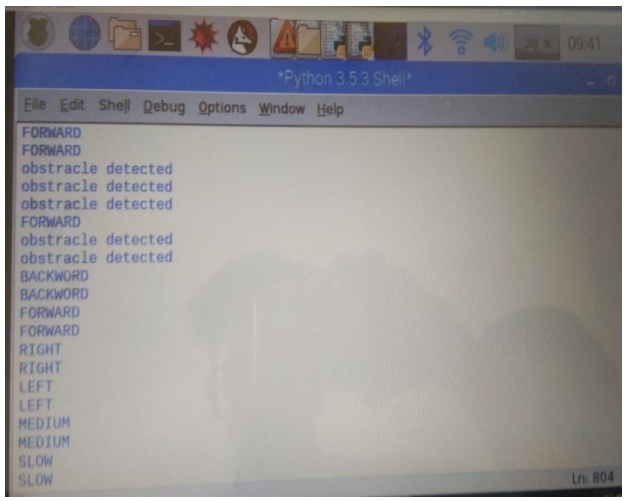

Fig.5: Output Command Viewer

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This viewer shows the operations that are accessed by the raspberry pi. If we give the command forward it shows FORWARD, similarly for the remaining. By observing these in command prompt we can know the commands are performed. This also displays about the obstacle is detected or not. We can use the command window for the viewing of the live streaming. There will be notification displayed in user smart phone using the BLYNK app.

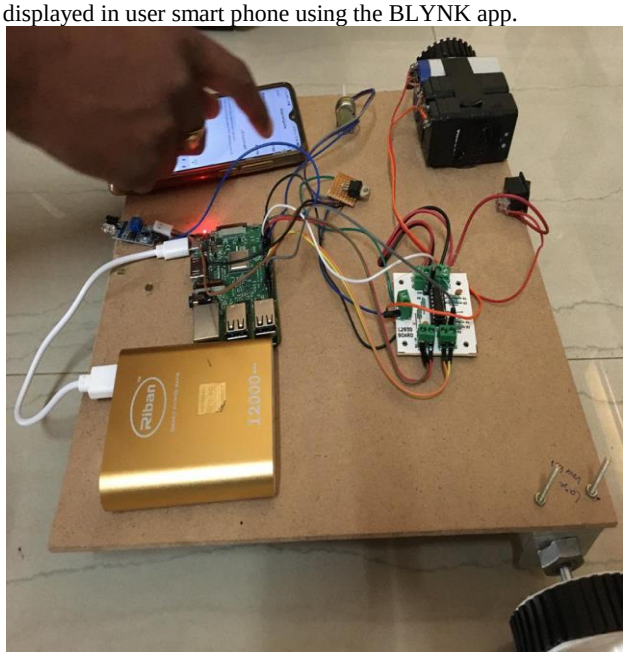

Fig. 6: Automotive Vehicle

4. Conclusions

In terrain places to monitor the entire area using the webcam. The notification of the low power will be notified in our mobile phone. By seeing that notification we take the required precautions like power backup using the power bank. When we implement it in real time we can use high-definition (HD) cam for more visibility of obstacles. The entire program is written with the help of BLYNK app so that it can also be controlled using that application by creating buttons of our commands.

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Optimized Beam forming by using LCMV, MVDR and PSO for Advanced 5G Application's

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Abstract: In this paper, authors have described the performance of improving the LCMV and MVDR beam forming using PSO algorithm. Primarily we have designed beam forming using LCMV and we have analyzed the performance of Array signal processing by extracting the parameters like weights, power and SINR. By using LCMV, we noticed minimum Signal to Interference Noise Ratio (SINR), occurrence of side lobes and interference. Eventually, we try to improve the performance by adopting PSO in to beam forming. We have observed that the performance is improved significantly. The analysis is extended with multiple sensor elements like M=4/8/50/100. The entire analysis was performed in the MATLAB by using phased array system tool box and the corresponding outputs has been obtained. By comparing the LCMV and MVDR with PSO technique it results that optimized outputs are observed in PSO, which increases directivity, avoids interference and mitigate the side lobes.

Keywords: Beam forming, LCMV, MVDR, PSO Array signal Processing, SINR.

1. Introduction

Beam forming is nothing but a spatial filtering that comes under array signal processing. It is a combination of multiple sensor elements which results beam in a certain direction [1]. Beam forming can be accessed by an array of signals which can be processed, in such a way that the desired direction can acquire directivity of beam and other directions experiences the side lobes and interference. Beam forming has been widely used in various applications. One of its applications is RADAR which includes phased-array RADAR, synthetic aperture RADAR and air traffic control. SONOR is another application that localizes the source. Beam forming can also be used in biomedical fields like fetal heart monitoring, tissue hyperthermia and hearing aids. Not only in the above fields, it can be pre-owned in Communications, Geophysical Exploration, and Astrophysical Exploration and Image processing [2].

1.1. Motivation

Especially in future communication applications like 5G technology, it is a Big Challenge to deal with mitigation of side lobes and interference in array signal processing. For that reason, we go for the LCMV and MVDR Beam forming techniques in addition to PSO optimization. By adopting this techniques, we can avoid interference and side lobes. Apart from that, we can also increase the directivity.

1.2. Beam forming Techniques

The different Beam forming techniques are LCMV [3], MVDR [4], MUSIC, 2D-FFT, and Bartlett [5].Among these we used LCMV and MVDR Beam forming techniques to compare the Signal to interference noise ratio. Coming to the challenges, both are based on computed weights .Especially by using LCMV, it is inadmissible when the users spread in all directions. By using these techniques we are facing some complexities like side lobes, interference and less directivity. These problems are reduced by using meta-heuristic algorithms, which are nothing but optimized Algorithms.

1.3. Different Optimized Algorithms

Some of the optimized techniques available are Differential evolution (DE)[6], Firefly Algorithm (FA) [7], and Particle Swarm Optimization (PSO)[8]. Among them we used PSO because it is one of the meta-heuristic algorithm and is purely based on the natural behavior of animals and birds.

2. Related Work

From Table 1 [9] authors discussed about the beam forming by using the LCMV technique .Coming to the novelty of LCMV, it is purely based on weights based on that weights we can easily calculate the signal to interference noise ratio and the power of the beam. Here interference signals are controlled but directivity is decreased by increasing the number of signals. From [10] authors proposed MVDR, it is also another type of beam forming technique which increases directivity of the signal but it is limited to one interference signal ,means that it controls only one interference signal.

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Table. 1: Beam forming Algorithms

Ref.	Method/Technique	Novelty	Limitation
[9]	LCMV	Based on weights	More interference signals are restrained
[10]	MVDR	It also based on weights	One interference signal is restrained

Table 2: Optimization Algorithms

Ref.	Method/Technique	Novelty	Limitation
[11]	PSO	LCMV weights are used as input	More iterations
[12]	firefly	Starts with population initialization	Convergence is delayed when the beam is scanned to a certain angle

From Table 2 [11] the authors proposed the optimization method called PSO. By using this method they increased the directivity and reduced the noise by taking the inputs as LCMV weights. But the disadvantage is it takes more iterations. Coming to [12] Firefly optimized algorithm is proposed, it starts with population initialization .And the challenge it faces is convergence is delayed when the beam is scanned to a certain angle.

3. Linear Constrained Minimum Variance (LCMV)

LCMV (Linear Constrained Minimum Variance) is one of the beamforming technique which is used to increase the directivity of beam .This technique is purely based on weights of the beam .In this authors are comparing different parameters of the beams by increasing the no of elements. The comparison parameters are weights, SINR and power. In this if number of elements increases directivity decreases and interference increases. And algorithm was discussed below [13]

3.1. Algorithm

Step: 1 Initialize number of elements.
Step: 2 Calculate the weights of the beam by using Mathematical formula.
Step: 3 Then calculate the power of the beam.
Step: 4 And then SINR of the signal.
Step: 5 Repeat the same process by taking different number of elements.
Step: 6 Compare the different parameters for different Elements.

3.2. Mathematical Analysis

The output y(t) is known as linear combination of antennas with x(t) is input vector w(t) is known as weight.
Vector and h is known as the conjugate equation (Hermitian Transpose)

$$Y(t) = w^h(t)x(t) \quad (1)$$

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The formula for n elements and interference angles we can use

E (ɵ, φ)= $\sum_{n=0}^{n-1} e^{jnkd \sin\varphi sin\theta}$

E (ɵ, φ) = a_0

The formula for w is

$$w^h=\frac{a_0}{n} \quad (2)$$

We use different formulae for different approaches, for the calculation of power we use

$$P=\left[\frac{1}{n}\frac{\sin(n(1/2\ (\pi\cos(\phi)+\alpha))}{\sin(1/2(\pi\cos(\phi)+\alpha))}\right]^2 \quad (3)$$

For SINR we use

$$SINR=\frac{\text{signal power}}{\text{noise+interference power}} \quad (4)$$

First of all calculate the weights of the beam and that can be observed as

Table 3. Measurement of weights by using lcmv for different number of elements

s.no	Number of elements	Weights
1.	4	-0.2960-4.9855i -12.8566-7.6487i -12.8439+7.6720i -0.2872+4.9861i
2.	8	-8.5441+10.3272i 11.5531+20.6056i -5.7143-4.0206i -5.8372+14.5376i -5.9527-15.0938i -6.3088+3.7420i 11.2705-20.3310i -8.5037-10.2430i
3.	10	5.5930+1.2668i 3.2652-5.3767i 1.5781+5.2968i 0.2466-1.9596i -4.1676+4.66748i -2.5997-4.35108i -2.0629-0.0892i -0.1708-4.4310i 2.6689+4.8607i 4.9986-1.2412i

In Table 3, To obtain the LCMV results. Weights will play a crucial role that can be calculated to get the desired outputs. These weights are calculated by taking number of elements as inputs. Here the input angle is constant i.e, 45 degrees. Different number of elements such as 4, 8, 10, etc., will be taken which results in different corresponding output results.

Table 4: .Measurement of power and SINR for different elements user at 0 degrees and interference angle at 20 degrees.

s.no	Number of elements	Power at 0 degrees	Power at 20 degrees	SINR
1.	4	-142.700	-29.4984	3.7281
2.	8	-142.701	-33.0547	3.3727
3.	10	-142.712	-77.6084	-0.2558

By increasing the number of elements power is decreasing means directivity is automatically increases why because power and directivity are inversely proportional to each other. At the same way signal to interference noise ratio is also decreasing so, authors go for MVDR to increase the signal to interference noise ratio.

3.3. Simulated Results For LCMV

If we take number of elements is 4 and analyze the results by using matlab tool we can get

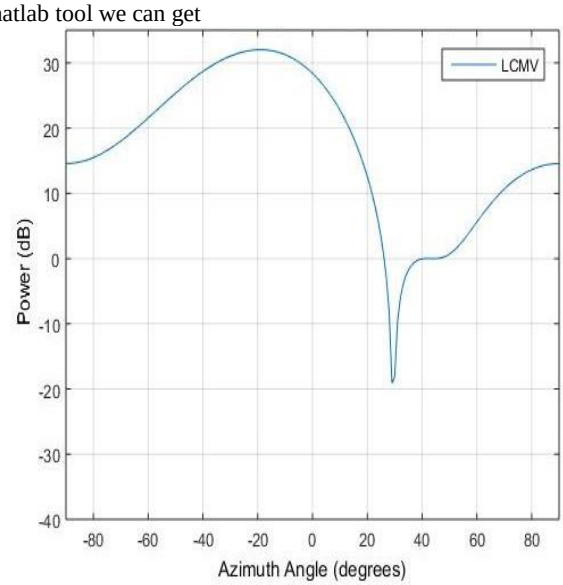

Fig.1: Number of elements is 4 ,LCMV got directivity at 25 degrees.And input angle is 45 degrees.

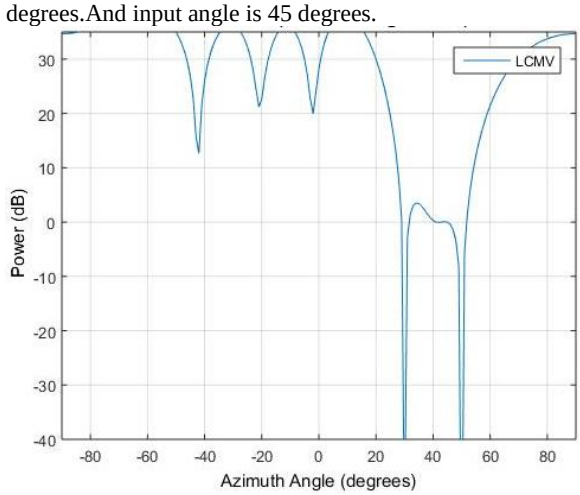

Fig.2: Number of elements is 8, LCMV got directivity at 25 degrees. input angle is 45 degrees.

For this LCMV technique they got the directivity but they din't get the desired signal for n=8 .At the same time we increase the number of elements noise is increasing so, another beamforming technique is used to increase the directivity and to obtain the desired signal.

For this reason using MVDR technique to increase the signal to interference noise ratio and decrease the noise if we increase the number of elements.

4. MVDR

To produce a beam it need weight vectors but to determine those vectors it adopts a technique called MVDR Beamforming .This is used to calculate the weight vectors and there is a need to nullify the interference .Nullifying the interference is done by this technique but a bit disappointment. Output power is minimized and sensitivity is maximized by using this but only in one direction.MVDR beamforming has also another name called Capon Beamformer.

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And coming to the algorithm it is same as LCMV.In matlab in the place of LCMV function we use MVDR.

Table.5: Measurement of weights by using MVDR for different number of elements

S.No	Number of elements	Weights
1.	4	-4.2148-0.5222i -1.5630+3.1808i -1.5559-3.1692i -4.201+0.5218i
2.	8	0.4559-0.4871i 0.0049+0.3085i -0.0064-0.0871i -0.1284+0.1861i -0.0547-0.1929i 0.0419+0.0445i 0.0660-0.2263i 0.5417+0.5086i
3.	10	-0.3144-0.1020i 0.1875-0.1601i 0.0309+0.1883i -0.0108-0.0793i -0.0034+0.0315i 0.0024-0.0057i 0.0099+0.0797i 0.0204-0.1383i 0.2062+0.1625i -0.3564+0.1006i

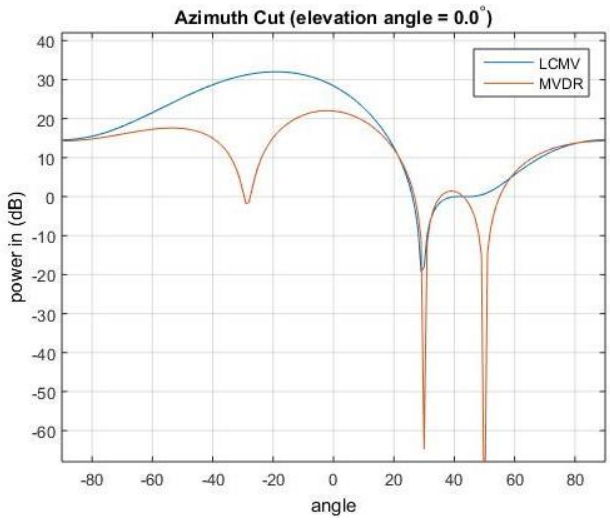

Fig.3: Number of elements is 4, LCMV got directivity at 25 degrees and MVDR has at 25 degrees and 45 degrees.

In Table 4, to obtain the MVDR results weights will play a crucial role that can be calculated to get the desired outputs. These weights are calculated by taking number of elements as inputs. Here the input angle is constant i.e, 45 degrees. Different number of elements such as 4, 8, 10, etc., will be taken which results in different corresponding output results.

Table.6: Measurement of power and SINR for different elements user at 0 degrees and interference angle at 20 degrees.

s.no	Number of elements	Power at 0 degrees	Power at 20 degrees	SINR
1.	4	-142.7100	-29.4984	4.2287
2.	8	-142.7101	-33.0547	3.8554
3.	10	-142.7102	-77.6084	0.0775

Comparing to LCMV the signal to interference noise ratio is somewhat increased in MVDR but number of elements increasing SINR automatically decreases so, we go for optimization technique.

4.1 Simulated Results

By using LCMV and MVDR Beamforming techniques authors obtained the results as that LCMV got the directivity at some angles as it compared in theoretical calculations .Coming to the MVDR it got the great directivity compared to the LCMV, but at some angles noise is occurred. To reduce that noise they used optimization techniques.

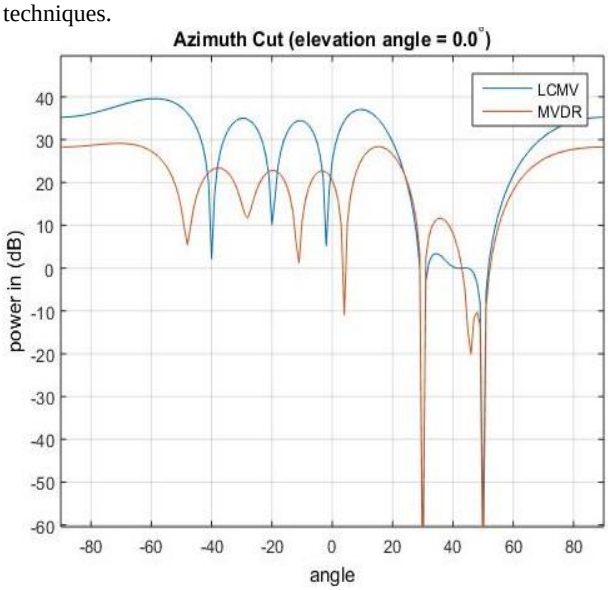

Fig.4: Number of elements is 8, LCMV got directivity at 45 degrees and MVDR has at 25 degrees and 45 degrees.

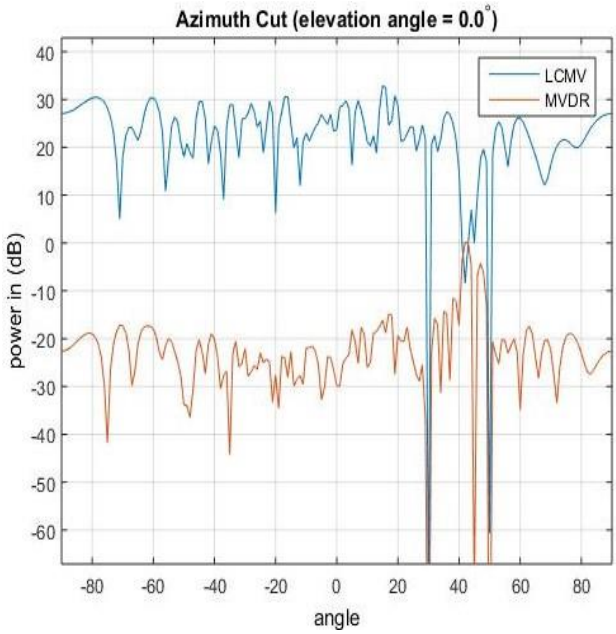

Fig.5: Number of elements is 50, LCMV got directivity at 25 degrees and 45 degrees MVDR has at 25 degrees and 45 degrees.

By observing the above two figures MVDR got more directivity than LCMV for n=4 and n=8. Now we can observe the results by increasing the number of elements, those results are given.

By observing the above results the authors said that, if number of elements increases automatically noise also increases. From figure.1 the number of elements is 4 , LCMV got directivity at 25 degrees and MVDR got directivity at 25 degrees and 45 degrees. From figure.2 the number of elements is 8 , LCMV got directivity at 45 degrees and MVDR has at 25 degrees and 45 degrees and from figure.3 the number of elements is 50 ,LCMV got directivity at 25 degrees and 45 degrees and MVDR got directivity at 25 degrees and 45 degrees.Figure.4 the number of elements is 100 ,LCMV got

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directivity at 25 degrees and 45 degrees and MVDR got directivity at 25 degrees and 45 degrees. From figure.3 and figure.4 it clearly states that if number of elements increases leads to increase in noise. To reduce the noise we go for optimization techniques there are some optimization techniques i.e. PSO and FA .In this authors explained the optimization technique called PSO to reduce the noise when number of elements increases.

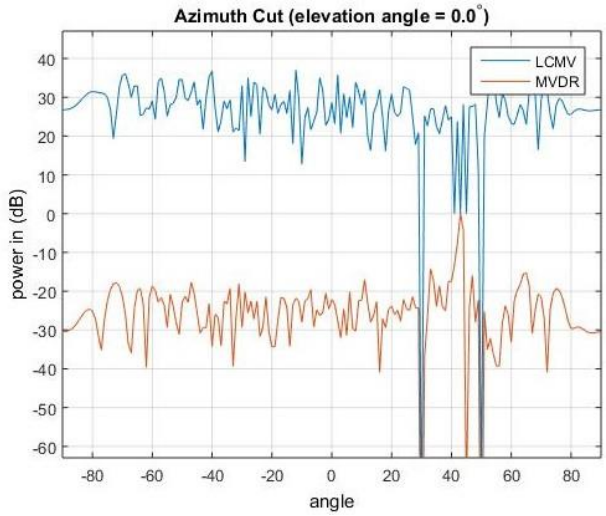

Fig.6: Number of elements is 100, LCMV got directivity at 25 degrees and 45 degrees MVDR has at 25 degrees and 45 degrees.

5. Beamforming Optimization Using Pso

In general, to find a better solution for a problem we go for optimization which includes adjustments of inputs to obtain a desirable output. Optimization problems are mostly related to real-life problems. Sociologists, financiers,manufacturers, engineers and even scientists approach with various types of optimization techniques for better solution to their problems. Particle Swarm Optimization which is simply called as PSO, deals with a major research area for adaptation and optimization. It was introduced in the year 1995 by James Kennedy who is a social psychologist and Russell Eberhart who is an electrical engineer.It is a population-based search algorithm that includes particles with velocity. The movement of the particles are arranged with velocities through search space and are accompanied by their own with best known position. By this invention, many of the researchers around the world had been attracted towards PSO.Since from 1998, various conferences including Congress on Evolutionary Computation has been conducting conferences on PSO.In 2001, the first book named as -Swarm Intelligence was published by James Kennedy, Russell Eberhart with Yuhui Shi.

5.1 Mathamatical Analysis

The velocity and position of each and every population member is updated by using the formula [14]

$$V_i^a = wV_i^a(t) + c_1R_1(pbest_i^a(t) - p_i^a(t)) + c_2R_1(gbest(t)^4 - p_i^a(t)) \quad [5]$$

$$p_i^d(t+1) = p_i^d(t) + V_i^d(t+1) \quad [6]$$

In the formula v_i^d is velocity and it having dimension d and particle I and pbest is the particle best and gbest is global best. The authors in [15] have given that six steps to solve PSO.

5.2 Algorithm

Step 1.Randomly generate the particles and their velocities in space
Step 2. Fitness function is evaluated for each particle.
Step 3.pbest and updated for each position ,if pbest< current fitness value ,replace with current value.
Step 4.Then update the gbest value, if gbest<current fitness value then replace it with current value.
Step 5. Position and velocity of each particle is updated by using (5) and (6).

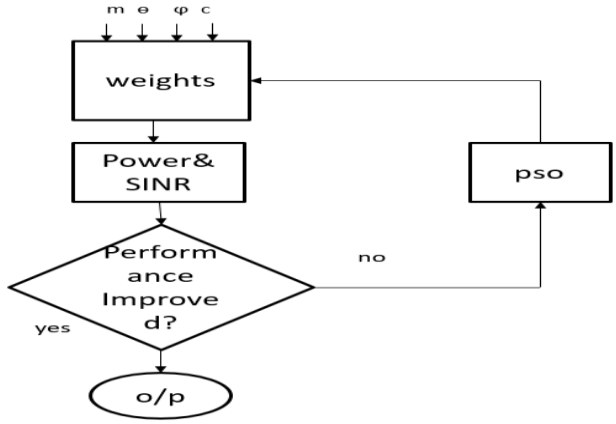

Fig.7: Methodology

5.3 Simulation Results

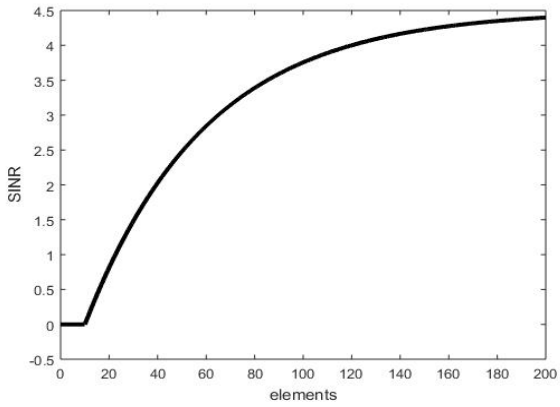

Fig.7: SINR versus Number of elements

Table.7: Measurement of SINR by using PSO.

SNo	Number of elements	SINR
1.	25	1.5
2.	50	2
3	100	3.5
4	150	4
5	180	4.2
6	200	4.5

Here the above table shows that the number of elements increasing signal to interference noise ratio also increases, optimization technique pso is used.

6. Conclusions

In this paper, it stated that MVDR with PSO for antenna array to control the noise and interference. The LCMV and MVDR results are compared and the mitigation of side lobes, maximization of the signal to interference noise ratio was observed .The desired results are obtained at the input angle ɵ=45^0 and φ=180^0. Further MVDR with PSO gives best results, but in this paper LCMV and MVDR results are observed. This new proposed algorithm is very much useful in various applications because of its good accuracy.

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Automatic Arduino Controlled Agribot For Multi-Purpose Cultivation

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Abstract: Agribot is a robot and mainly designed for agricultural purposes. The agribot can be able to do all forming techniques.It is an autonomous proto type robot that will help farmers in the farmland.This is an arduino controlled robot that will be able to plough, sow and water the farmland. And it can be water the farmland with the help of the moisture sensor through identifies how much amount water required to the soil.It can be do the farming techniques with the help of the supply of single switch. The robot will perform farming using the analogy of ultrasonic detection in order to change its position from one farming strip to another within the fewsec.This can be gives the buzzer signals to the farmers when the water level is empty in tank. The robot Thus, will contribute greatly in developing the farming strategies and reduce farmers cost of cultivation and will also increase their profit margins.

Keywords: Agribot,moisturesensor,ploughing, sow,watering, autonomous,Buzzer, profit, land, time saving, cost saving, farming machinery.

1. Introduction

Thinking about how to benefit the farmers and small scale greenhouse cultivators, at the same time to bring innovation to the country's agriculture mechanism we decided and succeeded in making a multi-purpose agricultural robot "AGRIBOT" .This project we developed using local available materials to make it very cost effective and at the same time specialized according to our country's condition. It can do all the functions of farming, the main difference is it does all the things by itself with the on/off of a button.This is an agricultural robot that can be adjusted according to the type of land. The ploughing teeth for ploughing is removable, so if the land type is soft a lightweight teeth can be connected and vice versa.

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Agribot is a robot designed for agcultural process.in the 21st century the trends of development on automation and intelligence of agricultural machinery is increasing.all kinds of agricultural robots have been researched ad developed to impleament a number of agricultural products in many countries.this bot can performs basic elements functions like harvesting , planting and spary the pesticides.the gole of agricultural robotis is more is more than just the application of robotics technologies to agriculture.currently,most of the automatic agricultural vehicles used for weed detection.

Agricultural growth is crucial to reducing poverty in Bangladesh. Employing around 47.3% of the country's workforce and contributing to around 22% of the national GDP it is by far the single largest industry in Bangladesh. So much contribution by an industry has seen little technological innovation in past 4 decades, but things are changing. Although Bangladesh has only seen imports as existing solution there is almost no technological innovation within the county.

Throughout history technology has helped make human life easier. The main purpose is it complete all works more efficiently as a result bring down the cost of producing any good. Likewise from the days when field was cultivated using horses and cows which produced very limited amount of crops, now the same field with aid of technology produces more within a short amount of time ensuring food security for people at a much cheaper cost than ever.

In it has been integrated with mapping functions using ultrasonic sensor and obstacle detection technique to move through the field on its own. As it does its other ultrasonic sensor with dedicated Arduino programmed to plough, sow and water the field as it moves along. It uses Battery as power source which has no risk of oil spill and rechargeable too. The recharging of battery can be solved suing existing solar power technology available in the market making it eco-friendly too. It is an electro-mechanical robot that has individual wheel control using relay switching and Arduino programming.

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2. Praposed Methodology

2.1 Methods and materials

In Our Robot there are basically two important things.

2.1.1. Making Lanes ,Mapping &Placing obstacles

In a square land through lanes to make the robot can moves.While ploughing, seeding we placed obstacles manually. Proposed system requires Arduino UNO, Ultrasonic Sensor as main blocks for the design. There are 3 ultrasonic sensors on three sides of the robot, one at front, one at the left side.the 3 sensors can identifies the distance of 3 specified sides. Initially we have to put the robot in the 1st lane which is always the left side of the land as we have programmed it in such a way.

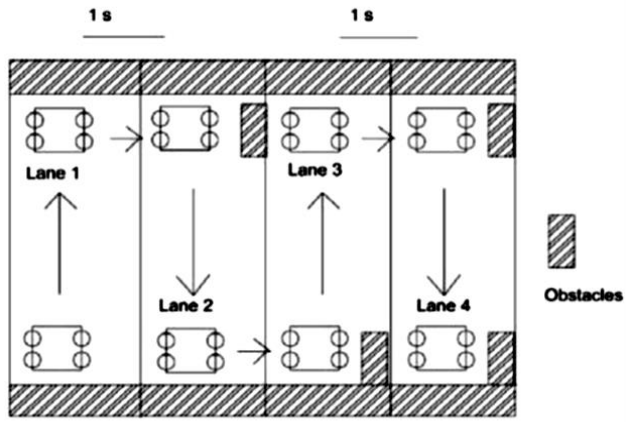

Fig.1: Mapping of the system.

Once it reaches the end of the lane front sensor would detect an obstacle and turn right and move for about 1 second to cross first lane and detect another obstacle in front. Thus it turns right again and starts moving. Now this 1second we have found after a lot of trail and error methods and taking into considerations many terrains or land types. We have seen that the crossing time from one lane to another varies between 0.95s to 1.05s.

Now once the robot moves through 2nd lane it again detects an obstacle at the end of the lane. This time instead of turning right it turns left and moves for 1 seconds. It then again finds an obstacle and turns left and thus starts moving in the third lane. This process will continue on and on until it there are 3 obstacles placed manually, upon detecting those the robot would stop. We have used counter in our programming to alternate between turning right and left.

The important task of Agribot is obstacle detection. Fig depicts the ultrasonic sensor working with the help of wave forms. First wave is trigger, second is 8 consecutive wave pulses and third is time it takes to leave and return.

In ultrasonic ranging module HC-SR04 provides 2cm – 400cm non-contact measurement function and the ranging accuracy can reach to 3mm which can be used for obstacle detection. The module includes ultrasonic transmitters, receiver and control circuit.

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The basic principle is by using trigger is for at least 10us high level signal and then module automatically sends eight 40kHZ cycle and detect whether there is a pulse signal back. If the signal gets returned through high level time duration, test distance can be calculated as shown in equation.

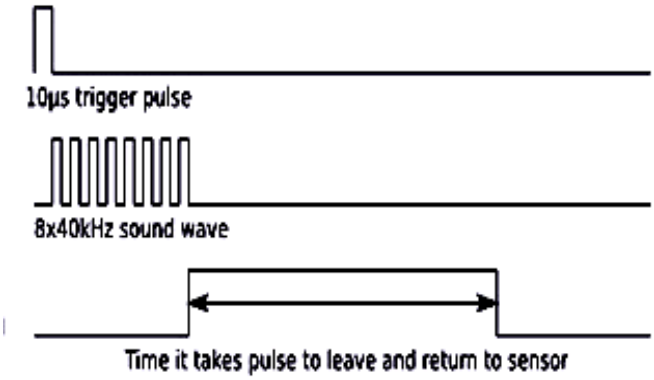

Fig.2: Waveforms of Ultrasonic Sensor

2.1.2. Agricultural Functions (ploughing, seeding, watering)

a. Ploughing Mechanism

The essential objective of ploughing is to revolution over the upper bed of the soil, gather original minerals to the exterior, although burying weeds on the residue of preceding crops and concede them to resolve. As the plough is starved concluded the soil it establish long ditch of fertile soil termed as furrows. In modern employment, a ploughed field is generally left to alleviate, and is then demolished previously planting. Ploughing and farming a soil accommodate and customizes the above 10 to 30 cm of the soil to mode a plough soil into the field. In an abounding soils, the preponderance of expensive plant feeder roots can be established in the topsoil or plough the soil into the field.

When the robot follows the path simultaneously the Agribot has to do ploughing the soil with assistance of plougher. The Agribot has to attach with the servo motor; the servo motor shaft can be attached with the plougher. The plougher can be loosening the soil in different depths. There are different categories of soils are there, on that seeds also different. Particular seeds having different depths for farming the field, based on the servo motor can be given movement to shaft. The shaft can be rotate with certain angle the plougher can be loosen the soil normally. For the heavily crop we have to give more than 60 degrees angle to servo motor.

2.2. Seeding Mechanism

For the application of seeding we are using servo motor. This is nothing but a simple electrical motor, controlled with the help of electromechanism.

In the extension with seed sowing, multipurpose activities such as Plugging are also required. But various issues are sustained by farmers until seed sowing proceeding. Seed sowing is an appropriate essential and paramount process in the agricultural field. A simple seed sowing mechanism is as shown in fig. Also a couple of bullocks is needed to fetch the heavy appliances of identical and seed dropping.

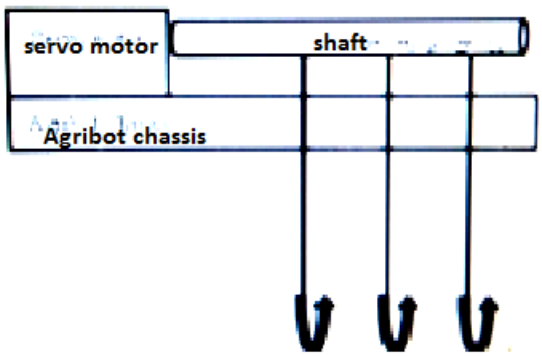

Fig. 3: ploughing mechanism

Another process of seed sowing is to helped tractor in farms. The excessive appliances of seed repository and dropping tool are appended to the tractor to globule the seeds. A ground wheel is connected at the contemptible of the seed sowing tool. The competence transmission ideology is used to convey the action of the turn to the metering appliance.

All the methods are leading to customizing the appliance in cultivating which works consequently without the human competence concerned. The small tool would be assembled from extant mass formed elements without the extremity of specialized idea and tooling. Also exertion desire to this tool is less as related with tractors or any agricultural tool. Seeding formation is our day to day life we utilize tractor in farms. But it utilizes extra time and the human deficiency is opposed continuously.

When the robot follows the path, simultaneously it has distributed the seeds into the field through servomotor. The servomotor rotates the shaft with some delay, on that delay the shaft rotates, while attached to the hopper container the seed has to fall to the soil by moving the shaft.

In farmland, watering can be done after seeding is done, the water can be sprinkling water level through the moisture sensor. The moisture sensor can identify the how much amount of water can be present in soil that can be analysed to proceed watering.

In farmland, at time of winter and rainy season soil requires less amount of water so, that is why we are using the moisture sensor as it requires less power and gives better results.

It can identify given PH value. Its value is compared to sprinkling the water. If water level is empty in the water tank the buzzer is activated.

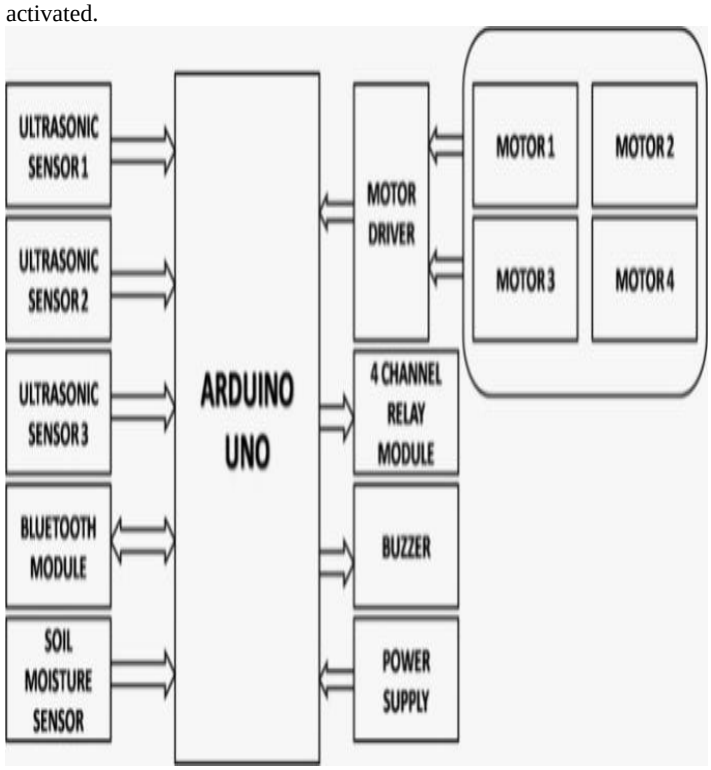

Fig.4: Proposed Block Diagram of the system

Table 1. Comparision Between Traditional, Tractor and Robotic

S.No.	Parameter	Traditional	Tractor	Robotic
1.	Speed	Slow	High	Very high
2.	Time required	More	Moderate	Less
3.	Man power	More	Less	Less
4.	Pollution	No	More	No
5.	Required energy	High	Very high	Less
6.	Sowing technique	Manually	Manually	Automatically

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By compared to traditional ,tractor and robotic, the robotic better because of man power is less ,speed is more ,required energy is less ,pollution is less ,and time required is less.

- no wastage of water
- less man power required
- it is portable
- it works on battery so no harm done to farmland due to oil spill
- Not prone to hazardous chemicals like pesticide.

3. Results

The robot operates on automated mode as well as manual mode.the main purpose of agribot is it do the all functions automatically when power is given and another way is the main purpose of manual mode is, if you require any one function then press particular manual switch. Suppose ploughing is needed ploughing is only ON when ploughing switch is click to ON . It can operates with mobile also by using the blue tooth system. By using the blue tooth system agribot can operates with in the short distance of 10 meters. It also gives the sound signals when the water is empty in water tank.

We are tested the this agribot functions in small farm land and the agribot functions are ploughing seeding and watering. And also tested the robot at the farm land strip. Ultrasonic sensors detecting the obstacles, By using ultrasonic sensors to turning the one strip to another strip. At the end of farmland we are placed the three ultrasonic sensors. This agribot can stop the functioning when three sensors identifies the three obstacles.

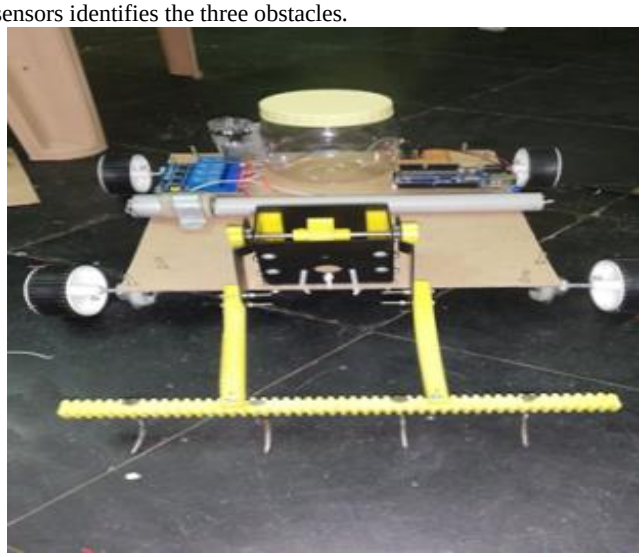

Fig. 5: Proposed agribot

4. Conclusions

The project main aim is minimizing man power and cost of equipment. The advantage of the agribot is reduce the labour cost and time. It is a very simple yet a very effective robot for carrying out farming process in farmland. And also it is very eco-friendly than tractors. By using agribot, we can prevent the oil spill from the tractor into the farmlands.

In future, we have plans to add some more features like camera, fertilization, and fruit picking, harvesting weeding monitoring. The is for ti get live updates about the farmland having crop monitoring system that will tell the farmers if the crops are healthy or not and also guide the farmers to farm

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Electronic copy available at: https://ssrn.com/abstract=3643592

Eye Directive Wheelchair for Physically Impaired People

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Abstract: The eye directive wheel chair is a mobility-aided device for persons with moderate physical disabilities or chronic diseases as well as for the elder people. Now a days electric wheel chairs in the market are mostly controlled by joystick which required users to operate with hands flexibly. But this wheel chair could not be used by people with hand disability. This paper designs an electric wheel chair controlled by eye movements. According to position of the eye, wheel chair motor will be directed to move left, right and forward, stop by using Raspberry-Pi. In addition to this, for the safety purpose ultrasonic sensor is mounted in front of wheel chair to detect the obstacles and it automatically stop the wheel chair.

Keywords: Wheelchair, eye movement, Raspberry Pi, Ultrasonic sensor.

1. Introduction

Wheelchair became important for elders and physically disabled persons. Here introducing the design and implementation model of totally independent eye controlled wheelchair. Different types of electrical wheelchair are available in market. Those are voice controlled system , electrical controlled system and brain control system [2].

In voice controlled system , use commands based on voice. The system recognize the user commands according to that wheelchair will move. In this system accuracy is less because of noise. Electrical controlled system work with the help of joystick. Brain controlled system use ECG signals as a command and cost is high. These all techniques are not useful for totally paralyzed persons. Here the eye controlled system provide the independence to make their life easy and more convenient. It also save the energy or external man power [1]. Eye controlled wheelchair consists of Raspberry Pi 3B+ model ,Raspberry Pi cam ,motor drivers, ultrasonic sensor and SMS module. Cam is used to capture the image in real time. The captured image is sent to the Raspberry Pi GPIO pins. The GPIO pins command sent to the motor drivers to move the wheelchair. SMS module is used for sending messages to the caretaker whenever the obstacle is found in front of the ultrasonic sensor.for detecting the eyes , facial land mark detector is used.

2. Literature Review

In 2011 a group of engineers published a paper, eye based electric wheel chair control system. The paper propose computer input system with human eye only and used for controlling EWC .mainly based on pupil detection . based on pupil movement the wheel chair will move .the main disadvantage is pupil detection, very difficult.

In 2012 a group of engineers published a paper, wheel chair motion control guide using eye gaze and blinks based on bug algorithms. It is will be based on eye movement and bug algorithm .the main disadvantage is bug algorithm process is bulk in nature and accuracy is less.

In 2013 a group of engineers published a paper, brain controlled wheel chair using lab view. It describes a noninvasive brain actuated wheel chair which acquires the signals from various electrodes placed according to the international 10-20 electrodes setup for EEG (electroencephalography). The brain signals are processed to determine the direction and movement of the wheel chair.

The main disadvantage is complexity and cost.

In 2016 a group of engineers published a paper, study of implementation of voice controlled wheel chair. The paper consists 3 modules voice customization module, voice capture module and voice recognisation. AT89C51 microcontroller is used. The main objective of the paper is based on voice the wheel chair is controlled . the main disadvantage is noise and efficiency. Noise is more and efficiency is less.

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3. Existing system

In 2016 biomedical engineering international conference introduce smart wheel chair based on eye tracking. This system is mainly designed for people with loco motor disabilities. It consists of three modules , image processing module, wheel chair controlled module and SMS manager module.

Image processing module is used for capturing the image , wheel chair controlled module is used for controlling wheel chair, SMS module is used to send messages to care taker .

The system consist of Raspberry Pi ,web CAM , WeMOS DI mini , arduino and joystick control. Web CAM is used to capture the image , Raspberry Pi is used to run the commands ,WeMOS DI mini is a SMS module to send message to caretaker. Arduino is used to drive the motor drivers. Joystick control is used to control the wheel chair.

Web CAM is installed on the eye glass. Eye glass capture the eye movement and transmitted to Raspberry Pi microcontroller. Based on eye movement i.e , left, right, forward and stop Raspberry Pi send command to arduino to drive the motors. Wheel chair is moving automatically message is send to caretaker by using WeMOS DI mini. The main disadvantage is complexity, less accuracy and high cost.

4. Proposed System

The proposed system mainly consists of Raspberry pi. The main aim of the paper is help to physically disabled persons to move one place to other. In this system the wheel chair is moved based on eye movements by using frontal face detector with dlib. It is based on HOG(histogram oriented gradient). Open CV is used in the digital image processing to capture the image .the captured color image is converted into gray image and finally into binary image.

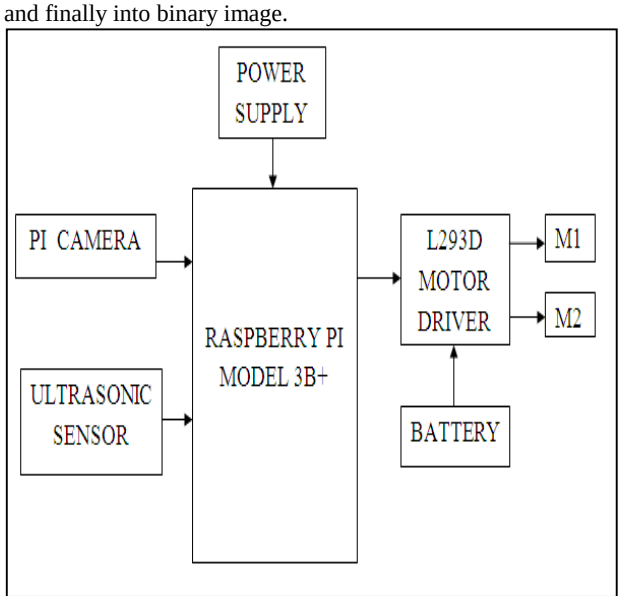

Fig. 1: Block Diagram of Proposed System

RaspberryPi 3B+ is powered by a +5v micro USB supply. Typically, the model B uses between 700-1000 mA depending on the peripherals which are connected to the controller

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The Raspberry pi is a mini computer which is designed in a single board with all the essential components required for running an operating system. All models of raspberry pi feature a Broadcom system on a chip (SoC) with an integrated ARM compatible central processing unit (CPU) and on-chip graphics process in unit (GPU). Processor speed ranges from 700 MHz to 1.2 GHz for the Pi 3 and on-board memory range from 256 MB to 1 GB RAM. Secure Digital (SD) cards are used to store the operating system and program memory in either SDHC or Micro SDHC sizes. It contains 40 pins in which four supply pins two 3.3v pins, two 5v pins, 7 ground pins and 29 GPIO pins.

The Pi board will accept the inputs from the ultrasonic sensor and Camera module, based on the inputs and commands from the user eye .

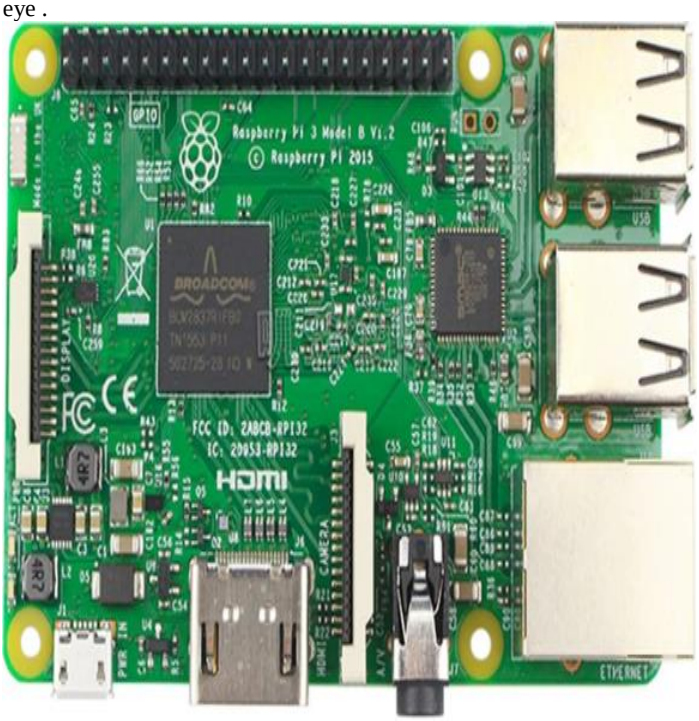

Fig. 2: RaspberryPi

Ultrasonic sensor is used to detect obstacle in the path of wheelchair.HCSR-04 is directly connected to the Raspberry Pi.It receives the data and measuring the distance between wheelchair and obstacle. If any obstacle is detected very close to wheelchair in the range of 2cm to 400cm ,motors will stop the wheelchair automatically.

The sensor consists of four pins: (1) VCC, (2) Trigger, (3) Echo and (4) ground.

- VCC – It is used to provide 5V power to the sensor.
- Trigger – Takes in input pulse to trigger the sensor.
- Echo – It is used to receive the output pulse i.e., the echo from the object detected.
- Ground – It connects sensors to the ground.

Fig 3: Ultrasonic sensor

Camera is used for detecting the eyes .It capture the eye movements and transmitted to Raspberry pi. According to the movements of the eye, wheelchair will be moved.

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC. The L293D can drive small and quiet big motors as well. It works on the concept of H-bridge. H-bridge is a circuit which allows the voltage to be flown in either direction as voltage need to change its direction for being able to rotate the motor in clockwise or anticlockwise direction, Hence H bridge IC are ideal for driving a DC motor for this purpose.

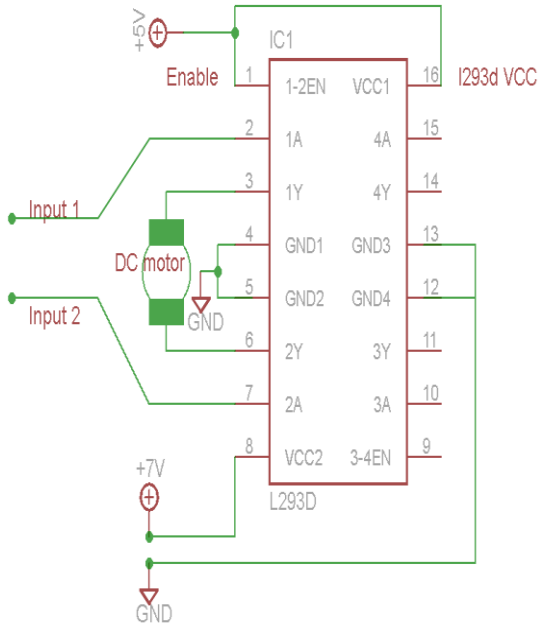

Fig.4:L293D Circuit Diagram

5. Methodology

In this paper for detect the eyes we use frontal face detector with dlib. According to dlib's github page, dlib is tool kit for making real world machine learning and data analysis applications in c++, easy to use python bindings.

Majorly dlib is used for face detection and facial landmark detection. The detector is based on Histogram Of Oriented Gradients(HOG) and linear SVM .

The facial landmark detector implemented inside dlib produces 68 (x,y) coordinates that map to specific facial structures. These 68 points mappings were obtained by training a shape predictor on the labeled " ibug 300-w data set".

The recognization of a face I a video sequence is split into three primary tasks. Face detection ,face prediction, face tracking. Face detection is the fundamental step in any one of the operations carried out in the face recognization process.

To recognize the face obtained, a vector of HOG features of the face is extracted. This vector is then used in the SVM model to determine a matching score for the input vector with each of tables.

In that code for installing the dlibs HOG based face detector and loading the facial predictors using

Detector =dlib.get_frontal_face_detector()

Predictor=dlib.shape_predictor("sp.dat")

For each face region , we determine the facial landmarks of the ROI and converts the 68 points into a Numpy array.

In this paper ,based on eye movements the wheelchair will be moved. If both eyes are open indicates the wheelchair will be stop. Similarly for closing the eyes ,the wheelchair will be moving forward. If open the left/right eye it will moved according to the eye which one is opened.

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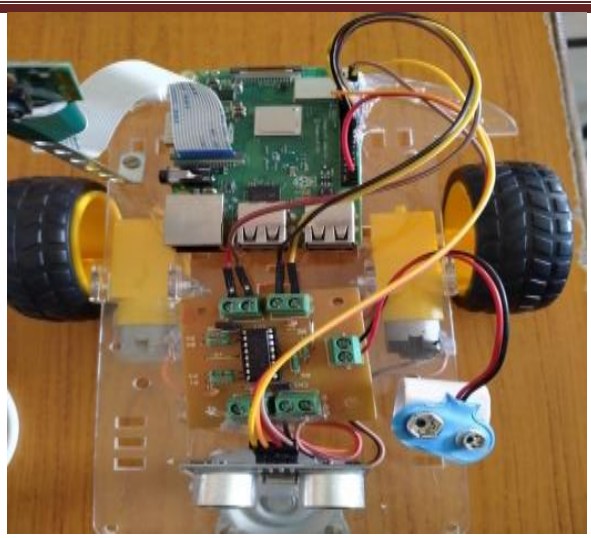

Fig. 5: Prototype of the propsed system

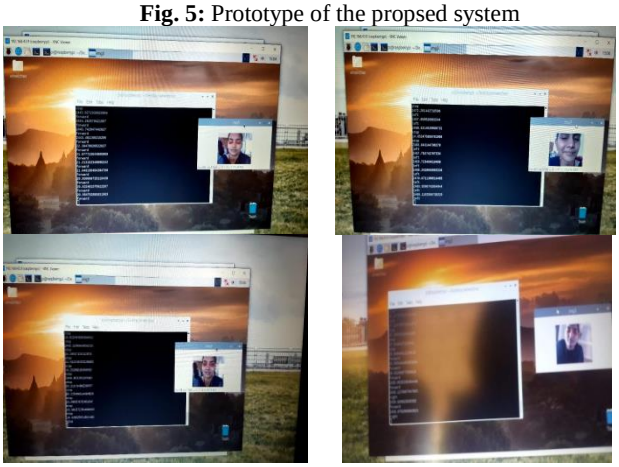

Fig.6: Movements of wheelchair based on eye shown in raspberry pi window

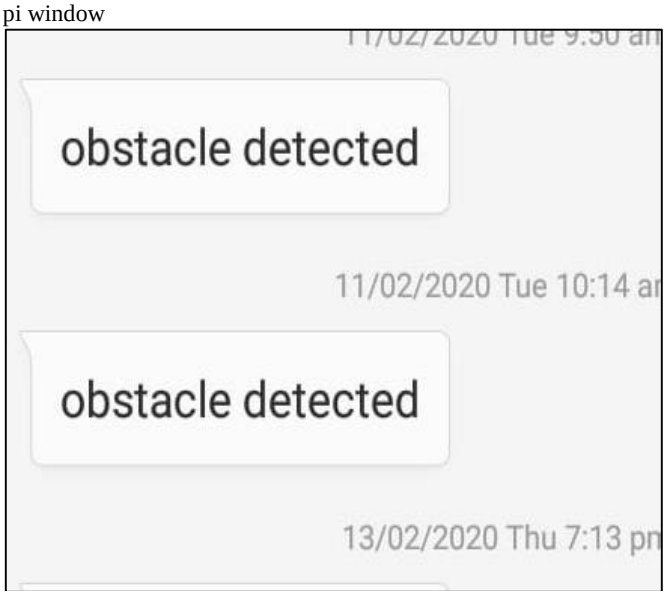

Fig.7: SMS notification

6. Conclusions

There are several barriers that much be overcome before smart wheelchair can became widely used. A significant issue is the cost versus accuracy. Compared to all electrical wheelchair accuracy rate is more than 90% but the user need to familiar with the CAM functioning. The main aim of the paper is to help the totally paralyzed persons and give an independent life.

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Product label,Obstacle and Sign Boards Detection for Visually Impaired People

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Abstract: From the ancient days, visually impaired people had been facing many problems.In this scenario due to heavy traffic there is a chance for them to meet with an accident due to the absence of vision. In addition it becomes necessary for them to depend on others while crossing the roads, to recognize the product labels and to identify the directions in the one way roads. This work helps such people to overcome those problems.This work uses camera module for identifying directions and product labels. The camera captures the label image of the product which is infront of it, detects the product label image and then the image is separated using open CV library. It also uses ultrasonic sensors for identifying obstacles. The output can be heard by impaired people in the form of voice signals through earphones. All this work is carried out by using raspberry pi 3 module B+ with python software. This work helps the visually impaired people to find obstacles which appear infront of them. It also helps in identifying product label and sign boards on the road.

Key Words: Visually impaired, Assistive devices, optical character recognition, Text localization algorithm, ultrasonic sensor, Ear phones.

1. Introduction

Eye sight plays a crucial role in our day to day existence. People with disabilities are among the most stigmatized and excluded groups of people around the globe. The loss of eye sight severely restricts a person's lifestyle and activities. Mobility for blind and visually impaired can be challenging due to the inability to determine their positions and objects location in the surrounding environment. People with normal vision may observe the surrounding environment to gain knowledge and navigate while it may be difficult for a blind person to find the shortest(or safest)route to a destination[5].

Reading is necessary everywhere in today's world whether in the form of bank receipts, restaurant menus or reports.In 2009, according to World Health Organization disability survey, visually impaired people are 269 million and 45 million people are blind worldwide. In today's time, due to the development of digital cameras and computers can help blind persons to read necessity things with the help of camera-based products such asOCR.Formulating such devices can promote independent living and foster better economic and social self-dependent life[1].

In present day, sign detection is mainly used to assist the visually impaired people and give commands through audio feedback, consequently decreasing the number of accidents.The objective of this work is to formulate a method for detection of sign boards. With the help of this method, one can accurately detect traffic signs like forward, turn left, turn right and turn back[3].

This paper also proposes to develop obstacle detection in the path of visually impaired people. This helps the user to walk without colliding with any obstacles in their path[2].

2. Literature Survey

In a vision based assistive system for label detection with voice output is discussed. A camera based assistive text reading framework help blind persons read text labels and product packaging from hand-held object in their daily resides. To isolate the object from cluttered backgrounds or other surroundings objects in the camera view, an efficient and effective motion based method to define a region of interest (ROI) in the video by asking the user to shake the object. In the extracted ROI, text localization and recognition are conducted to acquire text information.

To automatically localize the text regions from the object ROI, a novel text localization algorithm by learning gradient features of stroke orientations and distributions of edge pixels in an Adaboost model is applied. Text characters in the localized text regions are then binarized and recognized by off-the shelf optical character recognition software. The recognized text codes are output to blind users in speech.

Presents Darshan a Navigation System for blind people to navigate safely and quickly, in the system obstacle detection and recognition is done through ultrasonic sensors and USB camera. The proposed system detects the obstacles up to 300 cm via ultrasonic sensors and sends feedback in the form of beep sound via earphone to inform the person about the obstacle. USB webcam is connected with Raspberry Pi Embedded board which captures the image of the obstacle, which is used for finding the properties of the obstacle (Human Being). Human presence is identified with the help of human face detection algorithm written in Open CV. The algorithm is implemented in Open CV, which runs on Debian based Linux environment.

In existing system, ultrasonic sensor in used in three directions for finding the object in front , left and right side of the person by using the distance of the object , which is detection within the rangeand using some external audio player wecan play thepredefined saved voices for the alert for blind person.

3. Proposed System

The proposed system helps in detection of labels on the products,Sign boards and obstacle detection for visually impaired people.

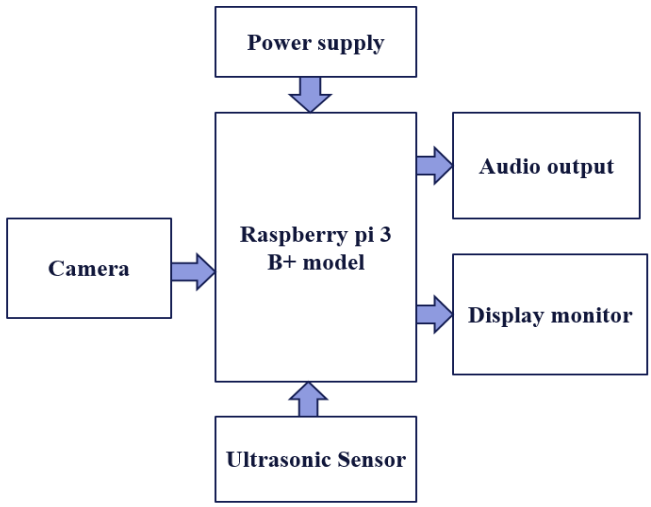

Fig.1: Block Diagram of Proposed System

This system requires a 5V power supply. We can use a battery, portable charger, micro USB as the input power supply. The Raspberry pi camera module is a custom designed add-on for Raspberry pi. It attaches to Raspberry pi by way of one of the small sockets on the board upper surface. This interface uses the dedicated CSi interface, designed especially for interfacing to cameras. The board itself tiny, at around 25mm x 20mm x 9mm. It also weighs just over 3g, making it perfect for mobile or other applications where size and weight or important. It connects to Raspberry pi by way of a short ribbon cable The sensor itself has a native resolution of 5 megapixel, and has a fixed focus lens on board. In terms of still images, the camera is capable of 2592 x 1944 pixel static images,and also supports 1080p30,720p60 and 640x480p60/90 video. The camera is supported in the latest version of raspbian, Raspberry Pi's preferred operating system.

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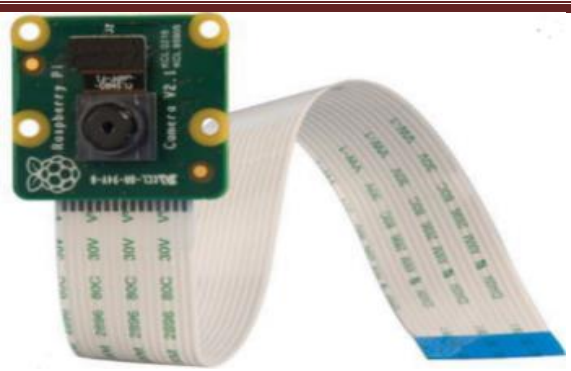

Fig. 2: Camera Module

The ultrasonic sensors belongs to a category of sensors that emits ultrasound i.e., sound of frequency more than 20 kHz. Initially, a trigger pulse is given as an input to the ultrasonic sensor using Raspberry Pi. The ultrasonic sensor then emits a short 40 kHz ultrasonic burst signal. This burst signal travels through the air at approximately 343ms, hits an object and then bouncers back to the sensor resulting in an output pulse. This output pulse is captured by Raspberry Pi. Then using the time taken pulse to return back we calculate the distance from the obstacle.

The sensor consists of four pins: (1) VCC, (2) Trigger, (3) Echo and (4) ground.

- VCC –It is used to provide 5V power to the sensor.
- Trigger – Takes in input pulse to trigger the sensor.
- Echo – It is used to receive the output pulse i.e., the echo from the object detected.
- Ground – It connects sensors to the ground.

Fig. 3: Ultrasonic Sensor

Raspberry Pi is a credit card sized computer which can be used for many of the things, like word processing and games. Raspberry Pi board is brain of the system. Raspberry Pi have its own operating system is known as raspbian which is Linux based operating system and compatible with Raspberry pi board. Raspberry Pi is so brilliant in its ability to execute “Python” coded programs. Processor speed ranges from 256 MB to 1GB RAM. Raspberry Pi 3 model B was released in February 2016 with a 64-bit quad core processor and consists of on board Wi-Fi, Bluetooth and USB boot capabilities.

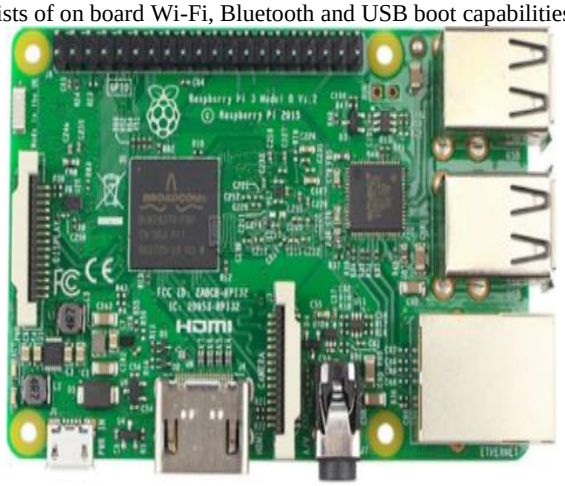

Fig 4: Raspberry Pi 3 B+ model

4. Methodology

4.1. Text and product label reading

Text and product label reading can be done by using text localization algorithm and haar cascade adaboost model. The below figure shows the working procedure of text and product label detection.

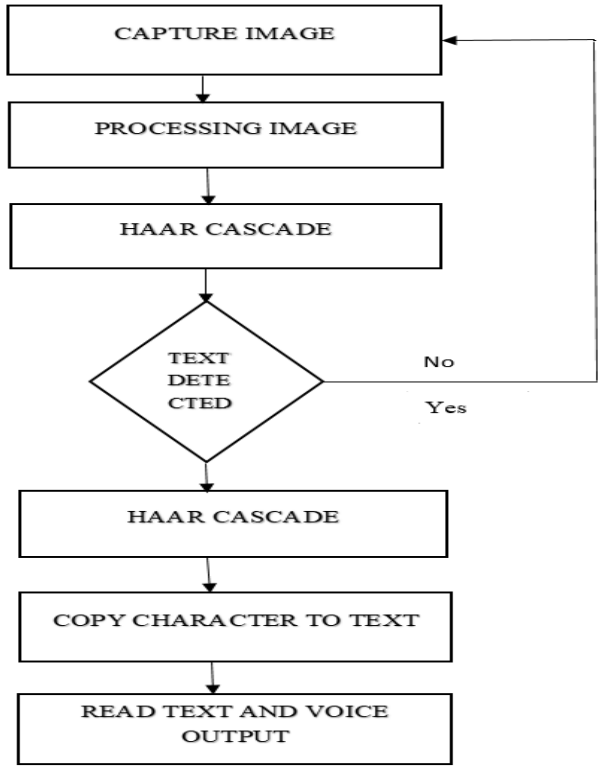

Fig. 5: Flow chart of text detection

4.2. Obstacledetection

Ultrasonic sensors are used for obstacle detection and calculation of distance between the obstacle and the visually impaired person.

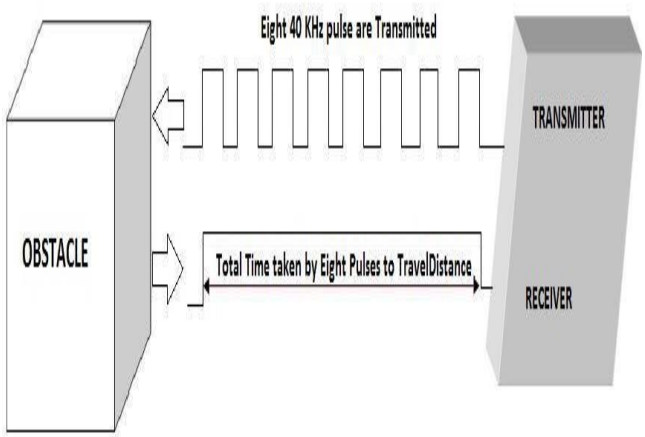

Fig. 6: Working of an Ultrasonic sensor

4.3 Sign board detection

The HSV values for the colors green, white and red are defined. In the image, the white colored blobs are identified. The largest square blob is the sign. The images are smoothened using Kernel Algorithm. Then, the contours in the mask are detected. If thedetected contours are greater than zero then the contour of identified rectangle is drawn on the image. After this the ROI is selected where the sign part is expected to be present. The way in which ROI and segments are defined.

5. Results

In this Proposed Work a prototype for Product label, Obstacle and Sign board detection can be done using Raspberry pi model b+ for visually impaired people.

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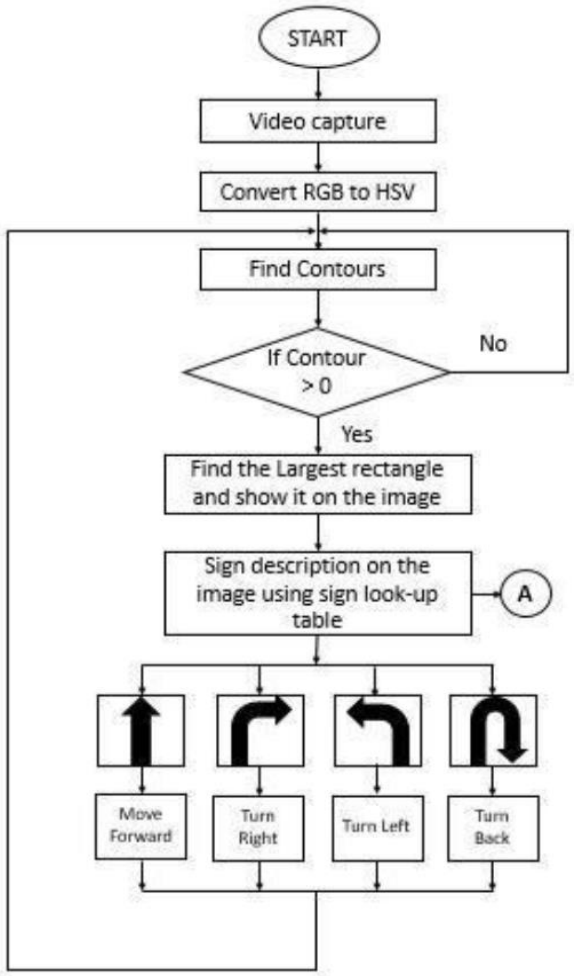

Fig. 7. Flow chart of Sign board detection

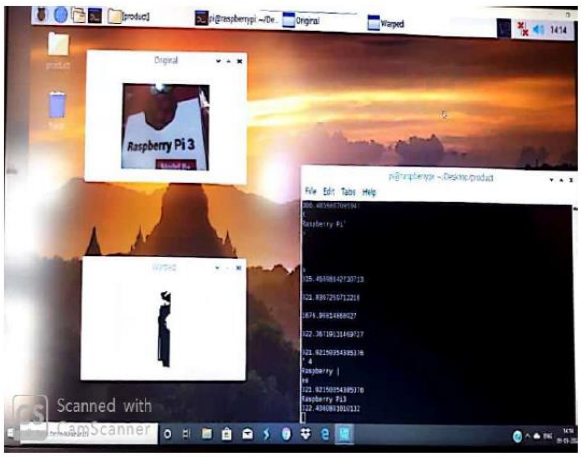

Fig. 8: Detection of product label

Fig. 9: Detection of obstacl

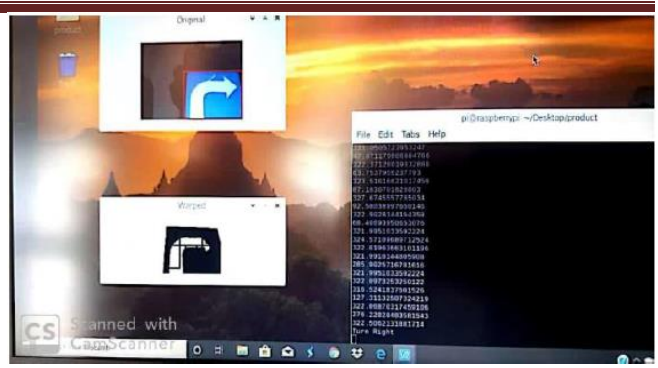

Fig. 10: Turn right identification with message dis

Fig. 11: prototype of proposed system

6. Conclusions

The proposed system helps visually impaired people to read printed text on products which appears in front of the camera through the earphone, it also helps them to detect the obstacle to prevent them from falling. In addition it also helps them to detect sign boards on the road.It can build self-confidence and can give a better life to the blind users as theybecome self- dependent for day to day requirements.

In future the proposed system can also be used to find the medicine or tablet names for visually impaired people. It helps them to become independent in their day to day life.

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Smart IOT System for Monitoring and Controlling Livestock Parameters

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Abstract: In this paper we consider the products like quality and welfare of animals which are closely related to the environment parameters in livestock building. A monitoring and control method of environmental parameters in livestock buildings based on wireless sensor network is proposed in this system. The parameters like temperature, humidity, light intensity, carbon dioxide concentration, ammonia concentration, and hydrogen sulfide concentration can be monitored and controlled in real time by this method. These parameters can be adjusted and controlled through WLS algorithm and also can minimize the deviation criteria. Along with this, the system can also track the location of the animals in the livestock building using several tracking nodes placed around the neck of the animal. In addition, the system proposes the ALEXA based voice assistant which is a user friendly system that can assist us to control and monitor the livestock parameters. Compared with the traditional method, the proposed method reduces the high labour cost and energy consumption will be decreased.
Keywords: Wireless sensor Network, Tracking, ALEXA, GPS, GSM, Zigbee, MYSQL.

1. Introduction

From [1] Livestock husbandry is also an important sector which place a key role in economy employment. Recently most of the livestock forms are get effected by the environmental parameters such as temperature, humidity, light intensity, Carbon dioxide(CO_2), Ammonia(NH_3), Hydrogen sulfide(H_2S). The environmental condition of the poultry house and livestock stall has become an important factor in the development of poultry house and livestock production. In the process of poultry and livestock breeding, controlling the poultry environment has an important significance to the animal health growth to maximize the use of its growth performance. The proposed system of livestock and poultry production have shown that the growth, health, reproduction status, and forage utilization of livestock and poultry are restricted by the environment its house and stall.

According to The Latest Agriculture Industry Standard of India, it is the main environment parameters in livestock building such as temperature, humidity, light, carbon dioxide concentration, ammonia concentration, and hydrogen sulfide concentration. In [2], Most of the research results, at present are only in the theoretical stage and the experimental stage, few of them have been tested for a long time, and the accuracy and stability of data acquisition and system still cannot be verified before having mass field testing in livestock building.

From [3] for improving the management of livestock husbandry, there is a need for tracking the location of animals in livestock building using an automated system. Since the animals are in the closed environment but still there may be a chance of missing of animals or may be a chance of theft of animals by some other persons. Therefore livestock farm may need this tracking system. The Range will be created according to the physical area of the livestock building.

For user friendly, AMAZON ALEXA was introduced in this system. According to the commands given by the user, it will control and monitor the livestock parameter in the real time.

The rest of the paper deals with the following concepts

Related work--gives a comparison between proposed systems with other References.

Measuring Parameters--deals with the parameters that are going to measure and also about the nodes that are being placed in the livestock Farm.

Proposed System--deals with the Pictorial Representation of the system with proper description.

Algorithm and Flowchart—deals with the WLS algorithm and it's Flowchart with proper required equations.

Conclusion—it represents what the proposed system finally achieved compare with Past systems.

If any animal crosses that range, alertness will be obtained to the user in the form of alarm and Message to mobile with the help of GSM and controller.

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2. Related Work

Let us consider [1] i,e. Yu Zhang's Environmental Parameters control Based on Wireless Sensor Network in Livestock Buildings, Monitoring and controlling is done automatically using server. But, estimation of environmental Parameters are not done. Similarly in Addition to this we Proposes the Tracking of cattle in Livestock building. Along with this we Includes the Amazon's Alexa Voice Assistant system for better Accessing and Controlling of Parameters by the User.

Similarly consider the [2] i,e. WenJie Tian's Environmental Monitoring system of Household Security Robot Based on Wireless Mesh Network, Monitoring is only achieved using Wireless mesh Network. From [3] i,e Sung-Gi Choi's Design and Implimentation of a GPS-enables Mobile Wireless sensor Network for Livestock Herd Tracking in Mangolian Nomadic Herding, Tracking of animal location is achieved.

Table 1: Comaprison between proposed system and others

PARAMETERS	REFERENCE1	REFERENCE2	REFERENCE3	PROPOSED SYSTEM
Sensors	Temperature Humidity,light Illumination, Gas concentration Sensor.	Temperature, Distance sensor,video camera.	_____	Temperature, Humidity,ammonia, CO_2,H_2S,light Illumination sensor.
PROCESSING UNIT	_____	ARM920T	Normal MCU unit	ARM cortex-A53
COMMUNICATION MODULE	Zigbee	Zigbee	Zigbee	Zigbee
PROTOCOLS	http protocol	HWMP, http Protocol.	TCP/IP	TCP /IP, http protocol
PLATFORM	_____	Embedded C	PYTHON	PYTHON V3.7,Embedded C
SERVER	SQL server	Web Server	Web Server(Apache)	MYSQL server
DATABASE	SQL data base	____	MYSQL database	MYSQL data base

3. Measuring Parameters

3.1 Air temperature

From [1], the sunlight varies with the seasons and time, so temperature changes, in the livestock building is not set in stone. When temperature changes, livestock will react accordingly. Take the temperature dropping, for example; livestock will make spontaneous activity weakened decrease sweat glands respiratory

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activity, in order to reduce the heat loss. At the same time, under the cold condition, livestock and also use the oxidation of nutrients in the body to increase the body's heat peroxide and maintain body temperature regulation.

Temperature sensor makes use of various physical properties with temperature change law of the category of sensor temperature conversion into electricity. According to the principle of work, it can be divided into pyroelectric temperature sensor, thermal resistance temperature sensor, and PN junction temperature sensor. Surface temperature is the important basis of animal epidemic prevention. As per the Indian standards 34.5 to 41C is the standard temperature range.

3.2 Relative Humidity

In [1], it is the most direct impact of air humidity on livestock, which affect livestock thermal regulation. Under the condition of high temperature, livestock regulate their own body temperature by evaporative heat, but high humidity can reduce the temperature difference between skin and air difference to reduce the heat. Humidity is an environmental factor and promotes fattening and growth of livestock with other environmental factors together. The rise of humidity will have a harmful effect on the composition of the breast milk.

Common method to measure humidity is absolute humidity and relative humidity. According to the different devices, the humidity sensor can be divided into two major categories of the resistive one and the capacitive one. It is an important environmental parameters index, and humidity sensors are widely used in green houses and livestock breeding places to monitor the humidity. The standard Relative humidity in India for livestock Farms are ranges from 30% to 60%.

3.3 Ammonia

Ammonia is absorbed by livestock, when the quantity is small, it can be directly transformed into urea and be eliminated from the body, but it also affect the disease resistance of livestock. From [1], if the quantity is large, blood can bring it through the lungs and generate the low iron into the alkaline high iron red element, which influences blood oxygen capacity of livestock, causing symptoms such as anemia and lack of oxygen.

3.4 Hydrogen sulfide

Hydrogen sulfide enters into the livestock by cattle respiratory system. Combined with sodium ions, it can produce sodium sulfide, in respiratory mucosa. Which stimulates mucous membrane, causing inflammation, and even tissue edema.

In [1], Hydrogen sulfide is harmful for the circulation of the blood system. It enters into livestock by alveolar. Finally it affects cell oxidation ability, causing systemic poisoning symptoms of animals.

3.5 Carbon Dioxide

Most of the carbon dioxide comes from animals breathing activity. It is nontoxic substances if carbon dioxide is too much, the concentration of oxygen in the air will drop greatly. Thus inhibit normal breathing and physiological metabolism of livestock.

3.6 Light intensity

Light intensity is the luminous flux in the form of object area and surface, it is indispensable to livestock environmental factor, which plays a key role in the process of external conditions, such as survival, growth, development, and breeding. On the natural conditions, natural light has a high regularity, with the seasons changing, day and night shifting. It makes a lot of functions of livestock and poultry body deal with regular sunlight life activities, such as sleep, tissue metabolism, hormone levels, and immune and nervous system.

In [1], Light intensity sensor is a part of the photoelectric sensor, which can take advantage of the component of the photoelectric effect to convert light flux into electricity. Light is closely related to the physiological cycle regulation of livestock, so the light sensor is widely used in the field of monitoring and control of agricultural production.

3.7 Harmful gas transducer

From [1], Gas sensor is a type of sensor that can convert gas concentration measurement to the amount of voltage or electric current. According to the different principle, gas sensor can be divided into semiconductor gas sensors, electro chemical gas sensors and infrared gas sensor.

Among these, semiconductor gas sensor takes advantage of high sensitivity, fast response speed, good maintainability and low cost. Harmful gases will directly affect the quality of growth and livestock products. Thus most of the harmful gas sensor are used in livestock environment intelligent control field.

Table 2: Type of parameters

Parameters	definition	type	Power supply
Temperature sensor	Temperature sensor is a device, which is used to sense the heat of temperature	digital	3.5V to 5.5 V
Humidity sensor	It is the sensor which measure the amount of water vapour in the surrounding air.	digital	3.5 V to 5 .5V
Light sensor	It is the sensor which measures the light intensity in the surrounding environment.	analog	2 V to 5 V
Ammonia sensor	It is the gas sensor which measures the amount of ammonia present in the air.	digital	3 V to 5.0 V
Co_2 sensor	It is the gas sensor which measures the amount of carbon dioxide present in the air.	digital	3 V to 5.0V
H_2S sensor	It is the gas sensor which measures the amount of hydrogen sufide in the air.	digital	2 V to 5.0

3.8 Wireless sensor network

WSN is a new type of information awareness and network system of collection. It can obtain all kinds of detailed and accurate target data information at any time, any place, and any environment too.

From [2] and [16] Several Sensor nodes are placed at different places around the animals in the Livestock building. These sensor nodes are connected to the master node through the Zigbee protocol (IEEE 802.15.4). The Master node in WSN was equipped with GPRS module, which can send the data via mobile communication network to the Controller.

3.9 WSN for Tracking

From [3] and [15] and for tracking system, the sensor node was equipped with Zigbee module (IEEE 802.15.4), Micro controller unit module and power supply. Where as the master node was equipped with an additional block device called GPS module. Zigbee is the protocol used between the sensor node and master node where as GPRS is for master node and controller.

GSM module connected to the master tracking node to give proper alertness to the user. Each animal in the livestock building was allocated with a unique ID which creates flexibility to identify the cattle in the livestock. The type of cattle is also identified using ID number. The coordinates of latitudes and longitudes at the animal location is sent to the mobile through GSM module.

3.10 Amazon Alexa

Simply known as Alexa, is a vitual assistant AI developed by Amazon. It can control several smart devices as per the requirements by the user. From [4], most devices with Alexa allow users to activate the device using a wake word. It allows a user to say a command, such as "Alexa" or "Alexa wake". Currently, interaction and communication with Alexa are available only in English, German, French, Italian, Spanish, Portuguese, Japanese, and Hindi. The code almost entirely in the cloud, using Amazon's AWS LAMBDA service.

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The format of common NLP (natural language process) contents wake work, invocation name and utterances. Wake work indicates the device coming to the wake (active) from sleep mode. Invocation name indicates skill identifier i.e. name of system. An utterance indicates the way of conversation.

4. Proposed System

The figure 4.1 represents the way of arranging the sensor nodes to different corners in livestock building. These Sensor nodes are connected to the Center node using Zigbee protocol.

Similar to this, Several Tracking nodes are connected to the Tracking sink node using same zigbee Protocol.

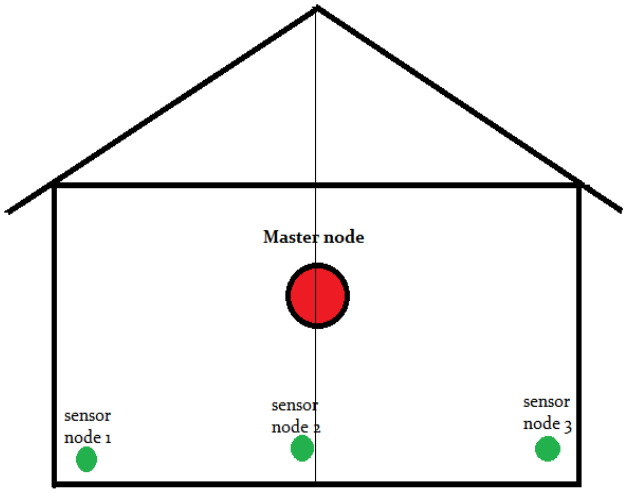

Fig. 1: Position of sensor nodes installed

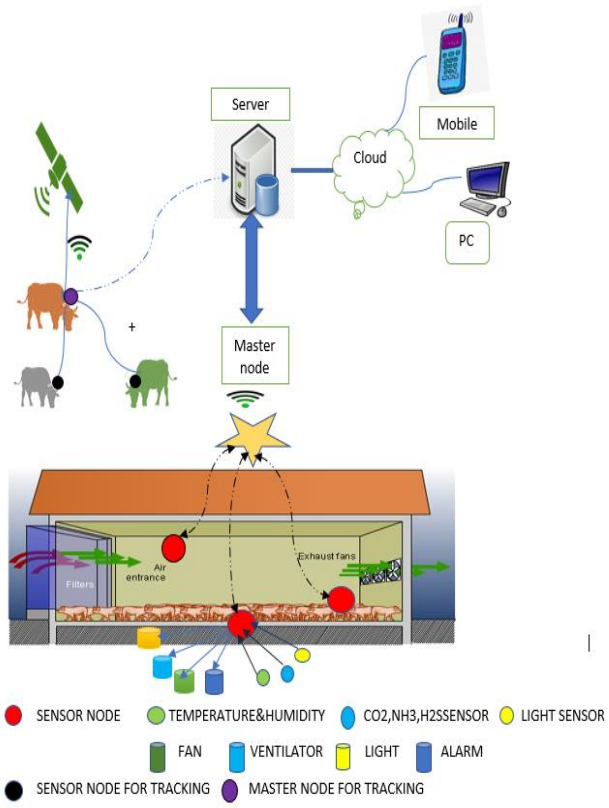

Fig. 2: Overall system Design

The proposed system consists of monitoring, controlling and tracking functions as shown in Figure 4.2. Several sensor nodes are placed at different places in the livestock building. Each sensor node contains sensors such as temperature, humidity, light illumination and gas sensor and each sensor node is connected with different actuators like fan, light, ventilator, alarm etc. Master node contains all the information which were coming from different sensor nodes through zigbee protocol (IEEE 802.15.4). From master node, the information goes to back end server.

By using WLS algorithm, the code is dumped in to the server to attain proper control over the actuators. From [12], if any parameter exceeds the standard range, then the actuators will control the deviation until it has been set.

Similarly, tracking nodes are attached to animals by means of a belt. These nodes are connected to a master node via zigbee protocol (IEEE 802.15.4) which contains multiple hardware components like GPS/Cellular module, ZigBee module, MCU module, power supply module. Here by using GPRS protocol the master node is connected with server. If any animal escapes from the given range, then proper vigilant is generated to the mobile containing the latitude and longitudinal values of that particular locations. According to the area of livestock building, the range is allocated by the user.

4.1 Monitoring and Controlling Using Alexa

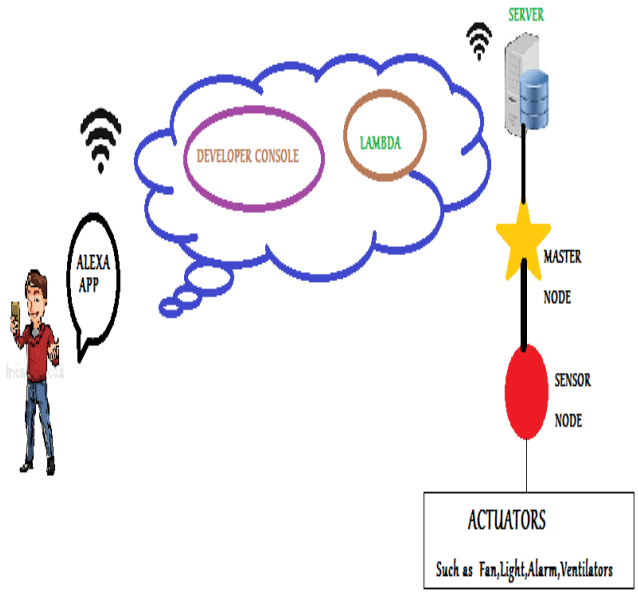

Fig. 3: Working of an Alexa system

The figure3 represents monitoring and controlling environment parameters using amazon ALEXA kit. The commands from us carried to the AWS (Amazon Web service) Cloud through the Amazon Alexa APP. Alexa Device will converts the NLP (Natural Language Process) into Machine Language. Developers Console and LAMBDA Tools are Present in the AWS cloud. Developer Console Provides a Streamlined Experience to help you create, manage, and Publish skills. The following are the Steps that leads you to become an Alexa Developer

1. Design Your Voice Experience
2. Build Your Voice USER Interface in the Alexa Developer console.
3. Build Your Backend to power Your Skill.
4. Test and optimize.
5. Submit, Get Certified, and Publish.

In AWS, Lambda application is a Combination of Lambda functions, event sources, and Other Resources that work together to Perform Tasks. All you need to do, for a custom Alexa Skill, is to upload your code into a Lambda function, which will execute in response to Alexa Voice Interactions. Currently Lambda Supports Node.js, Python, Java, and C#.S

Lambda is Connected to the Server via IOT application and then to the Sensor node. Hence controlling and monitoring is done.

5. Algorithm and Flowchart

Along with monitoring, the controlling and estimating of environmental parameters can be done by using WLS algorithm. The method of weighted least square can be used when the ordinary least square assumption of constant variance in the error is violated is called Heteroscedasticity. The model under consideration is

$$Y = X\beta+€$$

Where, Y = dependent variable

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X = independent variable
β = estimation of parameter
Є = error

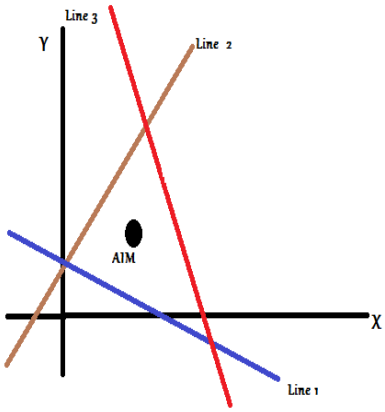

Fig. 4: Multi sensor perceptual information vector equivalent

Where now Є is assumed is to be (multi vibrate) normally distributed with mean vector zero and non-constant variance-covariance matrix

$$\begin{pmatrix} \sigma_1^2 & 0 & - & - & 0 \\ 0 & \sigma_2^2 & - & - & 0 \\ - & - & - & - & 0 \\ 0 & 0 & - & - & \sigma_n^2 \end{pmatrix}$$

If we define the reciprocal of each variance $\sigma_1^{2,}$ as the weight $w_{1=1/}$ $\sigma_1^{2,}$ then let matrix w be a diagonal matrix containing these weights

$$w = \begin{pmatrix} w_1 & 0 & - & - & 0 \\ 0 & w_2 & - & - & 0 \\ - & - & - & - & 0 \\ 0 & 0 & - & - & w_n \end{pmatrix}$$

The weighted least square estimation is then

$$\beta_{wls=\arg\beta_{min}} \sum_{i=1}^{n} \varepsilon_i^{-x^2}$$

Or

$$(x^T\ w\ x)^{-1}\ x^T\ w\ y$$

Residual sum of square

$$R_{ss}(\beta) = \sum_{i=0}^{n} (y_i - x_i * \beta)^2$$

The minimizing deviation criteria of environment parameters control. The control of temperature and humidity it has been a significant problem. Many people attempt to find out an accurate and efficiency way to control temperature and humidity.in order to solve this problem, a useful method will give us some aspiration.

Environment parameters influence each other nonlinearly so that they cannot be adjusted separately. Set S_i and $S_i^{'}$ as standard values and measured values of the monitoring parameters. Define the minimizing deviation criteria of environment parameters control for

$$Q = \sqrt{\sum_{i=1}^{n} \left(\frac{S_i' - S_i}{S_i}\right)^2}$$

If Q tends to be the minimum, the control algorithm works. In practice, usually set the temperature and humidity as a group, and set the gas as the other group.

The basic steps that are involved in the controlling process are as follows

1. Monitor the actual state Parameters.
2. Calculation of Actual Measurements.
3. Compare the actual parameter values with the fixed range.
4. If the obtained difference was large, then automatically controlling action will be takes place along with proper alertness.
5. The controlling still done until the difference was too small.

Internally the WLS algorithm Estimates the future Parameters values by taking the past values. The Estimation values may not be exact. There may be a chance to get slight variation between estimated value and real value.

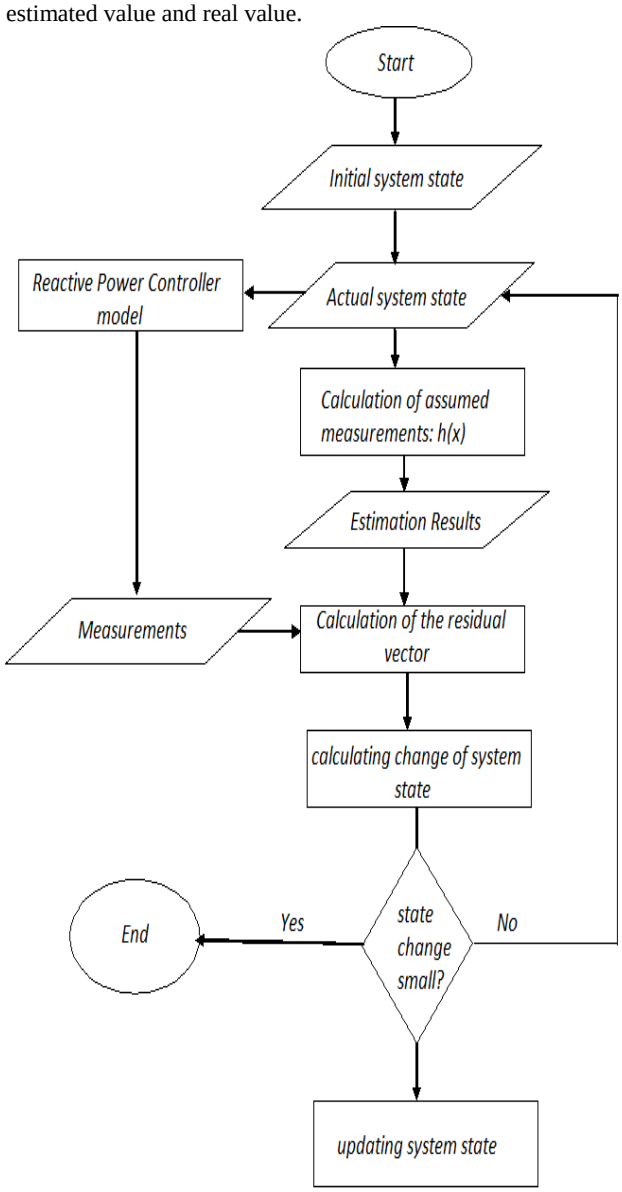

Fig. 5: Flow chart

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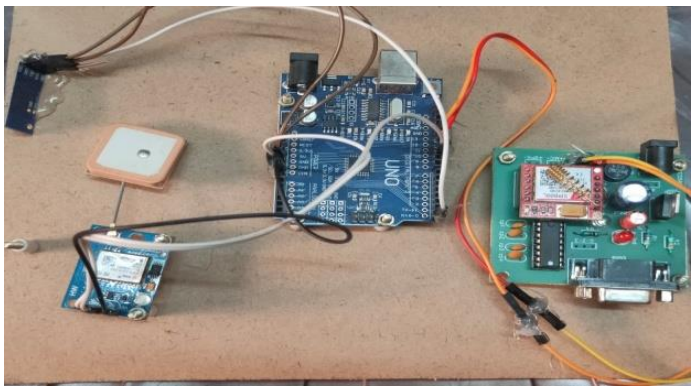

Fig. 6: Tracking Sink (master) node

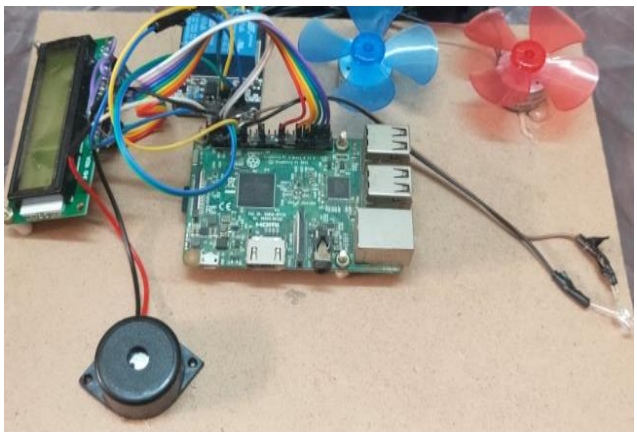

Fig.7: Controlling unit

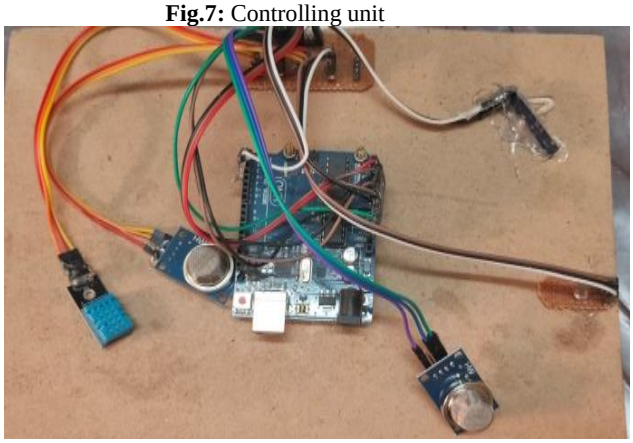

Figure 8 Sensor node

6. Conclusions

In this paper, we presented the smart IOT system for monitoring and controlling livestock parameters the entire system is designed using ARM processor embedded single board with 1GHz processing speed i.e. raspberry pi. Overall several sensor node are created to convert physical data into electrical quantity. The recent advantage in IOT has several benefits and advantages over manual wired/ wireless system. For better management of livestock building, tracking application plays a major key role. In additional, we added ALEXA voice assistant system which makes the controlling and monitoring easily by the user.

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Soil Testing and Analysis of Nutrients for Crop Yield

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Abstract: With the surge of advent in various technologies, real time applications were put into practise. However, the habituals in the field of agriculture needs to be improved by a fence. This paper is based on monitoring the nutrients level of soil thus providing crop analysis. Various sensors like temperature and humidity along with pH meter are used. It obviously takes a long time, especially when monitoring the decreasing level of soil parameters. This practice is less efficient and needs a solution to improve efficiency. Raspberry Pi is used in confining the essentials and the information about soil, crop and environmental factors will be sent and updated to farmers through our proposed system methodology.

Keywords: pH meter, Raspberry Pi, Nutrient level, Temperature and Humidity

1. Introduction

IOT technology has the ability to design present and future society requirements and its IOT applications is defined as the interconnection that is established between the physical devices with the help of internet without the intervention of humans. It can be expanded to various fields as it is subjected with many ecosystems, which are smartly controllable. This evolution of IOT came to existence because of the rise of embedded systems, real time analytics, and machine learning along with sensors.

Sensor is a device that senses various parameters which are cognizant and which vary with the surrounding changes. Sensors help in the backdrop of monitoring real-time data thereby updating the values in the cloud for present use. The monitored sensor changes in the environment are converted to electrical signals.Soil is an important parameter which must be taken into consideration. It is the major organic material present on top of the land that is feasible up to 25% and is responsible for plant growth. The major available type of soils are sand, silt, clay and loamy with minerals, gases, liquids, organisms are present in it.

Soil testing management increases productivity by identifying the nutrients that are present in the soil and which contribute to their growth. Also increases the fertilizer efficiency, and identifying soil erosions.

Soils provide room for gaseous exchange between roots and atmosphere and the important parameters are nitrogen, potassium and phosphorus. These describe the plant analysis and content of soil in pH range.

A crop is suggested based on NPK values along with pH where nitrogen is responsible for growth of leafs. Too little with the addition of nitrogen the leaf turns yellow and too much can delay flowering and produce poor quality fruit. Besides, phosphorus is important for plant genetics and seed development aiding the plant maturity whereas potassium helps in coloring of fruit and early growth. Different soils have their pH ranges on the respective grounds (conveys whether they are acidic, basic or neutral).These nutrients create a major issue in agriculture sector even in different countries. In India, agriculture is the backbone of economy that contributes to the growth and has a proportion of 50% to the country's welfare. There are also some challenges which are encountered in the fields such as water scarcity, labor management, marketing and consuming of items (e.g. fertilizers). Technology based applications are much needed to monitor this system in order to perform the actions besides itself intelligently.

2. Related Work

As per the significant research done in the field automation, communication devices proposed many sensors to display the results existed to determine the monitoring of plant growth and soil. Extracting information of various soils is a lengthy procedure in determining pH ranges and nutrient values. On the par, the previous works that were carried out were monitoring the soil, crop and other environmental factors on a huge scale. Several sensors were used in this process such as temperature, humidity, water level sensor, soil moisture sensor, light dependent resistance, and electro-chemical sensor.

In the previous system, the relationship between nutrients in the soil and pH have been identified using microcontroller. Mostly all the crops are suitable when the pH is in the range of 4.5-8.5. In this they identified the nitrate level in the soil by assuming the fractions of the estimated formula. Moisture levels were obtained for wet and dry soils by mixture of water and available soils in addition with temperature that is sustained in the soil. DHT-11 is used as principal temperature sensor which acquired the values from soils. An approach for obtaining these parameters included to take continuous measurements and checking them at times.

Moisture irrigation controllers use water content information from the sensor to allow scheduled irrigation cycles on the timer. SMS controller has adjustable threshold setting and if the soil water content exceeds the setting, the event is bypassed. The soil water content threshold is set by the user. Another type of technique is SMS devices on-demand where the controller initiates irrigation at a low threshold and terminates at high threshold. By this the moisture level has been obtained up to the required level.

Previously they have taken the values by a manual method and suggest the crop by taking the pH values of the soil and they have given the relationship with the nutrients of the soil so they can approximate that the nutrient content according to pH value and also given relationship the soil pH and crops. They adjusted the pH values to suggest the crop by the testing of soil and finally they have done that suggesting crops to farmers without going to soil test centers. They have estimated only few essential factors that required for the plant growth but they have not estimated the major nutrients that required for the plant growth. They found out the values for the wet and dry lands only. They have not taken the values for all lands available in our country.

By taking the estimation of soil manually the results may be differ to the suggestion of plant growth. Plant with essential nutrients will suggest the plant growth by providing rich nutrients in the soil. There are many methods to extract the soils by mixtures of chemical reagents available in liquid state.

Dumas method is a method of analytical chemistry process it is used for the quantitative method for the determination of nitrogen. In dumas method we can process CO_2 generator and diffuse the soil in the combustion tube and finally we can Schiff's nitro meter for obtaining available nitrogen in the soil. By this process it takes long time for mixing the chemicals that required for the testing.

Estimation of the major nutrients that required for the plant growth was done. The major nutrients that required for the plant growth are nitrogen, phosphorus and potassium. We had found out the major nutrients that required for the soil with the help of various equipment's like Kjeldahl assembly, Colorimeter, Flame photo meter. These equipment's are used for the estimation of the major nutrients that required for the soil.

In Kjeldahl assembly method the soil is mixture of various reagents and doing the process of distillation, digestion, titration hence we can estimate the nitrogen level in the soil. In colorimeter we can extract the available phosphorus in the soil by using the Olsen's reagent method. By mixing the soil with this reagent we can estimate the phosphorus. By using Flame photometer we can extract

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the available potassium present in the soil. By taking soil in flask and mixing reagents in that flask and heating the flask we obtain the available potassium in the soil.

3. Proposed System

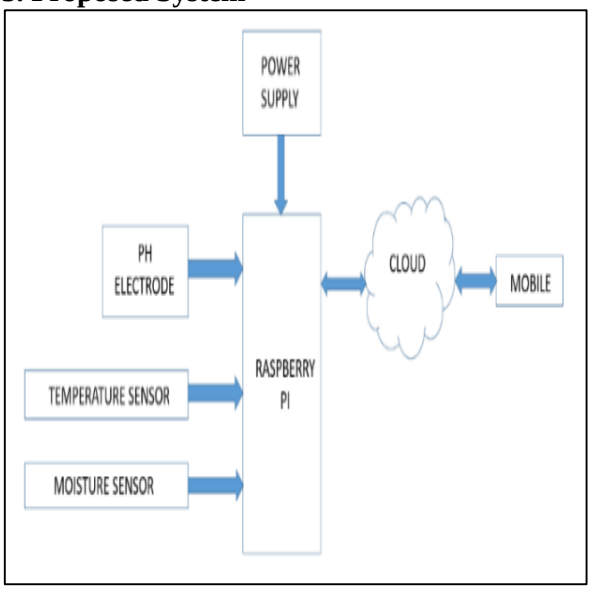

Fig. 1: Block Diagram

In this block diagram there are different types sensors connected to the raspberry pi, and are used to obtain the sensed information from the soil. The raw data obtained from the sensor is taken as input to the raspberry pi, then raspberry pi stores the obtained values and process the sensing values and stores them in its memory. The raspberry pi is used to connect with the cloud which is used store the sensing values.

The proposed model depicts the use of raspberry pi in fulfilling the purpose of selecting the suitable crop. Different sensors like pH, temperature and humidity, moisture sensors are used. Later on, these values with the help of raspberry pi are forwarded and stored to the cloud for number of applications. With the help of internet, one could even get better access to the predicted values and could compare them with the database values for accurate results resulting in crop suggestions.

Soil texture is effected by various Cfcs. These gases are very harmful as they have adverse effects on the parameters that are available in the soil. They include soil texture, soil temperature, soil pH, soil moisture and humidity. It also tends to change the major nutrients and their levels for a particular trend. This is a serious issue on which one has to look upon and mark the changes beneficial to him. Various practices are being made and which help to sustain the new environment changes that are abrupt. These changes needs to be monitored and with the assistance of ample sensors, the user can do this job quite easily and thus making the field smart. This is also said to be smart-farming. Sensor values change every second as parameters which are being monitored change every moment.

It is the main block which supplies power to the mini-computer. It supplies required amount of voltage that is needed to drive that particular electrical device. It consists of a transformer, rectifier, filter and circuits in application.

A mini-computer that is of low cost, card sized switch uses languages like python to be programmed and that operates, controls paving to act as an interface.

Cloud provides storage worldwide, which is highly durable object storage that scales to Exabyte of data.

DHT-11 is a temperature and humidity sensor that senses, measures moisture and air temperature. It is a composite sensor which gives the calibrated digital signal output of temperature and humidity which includes capacitive, resistive, and thermal types. pH stands for potential of hydrogen. It measures the concentration of hydrogen-ions present in the soil. When the pH range is from 0 to 6.3, it is acidic and if it ranges between 7.2 to 12, it is basic. If it is from 6.4 to 7, it is neutral and provides the best productivity. It is a soil moisture sensor which measures moisture content of the soil and gives the volumetric content of water.

Crop suggestion is very crucial factor in this proposed model. It is done by initialling the system and reading the values of humidity, temperature, moisture, and pH. Further, it asks the user to provide the details of the soil and the type moving on to write the major nutrients values as nitrogen, phosphorus, and potassium. Then, it compares the present values with the values in the database to acknowledge the user about different crops that could best suit with the soil conditions.

pH value of the soil is considered to be the most important part as it decides the balance of alkality and acidity present in the soil. If it is above the range that is needed then it needs to convey that the soil is not suitable for production. Else if it is in range that is acquired, then the crops list that matches with the pH readings are made available to the user.

Table 1: Comparisons between sensors and proximate value

Availability	N with sensors Kg/ha	K with sensors kg/ha	P with sensors Kg/ha	N with manual kg/ha	K with manual Kg/ha	P with Manual Kg/ha
Low	51 to 100	Pd ±25	P d ±25	<240	11	<110
Medium	100 to 175	26 to 75	26-50	240-480	11-22	110-220
High	175 to 250 251 to 325	76-125	51-100 101-180	>480	>22	>280

In the above comparison table given data gives the information about the soil productivity of the nutrients in the crop fields in comparative between sensors and manual method. Sensors can take up to some data which will perform a necessary data we can take up to 70% readings by taking manually we can provide more data about the nutrients in the soil and produce more productivity to the farmer.

From the above table it shows that the soluble salt ranges for the germination of crops. Due to this ranges it indicate that the conductivity of salts levels in the soil and also it intimates that how it effects the crops growth in those ranges. The conductivity range of plant growth ranges in mohos. The various levels in the soluble salts indicates the types of crops grown in the different regions.

Table 2: Salt ranges in soil

Soluble salt ranges	Conductivity in milli mohos/cm^2
<1	Normal
1-2	Critical for germination
2-4	Critical growth of sensitive crops
Above 4	Injurious to most crops

3.1 Algorithm

Step 1: Initialize the system.
Step 2: Providing the soil type.
Step 3: Read the values of temperature, humidity and moisture along with pH.
Step 4: if the pH reading is neutral, then the system asks for the major nutrients nitrogen, phosphorus, and potassium.
Step 5: Comparing the values with database values which are obtained previously.
Step 6: Selecting the list of crops that are best suited are partitioned and sent to the user.

The whole algorithm is segregated into six steps which concludes the information and the procedure that is carried out in obtaining the

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required specific values and helping the user in letting to know what sort of crops are best suited to the conditions that are available and he ones which are presented from the past. This makes the user work at ease and is beneficial in every aspect for obtaining high crop productivity.

5. Results

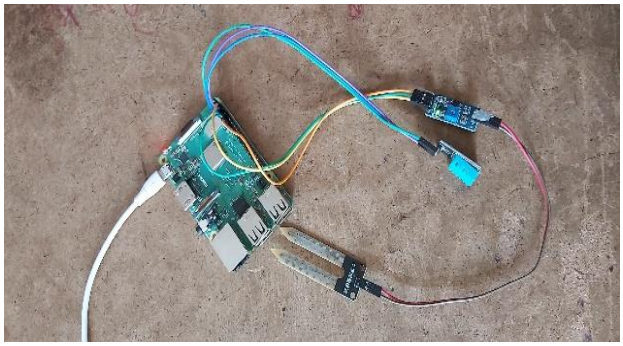

Fig. 2: Prototype

Here fig.2. represents the prototype which comprises raspberry pi 3b in connection with soil moisture sensor, temperature humidity sensor and power supply. The values are taken from the database and compared with the original values proposing the suitable crops.

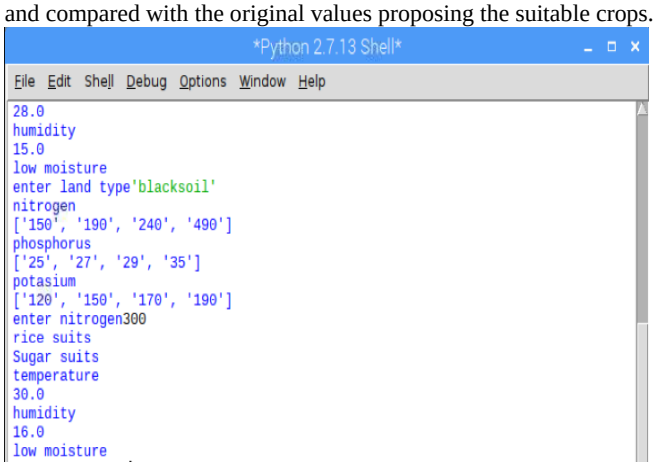

Fig.3: Terminal

Fig 3. gives the information about terminal output which is obtained from python shell. Every detail is mentioned in the terminal from obtaining the values of pH, nitrogen, phosphorus, potassium and using them to suggest the suitable crop.

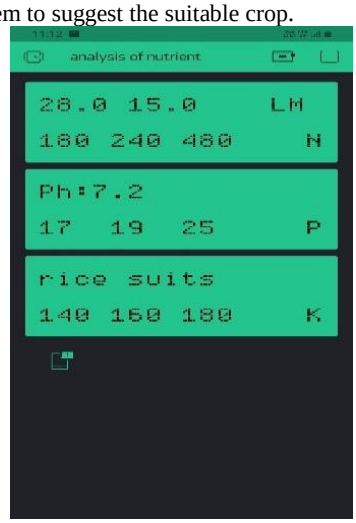

Fig. 4: Message output

Fig. 4 is the final output which is delivered to the user to let him know which crop could better suit up with the conditions and which could be of high productivity.

6. Conclusions

There is a concern that crop intensification leads to adding up of more nutrients in the form of fertilizers, for growth of the plant which require major nutrients as nitrate, phosphorous and potassium. These N, P, K nutrients occupy major ratio of 70% for plant growth. From this proposal there will be no delay in obtaining the results available for crop fields, and one can produce accurate results of the soil in no time, and produce the healthy crops.

This reduces the difficulty of the farmer in finding the suitable crop that best suits for possible grown in the crop production & which has best yield, crop growth.Thereby providing the optimization of the sensor values, monitoring the yield, reducing the time, profits the farmer increasing the efficiency.

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Implementation of P-N Learning Based Compression in Video Processing

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Abstract: Now-a-days, visual information is playing a more and more important role in our daily life and effects our way of communication and living in many aspects. Digital images and video applications usually involve storage or transmission of vast amount of data. For secure transmission of data and to reduce the size of the video, video compression techniques are used. Some of the techniques that are used in present days reduce the quality, data size and the original data cannot be retrieved. To overcome these problems, P-N learning based compression technique can be used.In this work, multi-scale filter banks are used for performing necessary operations to obtain the compressed video. The image extraction from video is obtained by performing sequential frame selection method, which is converted to grayscale and then encrypted by using sparse matrix generation technique. MATLAB is a multiparadigm numerical computing environment and proprietary programming language. It allows matrix manipulations, plotting of functions and data, Implementation of algorithm, creation of user Interface. This work helps in providing security for images containing information it also helps in the reduction of bandwidth utilization since only the information contained image is transmitted instead of whole video.

Keywords: Secure transmission, Video compression, P-N learning, Multi-scale filter bank, Security, Bandwidth Utilization, Sparse matrix generation, MATLAB.

1. Introduction

Now-a-days the use of video continues to expand so that the demand for high-quality video continues to increase. The video content providers have been extending the video parameter space by using higher spatial resolutions, frame rates and dynamic ranges, which greatly increases the space required for video storage. Many areas, such as the railway transportation industry, civil aviation industry, schools and banks have strict requirements on video storage time which leads to the development of video compression techniques.

On the other hand, as the use of wireless mobiles and tablets had become too common these days, the video transmission also had become ordinary in wireless networks, which leads to the problem of large number of packet loss. Since the data is a video, it utilizes more bandwidth and time for transmission. In such scenario, it becomes necessary to reduce bandwidth allocation for efficient transmission. To meet the above considerations, several frames are introduced through which transmissions are to be take place. The video streams are made to pass through these frames and then are transmitted in the form of bit streams.

Compression is a technique defined as the process of reduction of image or video size to occupy less space. It is achieved by the removal of one or more of the three basic data redundancies such as Coding Redundancy, Interpixel Redundancy, and Psychovisual Redundancy. When less than optimal code words are used then coding redundancy is present. Interpixel redundancy results from correlations between the pixels of an image. Image and video data compression involves a process in which the amount of data used to represent image and video is reduced to meet a bit rate requirement where the quality of reconstructed image or video satisfies a requirement of certain application. In recent decades, video compression algorithms have relied on hand-craft modules such as block-based motion estimation and discrete cosine transform (DCT), to reduce redundancies in video sequences. While they have been very well engineered and thoroughly tuned, they are hard-coded, and as such, they cannot adapt to the growing demand and increasingly versatile spectrum of video use cases such as social media sharing, object detection and VR streaming. Later, the standards for video compression such as H.262, H.264 and H.265 are widely used to save transmission bandwidth and storage space. This work proposes a video compression technique using H.264 codec based on P-N learning algorithm, a deep learning algorithm that has revolutionized many industries and research disciplines.

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This method uses a compressive algorithm in which the object can be well classified based on the features extracted in the compressive domain. These features are then used to separate the particular object from the surrounding background via a naive Bayes classifier. At each frame, this method samples positive regions near the object location and negative regions far away from that object centre to update the classifier.

This work mainly focuses on the secured transmission of compressed video data. The security is achieved here by encoding the compressed video frames into bit stream. This bit stream is transmitted through the transmission media and is then decoded when it reaches the receiver. To achieve a seamless playback, the data must be received at a rate that allows the client device to decode and display each frame of the video sequence according to a playback schedule. For achieving the above mentioned processes, H.264 codec with P-N learning algorithm is used.

2. Block Diagram

Fig.1 shows the block diagram of P-N learning based video compression in which the input video is first converted into a number of frames. The P-N learning algorithm is then applied to obtain compressed video, frames generation, digital conversion, encryption and decryption. The techniques used to obtain the above mentioned results are as follows:

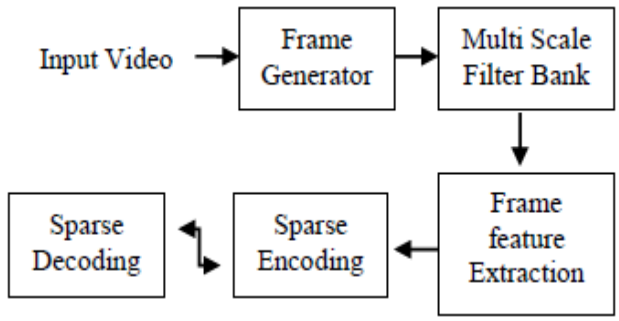

Fig.1: Block Diagram of P-N Learning Based Compression in Video Processing

2.1.P-N learning algorithm

The name P-N stands for 'Positive' and 'Negative' regions of a frame which indicates the object and background pixels respectively. The block diagram of P-N learning is as shown below:

The P-N learning consists of following blocks:

1. A classifier to be learned.
2. Training set for collection of labeled training examples.
3. Supervised training for training a classifier from training set.
4. P-N expert are functions that generate positive and negative training examples during learning.

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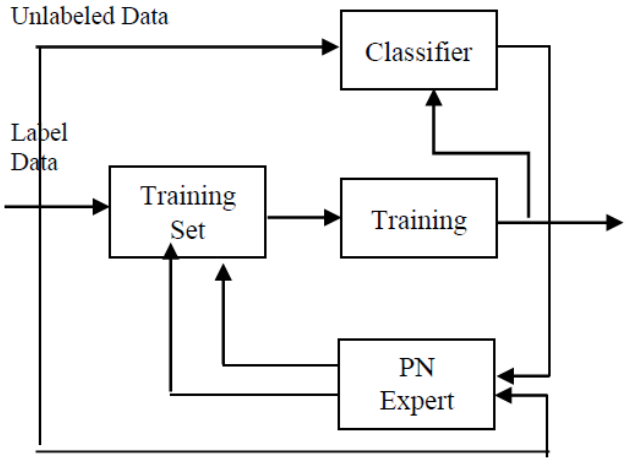

Fig.2: Block diagram of P-N learning

2.2. Multi-scale filter bank

A multi scale filter bank is an array of band pass filters. It divides a signal into a number of sub bands which can be analyzed at different rates corresponding to the bandwidth of the frequency bands. This work uses these filter banks to perform compression.

2.3Sparse matrix generation:

Sparse matrix generation is a very easy technique to compute since it requires only a uniform random generator. In this work, sparse matrix generation technique is used for image digitalization, encryption and decryption.

Sparse matrices provide efficient storage of double or logical data that has a large percentage of zeros. While full matrices store every single element in memory regardless of values, sparse matrices store only the nonzero elements and their row indices. For this reason, using sparse matrices can significantly reduce the amount of memory required for data storage.

3. Working

In this work the input video is converted into compressed video by giving a number of frames to the multi scale filter bank. This compressed video is then converted into a number of frames and then digitalized, encrypted and decrypted using sparse matrix generation technique. The entire process is done based on P-N learning algorithm which is a new technique introduced for compression.

Table 1. comparison between high scalable video compression and PN learning based compression

Highly Scalable Video Compression	P-N Learning based Compression
1.Need resources for compression. 2.Need licensed code and decoding. 3.Quality is reduced. 4.Complex process. 5.More processing time.	1.No need of additional resources. 2.No need of licensed coding. 3.Doesn't affect quality of image. 4.Simple procedure. 5. Less processing time.

This technique has many advantages compared to those of previously used algorithms. Some of the comparisons of this technique with previous technique.

4. Software

MATLAB is a high-performance language developed by Math Works for technical computing it combines a desktop environment tuned for iterative analysis and design process with a programming language that expresses matrix and array mathematics directly. It integrates computational, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notations. MATLAB code can be integrated with other languages. It includes the Live Editor for creating scripts that combine code, output, and formatted text in an executable notebook.

MATLAB is built around the MATLAB language, sometimes called *M-code* or simply *M*. The simplest way to execute M-code is to type it in at the prompt, >>, in the Command Window, one of the elements of the MATLAB Desktop. In this way, MATLAB can be used as an interactive mathematical shell. Sequences of commands can be saved in a text file, typically using the MATLAB Editor, as a script or encapsulated into a function, extending the commands available.

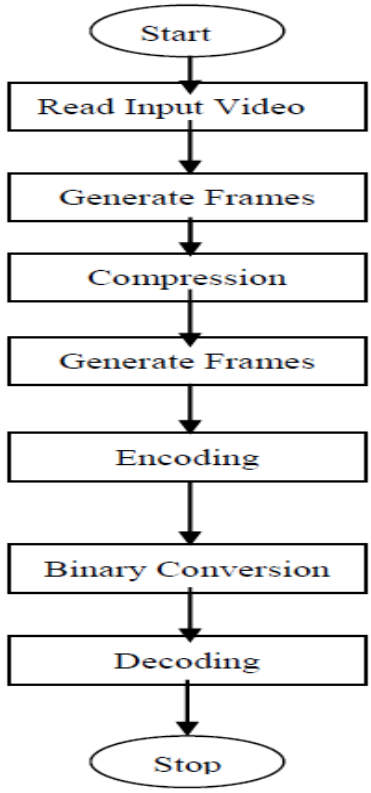

Fig.3: Flowchart of P-N Learning Based Compression.

5. Results

This work is implemented by using MATLAB software. The code that has been developed is executed by clicking the 'Run' button. The input video taken can be of the type .mpg file only. Fig.4 shows the execution reults.

Fig. 4: Sample Input Video

Here, the input video is first red into the MATLAB by creating a .mat file. After completion of reading the video, the video is displayed when the corresponding command is executing. Here, only few frames of the video are played according to the frame numbers given in the code. This video is then compressed and the corresponding compressed video is as shown in Fig.5.

The compressed video size is adjusted to 128x128 which can be changed according to the dimensions of the video. But, for every

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time changing the dimensions, it needs to modify the decoding program according to it.

Fig. 5: Compressed Video

This compressed video is then encoded into a stream of bits as shown in figure 6.

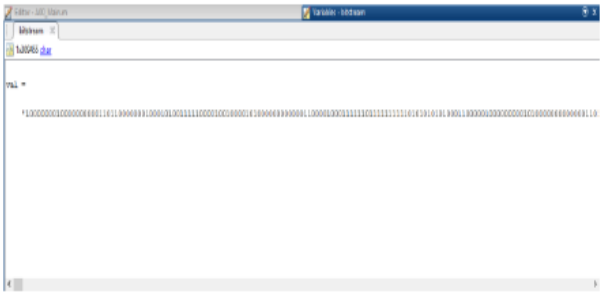

Fig.6: Encoded Bitstream

The corresponding decoded video is as shown in Fig.7. It is same as that of the compressed video shown in Fig.5. The secured transmission is provided here by encoding the compressed video into bits.

Fig.7: Decoded Video

The entire work provides secured transmission of data in many applications, decreases bandwidth since images are converted to digital data. It doesn't affect the picture quality. This work is not applicable for HD videos and frame selection is not possible.

6. Conclusions

In this work, the compression is done using H.264 codec based on P-N learning algorithm, which was previously developed in [] for tracking. This method was adopted here for performing compression without any loss of quality. The main moto of this work is to provide secured data transmission. Here, the process of the algorithm includes generation of frames from video, frames feature extraction and compression, grayscale conversion, encryption and then decryption. Finally, this work provides many ways of data security in various fields and maintains data quality. This work can be forwarded in future by considering the rate of speed control of the encoded bits while transmission.

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Design And Implementation Of Smart Helmet Using IoT

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Abstract: Now a days road accidents are occurring very frequentlyin our daily life because motor cyclists are not wearing of helmet. Toavoid those road accidents motor cyclists can have to wear helmet. Bywearing it riders can have to save their life up to some instant. Thisproject is to improve the safety of riders. The design of this smart helmetis to detect the user can wear helmet or not. Not only but also the helmet can detect the user is alcoholic or not. If user is alcoholic the ignition gets OFF. Only the ignition gets ON when user can wear helmet and user is not alcoholic .Even user met with an accident by using GPS and GSM the location can share to contact members .By using IOT the data of user can send to cloud for monitoring of activities like wearing of helmet, alcoholic and accident condition.

Keywords: ArduinoATmega328P, GPS, GSM, WIFI, IOT.

1. Introduction

The major aim of this project is to prevent road accidents,detection and notification. Many road accidents are occurring because violating the traffic rules and regulations, rash driving, drunk and drive and using mobile phones while driving. Many people lose their lives because of triple riding and the report of accident place is not easily track by the people. So by using the GPS and GSM the identification of exact accident location is can be possible with exact latitude and longitude locations. The use of IOT is for the police men to detect very easily because the information of the bike rider is saved in the cloud about accident condition, alcoholic state and helmet state. In India according to the Motor Vehicles act 1988,the sections 129 the wearing of helmet is compulsory. So this smart helmet is to decrease the road accidents and if government can place this helmet is must and should the use of smart helmet is increases and the accidents can reduce day by day. World Health Organization(WHO) has declared that many deaths and injuries are reduced because of wearing of helmet. The main goal of this project the two wheeler riders can wear helmet compulsory for their safety.

2. Literature Survey

By similarity with other vehicles, two wheelers are having less importance in increasing of their safety levels. Comparing with other vehicles the danger is very high for the motor cycle riders. The smart helmet is even used in the mining industries for their risk and work. GPS and GSM are used for identification of the preciselocation and something about rider. If the user is fell down then the helmet hits and damages then there is a cause occur to the user .When there is a high harm to the person immediately there is delivery of messages for the contact members. For transferring of information wireless communications like Zig -Bee and radio frequency etc; are used. In the middle of helmet and bike various types of wireless communication systems are used. There are various features such as temperature sensor, accelerometer, ultrasonic sensor, force sensing resistor, vibration sensor, push buttons are used for their protection. Based on applications and cost types of microcontrollers like arduino and raspberry pi are used. Regards to the Research paper in 2016 titled 'Smart Helmet' in this paper the aim of the author is to wear helmet for bike rider is compulsory for safety of life.

_ In this aggressive world one of the survey says that many of death and accidents are occurring because not presence of helmet. Traffic police cannot cover remote areas like cities and other places where there are people are heavy. It is very difficult to them to check each and every motor cycle rider. So 'Smart Helmet' is very useful for many conditions for traffic police to see the activities of motor cycle riders.

3. Existing System

The objective of the existing model of smart helmet is to prevent accidents. The wireless communications such as Bluetooth, Zig-bee are already existed for purpose of communication between helmet and two wheeler. For detection of various activities of bike rider many types of sensors are attached to the helmet. If the bike rider is in emergency condition then by using GSM and GPS sharing of exact location is automatically existed. The other set of sensors are fixed to the helmet whether the user is drunken or not for their security purpose. Along with other type of photoelectric cells speed limit sensors are fixed to the helmet module for decreasing of speed of motor vehicle. For measuring distance ultrasonic sensors and for converting text-to-speech, speech synthesizers are used.

There are many Research papers on 'Smart Helmet' for preventing of road accidents and to protect head from injuries. Many authors are working to build smart helmet with different applications for the convenient of the users. One of the example is that if the bike is stolen then by using smart helmet the identification is simple to know who had stolen it. For different types of applications and uses this smart helmet is very benefited.

4. Proposed System

The idea of smart helmet is to check primarily whether the rider is worn helmet or not. Secondly is to know the user is alcoholic or not. If above two conditions are detected then ignition gets OFF. If two circumstances are satisfied then ignition gets ON. To know about ignition OFF to rider there is an LCD for displaying the conditions of smart helmet.

Other main condition is also present in this smart helmet is accident prevention. The mercury switch is used to detect while driving accident is happen or not. When there is happen of accident then there is sending of messages to the contact person using GPS and GSM. By using GPS exact latitude and longitude number can be sent to contact person.

IOT is also present in our proposed system because every activity of bike rider is saved in the cloud services. For viewing of person activity the Things speak

account is created. The activities that are monitored in cloud are helmet condition, alcohol state and accident status. Not only has these but also viewed other parameters based on applications.

5. Block diagram

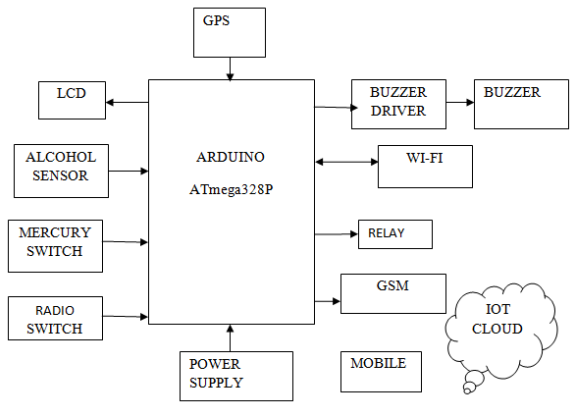

Fig.1: Block Diagram

It is an 8-bit microcontroller based on AVR RISC architecture. It is the most popular of all AVR controllers as it is used in ARDUINO boards. It has 28 pins and operating voltage is +1.8v-+5.5v. It has 23 number of programmable I/O pins.

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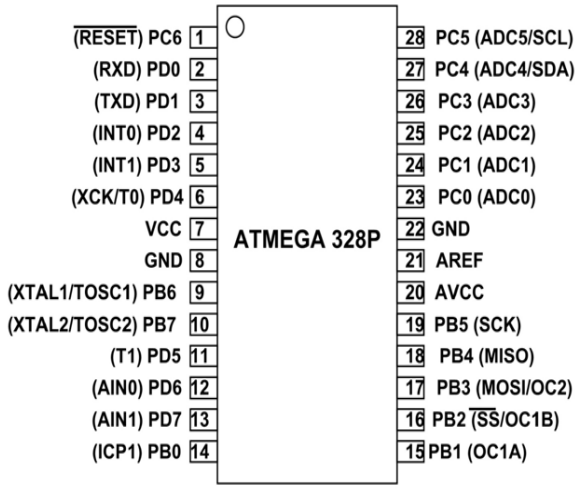

Fig.2: Arduino ATmega328P Pin Diagram

LCD (Liquid Crystal Display) is a type of flat panel display which uses liquid crystals in its primary form of operation.. LCD's were a big leap in terms of the technology they replaced, with light-emitting diodes.

Fig.3: LCD

GPS (Global Positioning System) is a satellite navigation system used to determine the ground position of an object. A GPS receiver combines the broadcasts from multiple satellites to calculate its exact position using a process called triangulation.

Fig.4: GPS

GSM(Global System for Mobile Communication) is a digital mobile network that is widely used by mobile phone users. GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its time slot.

Fig.5: GSM

An alcohol sensor detects the attentiveness of alcohol gas in the air and an analog voltage is an output reading. The sensor activates at temperature ranging from -10 to 50 degrees with a power supply of 5v.

Fig.6: Alcohol Sensor

A mercury switchis an electrical sensor that opens and closes a circuit when a small amount of the liquid metal mercury connects metal electrodes to close the circuit. It is used to know the occurrence of an accident.

Fig.7: Mercury Switch

A buzzer is an audio signaling device, which may be a mechanical or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers etc.

Fig.8: Buzzer

A Wi-Fi(Wireless-Fidelity) is a single device that combines the functionality of a modem and a router, making it one-stop for internet connectivity.

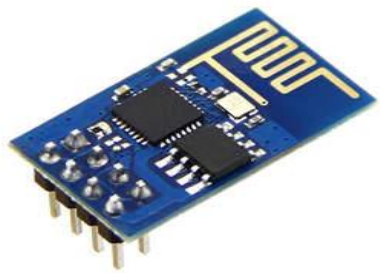

Fig.9: Wi-Fi

A relay is an electric switch operated by a signal in one circuit to control another circuit. The relay module has three pins and it should be connected to Uno as Vcc to 5V, Gnd to Gnd, IN to digital pin8.IOT cloud refers to any number of cloud services that power the IOT. These include the underlying infrastructure needed for processing and storing IOT data. It also includes the services and standards necessary for connecting, managing and securing data.

One of the basic building blocks of electronics project is building your own DC power from an AC source of 110 VAC or 220 VAC. The common DC voltages that are required to power up the devices

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are generally in the range of 3 VDC to 30 VDC. Typically the fixed types of DC voltages are 5V, 9V, 12V, 15V and 18V DC.

6. Results Comparisions

This paper gives a different way of the approaching problemwhen compared with other papers. The results are as shown below:

1. If helmet is worn then only ignition gets ON else the ignition gets OFF.
2. If user is worn helmet but user is drunk then ignition gets OFF.
3. If user met with an accident then message sent to the respected mobile number with latitude and longitude directions by using GPS and GSM.
4. By using IOT the data can be stored in the cloud to view the information about the motor cycle rider.

There is a LCD displayto view the conditions about the bike rider. From the display only user knows why the ignition gets ON and OFF.

By comparing with other papers our smart helmet is very efficient for the security of preventing the road accidents to the motor cycle riders.

7. Conclusions

With the advancement of science and technology the life of every individual is important. So, Smart Helmet is used to provide security and accommodate all the needed facilities in compact manner. The proposed design of smart helmet will give in terms cost effective and updated technology front for all kinds of helmets for the prevention of road accidents.

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Secured IoT Based Health Monitoring System

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Abstract: Health Monitoring is the pivotal part of human well being. In Today's world of automation the field of biomedicine is no longer a distant part. Application of Technology has gained its importance in the field of biomedicine. It has improved the total process of medication. Earlier detection of diseases is possible through continuous monitoring of the patient. Health Monitoring has gained its importance from the past decades. Health monitoring systems are about to revolutionize the life of human by fast detection and real time monitoring of the patients. Continuous Monitoring of the patient is essential for earlier detection of diseases and taking the preventive measures possible. Continuous Monitoring of the patients by doctors is not always possible. To overcome this problem an IoT based continuous monitoring system is proposed in this paper where the data i.e.; the patient parameters are collected from the patient using the sensors and the data that is collected is processed at the processor. The processed data is updated to the cloud. Utilization of IoT innovations has arranged doctors and patients for connecting them to restorative regions in medicinal services environment. In this method the information collected by the wearable devices i.e.; sensors in real time are stored in database which connects doctors and people at the time of an emergency for the right information. Mostly, the health care systems concentrate on integrity and confidentiality of the data. Data Privacy, Data Integrity, Data Freshness, Authentication and Anonymity are the security requirements in IoT based health care systems. Cryptography is used to provide confidentiality to the data. In this paper we propose an Advance Encryption Standard Algorithm (AES) to provide security to the data that is updated into the cloud to finish the required prerequisites.

Keywords: IoT, IMoT, AES, Encryption, Cipher, Decryption, Authentication.

1. Introduction

Better Health is essential for the human happiness and better living of a human being. It is one of the important contributions to economic development of the society as healthy populations live longer, are more productive and save more. Health is one of the crucial assets to be taken care of by the human being. Health Research can provide important information about disease trends, risk factors and outcomes of treatment or public health interventions, functional abilities and its use. It is important to record and assess experience in clinical practice in order to develop guidelines for best practices and to ensure high quality patient care. Advancements in technology are enabling a transformation in health research that could facilitate studies that were not possible in the past. Unlike in the past centuries most of the people used to face the problems with the lack of facilities. Today with advancements in technology, improved facilities and newer opportunities have come up to serve the existing population. Internet has become the new catalyst in technical innovations.

Internet of Things (IOT) is one of the emerging technologies in the present world which connects the physical objects together [1]. It is an ecosystem of physically connected objects which can be connected together and can be accessed through internet. The term "Things" in Internet Of Things relates to a person who is to be monitored (or) the objects that have be assigned an IP address and have ability to collect and transfer the data without manual assistance. Now Internet of Improvement of Radio Hardware and different communication protocols bought into the picture different wireless sensor measurements [11]. Remote Health Monitoring is one of the emerging technologies among them which made the continuous monitoring of the patients in remote places i.e.; homes, hospitals and work places easier. Early Detection Of diseases has become possible only with continuous monitoring of patient and preventive measures can be taken in-order to reduce the adverse effects of the situation on the patient. This helps us in preventing the things to become worse. Health Monitoring enable us to know about health problems caused and to look into prevention measures to prevent the problems.

Saving Lives requires monitoring of health conditions of people who have various diseases daily. Detecting the problems can extend the life span and reduce the rate of the disease in the population i.e. life span increases thus reducing the death rates. Even, though the healthcare industry has been slower to adopt Internet of Things technologies than other industries, the Internet of Medical Things is poised to transform how we keep people safe and healthy especially as the demand for solutions to lower healthcare costs increase in the coming years [2].

It can help monitor, inform and notify not only care-givers, but provide healthcare providers with actual data to identify issues before they become critical or to allow for earlier invention.

Internet of Things can be used in medical industry [1] to process various values related to health and notify them with an alert when the values exceed the ranges of the prescribed values. In this paper we take the different parameters of human body and process it at the processor level based on the optimal set values a sms alert is sent to the person.

As usage of Internet has been increased to exchange the data, this data may contain the confidential data which needs to be secured [3]. Similarly in Health Monitoring Systems there are many security threats that can endanger the life of the patient and even at times cause death of the person. An efficient security framework must therefore provide us with the following prerequisites such as Privacy, Confidentiality, Authentication, Availability and Authorization [3] etc. Data Confidentiality and Data Integrity is to be maintained in case of secure health data transmission.

In this paper the aspects of Security Issues related to the health data in Section III and providing the data security using cryptography techniques. Cryptography is one of the key concept in transforming the plain text into an encrypted format i.e.; into an unreadable format. Cryptographic Technology can provide with data security for Internet of Things. There are two types of Cryptographic methods they are namely Symmetric Key Cryptography and Asymmetric Key Cryptography. Symmetric Key Algorithms uses the same key for both encryption and decryption of the data. In Asymmetric Key Algorithms different keys are used in case of encryption and decryption. Asymmetric Key Algorithms are 1000 times slower than Symmetric Key Algorithms as it is impractical when large amount of data is to be encrypted.

Cryptographic Algorithm based on the demands of the application being used. Different Evaluation Metrics are taken into consideration when selecting a cryptographic algorithm are Encryption Time, Decryption Time, Memory used, Avalanche Effect, Entropy and

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Number of Bits required for optically encoding the data. Based on the evaluation metrics met and the application to be met the algorithm is chosen and implemented. If Confidentiality and Integrity are the major areas to be met Advanced Encryption Standard (AES) Algorithm [9][10] is to be used which is mentioned in Section IV.

This paper has been organized into the following sections. Section I consists of Introduction of the paper. Section II consists of the Related Work and Motivation towards choosing the project. Section III deals with the various requirements in IoT based Health care systems. Section IV includes the AES (Advanced Encryption Standard) Algorithm where the plain text is converted into cipher text during encryption and the cipher text is decrypted to obtain the original plain text using decryption. Section V includes the proposed methodology to implement the project. Section VI consists of the results obtained and Section VII consists of the Acknowledgment.

2. Related Work and Motivation

Alvee Rahman et al to implement the project [4] have presented the implementation of health monitoring system that includes ECG sensor and digital thermometer for real time monitoring of patient. This system also sends notification to doctors or relatives based on the optimal values of the sensors.

Neel Kamal et al. [5] have proposed a Three Tier Architecture for IoT driven health monitoring system where the three tiers include Wired Sensor network, Local Processing unit and Hardware control unit. This system is efficient to generate different reports in different modes i.e. precision mode as well as in fast mode.

A'isya Nur Aulia Yusuf et al. [6] proposed a system to develop a health information system that is able to provide patient health information to the health workers using android platform. Code Blue [12] is a popular healthcare research project developed at Harvard Sensor Network lab is a wireless continuous monitoring system where several biosensors are placed on the body and these sensors collect various physiological parameters from the human body and sends it to the central node. This project acts as personal digital assistant where the doctors respond it to the queries of the patient. Though it is a popular research project security is still a pending issue to be solved. Provision of security to the data is being considered as the most critical aspect.

Alarm-Net [13] is a heterogeneous network architecture developed at University of Virgina is a patient health monitoring system in assisted living and home environment. Network and data security is provided to the physiological, behavioral and environmental parameters but the drawback of the system it has confidentiality attacks on the location of the residents and the data was leaked.

UbiMon [14] is a project developed by department of computing, Imperial College, London for analyzing and providing solutions to the issues that are related to usage of implementable and wearable sensors which was widely accepted all over the world without considering security of the data.

Mobi-Care [15] is a mobile patient care monitoring system which deals with all the parameters of the patient continuously which was developed in 2006 by Chakravorty. It has dealt with continuous and timely monitoring of parameters .He has acknowledged the security issues in paper but never dealt with them. Several security issues are to addressed.

MediSN [16] is a recent health care system developed at John Hopkins's University which involves continuous monitoring of the patient. In this system the data is collected from the sensors in terms of battery powered motes. In their project description author acknowledged that data security must be provided o the powered motes. They have not mentioned which crypto system has been used in their description of project. Though some sort of security has been provided to the data the implementation has not been mentioned in their works.

All the above projects mentioned involve continuous monitoring of the patient and automatically gets the health data from the sensors. These systems provide with qualitative monitoring of the health without disturbing the patient comfort. All projects concentrated on cost effectiveness, reliability and power related issues but none addressed the security issues in their projects. Few projects have acknowledged with security issues but implementation and mechanisms have not been discussed in detail. In-Depth Analysis of Security and privacy related issues in real time health monitoring systems is required and need to be addressed by us. This lead us to take up a project and propose a Secured IoT based Health care monitoring System which provides the data security using AES (Advance Encryption Standard) Algorithm and its implementation[10].

3. Security Requirements In Iot Based Health Care Monitoring System

Security is one of the crucial aspects of an IoT based system [11]. One of the greatest threats in IoT based system is it doesn't provide proper secure to the data in the cloud. Clouds are not having proper security when compared with other technologies. Providing Security to the data in cloud is one of the most important aspects in today's world. Following are the key security requirements in IoT based Health Care System

3.1 Data Privacy

Data Privacy is one of the most important issues in Sensors. It is important to protect the data from disclosure. An eavesdrop of information can overhear critical information. This eavesdropping may cause severe damage to patient since it can be used for many illegal purposes.

3.2 Data Integrity

Data Confidentiality is to be maintained in case of secured health care system. Data Confidentiality is must to protect the external data from being modified. The data can be manipulated by adding some fragments. This manipulation of data and Lack of Integrity is very dangerous to patient especially in critical issues. Data Loss can also occur due to bad communication environment.

3.3 Data Freshness

Data freshness is one of the critical aspects in IoT systems where new data is to be maintained and this new data is to be replied with new messages and not with the old messages.

3.4 Authentication

It is one of the most important requirements in IoT based healthcare systems which can efficiently deal with attacks. The sensors send the data to the coordinator. The coordinator needs to send the periodic updates of the data of the patient to a server. Authentication confirms their identity to the coordinator and the sensors.

4. AES Algorithm

AES is a symmetric encryption algorithm recommended by NIST to overcome loopholes of small key size and slow speed in existing symmetric encryption algorithm. AES is an algorithm which considers input data in blocks (128 bits). Encryption keys used in AES are of 128 bits, 196 bits or 256 bits. AES is having fixed packet length of 128 bits and key length can be 128 bits, 192 bits (or) 256 bits. AES is a round based algorithm where number of rounds depends on key length or key size as tabulated below.

Table 1. Indicating Number of Rounds required in AES Algorithm based on Key Size

Key Size	Number Of Rounds
128	10

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192	12
256	14

AES Encryption and Decryption as shown in Figure4.1 includes the following steps:

4.1 Substitute Byte Transformation

This is the process of substituting each byte of the state non-linearly with the look up table. This look up table is generally known as an S-box. S-box is a 16*16 matrix which is computed using multiplicative inverses in the Galois Field GF ($2^{8)}$. Affine Mapping concept is used for finding out multiplicative inverse in the process of encryption. In decryption the inverse affine transformation is used. S-box is computed either using computing substitution or by using the lookup tables. Look up tables are faster and inexpensive in terms of power consumption

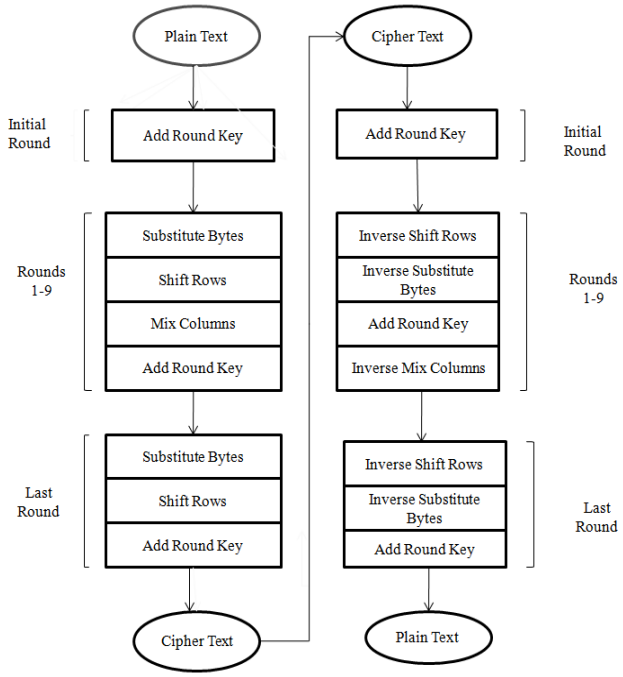

Fig. 1: AES Encryption and Decryption Flow

4.2 Shift Rows

Circular Left Shift is performed on each byte of the row of state matrix by shifting the bytes in last three rows of the state matrix by offset value from one to three bytes respectively on each row. Shift Rows Transformation consists of not shifting the first row of state array, circularly left shifting the second row by one bit, circularly left shifting the third row by two bits and last row by three bits.

4.3 Mix Columns

Matrix Multiplication is done on each byte of state matrix with each byte of fixed matrix. Each column of four bytes is now transformed into new matrix. Four Bytes of one column is taken as input and completely four new bytes will replace the original bytes. This results in 16 new bytes matrix. This step is not performed in last round.

4.4 Add Round Keys

The resulting 16 bytes of the mix column operation is taken as 128 bits and XORed with 128 bits of Round-key. If this is the last round the resulting output is taken as cipher text. The number of rounds is based on key size and last round excludes the mix columns operation. Decryption follows the reverse order as done in encryption such as Inverse Shift Rows, Inverse Sub Bytes Substitution, Add Round Key Transformation and Inverse Mix Columns Transformation.

AES Decryption [9] is similar to AES Encryption method which converts the cipher text into the plain text using the same steps as mentioned above but in a reverse process. The steps followed in decryption are Inverse Shift Rows, Inverse Substitute Bytes, Add Round Key and Inverse Mix Columns. Inverse Substitute Bytes makes use of Inverse S-Box.

5. Proposed Method

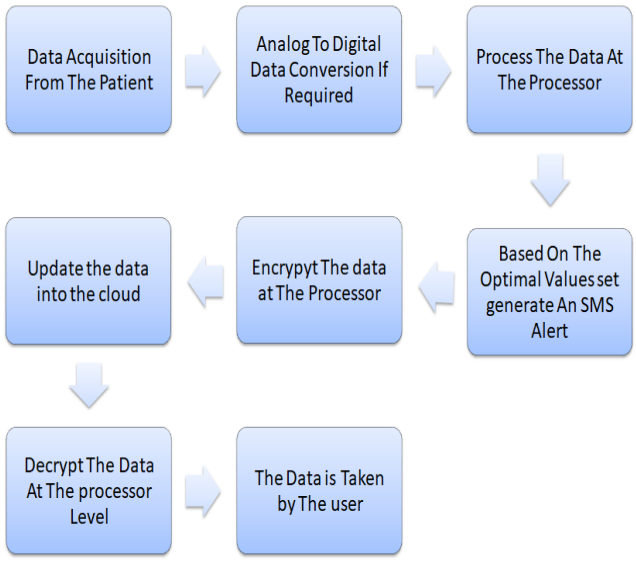

Fig. 2: Step by Step Implementation of the System

Fig. 2 we propose to implement a secured health monitoring system. The above block diagram i.e. Figure 2 basically consists of four main stages. The First stage includes the data acquisition from the patient. This data acquisition is done with the help of body sensors. Different sensors are used that include Body Temperature Sensor, Heart Beat Sensor, ECG Sensor, Fall Detection Sensor, Respiratory Sensor, Temperature Sensor and Air Pollution Detection Sensor. In the second stage the data acquired from the patient is processed at the processor based on the optimal values of the sensor an SMS alert is set if the values are out of optimal range. In the Third stage the processed data is encrypted using AES Encryption Algorithm which is mentioned in the earlier parts of this paper. The Final stage is decrypting the data using AES Decryption Algorithm which is similar to Encryption Algorithm and a reverse process of it.

Raspberry Pi3 is an ARM based credit card size computer developed in UK in Raspberry Pi foundation. It is a 64 bit Broadcom BCM2837 Quad Core Processor. It can be considered as a single board computer that works on LINUX operating system. This model includes 802.11nWiFi, Bluetooth 4.0, and a quad-core 64 bit ARM Cortex A53 running at 1.2 GHz.

Body Temperature Sensor measures the body temperature of a human body. The normal range of body temperature is 37^0 C. If the temperature goes above 40^0 C or below 33^0 C the person is not in comfort and need some medication. We have used DS18B20 as a means to measure the human body temperature. The following are the specifications of DS18B20 sensor:

- Programmable Digital Temperature Sensor.
- Communicates using 1- wire interface method.
- Operating voltage: 3-5V.
- Temperature Range: -55^0C to $+125^0$C.
- Accuracy:$\pm 0.5^0$C.

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- Output Resolution: 9 bit to 12 bit (Programmable).
- Unique 64 bit address enables multiplexing.
- Conversion Time: 750 ms for 12-bit.
- Programmable Alarm Options.

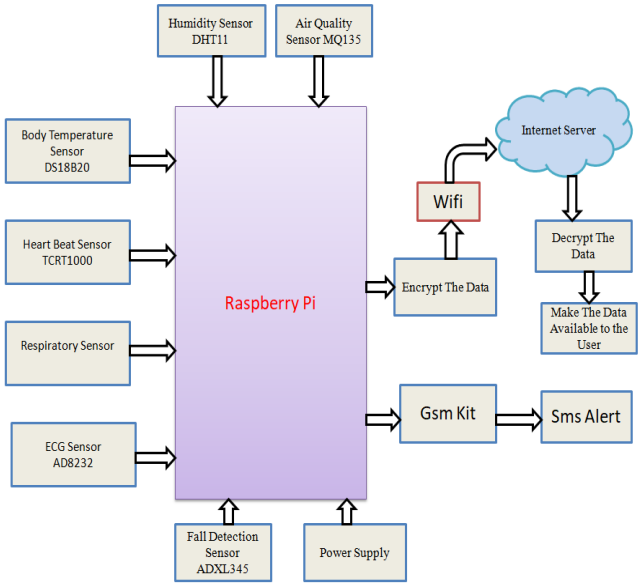

Fig. 3. Secured IoT based Health Monitoring System

TCRT1000 also known as "Easy Pulse" is a Reflective Optical Sensor for Photo-Plethysmography. The use of this sensor simplifies the build process of sensor part of project as both infra red light emitter diode and the detector arranged side by side in a leaded package which thus blocks the surrounding Ambient Light. The Output of this sensor is a digital pulse which is in synchronous with heart beat of a person. This Output pulse is either fed to Analog to Digital Converter Channel or the digital pin of microcontroller for further processing and retrieving the heart rate in beats per minute (bpm).

The following are the specifications of TCRT1000 Sensor:

- Sensing Distance: 4mm.
- Current – Dc Forward: 50 mA.
- Operating Temperature: -40^{0}C to 85^{0}C
- Power Dissipation: 200mW.
- Output Type: Photo Transistor.
- Package Type: Leaded.
- Number of Pins: 4

AD8232 is an integrated signal conditioning block for ECG and other bio-potential measurement applications. It is designed to extract, amplify and filter small bio-potential signals in presence of noisy conditions created by motion or remote electrode placement. This design allows for an ultra low power ADC or embedded microcontroller to acquire output easily. The following are the specifications of AD8232 Sensor:

- Fully Integrated single-lead ECG frontend.
- It is used to measure the electrical activity of the heart.
- Low Supply Current: 170uA (Typical).
- Common Mode Rejection Ratio: 80 dB (dc to 60Hz).
- Two or Three electrode Configurations.
- High Signal Gain (G=100) with dc blocking capabilities.
- Signal Supply Operation: 2.0V to 3.5V.
- Two pole adjustable High-pass Filter.
- Three pole adjustable Low-Pass Filter.

ADXL345 is an ultra-powered, small, thin,3-axis accelerometer with a high resolution (13-bit) measurement up to ±16g. ADXL345 is mostly used for mobile device applications. It is used to measure the static acceleration of gravity in tilt sensing applications as well as dynamic acceleration resulting from motion or shock. The Following are the specifications of ADXL345 Sensor:

- Ultra- Low Power: as low as 23 uA in measurement mode and 0.1 uA in standby mode at V_s=2.5V (Typical).
- Power consumption scales automatically with the Band width.
- User Selectable Resolution.
- Fixed 10 bit resolution,
- Embedded Memory with FIFO Technique that minimizes the Host Processor Load.
- Voltage: 2.0V to 3.6V.
- I/O Voltage Range: 1.7 to V_s.

DHT11 is used both as Temperature as well as Humidity Sensor. It features a Calibrated Digital Output. DHT11 calculates relative humidity by measuring the electrical resistance between the two electrodes. DHT11 Sensor as a whole consists of a Capacitive Humidity Sensing element and a Thermistor for sensing the Ambient Temperature. The following are the features of DHT11 Sensor:

- Operating Voltage: 3.5V to 5.5V.
- Operating Current: 0.3 mA for measuring and 60uA in stand-by mode.
- Output: Serial Data.
- Temperature Range: 0^{0}C to50^{0}C.
- Humidity Range: 20% to 90%.
- Resolution: 16 bit.
- Accuracy: ±1^{0}C and ±1%.

MQ135 Sensor is a gas detecting sensor which is used to detect the toxic gases in the surrounding atmosphere. This sensor conductivity is generally low. As the gases increases.MQ135 is highly sensitive to Ammonia, Sulfide and Benzes steam, and also sensitive to smoke and other harmful gases. It is of low cost and being used for different applications. The following are the specifications of MQ135 Sensor:

- Wide Detecting Scope.
- Fast Response and High Sensitivity.
- Stable and Long Life.'
- Operating Voltage:+5V
- Detects and measures NH_3, NOx, alcohol, Benzene, Smoke, Co_2etc…
- Analog Output Voltage: 0 to 5 V.
- Digital Output Voltage: 0Vor 5V (TTL Logic).
- Preheat Duration: 20 sec.
- Can be used as a Digital or Analog Sensor.
- The sensitivity of digital pin can be varied using the potentiometer.

The data that is obtained using all the above mentioned sensors is to be encrypted. Thus, the data is encrypted using AES Algorithm as mentioned in the Section IV of this Paper. Later when the data is to be provided to the user it needs to be decrypted this is the reverse process as of AES Encryption.

In Figure 5.3, the step by step procedure is described to perform the project. At the start we initialize all the sensors and GSM kit. The data is processed at the processor and the based on the optimal values set the sms alert is sent to the mobile when the values cross the optimal values. The data is then encrypted and the encrypted data is updated into the cloud using a wifi. Module. When the data is to be retrieved the data is decrypted at the processor and the data is made available to the user.

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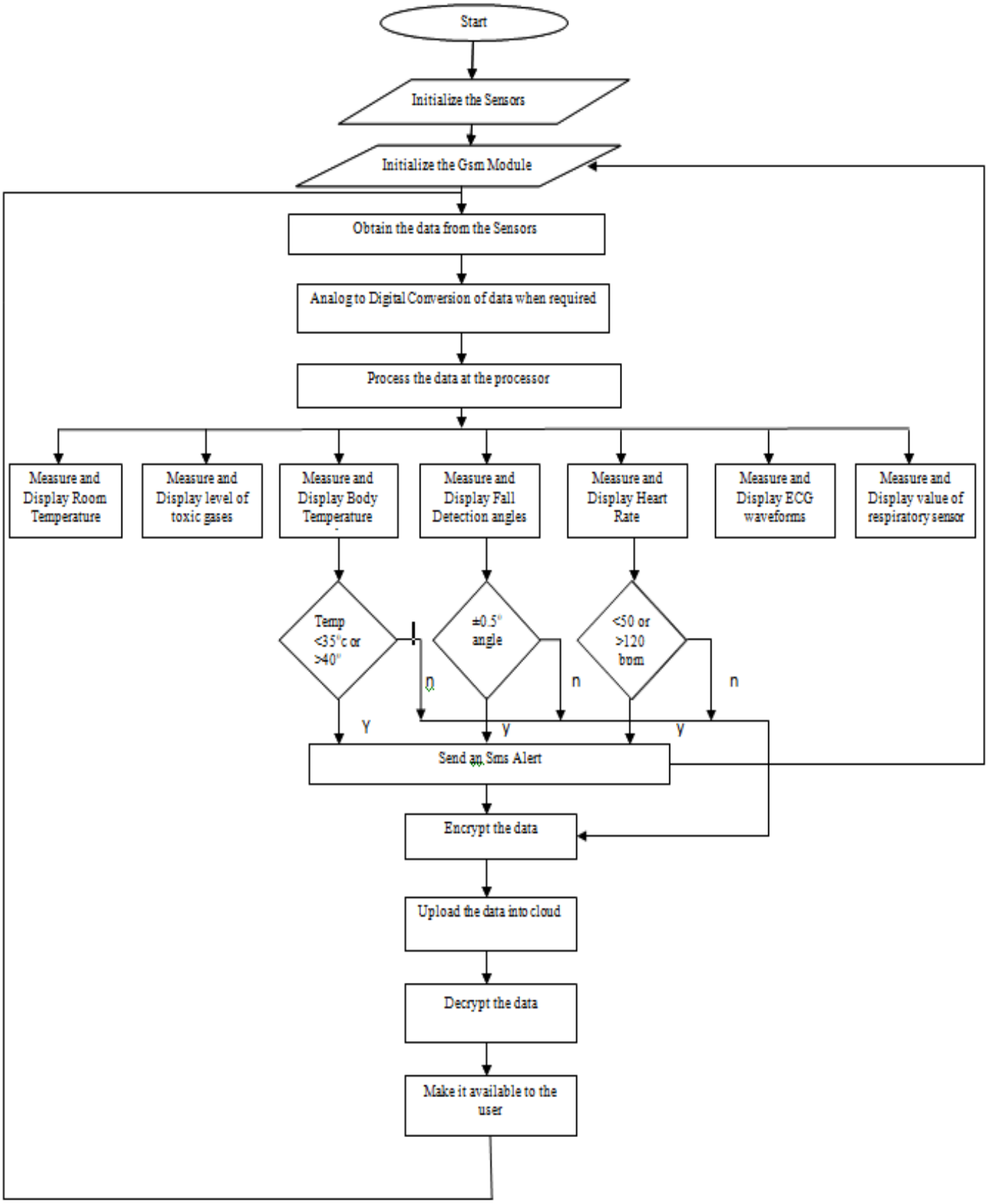

Fig. 4. Flowchart representing the entire working of project

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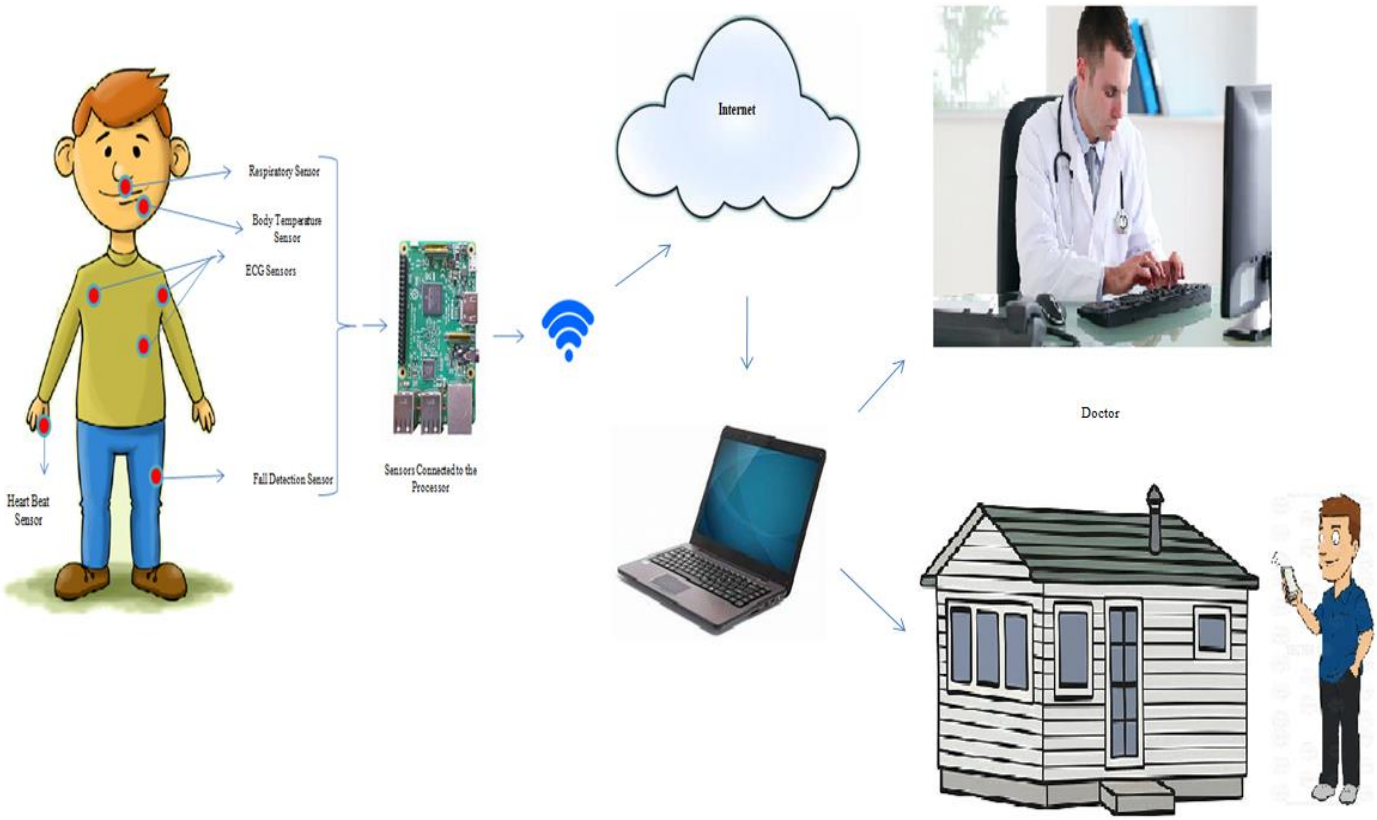

Fig.5. Pictorial Representation of Implementation

Figure 5, represents the pictorial representation of implementation of this project. First the data is acquired from the entire sensors namely Respiratory sensor, ECG Sensor, Heartbeat sensor, fall detection sensor. All these sensors are connected to the raspberry pi board where the data is processed and based on the optimal values a sms alert is sent if required to the doctor and a family member. The data is encrypted and sent to the cloud and then decrypted at the processor level to obtain the results and these are made available to the doctor and the users available.

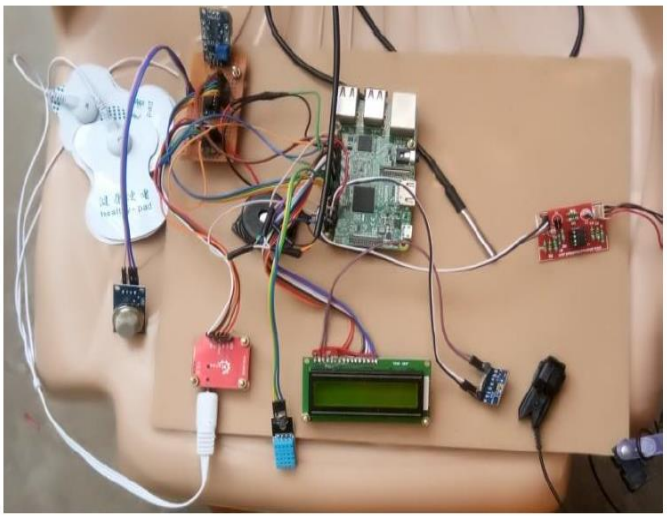

Fig. 6: Health Monitoring System Hardware Setup

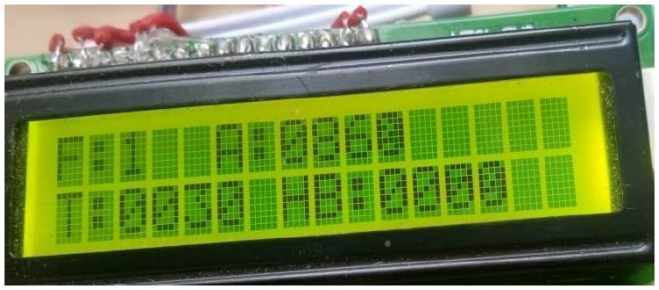

Fig.7: LCD showing the results

6. Conclusions

Hence the data is secured using the AES algorithm in the proposed system and the health monitoring is done continuously. This paper presents a design and implementation of health monitoring system based on IoT environment. This facilitates constant health monitoring for the patients remotely from any place. Thus, data security is provided and this system can be set up in hospitals and massive amount of data can be obtained and secured in the cloud-based environment. Even the results can be accessed from mobile through an application.

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Electronic copy available at: https://ssrn.com/abstract=3643863

Retinal blood vessel segmentation and Identification of Glaucoma using Convolutional Neural Network

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Abstract: Exudates are the main root cause of blindness. These exudates are looks like cotton wool spots. The damages due to increment of exudates are wet macular detection and retinopathy. Hence, the important diagnostic task is to find exudates. In this paper, we extract the blood vessels using thresholding method along with filtering the image using curvelet transformation and detect optic disc using circular Hough-man transform method. Finally we detect the exudates using adaptive thresholding method in fundus image along with boundary detection using contour boundary tracing algorithm. Measuring the vessel ratio damage ratio and damage stage of the eye based on ocular vision strategy.
Identifying the eye diseases was a complicated process, our approaches made easy by using Multi resolution analysis with feature extraction process. Texture features with in fundus images are actively pursued for accurate and efficient glaucoma classification. In this paper a novel technique proposed, energy texture features extracted using CURVELET transformations which is accessible under geometry conditions where wavelets were not defined to satisfy conditions and also compared with WAVELET transformation analysis. SVM classifier is used for the classification process and feature ranking procedure under extension of multi SVM classifier. This is used for obtaining accurate results. Under the above mentioned conditions the resultant accuracy is about 97.35%.
Keywords: Exudates, Feature extraction, Curvelet transformation.

1. Introduction

Diabetic retinopathy is one of the common complications of diabetes. Regrettably, in lots of circumstances the patient is not mindful of any signs until it's too late for effective therapy. The screening of diabetic patients for the development of diabetic retinopathy probably reduces the hazard of blindness in these sufferers through 50%. It has been estimated that 30,000 contributors per million complete populations ought to be examined to put in force this kind of application. That is past the scope of currently existing ophthalmology departments and would produce a heavy medical burden if left to diabetic physicians. Photographing the fundus of such patients with later assessment of the images has been tried with some success, however still requires the rather steeply-priced time of the expert ophthalmologist to furnish a classification of the retinopathy. This may increasingly lengthen referral of the sufferer for extra examination. A absolutely automatic technique involving fundus photograph evaluation with the aid of computer would strengthen the efficiency of the evaluation of the snapshot by way of offering an instant classification of the fundus of the sufferer on the time of acquisition of the snapshot.

Retinal hemorrhage is an ailment of the eye where bleeding happens into the retina. The retina is a thin disc-formed layer of sunshine-touchy tissue on the again wall of the attention. Its job is to translate what we see into neural impulses and send them to the brain by way of the optic nerve. A retinal hemorrhage will also be brought on by way of hypertension, retinal vein occlusion (a blockage of a retinal vein), or diabetes mellitus (which explanations small fragile blood vessels to form, that are effectively broken).Diabetic retinopathy is a usual eye predicament related to diabetes. Diabetes, by using stressing the circulatory method, can intent harm, together with hemorrhaging, to the small blood vessels of the retina.

On-proliferative retinopathy happens when the damaged or leaking blood vessels don't spreading. Proliferative retinopathy happens when new blood vessels start to kind in broken areas of the retina and could result in spots, floaters, lowered imaginative and prescient, or unexpected lack of imaginative and prescient. Sudden imaginative and prescient loss may just arise if probably the most newly formed blood vessels ruptures. As a result of extended pressure within the discipline, the retina could detach from the again of the attention, a significant situation and a reason of blindness [6].

2. Related Work

Supervised methods have great importance for medical image Classification. These methods have two datasets, i.e., trained set and test set. The trained set consists of different images labelled for a specific category e.g. vessels or non vessels. The test set is the manual annotation of the dataset by expert ophthalmologists. The classification method is targeted at dividing image pixels into the blood vessel and non-vessel types. It uses various supervised classification techniques considering the feature structure of image vessel to achieve blood vessel segmentation. The performance metrics of the support vector machine methods, neural networks [1]

There exist various publically available standard databases which are used for image analysis and testing of fundus images for blood vessel segmentation, DR detection and for classification. DRIVE is referred to as Digital Fundus Images for Vessel Extraction consisting of 40 colour fundus images. All the images are digitized using Cannon CR5 3CCD camera with 45 degrees field of view (FOV). Each image is of size 256×256 with resolution of 24 bits per pixel. Ground truth vessel segmentation was produced for all the images which were labeled by hand[2].

Three features are extracted for the regression. The first feature is a statistical feature called ANIS of the A-scan segment from the corresponding standard boundary line, an intensity normalization with empirical mean and standard deviation from this benchmark line. The normalization moves the intensity distribution to the standard normal distribution adaptively according to the benchmark pixel intensity as reference information[14] By this means, the intensity range in each A-scan segment is transformed to a more balanced distribution, which is done because intensity-range imbalances among different A-scans can cause false detections in the column-based methods. Overcoming the problem of inconsistent intensities requires additional steps in the processing, such as binary masking for search region limitation or intensity normalization [3].

Four commonly used metrics were employed to evaluate the performance of the competing methods in terms of pixels: sensitivity (Se) = tp=(tp + fn), specificity (Sp) = tn=(tn + fp), accuracy (Acc) = (tp + tn)=(tp + fp + tn + fn), and the area under a receiver operating characteristic curve.

tp, tn, fp and fn indicate the true positive (correctly identified vessel pixels), true negative (correctly identified background pixels), false positive (incorrectly identified vessel pixels), and false negative (incorrectly identified background pixels), respectively. Sensitivity is a measure of effectiveness in identifying pixels with positive values: specificity performs the same function for pixels with negative values [21]

3. Existing System

In Existing system they have done just vessel part extraction and calculated accuracy using svm classifier. The techniques they have used are over lapping-block-based algorithm for retinal blood vessels segmentation by support vector machine (SVM) with chromaticity and discrete cosine transform (DCT) coefficients as classification features[9-10]

Here retinal images were divided into blocks and each block was described by several features that were used as input vector for machine learning algorithm. Block size was determined by empirically. Blood vessels are rather thin in used images, the thickness is from 1 to 6 pixels. Based on that fact block size of 5×5 was determined so that each block has vessel and non-vessel pixels. Region characteristics were used for features extraction.

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It is known that green channel provides the best contrast between vessel and non-vessel pixels in retinal images. Red and blue channels are not visible in thin vessels. Moreover, even larger vessels are hardly different from the surroundings.

In this method automated system has a problem to find an appropriate threshold. Average level of illumination is very different in different parts of the image.

Pixel intensity of larger vessels is similar to the intensity in the centre of retinal image, thus if the threshold value separates larger veins it will also recognize centre as a vessel. On the other hand, thin vessels have similar intensity to the non-vessel pixels at the bottom of the retina.

It is not possible to find appropriate global threshold value even though veins are different from the neighborhood. This characteristics was used to select the first two features. Central pixel's green intensity level together with the average green intensity level of the whole surrounding block of the size 5×5 were used as two features .This two features together provide useful information. If the central pixel belongs to the vessel it would be darker that the average intensity of the block.

The next feature that was used is the green intensity standard deviation of the block. The idea is that since vessels are in thin, blocks that contain vessels will also contain the non-vessel pixels since the block size is 5×5 and the vessel thickness is usually smaller than 5.

Green channel for vessel and non-vessel pixels around the vessel are different, so the standard deviation will be larger than in the case of non-vessel blocks. In the case of larger vessels, inner veins pixels will be recognized by later analysis of initial classification.

The fourth feature was also created based on the idea that vessels can be locally recognized as darker areas and additionally as areas with the clear edges.

The last region feature is based on discrete cosine transform coefficients. Two dimensional DCT was applied to one block resulting in 5×5 matrix with real value DCT coefficients. By applying dilation class of such pixels will be corrected. Dilation was followed by erosion to restore the original size [4].

4. Proposed Block Diagram

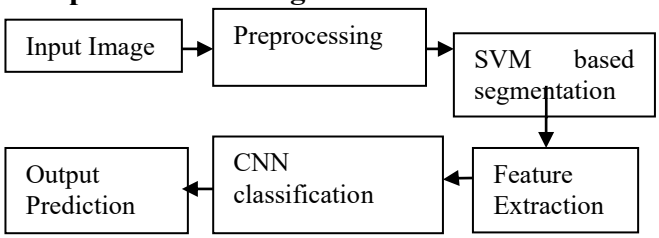

Fig. 1: Filtration Process

Then it will make its entrance into smoothing filter, here low pass filter is used to smooth the pixel values of the wedges. Then renormalisation will takes place, here every part has been moved to unit cell. And finally ridgelet transformation has to be done on the image. This transformation has two modes one is in square mode and second is in circle mode. It is used for tiling and by using Fourier Transformation for angular transformation.

A. SUB-BAND decomposition is done by I→
(PǫI,Δ1I,Δ2I,Δ3I,Δ4I,....) – (1)

B. SMOOTH partitioning is carried out by
hǫ=Wǫ.ΔsI - (2)

C. RENORMALIZATION is carried out by
gǫ=Tǫ¯¹.hǫ - (3)

D. RIDGELET transformation is carried out by
α(ǫ,λ)= (gǫ,pλ) - (4)

The continuous-space definition of the CurveletG2 uses coronae and rotations that are not especially adapted to Cartesian arrays. It is then convenient to replace these concepts by their Cartesian counterparts, that is, concentric squares (instead of concentric circles) and shears (instead of rotations)[15-16]

4.1 Proposed Algorithm for Identification of Diseased Part

Step 1: Select input Fundus Image.
Step 2: Image Normalization.
Step 3: Applying curvelet transformation.
Step 4: Selecting the real values for the output image of transformation.
Step 5: Texture feature energy calculation.
Step 6: Feature extraction for entire dataset.
Step 7: Training entire feature extracted dataset using multi svm train.
Step 8: Calculating accuracy for the diseased part using cnn layer classification.

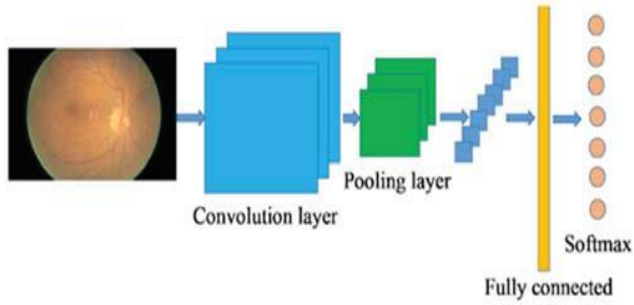

Fig. 2: General Block diagram of CNN

In this paper curvelet changes are utilized for highlight extraction and filtration process. Here the deterioration procedure is experienced less than 360^0 and this examination is far known as rakish decay on all recurrence level with a scaling parameter "ξ". The procedure is totally relies on upon the precise recurrence and the scaling parameters with wedges. The procedure is begun from left top wedge values. These aides in highlighting estimation and characterization[8-11]

Using FFT analysis in the decomposition process to complete the initial phase later each segment is wrapped around the origin then IFFT is going to be applied. In this level it comprises of Low pass, band pass, and high pass filters, this is used for energy preservation[12]

Algorithm: Fast Discrete Curvelet Transform

Undertaking: Compute the curvelet generation of M × N image I, utilizing one of the ridgelet transform executions.

Parameters: Number of determination levels J, least square size B min.

Step1.Apply the starlet change to f and get the set W = {w1, . . . ,wJ , cJ }.

Step2. Set B1 = B min.

Step3. For j = 1, . . . , J do

Allotment the sub band wj with a piece size Bj and apply the DRT to every square: we get the curvelet coefficients αj.

Step4. On the off chance that j modulo 2 = 1 then Bj+1 = 2Bj ,
else
Bj+1 = Bj.
Step5. end if

Yield: C = {β1, β2, β3, . . . , βJ}, FDCT decomposition.

5. Experimental Results

Our proposed method was tested on computer with the following characteristics: Intel R _ CoreTM i3-3770K CPU at 4GHz, 8GB RAM, Windows 7 Professional OS. The proposed algorithm was implemented in MATLAB version R2015b. The proposed algorithm was evaluated on publicly available DRIVE (Digital Retinal Images for Vessel Extraction) data set. Data set consists of 22 images for training and 22 images for testing purposes. For every retinal image in the data set ground truth image is given. Ground truth images were obtained manually with expert control. These images are used for performance evaluation of automatic segmentation algorithms.

For accuracy evaluation of the proposed method three different measurements were used, sensitivity, specificity and accuracy. These metrics are common for segmentation and classification

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algorithms and they were also used. Used metrics are defined by the following equations:

$$\text{Sensitivity}=\frac{TP}{TP+FN}$$

$$\text{Specificity}=\frac{TN}{FP+TN}$$

Where, TP is the number of true positive pixels (vessel pixels classified as vessel), TN is the number of true negative pixels (non-vessel pixels classified as non-vessel), FP represents the false positive pixels and FN is the number of false negative pixels (non-vessel pixels classified as vessels and vessel pixels classified as non-vessels, respectively). The best possible value for all three metrics is 1.

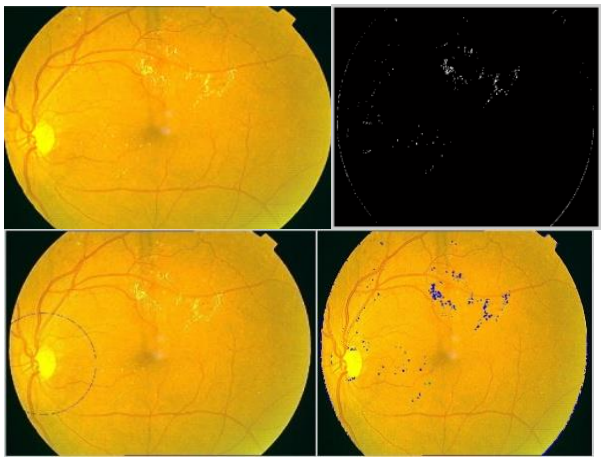

Fig. 3: (a) normal fundus image (b) curvelet image output with binary segmented image (c) idenfication of optic disc (d) Exodus extracted and bounday detected image.

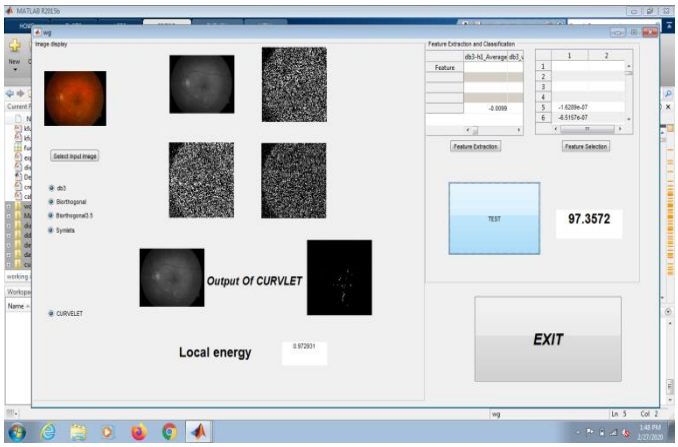

Fig. 4: Final output accuray value

Find glaucoma or normal image by calculating textual features and under goes svm training and classification (TEST) process using feature ranking method by kernel function.

$$\text{Accuracy} = \frac{TP + TN}{TP + FN + FP + TN}$$

Table 1: Comparison of Proposed Method and Method Proposed

Technique	Accuracy
SVM-DCT	95.38
CNN	97.35

6. Conclusions

In this paper, an automated approach to detect the glaucoma in retinal fundus images has been presented. The proposed method that is based on CNN demonstrated promising performance in diagnosing the glaucoma with considerably accuracy as compared to existing equivalent methods. Here a novel technique proposed, energy texture features extracted which is accessible under geometry conditions where wavelets were not defined to satisfy conditions. SVM classifier is used for the classification process and feature ranking procedure under extension of multi SVM classifier. This is used for obtaining accurate results.

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Evaluation of a novel approach for the diagnosis of BMD using CBIR and IOT

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Abstract: Bone is a most important anatomical structure in human body and a challenge in the medical world is the concern in the bone density called as osteoporosis. This disease in the bone is detected by medical image techniques. Mineral density of the bone varies from person to person, Osteoporosis the Silent disease, here, the micro architecture of bones becomes weak due to the low bone mass density (BMD). That leads to fragile bones which are at a very high risk for fractures, and also, it affects postmenopausal women. The main objective of this paper is to measure the bone mineral density (BMD) from X-ray images and thereby, evaluate the corresponding patient mail id using CBIR technique. IOT is introduced as automated mail sending system using E-mail protocol architecture. This method can reduce cost; reduce the time for detecting the patient status.

Keywords: Bone mineral density, X-ray, fractal dimension, Content based image retrieval, Internet of things.

1. Introduction

There is a growing interest during the last decades in finding effective diagnostic methods for skeletal diseases. Among these, Osteoporosis is the "Silent disease" in which the micro architecture of bones becomes weak due to the low bone mass density. Osteoporosis is a disease characterized by low bone mineral mass, micro architectural deterioration bone tissue leading to increased bone fragility, and a consequent increase in fracture risk. Osteoporosis has now become the epidemic. Osteoporosis causes approximately 8.8 to 8.9 million fractures per year worldwide. In one of Asian country this "silent disease" affects 6.8 million people and it will increase to in excess of 7.2 million by 2020.According to the World Health Organization(WHO),osteoporosis is referred to a faulty and weakened bone structure due to low bone mineral mass or content per unit volume. Reduction of bone mass increase fragility and minor stress on bone can cause fracture. Prevention of Osteoporosis involves several aspects low bone mass(Osteopenia) or Osteoporosis is the most important step for prevention and treatments .If Osteopenia or Osteoporosis has occurred, that person can take action to stop the progression of bone loss. The only way to accurately test the strength and solidness of the bones is with Bone Mineral Density(BMD)tests. Bone Mineral Density test measure the solidness and mass in the spine, hip , and/or wrist. Some Bone Mineral Density (BMD) test measure bone in the heel or hand. These tests are performed like X-ray films and they are the only reliable way to determine loss of bone mass. They are painless, non-invasive, and safe. Bone Mineral test helps to determine the low bone density, low bone density before a fracture occurs, conform a diagnosis of Osteoporosis if a person already has broken bones, predict the chance of person having a fracture in the future, determine the rate of bone loss and monitor the effect of treatment. Osteoporosis is one of the pandemic diseases, which is the skeletal disorder caused by low calcium level termed as bone mineral density (BMD). Osteoporosis can lead to bone fracture due to bone loss and fragility. It affects men and women equally and can happen at any phase of the life. The probability of bone fracture with osteoporosis above age 50 is high, especially in menopausal women. It is found that,1 in every 3 women and 1 in every 5 men of age above 50 are affected by osteoporotic fractures.Worldwide,200millions cases cause more that 8.5 million fractures[1]. The conditions of risk of osteoporosis can be determined by measuring mineral density in the bone. The density level can be evaluated by different method and at different undernourished sites where BMD can be measured. A bone density test is the only test that can diagnose osteoporosis before a broken bone occurs. This test estimates the density of the bone and the chance that bone will break.

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2. Literature Survey

The risk of facing diseases in the better life expectancy is more due to the increase of aging process. One of those diseases is the bone disorder that losses the mass of bone and causes the bone diseases such as Osteopenia and Osteoporosis. These are major bone disorders. The bone degenerative disease is described that the incident of low Bone Mineral Density (BMD) may commonly happen in elder people. The influences of these diseases enlarge the fractures risk, fragility and depressing mechanical force on sustaining normal body actions. The examination of BMD is an ultimate technique used for early detection of osteoporosis bone diseases BMD examination with the help dual method X-ray absorptiometry (DXA) can be one of the techniques for osteoporosis diagnosis.T-scores are standardized scores of DEXA on each dimension for each type of bone. Using WHO standards, the T-score estimated for three categories such as normal bone density, low bone density which referred as osteopenia, and brittle bones which referred as osteoporosis. Conversely, the prediction of bone disorders using DXA is comparatively more expensive especially in India, resolution and DXA is still a limitation since it cannot define the bone micro-architecture. The primary witness was the firsttime event of a fragility fracture occurs. Nonvertebral fractures are fragility fractures were some of the fractures are not including in this category such as toes, fingers and skull. The vertebral fractures are identified by radiographic image proof. Bisphosphonates are the most important class of medicine used for postmenopausal osteoporosis. Here they have been shown some prevention for fractures and also osteopenia is lacking slowly in patients.

In general, the elder people may have higher chance to meet dentists for the check-up to calculate the bone density using DXA.They insist that there is an association between the condition of hip bone and mandibular bone. Hence, the prediction of mandibular bone information is more important in early detection of osteoporosis . Various techniques were developed to diagnosis osteoporosis by measuring the cross sectional width of mandibular bone and based on the panoramic image of trabecular bone and its pattern. Slowly the structure of bone changes due to bone disorder such as osteopenia and osteoporosis that can be witnessed through panoramic radiography images. Therefore, the development of specific prediction process is required to extract the particular region from the bone image were the pattern changes comparatively.

3. Existing System

The data collected from the hospital as X-ray images and DEXA scan reports is used in the project for comparative study. The X-ray images include patients suspected with osteoporosis, osteopenia and normal person. The collected images were resized to the dimension 200*200 pixels before the pre-processing. Pre-processing includes cropping of the image for ROI and filtering of the same using average filter. Image enhancement was initially performed and later on eliminated from pre-processing techniques, since it was proved that the intensity of the image directly co-relate with bone mineral density. BDM report of patients suspected with osteoporosis and osteopenia were collected. A comparative study

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between the BMD values obtained from the image processing code and from BDM report of same patient was done.

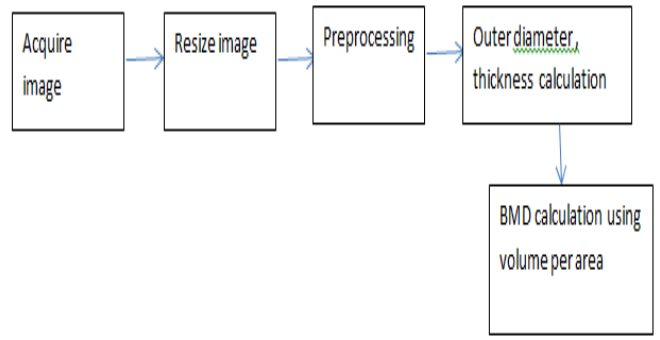

Fig. 1: Existing System Block Diagram.

4. Proposed Technique

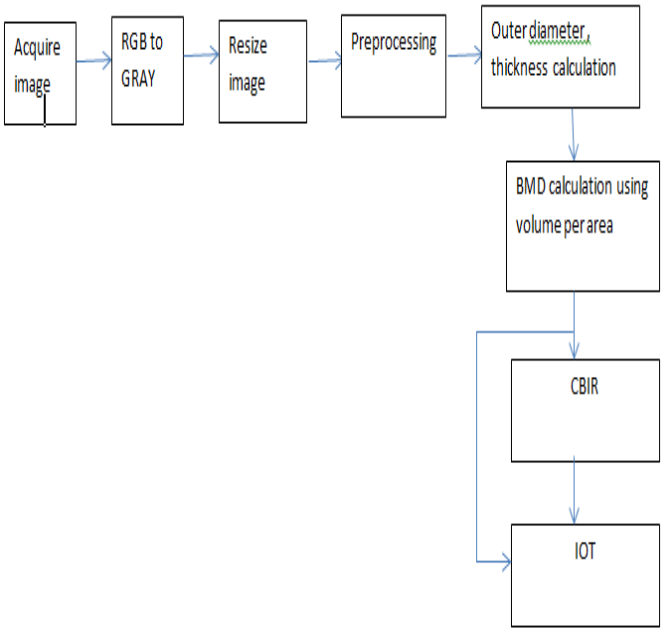

Fig. 2: Proposed System Block Diagram.

Input Image is preprocessed after gray conversion and resizing it in to fixed predefined size. Preprocessing involves image quality up gradation by basic operations. Filtering plays vital role, proceedings outer diameter thickness calculations, BMD using volume per area, follows CBIR for patient image recognition and IOT.

BMD is calculated in the most precise way by DEXA scanning which uses lower dose of x-rays. There are no special methods available now to identify the patients detected with osteoporosis from x-ray images itself. More over the cost for the DEXA scan is much higher than the x-ray test. This image processing code helps to estimate the Bone Mineral Density from the digital x-ray image itself. The collected image is initially re-sized to a fixed pixel dimension and is then loaded to the MATLAB software. The re-sized image then undergoes pre-processing which include cropping of the image for ROI and filtering the same in order to remove noise and other unwanted disturbances. After pre-processing, a graph plotting intensity vs. distance is obtained. The outer diameter and the thickness of the region is calculated from the graph and is substituted in the formula to initially obtain the volume per area (VPA). It is then substituted to obtain the BMD value based on which the patient status is confirmed. The BMD value obtained from the MATLAB code is later on compared with the DEXA report for the validation process.

$$Vpa=t.t(1-t/w)$$

$$Bmd=vpa.rho$$

where t =Cortical thickness, W=Outer diameter, VPA= Volume per Area and BMD= Bone Mineral Density

5. Design Approach

The data collected from the hospital as X-ray images and DEXA scan reports is used in the project for comparative study. The X-ray images include patients suspected with osteoporosis, osteopenia and normal person. The collected images were resized to the dimension 200*200 pixels before the pre-processing. Pre-processing includes cropping of the image for ROI and filtering of the same using average filter. Image enhancement was initially performed and later on eliminated from pre-processing techniques, since it was proved that the intensity of the image directly co-relate with bone mineral density. BDM report of patients suspected with osteoporosis and osteopenia were collected. A comparative study between the BMD values obtained from the image processing code and from BDM report of same patient was done.

The images are very rich in the content like color, tecture, shape information present in them. Retrieving images based on color similarity is achieved by computing a color histogram for each image that identifies the proportion of pixels within an image holding specific values (that humans express as colors). Color searches will usually involve comparing color histograms, though this is not the only technique in practice. Texture measures look for visual patterns in images and how they are spatially defined.The identification of specific textures in an image is achieved primarily by modeling texture as a two-dimensional gray level variation. The relative brightness of pairs of pixels is computed such that degree of contrast, regularity, coarseness and directionality may be estimated. Shape does not refer to the shape of an image but to the shape of a particular region that is being sought out. Shapes will often be determined first applying segmentation or edge detection to an image. Other methods use shape filters to identify given shapes of an image. In some case accurate shape detection will require human intervention because methods like segmentation are very difficult to completely automate. Here the paper discuss shape extraction using edge detection masks like Sobel, Roberts, Prewitt and Canny gradient operators.

IoT (Internet of Things) is an advanced automation and analytics system which exploits networking, sensing, big data, and artificial intelligence technology to deliver complete systems for a product or service. These systems allow greater transparency, control, and performance when applied to any industry or system.IoT systems have applications across industries through their unique flexibility and ability to be suitable in any environment. They enhance data collection, automation, operations, and much more through smart devices and powerful enabling technology.

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Fig. 3: System information.

6. Conclusions

Bone mineral density with the fractal dimension in images. For that, the proposed method is up to the task and gave good results. We not only calculate the fractal dimension, but also noticed the difference between normal BMD, bone with high mineral density. For that we presented some calculations of fractal dimension corresponding to certain range .However, extreme care must be taken in the choice of this range for the analysis. We have seen the fractal dimension is a very powerful tool for the detection of BMD. We found a new approach that reduces the cost of the estimation of BMD. And ease the work and effort for the same. Our solution can be used by the Doctor or his/her assistance without much waste of time. For that purpose, CBIR and IOT combined approach is evaluated with advanced methodologies.

The input image will be classified in next term, whether image infected or not infected using neural network. In future work, neural network is used for classification which gives good accuracy when compared against other classifier. Although neural network gives a good accuracy in classification then also for more better classification. we propose to classify using support vector machine where chance of misclassification near to zero. In future using fuzzy logic we will try to calculate percentage of infection.

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Electronic copy available at: https://ssrn.com/abstract=3644852

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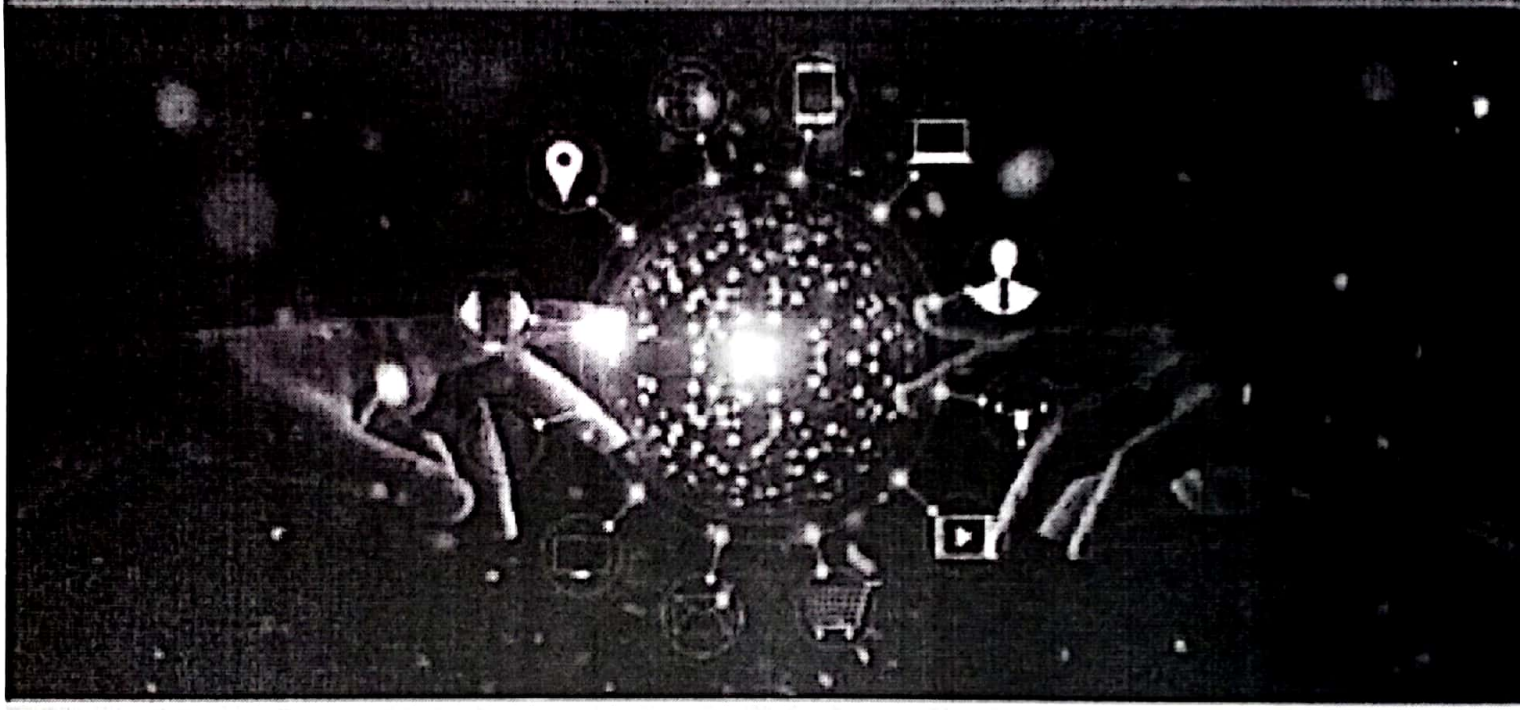

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ISBN : 978-93-88336-27-2

Growth of Micro, Small and Medium Enterprises-A select study with References to Guntur and Krishna Districts of Andhra Pradesh – Trends & Problems

Janardhana Rao Nidamaluri
Associate Professor, Department of Master of Business Administration, Andhra Loyola Institute of Engineering and Technology, Vijayawada, Andhra Pradesh

Abstract :- Very few states have matched the growth that Andhra Pradesh has been able to achieve within a short span of time. Hyderabad (which now is the capital of Telangana) is quite popular for its IT and cyber developments. In fact it is known as Cyberabad. Doing away with red tape, strong infrastructural support, doses of incentives, pro-industry policies etc. have made the state gallop to a commanding and respectable position in the country and the world as well. In its MSME policy (2015-20) the State has spelt out the thrust areas with impetus on several developmental areas. A measure like addressing incipient sickness is really appreciable where an institutional set-up will catch industrial sickness at the beginning itself. It speaks of the pro-active mindset of the Government to tackle problems at the inception stage itself rather than allowing them to take unmanageable proportions. An initiative like the SME Exchange is another praise-worthy step that would facilitate fund raising by MSMEs directly from the market. This article reviews the trends in growth of MSMEs in two important districts of Andhra Pradesh – Guntur and Krishna. It will also discuss the problems of MSME growth in these two districts.

Key words :– Guntur & Krishna Districts, MSMEs, Problems, Trends

1. Introduction :- In Andhra Pradesh there has been a consistent growth of MSMEs at all the three parameters, namely, number of MSMEs, investment and employment. The CAGRs for number of MSMEs, investment and employment work out to 8.22%, 36.10 & 11.60% respectively. All the three CAGRs for number of MSMEs are healthy ones and reflect a strong performance by the MSMEs. The numbers vouch for the implementation of the policy measures by the Government. Often it is found that policies, strategies, vision, mission etc. are matters of papers only. Their visibility on the ground is far too less. But in case of Andhra Pradesh the growth trajectory has been highly impressive and speaks volumes of the efforts in actual implementation of things. For a highly populated country like India a CAGR in employment of more than 10% for over 20 years is indeed a robust performance by all means. Amidst invasion of technology, if the employment level is rising it indicates that the quality of education and employability skills have improved too. Thus, the MSME growth story of Andhra

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This is to certify that Dr. Subba Rayudu Thunga has presented a paper titled Impact of knowledge sharing and dissemination on Agriculture Supply chain Management : A case study on cotton and chill farmers in Guntur and prakasam districts at the NCMP - 2019 on **"STRATEGIES FOR SUSTAINABLE BUSINESS GROWTH AND INNOVATION"** during 9 &10th August - 2019 organised by Department of Management Studies.

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JOURNAL OF MECHANICS OF CONTINUA AND MATHEMATICAL SCIENCES
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ISSN (Online) : 2454 -7190 Vol -14, No.-5, September - October (2019) 873-881 ISSN (Print) 0973-8975

Impact of Knowledge Sharing and Dissemination on Agriculture Supply Chain Management: A Case Study on Cotton and Chill Farmers in Guntur and Prakasam Districts

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https://doi.org/10.26782/jmcms.2019.10.00070

Abstract

The Research is undertaken among chilli and cotton farmers in various villages of Guntur and Prakasam districts of Andhra Pradesh. This study is formulated to analyse perceptions of farmers on knowledge sharing and dissemination practices that are applying in chilli and cotton crop supply chain functions. By this research the researcher made a attempt to assess and evaluate impact of knowledge sharing practices on effectiveness of agriculture supply chain management. The results are elicited by conducting survey among chilli and cotton farmers in different villages in Guntur and Prakasam districts. The survey was executed by selecting farmers purposefully among various regions in Guntur and Prakasam districts. For critical investigation on variables associated with research problem three categories are undertaken i.e. Knowledge sharing practices, Expertise on suppliers and distributors and Knowledge on marketing quality standards. The study results are extracted by analysing and evaluating perceptions of farmers on knowledge sharing practices, knowledge on suppliers and distributors.

Keywords : Agriculture Supplychain management, Knowledge sharing practices, distributors, marketing quality standards

I. Introduction

Agriculture has been recognised as primary occupation in Indian economy and it is necessary for government, NGO and cooperative societies to give

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ISSN : 2394 - 3114 Volume : 40 Issue : 03 February : 2020

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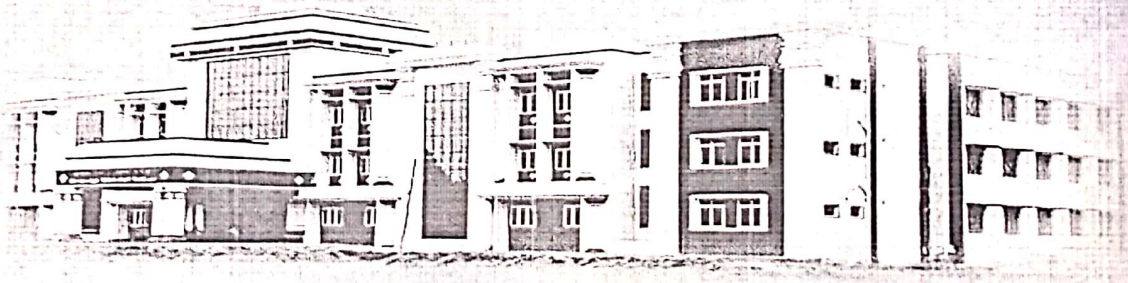

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ISSN: 2394-3114
Vol-40-Issue-03-February-2020

A STUDY ON IMPACT OF DEMONETIZATION ON USAGE OF PLASTIC MONEY

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Lavanya PB

Assistant Professor, Andhra Loyola Institute of Engineering and Technology Vijayawada, Andhra Pradesh, India,

Abstract

The objective of this paper was to examine the impact of demonetization on usage of plastic money in Indian economy. The government of India initiated the demonetization on November 8, 2016 to control invisible parallel economies, promote digital transactions and strengthen Indian financial system. This study examines whether there is any significant change in the usage of plastic money in India post demonetization. The data for research has been collected from Reserve Bank of India website i.e. 2015-16 and 2017-18, and paired sample t-test has been used for analysis. The study found that there is no significant impact of demonetization on usage of plastic money. This study would be useful to the public as well as government for enhancing the usage of plastic money.

Key words: Black Money, Demonetization, Gross Domestic Product, Plastic money.

INTRODUCTION

Demonetization is the act of stripping a currency unit of its status as legal tender. On November 8, 2016, the government of India stripped Rs.500 and Rs. 1000 denomination currency notes of their legal tender status. According to Reserve Bank of India report on 31st March 2016, Rs.500 and Rs.1000 bank notes consist around 86.40% of total cash circulation having value of Rs. 15.44 lakh crore. In this process 97 percent of old notes around Rs.14.98 lakh crore were deposited in bank before 31st December 2016. Lokesh Uke (2017) argued that reasons for demonetization are like rising inflation, corruption, black money, and boost cashless transactions in the country.

The Indian economy is one of the world's fastest growing economies which is consistently maintaining a growth rate of around 7 percent. On the other hand tax to Gross

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NC2015: A Qualitative Study on Entrepreneurial Challenges with reference to Indian Perspective

Dr.Subba Rayudu Thunga[1], Rajesh Pasala[2]
[1]Andhra Loyola Institute of Engineering and Technology, Vijayawada
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Entrepreneurship plays a leading role in the economic development and standard of living of the nation. An entrepreneur provides progress with a massive amount of goods and services and enhances the development of social welfare. Developing countries like India need more entrepreneurial initiatives to uplift economy and create more job opportunities to the young population. Entrepreneurs can act as a channel of social change and work for the national wealth. The present study is going to address main challenges of entrepreneurs which entrepreneurs face while starting and running their business. The objective of this study is to analyze the entrepreneurial challenges based on secondary sources. Hence this study identifies challenges of existing entrepreneurs in general and makes some recommendations and initiatives to overcome the challenges of the existing and upcoming entrepreneurs.

Keywords: Business, Entrepreneurship, Entrepreneurial challenges.

NC2018: A Study of Selected Women Entrepreneurs in Bhimavaram Town,West Godavari, A.P

K. Ganga Raju[1], D.Leela Kalyani[2]
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Entrepreneurship is a creative and innovative response to the environment and an ability to recognize, initiate and exploit an economic opportunity. An entrepreneur is an innovator playing the role of a dynamic business man adding material growth to the economic development through Small and Medium Enterprises (SMEs). In recent years the interesting fact is that, the rate of new business formation by women has been increased. The performance of women in India has making significant contributions to economic growth of the nation. With the change in economic policies and government support women are now entering in every aspects of business and are exploring the opportunities. Even with change in economic policies and other support from government there are some other factors which will influence the women in entering the business or other areas. This study has explored the motivational factors and their impact on women entrepreneurs in Bhimavaram town of Andhra Pradesh.

Keywords: Women Entrepreneurship, SMEs, Motivation

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International Journal of Social Science & Management Studies - I.J.S.S.M.S.
Peer Reviewed - Refereed Research Journal & Impact Factor - 5.2, Ex - UGC S.N. 5351
ISSN : 2454 - 4655, Vol. - 6, No. - 5, June - 2020
2020

Role of Educational Institutions in Rural Development After Covid-19

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Abstract :- The Covid -19 pandemic has brought the entire nation to a halt. Health officials and medical professionals are struggling with containing the disease, and testing and treating affected people. The risk of spread in rural areas is heightened. This is due to a number of factors, including lack of awareness, a limited supply of clean water ,low levels of nutrition and most importantly ,ill-equipped and insufficient public health centres and district hospitals. Slowed down economic activity in urban areas has an effect on rural areas as well. Numerous studies and experience from the field indicate that significant proportion of rural household incomes comes from migration and daily wage labourers. The informal industry in cities is being badly affected has resulted in loss of rural income. If the educational institutions play their proper role in imparting quality education with values and ethics, society will get good human resource. And good human resource will establish business organizations which will provide goods and services to the society to satisfy its needs and the satisfied society will support the business. Thus society and businesses can bring sustainable growth in future since both are interrelated and interdependent on each other. However shaping the future of business and society depends more on the education system and educational institutions of a country.

1. Introduction :- Higher education is at the apex in Indian education system and it has a specific objective of developing good human resource to the society to take some responsibility. Knowledgeable people with ethical and morale values are the only resource which is the prerequisite for shaping the future of the nation. And it is the responsibility of higher education to develop knowledgeable people for their country. Higher education has proved its relevance in the past and due to which few countries have become developed countries in the world. Developing countries including India have realized the vital role of higher education in the process of developing human resource which is essential for national development. Hence Indian governments, state and central, have been taking various steps in increasing investment in this sector. There has been unprecedented quantitative growth in educational institutions and enrolment from the year 2000 onwards.

Rural development is important not only for the majority of the population residing in a rural area but the growth of rural activities is necessary to stimulate the speed of overall economic expansion of the nation.

Rural development is pretended to be noticeable importance in the country today than in the olden days in the process of the evolution of the nation. It is a strategy trying to obtain improved rural creation and productivity, higher socio-economic equality, and ambition, stability in social and economic development.

The primitive task is to decrease the famine roughly about 70 percent of the rural population, implement sufficient and healthy food. Later, serve fair equipment of clothing and footwear, a clean environment and house, medical attention, recreational provision, education, transport, and communication.

2. Objectives of the study :- The basic objectives of the present study are as under:

1. To understand the present scenario in higher education in the process of rural development.
2. To analyze and conclude the role being played by the educational institutions in rural development.
3. To make certain suggestions in the area of higher education to bring some changes in rural development.

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"STRATEGIES FOR TRANSFORMING INDIA– THE WAY FORWARD" (SFTI)

VOLUME - III

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Transforming India

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ISBN NO: 978-93-5391-910-8

Role of micro, small and medium enterprises in transforming India – an overview

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Introduction

Micro, Small and Medium Enterprises (MSMEs) contribute in more than one way to the economy. Their contribution is not just restricted to their output; they also are a great source of employment for a number of people. Herofincorp (2018) has highlighted the role of MSMEs in Indian economy. They have mentioned that "MSMEs employ around 40% of India's workforce, which is an estimated 80 million people, who are given an opportunity for livelihood and employment via low-skilled jobs. Around 1.3 million MSMEs contribute 45% to India's manufacturing output and 40% of India's total export. In a way, they form the backbone of the Indian economy. At 48 million, India has the second largest number of MSMEs in the world, edging close to China which has around 50 million MSMEs.

There are around 6000 products manufactured by 31.7% MSMEs while the remaining 68.2% are engaged in delivering various services. This sector, if extended the right support, has the potential to spread industrial growth throughout the country.Despite employing 40% of India's workforce, MSMEs are also the bane of India's economic problems. Though the volume numbers work in their favor, they currently contribute to about 17% of India's GDP."

MSMEs in countries like India and China have obvious advantages in the form of cheap labor cost making the ultimate product price cheaper as well. They operate in a relatively compact set-up which leads to lower overheads. This again has an impact on the pricing of their products and services. Thus, MSMEs actually are great growth engines for an economy, more so, for densely populated countries like India and China.

As per the Micro, Small & Medium Enterprises Development (MSMED) Act, 2006 the Micro, Small and Medium Enterprises (MSME) are classified as below:

Definition of MSMEs as per the MSMED Act

Manufacturing Sector	
Enterprise Category	**Investment in plant & machinery**
Micro Enterprises	Does not exceed twenty five lakh rupees
Small Enterprises	More than twenty five lakh rupees but does not exceed fivecrore rupees
Medium Enterprises	More than five crore rupees but does not exceed ten crorerupees

Service Sector	
Enterprise Category	**Investment in equipment**
Micro Enterprises	Does not exceed ten lakh rupees
Small Enterprises	More than ten lakh rupees but does not exceed two crore rupees
Medium Enterprises	More than twocrore rupees but does not exceed fivecrorerupees

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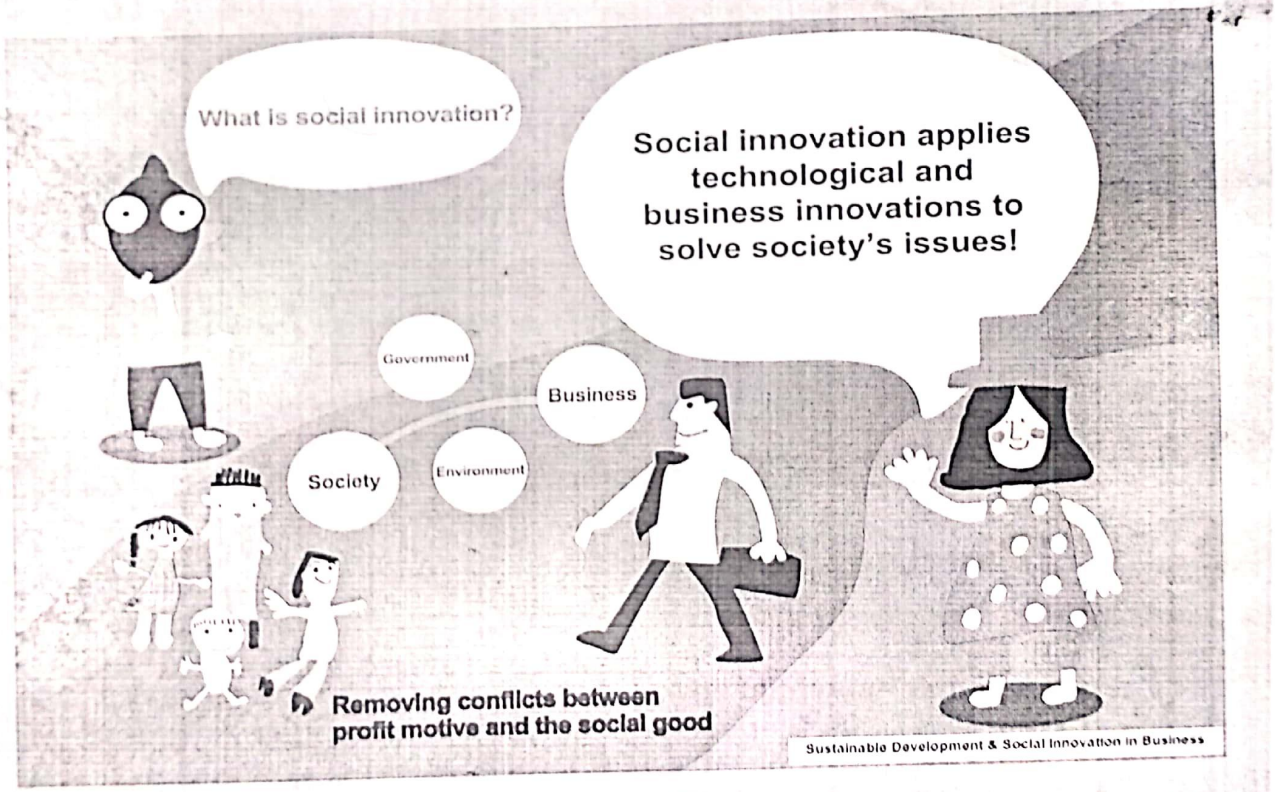
31st January, 2020



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A Study on Issues and Challenges of Financial Inclusion in India

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ABSTRACT: *Nowadays innovation and technology have brought a radical change in Indian financial system. India need more support from financial inclusion for providing cost effective financial services to low income people. The objective of this paper was to examine the issues and challenges of financial inclusion in Indian economy. The present study is an attempt to inspect the issues and challenges of financial inclusion in India. The study is based on primary and secondary sources i.e. observation, existing research studies, articles and newspaper coverage's. This study would be useful to the public, policy makers as well as government for effectively executing, reducing invisible parallel economies and strength the economy.*

KEY WORDS: *Financial Inclusion, Financial services, Financial system, Invisible parallel economies.*

1. INTRODUCTION:

The word financial inclusion is the process of ensuring access to appropriate financial products and services required by all sections of the society in general and vulnerable groups such as weaker section and low income group in particular at an affordable cost (*As per the Rangarajan Committee report, 2008).* Financial inclusion is significant priority of the people in terms of economic growth and development of society. It enables to decrease the economic gap between rich and poor in the society. It ensures people who are unable to access organized financial system so far can access it with ease *(Akhil Damodaran, 2013).* In the world still around 2 billion people do not have access to basic banking services *(World Economic forum Report, 2014)*

2. LITERATURE REVIEW :

According to Demirguc-Kunt et al., (2018) countries with deeper levels of financial inclusion defined - access to affordable, appropriate financial services-have strong Gross Domestic Product growth rates and lower income inequality. Shahul Hameedu (2014) found that the banking industry has shown tremendous growth in volume and complexity during the last few decades. Despite making significant improvements in all the areas relating to financial viability, profitability and competitiveness, there are concerns that banks have not been able to include vast segment of the population, especially the underprivileged sections of the society, into the fold of basic banking services. Bhoomika Garg (2014) conducted a study on financial inclusion and rural development he concluded that large number of small and marginal farmers, women, unorganized sector workers including artisans, self-employed and pensioners. Sayantani Banerjee et al., (2014) the study emphasis the need of financial inclusion for social development, social factors like unemployment and illiteracy are closely connected to the success of financial inclusion. Islam (2012) found microfinance institutions in India have played a key role in enhancing the status of financial inclusion. Beck et al., (2007) studied macroeconomic evidence shows that countries with deeper financial inclusion tend to grow faster and reduce income inequality.

3. OBJECTIVES OF THE STUDY :

1)To study the scenario and overview of financial inclusion in India 2)To investigate the issues and challenges of financial inclusion in India. 3) To offer recommendations for enhancing financial inclusion.

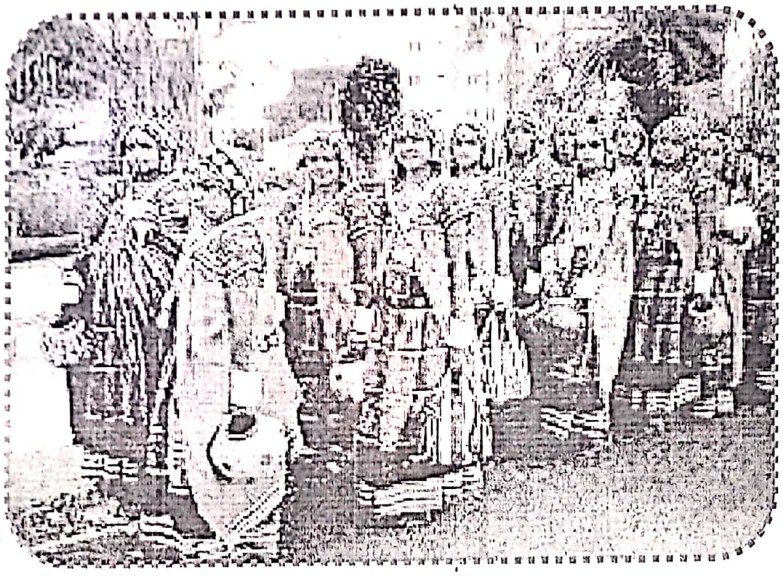
4. METHODOLOGY OF THE STUDY

The aim of this paper is to study the issues and challenges of financial inclusion in India. The present study is based on secondary data; data was collected from journals, research articles, periodicals, news paper coverage's and annual reports from government of India.

ISBN No: 978-93-5391-991-7

"An Impact of Developmental Programmes for Social Transformation of Scheduled Castes & Scheduled Tribes"

Book No-1



EDITOR
Dr. CH. VENU BABU

Published By
KBN College, Vijayawada
Andhra Pradesh, India

ISBN: 978-93-5391-991-7

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ISBN: 978-93-5

A STUDY ON SOCIO AND ECONOMIC STATUS OF SCHEDULED TRIBES

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ABSTRACT

Schedules tribes of India are varied in terms of their socio-economic and political development. Some of them have changed through Hinduisation, and some through conversion to Christianity or other routes. Some tribal people are in the transitional phase, while others are adhering to their older lifestyle. This shows an uneven process of change and development among tribal people in India. According to the 2011 census, the tribal population was 10.45 crore. Scheduled tribes constitute 8.6 percent of the country's total population and 11.3 percent of the total rural population. Only a small number of tribal people have been benefited by the policies, schemes, programmes meant for their development. Scheduled tribal people are marginalized from the society in many respects. Provisions made in the Constitution have brought about changes in their position but still they are confronted with a number of challenges. This paper addresses the socio and economic status of the scheduled tribes in India. The basic aim of this study is to find out the issues and challenges faced by scheduled tribes in India and suggest measures and initiatives for handling these issues and challenges successfully.

Keywords: Scheduled Tribes, Socio and economic development, Issues and Challenges.

INTRODUCTION

The tribal population in India numerically constitutes a small segment of the total population of the country but is a significant part of the population. The population of Scheduled Tribes in the country, as per census 2011 was 10.45 crore. Scheduled Tribes constitute 8.6 percent of the country's total population and 11.3 percent of the total rural population. Population of Scheduled Tribes males was 5.25 crore and Scheduled Tribes females was 5.20 crore. Lakshadweep, Mizoram, Nagaland, Meghalaya and Arunachal Pradesh have a highest Scheduled Tribes population in descending order, respectively. Uttar Pradesh, Tamil Nadu, Bihar, Kerala and Uttarkhand have a lowest Scheduled Tribes population in the country.

The Scheduled tribal population is identified as the indigenous population of our country. For centuries, they have been living a very simple life, based on the natural environment and have developed cultural patterns friendly to their physical and social environment. References of such tribal groups are found even in the literature on the ancient period, right from the Ramayana and the Mahabharata periods (Mehta, 2000). According to L.P.Vidyarthi tribe is a social group with definite territory, common name, common descent, common culture, behavior of an endogamous group, common taboos, existence of distinctive social and political system, and full faith in leaders and self sufficiency in their distinct economy (Vidyarthi, 1981). There are approximately two hundred million tribal people in the entire globe, which means, about 4% of the global population. They are found in many regions of the world and majority of them are the poorest amongst poor.

OBJECTIVES OF THE STUDY

1. To study the socio and economic statu scheduled tribes in India.
2. To quantify the level of poverty, literacy schemes available for scheduled tribes.
3. To analyze the issues and challenges facing t scheduled tribes in India.
4. To offer recommendations for improving soci economic status of scheduled tribes.

METHODOLOGY OF THE STUDY

The aim of this paper is to study the soci economic status of scheduled tribes in India. The p study is qualitative as well as quantitative in nature. St based on secondary data, which has been collected various sources like Government of India- Ministry of Affairs, Annual Report 2017-18, All India Survey on Education (AISHE) Reports, MHRD, Educational St at a Glance, Department of School Education, MHRI Report No.571: Household Ownership and Oper Holdings in India, All India Survey on Higher Ed (AISHE) Reports, MHRD, journals, research pape articles.

SCOPE OF THE STUDY

The present study socio-economic sta scheduled tribes, The Study is addressing issu challenges of scheduled tribes in India. The s confined to issues and challenges of scheduled t India.

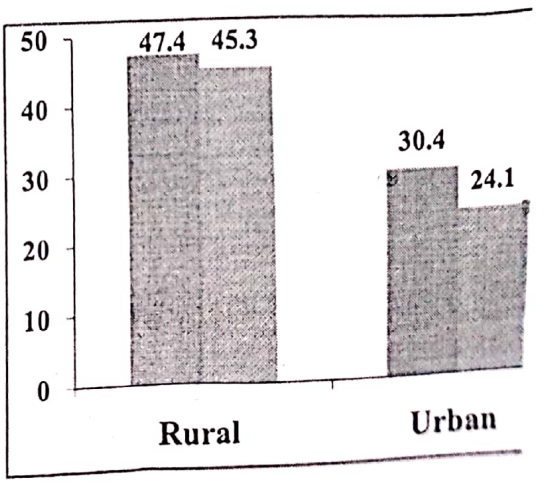
RESULTS AND DISCUSSION

Table -1: Shows States/Union Territories rank proportion of Scheduled Tribes

Top 5 states/ UTs		Bottom 5 States	
Lakshadweep	94.8%	Uttar Pradesh	
Mizoram	94.4%	Tamil Nadu	
Nagaland	86.5%	Bihar	
Meghalaya	86.1%	Kerala	
Arunachal Pradesh	68.8%	Uttarkhand	

Source: Government of India- Ministry of Tribal Annual Report 2017-18

Chart: 1 All India Percentage change in Poverty fi 10 to 2011-12 both Rural and Urban



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ISBN No: 978-93-5391-991-7

"An Impact of Developmental Programmes for Social Transformation of Scheduled Castes & Scheduled Tribes"

Book No-2

EDITOR

Dr. CH. VENU BABU

Published By

KBN College, Vijayawada
Andhra Pradesh, India

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Dr. CH. VENU BABU
KBN College, Vijayawada
Andhra Pradesh, India

NAME & ADDRESS OF THE PUBLISHER

KBN College, Vijayawada
Andhra Pradesh, India

PLACE OF PUBLICATION:

KBN College, Vijayawada-520001

ISBN: 978-93-5391-991-7

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ISBN: 978-93-5391-991-7

A THEORETICAL STUDY ON DEVELOPMENTAL PROGRAMMES FOR ECONOMIC AND SOCIAL EMPOWERMENT OF SCHEDULED CASTES IN INDIA

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ABSTRACT
Scheduled Castes (SCs), who constitute 16.6% of our population as per 2011 Census, have historically suffered social and educational disabilities and economic deprivation arising there from. Accordingly, special provisions have been enshrined in the Constitution for advancement of their interests. Article 46 of Part IV ("Directive Principles of State Policy") of the Constitution enjoins upon the State to promote with special care the educational and economic interests of the weaker sections of the people, in particular, of the Scheduled Castes and the Scheduled Tribes. Article 38 (2) in the same Part also enjoins upon the State to minimize inequities in income, and to endeavor to eliminate inequalities in status, facilities and opportunities, not only amongst individuals but also amongst groups of people residing in different areas or engaged in different vocations. The Government has hence taken a number of initiatives for development of SCs, which have yielded positive outcomes, and have also resulted in narrowing the gap between the Scheduled Castes and the rest of the population. The present study focused on various government schemes for economic development and social empowerment of SCs in India.

Key Words: *Scheduled Caste, Economic development, Social empowerment, Government Schemes.*

INTRODUCTION

Scheduled castes are those castes/races in the country that suffer from extreme social, educational and economic backwardness arising out of age-old practice of untouchability and certain others on account of lack of infrastructure facilities and geographical isolation, and who need special consideration for safeguarding their interests and for their accelerated socio-economic development. These communities were notified as Scheduled Castes as per provisions contained in Clause 1 of Article 341 of the Constitution.The deep concern of the framers of the Constitution for the uplift of the Scheduled Castes and Scheduled Tribes and Other Backward Classes is reflected in the elaborate constitutional mechanism set-up for their uplift. These provisions range from measures to remove any kind of social disabilities imposed on them to ensure equal opportunity in every sphere and to bring them on par with rest of the population.

The Constitution of India has prescribed, protection and safeguards for the Scheduled Castes (SCs), Scheduled Tribes (STs) and other weaker sections; either specially or the way of insisting on their general rights as citizens; with the object of promoting their educational and economic interests and removing social disabilities. These social groups have also been provided institutionalized commitments through the statutory body, the National Commission of SCs. The Ministry of Social Justice and Empowerment is the nodal Ministry to oversee the interests of the Scheduled Castes. Though the primary responsibility for promotion of interests of the Scheduled Castes rests with all the Central Ministries in the area of their operations and the State Governments, the Ministry complements their efforts by way of interventions in critical sectors through specifically tailored schemes. The Scheduled Castes Development (SCD) Bureau of the Ministry aims to promote the welfare of Scheduled Castes through their educational, economic and social empowerment.

OBJECTIVES OF THE STUDY

1. To study the profile of Scheduled Castes in India.
2. To investigate various governmental programmes and initiatives for the economic and social empowerment of Scheduled Castes in India.

METHODOLOGY OF THE STUDY

The present study is qualitative as well as descriptive in nature and based on secondary sources of data. The secondary information relating to various developmental schemes and initiatives of government aimed at economic development and social empowerment of scheduled caste in India have been collected from different sources like published

ISBN No: 978-93-5391-991-7

"An Impact of Developmental Programmes for Social Transformation of Scheduled Castes & Scheduled Tribes"

Book No-3

EDITOR

Dr. CH. VENU BABU

Published By

KBN College, Vijayawada
Andhra Pradesh, India

ISBN: 978-93-5391-991-7

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ISBN: 978-93-5391-991-7

Tribal Development Approaches for their all Round Development

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ABSTRACT

Administering the tribes in the country has been a part of the commitment made through the Constitution to strive for their socio-economic development. Though the problems of tribals ad attracted the attention of country's politicians, policy makers and social workers much before independence, the whole perspective with regard to the role of state vis-it-vis the tribal people in India. The builders of modem India took the task of development of tribal people and their integration with the mainstream of Indian society as one of the problems of nation-building. Of the plethora of problems and issues of tribal society, the role of human component remains significant, though relentless efforts have been made to bring forth tangible results in this particular area.

Key words: socio-economic, perspective, nation building, human component.

INTRODUCTION

The people are broadly classified into four constitutional categories, viz.: the Scheduled Castes (SC) community, who constitute 16.6 percent, the Scheduled Tribes (ST) 8.6%, the Other Backward Classes (OBC) community and the upper castes. Scheduled Caste is an official term, given to the "low caste" Hindu communities, who were generally referred as'untouchables'. Clause 24 of Article 366 of the Constitution of India defines the term 'Scheduled Castes' as such castes, races or tribes or parts of or groups within such castes, races or tribes as are deemed under article 341 to be Scheduled Castes for the purposes of the Constitution. The Constitution (Scheduled Caste) Order 1950 listed 1,108 Scheduled Caste communities in 29 states and Union territories as Scheduled Caste under article341(1) of the Constitution, as per the 2011 census report. Following are the various approaches to the development of the tribal people in India (a) Isolationist Approach., (b) Assimilation Approach, and (c) Integration Approach

OBJECTIVES OFTHE STUDY

1. To study the objectives of tribal development Approach.
2. To analyse various approaches of tribal development.

Objectives of tribal development Approach

- To promote sustainable participatory livelihood programmes.
- To take up Promotional efforts such as capacity building, exposure visits, training, developing literature, sensitization programmes etc
- To implement Sustainable livelihood, programmes.
- To support promotional activities for micro credit, promotion of SHGs,

The comprehensive Tribal Development Approach involves the following components.

- Orchard development (fruit/ plantation/herbal crops and forest plants)
- soil conservation in the Wadi
- Water Resources management.
- sustainable Agriculture
- Human Resources Development
- Women Development
- community health
- Micro-enterprises for land less people

Census of India, 2011. ST - Scheduled Tribes

S. No.	District	Total Population	Total ST Population	Male ST Population	Female ST Population	Percentage of ST in Total Population
1	Srikakulam	27,03,114	1,66,118	81,382	84,736	6.15
2	Vizianagaram	23,44,474	2,35,556	1,14,687	1,20,869	10.05
3	Visakhapatnam	42,90,589	6,18,500	3,02,905	3,15,595	14.42
4	East Godavari	52,85,824	2,97,044	1,44,548	1,52,496	5.62
5	West Godavari	39.94,410	1,33,997	65,439	68,558	3.35
6	Krishna	45,17,398	1,32,464	66,734	65,730	2.93
7	Guntur	48,87,813	2,47,089	1,25,105	1,21,984	5.06
8	Prakasam	33,97,448	1,51,145	76,677	76,677	4.45
9	SPSR Nellore	29,63,557	2,85,997	1,45,168	1,40,829	9.65
10	YSR Kadapa	28,82,469	75,886	38,571	37,315	2.63
11	Kurnool	40.53,463	82,831	42,052	40,779	2.04
12	Anantapur	40,81,148	1,54,127	78,573	75,554	3.78
13	Chittoor	41,74,064	1,59,165	79,756	79,409	3.81
	Andhra Pradesh	4,95,75,771	27,39,919	13,61,597	13,78,322	5.53

Source: Census of India, 2011. ST - Scheduled Tribe

❖ Isolationist Approach

During the British rule in the pre-independence period, most of the tribal

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ISSN(e):2321–4384

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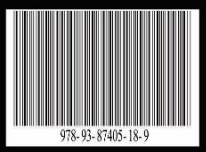

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★★★

ECOSOPHY AND SELF-REALIZATION IN MARGARET ATWOOD'S TRILOGY VIEWED FROM A GLOBAL PERSPECTIVE

Dr. Sr. Candy D'Cunha

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Abstract - The existing ecological phenomenon is undoubtedly one of the consequences of globalization. The world is facing many ecological problems due to the thoughtlessness, lack of sensitivity and the irresponsible behaviour of many people towards the Creator and creation. The present ecological crisis is gradually developing into a global ecological disaster. In order to prevent this disaster, at least marginally, we need a paradigm shift. Instead of looking at it merely as an ecological crisis, we need to view it from an eco-philosophical perspective. Ecosophy – the shortened form of eco- philosophy – helps us to develop this right approach in understanding the deeper inter-connectedness between the Creator, the cosmos and mankind and to work towards an ethical and balanced relationship between these three realities. Margaret Atwood‟s Trilogy view the ecological crisis from an ecosophical perspective as the novels are concerned with its deeper causes, such as rootlessness, nostalgia, alienation, racial and gender discrimination, marginalization, cultural hybridization etc. She presents these concepts very realistically through her creative imagination and her ecological ethics can be traced in her works from a global perspective. The main aim of this paper is to foster stability which is the fundamental basis of ecology. Geographically, this is termed as „harmonious relationship‟. By exploring the works of Atwood, the need for rethinking and reorientation in this area is enhanced. The openness to embrace a healthy and right way of being, thinking and acting can lead to a more harmonious and healthy relationship between the Creator, cosmos and mankind. The main intention in studying the novels of Atwood is to bring out the ecological philosophies that are contextualised in her novels with regard to the human relationships presented by her in a lively fashion. The following novels are taken up for study namely, Oryx and crake, The year of the flood, and MaddAaddam etc. All these novels depict the various aspects of the ecological crisis which exists on the face of the earth. The duplicity in the norms and recognition, the ghastliness of life and the tragic dilemma are found in the characters of Margret Atwood as they become the victims of pronounced values and actual values.

Keywords - Ecosophy, Self-Realization, Paradigm Shift, Balanced Relationship, Actual Values.

I. INTRODUCTION

The existing ecological phenomenon is undoubtedly one of the consequences of globalization. The world is facing many ecological problems due to the thoughtlessness, lack of sensitivity and the irresponsible behaviour of many people towards the Creator and creation.

„Think globally, act locally‟ was the electoral slogan of the ecological movement, which has helped in creating a „global citizen‟ who keeps in mind the earth‟s limits, within his or her thinking and action. Many of the ecological fields extend beyond the mere appearances and give true information to instil a kind of awareness in the life of human.

Eco-criticism has emerged as an inter-disciplinary science, inviting all the sciences to be brought together and to analyse nature from diverse viewpoints, in order to create a common platform for finding a possible solution to the environmental crisis. In a way, eco-criticism has been used as a blanket term for a number of critical attacks which have been waged by literary theorists against the lack of sufficient awareness of the existing ecological situation. Contemporary environmentalists continue with the "green" slogan that is similar to Libby Robin‟s 2008 declaration, that speaks of the strong relationship between people and nature. We need a literature that enhances the understanding of relationships between people and nature, of how we notice change personally, and how such global changes affect places we know intimately (Robin, 2008:292).

Several writers on eco-humanities, through their works, try to fill this vacuum by propagating their views on environment. The ecological focus, in fact, becomes the key element for reflection in the other sub-disciplines. Various environmental movements at the national and international levels also brought about awareness on the ecological crisis. In 1972, at The Third World Future Research Conference in Bucharest, Arne Naess introduced the term „Ecosophy‟ into environmental literature. The theory of ecosophy tries to unify most of the ecological approaches and bind them together as one inter-disciplinary subject of study. This newly emerging concept of ecosophy became the cornerstone for recognizing the inter-connectedness between human and non-human (Naess1989:1-6).

Ecosophy – the shortened form of eco-philosophy – helps us to develop this right approach in understanding the deeper inter-connectedness between the Creator, the cosmos and mankind and to work towards an ethical and balanced relationship between these three realities.

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Mangroves Vegetation Utilization And Socio-Economic Aspects Of People In Creek Based Villages Of Krishna District

AUTHORS

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Abstract

Mangroves Are Highly Productive Ecosystems With Important Economic And Environmental Functions. Based On Vegetation Status On Five Creek Based Villages The Present Study Is To Identify The Species Wise Utilization And Social-Economic Aspects Among Five Villages I.E,Pallethummalapalem, Kona, Bhavanipum, Kammavarichervu And Malakayalanka . The Socio-Economic Situation And Resource Utilization Among All Five Creek Based Field Stations Is Studied With The Help Of Questionnaire, The Base Line Data Consisting Of Community Status, Life Style, Occupation Etc. Are Developed. From The Data, The Living Conditions And Dependency On Mangrove Forests Are Analyzed. The Relationship Between Utilization Of Resources And Socio-Economic Conditions In Each Field Station Are Compared. It Is Observed That The Mangrove Forests Are Utilized For Fire/Fuel Wood, Thatching Of Houses, Temporary Walls, Boat Manufacturing, Traditional Furniture, Medicinal, Fodder, Tannin, Fish Nets, Fish Poisoning Extracts Etc. By The Inhabitants.

Keywords: Mangroves, Creeks, Socio-Economic, Resource Utilization

Proceedings of the Fourth International Conference on Computing Methodologies and Communication (ICCMC 2020)
IEEE Xplore Part Number:CFP20K25-ART; ISBN:978-1-7281-4889-2

2020 Fourth International Conference on Computing Methodologies and Communication (ICCMC) 978-1-7281-4889-2/20/$31.00 ©2020 IEEE 10.1109/ICCMC48092.2020.ICCMC-000185

A CPW Fed Patch Antenna Design for Weather Monitoring, Air Traffic Control and Defense Tracking Applications

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***Abstract*—Modern era require modern solutions and modern technologies. Thereby modernizing such in the domain of antennas, a new type of patch antenna intended for C-band applications is designed printing over a FR4_epoxy substrate. whose dimensions, is $W_1 \times L_1 \times h$ as 35mm×30mm×1.6mm the simulations results showed that the antenna works at a single resonant frequency 5.9Ghz, hence covering the applications like military, weather forecasting, defense tracking and air traffic control. The antenna feed with co-planar wave guide (CPW) is a simulation-based design and the parameters of antenna designed are optimized by making use of ANSYS HFSS software.**

***Keywords*— C-band, FR4_epoxy, millimeter wave, microstrip patch, CPW line feeding with HFSS**

I. INTRODUCTION

WIRELESS Communications is developing from the past decade; printed antennas such as microstrip patch antennas rapidly that has attracted many fields of Communications like Telecommunications Broadcasting, military, traffic and weather forecasting [1].

The low cost, low weight, high performance and the easy configurable attributes of the microstrip patch antenna makes them prominent among a wide range of application.[1]-[2]. to tackle the narrow width problems in the microstrip antenna the slots were introduced [2].the proposed method utilizes the co-planar feed line instead of microstrip feed line to experience lower, radiation losses, power dissipation and exhibits wider bandwidth.

The C-band is a portion of electromagnetic spectrum in the micro-wave range of frequencies from 4 to 8Giga-Hertz (GHz).C-band is primarily used for radar, satellite communication and wireless mobile networks.

Many substrates are present in the market, but we notably considered substrate for our antenna as FR4_epoxy with a relative permittivity (ϵ_r)=4.4.

The main purpose for designing this antenna is intended for C-band applications [2]-[12].

II.ANTENNA DESIGN

The configuration of the patch antenna printed on this substrate with a thickness (h) of 1.6mm, a relative permittivity(ϵ_r)=4.4 is the main consideration. The overall dimensions i.e,., width(W) and length(L) of substrate (W×L) of the antenna are 35mm×30mm[1].

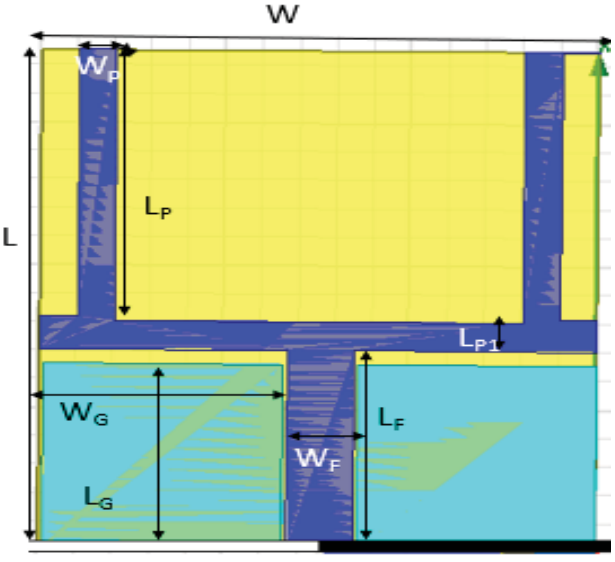

Figure-1: Geometry and Dimensions of the Final Design antenna

The proposed antenna is fed with CPW for better impedance matching and large working Bandwidth, Length of the substrate(L) is 35mm, width of the substrate(W) is 30mm,

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height of the substrate(h) is 1.6mm, length of the patch(L_p) is 19mm, width of the patch(W_p) is 2mm, width of the feedline(W_f) is 3.6mm, length of the feedline(L_f) is 14mm, length of the ground(L_g) is 12.9mm, width of the ground(W_g) is 13mm, length (P_{L1}) is 2.

III. SIMULATION RESULTS

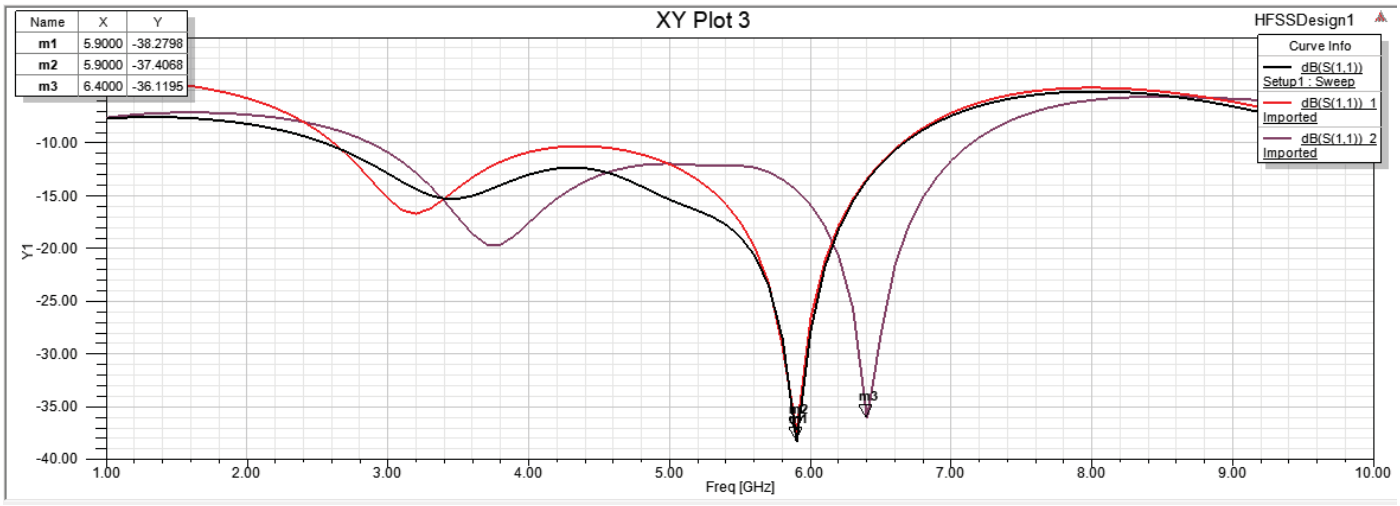

Figure-2: Simulated S_{11} of the proposed antenna

An estimate of S11 parameter is the heart of an antenna design. On that technical note, the figure-2 represents the S11 simulated results for three patch designs of which the antenna radiating at 5.9 GHz has a return loss of around -39 dB making it the antenna of our paper's choice. The other two patches radiating at frequencies 5.9 and 6.4 have return loss parameters -37dB and -36dB respectively.

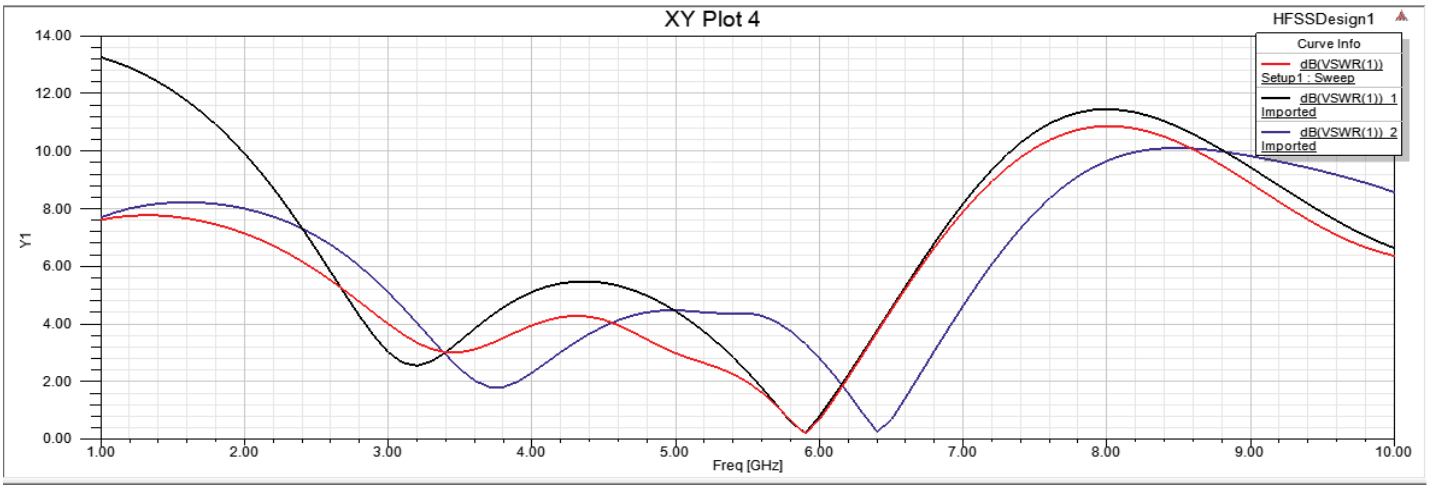

Figure -3 simulated results of VSWR

VSWR talks in terms of power radiated back and the same results are as shown in *figure-3*. Since our concern is at 5.9 GHz radiating antenna design, the red line indicates the VSWR reading corresponding to the same, having a value nearer to 0dB and thus as a result, it satisfies the theoretical statement suggesting that there are less reflections accompanying our basic design.

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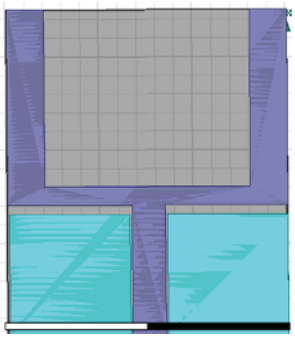
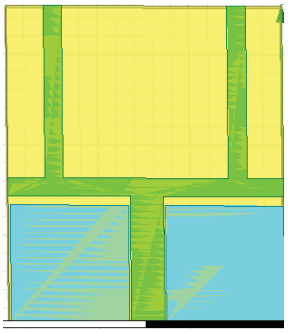
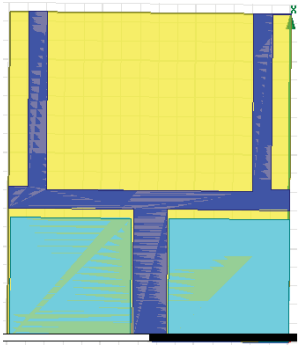
IV.COMPASATION OF DESIGN



(a)DESIGN-1



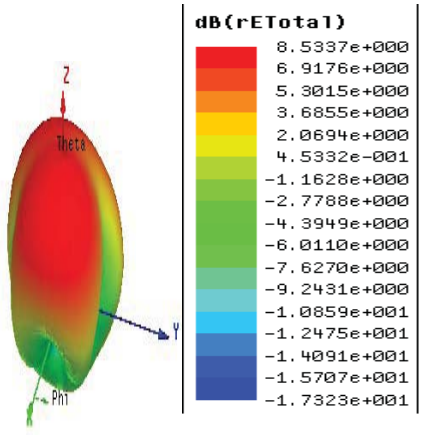
(b) DESIGN-2



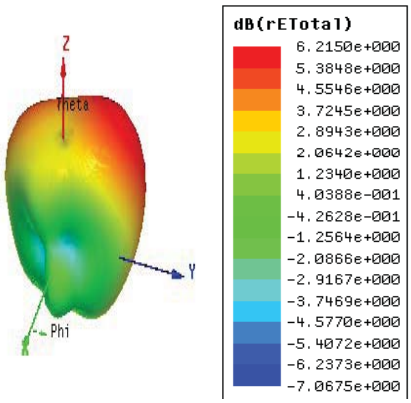
(c) FINAL DESIGN

Figure(c) indicates our final and considered antenna design. It is so because the various parameters obtained in this design regard are comparatively efficient when compared to the designs 1and 2 .

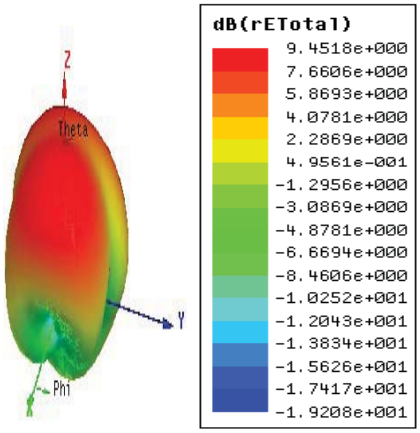
V.COMPARISATION OF GAIN(Db)



(a) DESIGN-1



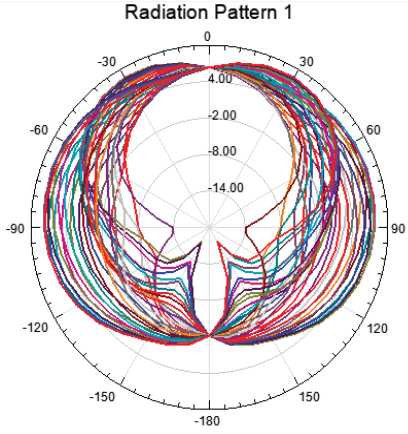
(b) DESIGN-2



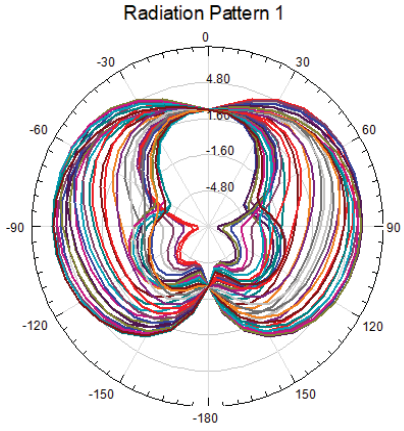
(c) FINAL DESIGN

The above comparisons are the results of gains obtained for the three antenna designs respectively. Assuming the same the final design that we considered has a gain of around 9dB which is far better when compared to the other two sample designs

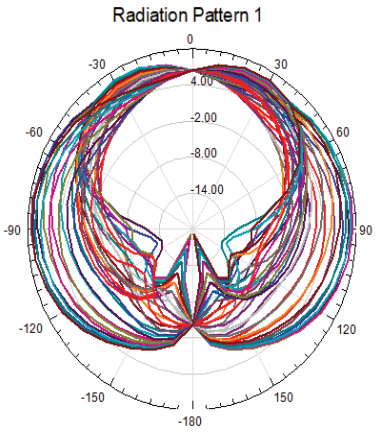
VI.COMPARISATION OF RADIATION PATTERN



(a) MAIN DESIGN



(b) DESIGN-1



(c) DESIGN-2

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Radiation pattern indicates the overall radiation distribution of the antenna and it is showcased as of above that the considered final antenna design has efficient radiation pattern. The pattern has an azimuthal angle varying between -180 to +180 degrees and elevation angle varying between 0 and 360 degrees

VII.COMPARISATION TABLE

DESIGN MODEL	FREQUENCY (GHz)	EFFICIENCY(%)	GAIN (dB)	RETURN LOSS(s_{11})	BANDWIDTH(MHz)	DIRECTIVITY (dB)
MIAN DESIGN	5.9GHZ	86	9	-38.27	800MHz	13.9
DESIGN 1	5.9GHZ	89	6	-37.40	800MHz	8.1
DESIGN 2	6.4GHZ	86	8	-36.966	700MHz	10.9

VIII.CONCLUSION

Because of high relative permittivity the gain of the antenna is very high enabling the antenna to work at 5.9GHz. The directivity of the antenna is 13.9 dB with a bandwidth 800Mhz. Simulated results evince the perfromnce of the antenna in terms of gain and radiation as compared to Design-2 and Design-3. The proposed antenna covers the application as fixed broadband services and space shuttle communication.

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Soil Testing and Analysis of Nutrients for Crop Yield

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Abstract: With the surge of advent in various technologies, real time applications were put into practise. However, the habituals in the field of agriculture needs to be improved by a fence. This paper is based on monitoring the nutrients level of soil thus providing crop analysis. Various sensors like temperature and humidity along with pH meter are used. It obviously takes a long time, especially when monitoring the decreasing level of soil parameters. This practice is less efficient and needs a solution to improve efficiency. Raspberry Pi is used in confining the essentials and the information about soil, crop and environmental factors will be sent and updated to farmers through our proposed system methodology.

Keywords: pH meter, Raspberry Pi, Nutrient level, Temperature and Humidity

1. Introduction

IOT technology has the ability to design present and future society requirements and its IOT applications is defined as the interconnection that is established between the physical devices with the help of internet without the intervention of humans. It can be expanded to various fields as it is subjected with many ecosystems, which are smartly controllable. This evolution of IOT came to existence because of the rise of embedded systems, real time analytics, and machine learning along with sensors.

Sensor is a device that senses various parameters which are cognizant and which vary with the surrounding changes. Sensors help in the backdrop of monitoring real-time data thereby updating the values in the cloud for present use. The monitored sensor changes in the environment are converted to electrical signals.Soil is an important parameter which must be taken into consideration. It is the major organic material present on top of the land that is feasible up to 25% and is responsible for plant growth. The major available type of soils are sand, silt, clay and loamy with minerals, gases, liquids, organisms are present in it.

Soil testing management increases productivity by identifying the nutrients that are present in the soil and which contribute to their growth. Also increases the fertilizer efficiency, and identifying soil erosions.

Soils provide room for gaseous exchange between roots and atmosphere and the important parameters are nitrogen, potassium and phosphorus. These describe the plant analysis and content of soil in pH range.

A crop is suggested based on NPK values along with pH where nitrogen is responsible for growth of leafs. Too little with the addition of nitrogen the leaf turns yellow and too much can delay flowering and produce poor quality fruit. Besides, phosphorus is important for plant genetics and seed development aiding the plant maturity whereas potassium helps in coloring of fruit and early growth. Different soils have their pH ranges on the respective grounds (conveys whether they are acidic, basic or neutral).These nutrients create a major issue in agriculture sector even in different countries. In India, agriculture is the backbone of economy that contributes to the growth and has a proportion of 50% to the country's welfare. There are also some challenges which are encountered in the fields such as water scarcity, labor management, marketing and consuming of items (e.g. fertilizers). Technology based applications are much needed to monitor this system in order to perform the actions besides itself intelligently.

2. Related Work

As per the significant research done in the field automation, communication devices proposed many sensors to display the results existed to determine the monitoring of plant growth and soil. Extracting information of various soils is a lengthy procedure in determining pH ranges and nutrient values. On the par, the previous works that were carried out were monitoring the soil, crop and other environmental factors on a huge scale. Several sensors were used in this process such as temperature, humidity, water level sensor, soil moisture sensor, light dependent resistance, and electro-chemical sensor.

In the previous system, the relationship between nutrients in the soil and pH have been identified using microcontroller. Mostly all the crops are suitable when the pH is in the range of 4.5-8.5. In this they identified the nitrate level in the soil by assuming the fractions of the estimated formula. Moisture levels were obtained for wet and dry soils by mixture of water and available soils in addition with temperature that is sustained in the soil. DHT-11 is used as principal temperature sensor which acquired the values from soils. An approach for obtaining these parameters included to take continuous measurements and checking them at times.

Moisture irrigation controllers use water content information from the sensor to allow scheduled irrigation cycles on the timer. SMS controller has adjustable threshold setting and if the soil water content exceeds the setting, the event is bypassed. The soil water content threshold is set by the user. Another type of technique is SMS devices on-demand where the controller initiates irrigation at a low threshold and terminates at high threshold. By this the moisture level has been obtained up to the required level.

Previously they have taken the values by a manual method and suggest the crop by taking the pH values of the soil and they have given the relationship with the nutrients of the soil so they can approximate that the nutrient content according to pH value and also given relationship the soil pH and crops. They adjusted the pH values to suggest the crop by the testing of soil and finally they have done that suggesting crops to farmers without going to soil test centers. They have estimated only few essential factors that required for the plant growth but they have not estimated the major nutrients that required for the plant growth. They found out the values for the wet and dry lands only. They have not taken the values for all lands available in our country.

By taking the estimation of soil manually the results may be differ to the suggestion of plant growth. Plant with essential nutrients will suggest the plant growth by providing rich nutrients in the soil. There are many methods to extract the soils by mixtures of chemical reagents available in liquid state.

Dumas method is a method of analytical chemistry process it is used for the quantitative method for the determination of nitrogen. In dumas method we can process CO_2 generator and diffuse the soil in the combustion tube and finally we can Schiff's nitro meter for obtaining available nitrogen in the soil. By this process it takes long time for mixing the chemicals that required for the testing.

Estimation of the major nutrients that required for the plant growth was done. The major nutrients that required for the plant growth are nitrogen, phosphorus and potassium. We had found out the major nutrients that required for the soil with the help of various equipment's like Kjeldahl assembly, Colorimeter, Flame photo meter. These equipment's are used for the estimation of the major nutrients that required for the soil.

In Kjeldahl assembly method the soil is mixture of various reagents and doing the process of distillation, digestion, titration hence we can estimate the nitrogen level in the soil. In colorimeter we can extract the available phosphorus in the soil by using the Olsen's reagent method. By mixing the soil with this reagent we can estimate the phosphorus. By using Flame photometer we can extract

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the available potassium present in the soil. By taking soil in flask and mixing reagents in that flask and heating the flask we obtain the available potassium in the soil.

3. Proposed System

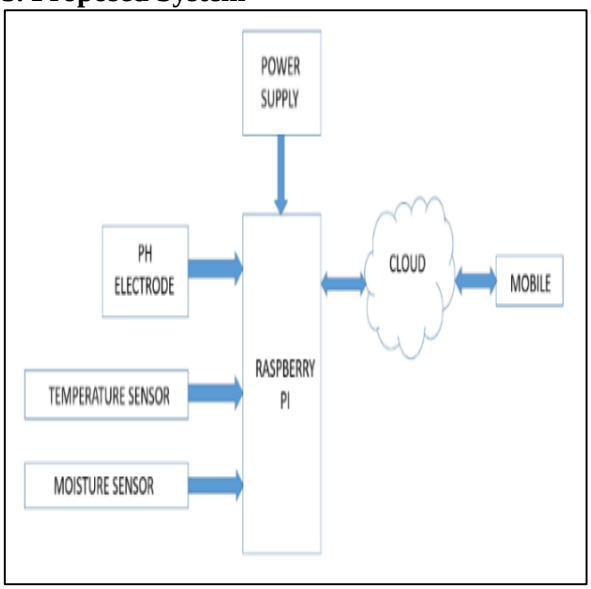

Fig. 1: Block Diagram

In this block diagram there are different types sensors connected to the raspberry pi, and are used to obtain the sensed information from the soil. The raw data obtained from the sensor is taken as input to the raspberry pi, then raspberry pi stores the obtained values and process the sensing values and stores them in its memory. The raspberry pi is used to connect with the cloud which is used store the sensing values.

The proposed model depicts the use of raspberry pi in fulfilling the purpose of selecting the suitable crop. Different sensors like pH, temperature and humidity, moisture sensors are used. Later on, these values with the help of raspberry pi are forwarded and stored to the cloud for number of applications. With the help of internet, one could even get better access to the predicted values and could compare them with the database values for accurate results resulting in crop suggestions.

Soil texture is effected by various Cfcs. These gases are very harmful as they have adverse effects on the parameters that are available in the soil. They include soil texture, soil temperature, soil pH, soil moisture and humidity. It also tends to change the major nutrients and their levels for a particular trend. This is a serious issue on which one has to look upon and mark the changes beneficial to him. Various practices are being made and which help to sustain the new environment changes that are abrupt. These changes needs to be monitored and with the assistance of ample sensors, the user can do this job quite easily and thus making the field smart. This is also said to be smart-farming. Sensor values change every second as parameters which are being monitored change every moment.

It is the main block which supplies power to the mini-computer. It supplies required amount of voltage that is needed to drive that particular electrical device. It consists of a transformer, rectifier, filter and circuits in application.

A mini-computer that is of low cost, card sized switch uses languages like python to be programmed and that operates, controls paving to act as an interface.

Cloud provides storage worldwide, which is highly durable object storage that scales to Exabyte of data.

DHT-11 is a temperature and humidity sensor that senses, measures moisture and air temperature. It is a composite sensor which gives the calibrated digital signal output of temperature and humidity which includes capacitive, resistive, and thermal types. pH stands for potential of hydrogen. It measures the concentration of hydrogen-ions present in the soil. When the pH range is from 0 to 6.3, it is acidic and if it ranges between 7.2 to 12, it is basic. If it is from 6.4 to 7, it is neutral and provides the best productivity. It is a soil moisture sensor which measures moisture content of the soil and gives the volumetric content of water.

Crop suggestion is very crucial factor in this proposed model. It is done by initialling the system and reading the values of humidity, temperature, moisture, and pH. Further, it asks the user to provide the details of the soil and the type moving on to write the major nutrients values as nitrogen, phosphorus, and potassium. Then, it compares the present values with the values in the database to acknowledge the user about different crops that could best suit with the soil conditions.

pH value of the soil is considered to be the most important part as it decides the balance of alkality and acidity present in the soil. If it is above the range that is needed then it needs to convey that the soil is not suitable for production. Else if it is in range that is acquired, then the crops list that matches with the pH readings are made available to the user.

Table 1: Comparisons between sensors and proximate value

Availability	N with sensors Kg/ha	K with sensors kg/ha	P with sensors Kg/ha	N with manual kg/ha	K with manual Kg/ha	P with Manual Kg/ha
Low	51 to 100	Pd ±25	P d ±25	<240	11	<110
Medium	100 to 175	26 to 75	26-50	240-480	11-22	110-220
High	175 to 250 251 to 325	76-125	51-100 101-180	>480	>22	>280

In the above comparison table given data gives the information about the soil productivity of the nutrients in the crop fields in comparative between sensors and manual method. Sensors can take up to some data which will perform a necessary data we can take up to 70% readings by taking manually we can provide more data about the nutrients in the soil and produce more productivity to the farmer.

From the above table it shows that the soluble salt ranges for the germination of crops. Due to this ranges it indicate that the conductivity of salts levels in the soil and also it intimates that how it effects the crops growth in those ranges. The conductivity range of plant growth ranges in mohos. The various levels in the soluble salts indicates the types of crops grown in the different regions.

Table 2: Salt ranges in soil

Soluble salt ranges	Conductivity in milli mohos/cm^2
<1	Normal
1-2	Critical for germination
2-4	Critical growth of sensitive crops
Above 4	Injurious to most crops

3.1 Algorithm

Step 1: Initialize the system.
Step 2: Providing the soil type.
Step 3: Read the values of temperature, humidity and moisture along with pH.
Step 4: if the pH reading is neutral, then the system asks for the major nutrients nitrogen, phosphorus, and potassium.
Step 5: Comparing the values with database values which are obtained previously.
Step 6: Selecting the list of crops that are best suited are partitioned and sent to the user.

The whole algorithm is segregated into six steps which concludes the information and the procedure that is carried out in obtaining the

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required specific values and helping the user in letting to know what sort of crops are best suited to the conditions that are available and he ones which are presented from the past. This makes the user work at ease and is beneficial in every aspect for obtaining high crop productivity.

5. Results

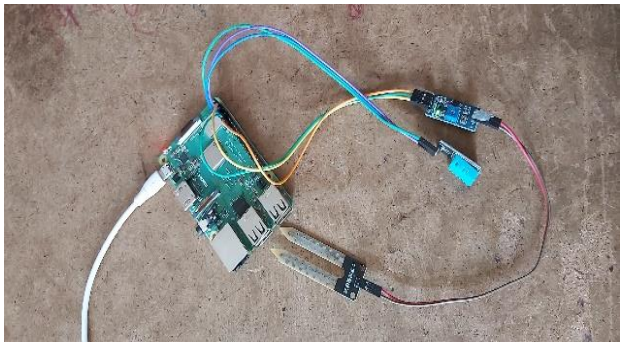

Fig. 2: Prototype

Here fig.2. represents the prototype which comprises raspberry pi 3b in connection with soil moisture sensor, temperature humidity sensor and power supply. The values are taken from the database and compared with the original values proposing the suitable crops.

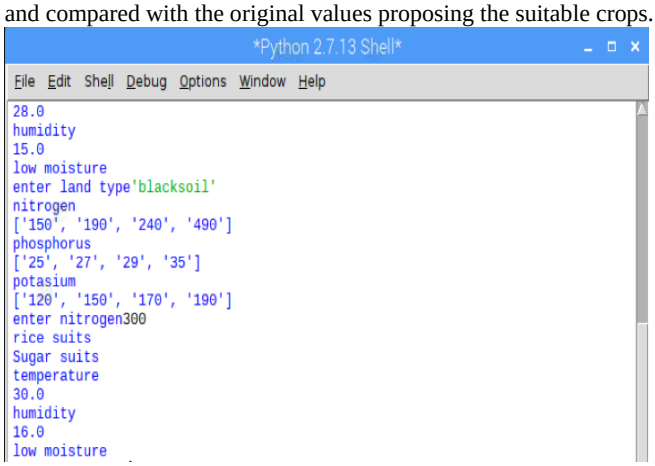

Fig.3: Terminal

Fig 3. gives the information about terminal output which is obtained from python shell. Every detail is mentioned in the terminal from obtaining the values of pH, nitrogen, phosphorus, potassium and using them to suggest the suitable crop.

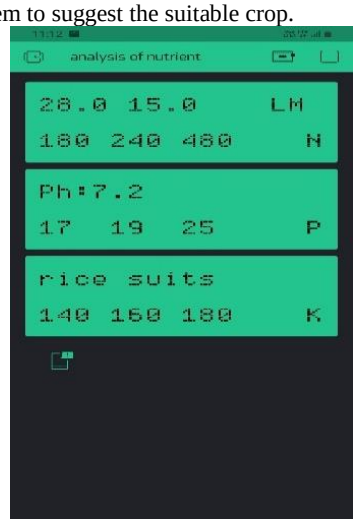

Fig. 4: Message output

Fig. 4 is the final output which is delivered to the user to let him know which crop could better suit up with the conditions and which could be of high productivity.

6. Conclusions

There is a concern that crop intensification leads to adding up of more nutrients in the form of fertilizers, for growth of the plant which require major nutrients as nitrate, phosphorous and potassium. These N, P, K nutrients occupy major ratio of 70% for plant growth. From this proposal there will be no delay in obtaining the results available for crop fields, and one can produce accurate results of the soil in no time, and produce the healthy crops.

This reduces the difficulty of the farmer in finding the suitable crop that best suits for possible grown in the crop production & which has best yield, crop growth.Thereby providing the optimization of the sensor values, monitoring the yield, reducing the time, profits the farmer increasing the efficiency.

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Electronic copy available at: https://ssrn.com/abstract=3643601

2020 International Conference on Computational Performance Evaluation (ComPE)
North-Eastern Hill University, Shillong, Meghalaya, India. Jul 2-4, 2020

An Image Processing Approach for Grading of Mangoes based on Maturity

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***Abstract*— Food processing industries plays a vital role for the development of our country. Mango is one of the economical fruit because of its nutrient dense foods. In general, ripening stage classification done by human experts which is strenuous process and a challenging task for food processing industry. A machine learning approach for ripening stage classification has been proposed. A MATLAB based implementation shows that Ensemble classifier outperform their counter parts discriminant classifier in terms confusion matrix, average accuracy, precision, recall, specificity and F-score.So,Maturity index classification of mango plays very important role to get to know about shelf life of mangoes. Thus this paper proposes effective mango fruit grading using machine learning approaches.**

Keywords— Classifier, maturity stage of Mangoes, statistical features, color features, F-score.

I. INTRODUCTION

Food processing industries plays vital role for economic development of our country. Mango plays very significant role because of its wide range of health benefits, rich nutrition. There are 500 varieties of mangoes such as Alphonso, chaunsa, dasheri, kesar, totapuri, himsagar, baginapalli etc. It has excellent flavor, luscious taste and has attractive color. Depending on cultivation, fruits color varies yellow, orange, red, or green. In general, manual grading by visual perception is more prone to errors, time consuming process, inconsistency, inaccurate and non-uniformity. The grading of mangoes is very important in industry for getting high quality of fruits in to the market.

Maturity index classification of fruits and vegetables in food processing industries is very significant for estimating the shelf-life time of mangoes. Thereby a proper preservation technique can be used in advance to prevent the loss of standard quality of the fruit. Most of the food processing centers make use of weight based classification which is laborious, time consuming, tiresome and soporific. Hence automatic grading of mango ripening stage classification is necessary [7][9]. In this paper an image processing based machine learning approach for ripening stage classification has been employed and the quality of classification is evaluated.

For detection of ripening stages, the mango images are taken from Kent [3] dataset, RGB images transformed in to gray and also in to HSV plane. Thirty four features are extracted, out of which ten are statistical and twenty four are color features. Further the values of each feature isstandardized and Neighborhood component analysis (NCA) is performed to get dominant features [17]. Those dominant features are given to the classifier for further processing. Ensemble classifier and Discriminant analysis are employed to evaluate the performance metrics of each classifier with regard to accuracy, specificity, sensitivity, precision, confusion matrix and F-score.

Paper been organized as Module I describes motivation and introduction of the work. Module II describes related work. Module III describes methodology. Module IV describes results and discussion.

II. RELATED WORK

DameshwariSahu et.al [3] has envisioned a technique for identifying defective regions and maturity classification of a fruit using shape, size and color features of an image. They have taken images from Kent dataset uses Low-level processing followed by defect identification uses quality ratio and maturity detection of harvested mangoes which uses contour information and matrix difference.

Megha. P. Arakeri et.al [7] has envisioned a technique for fruit grading system for evaluating the quality of tomato in food processing industry which uses image pre-processing followed by Otsu's method. After segmentation technique feature extraction and selection is done and features fed to Multilayer neural network for identifying the tomato as defective or non-defective. They have reported an accuracy of 96.4% for ripeness detection and 100% accuracy for detection of defective and non-defective regions.

Rahul PralhadSalunkhel et.al [9] has envisioned a ripening stage detection using RGB and HSV which uses shape detection and selection algorithm to remove unnecessary

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parts in an image. Followed by ratios of RGB are computed and reported RGB method outperformed their counter parts of HSV method for ripening stage detection.

III. Methodology

The main aim of this study is to classify mangoes based on maturity index of mangoes from their images in to two stages.

A. Dataset Preparation

The Dataset images are obtained from KENT dataset. The images are acquired using a high quality digital camera with a resolution of 5184 x 3456 pixels and a spatial resolution of 0.03 mm/pixel. These images are resized to 1200 x 800 pixels for effective storage and transmission. A special inspection chamber with four lamps that contained two fluorescent tubes has been used to record the images. The distance between the camera and sample is adjusted to 20 cm for effective sample preparation. The angle between axis of the lens and lighting source is set to 45º to diffuse reflections. Polarising filters are used to reduce the reflections occurring from the curved shapes of the samples. The flickering effect is reduced using high frequency ballast and hence produces a more stable lighting for image recording. Each mango image from both sides were taken (A and B). These images are stored and publicly available as Kent Dataset [14][15].

The authors have taken KENT dataset for classification of ripening stage of mangoes into 2 stages viz. Stage 1: Unripe, Stage 2: Ripe. Fig. 1 describes the preparation of KENT dataset. Fig. 1 describes the preparation of KENT dataset using imaging environment and Fig. 2 describes the flow diagram for classifying ripe and unripe mangoes.

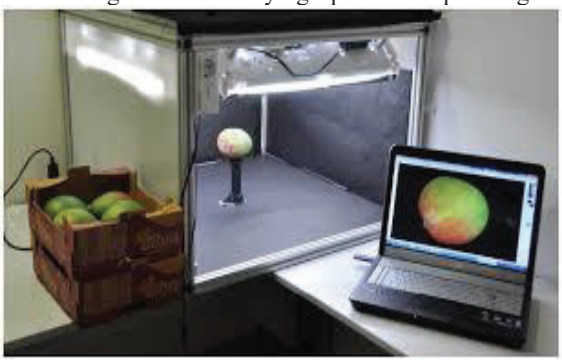

Fig. 1. Preparation of Kent dataset using Imaging Environment.

B. Pre-processing of a mango image

A random mango image is taken from the dataset and resized to 400x600 pixels.

C. Extraction of statistical and color features

Feature extraction is used for dimensionality reduction which maps the regions of interest[23] in an image as a compressed feature vector. This technique is useful when feature vectors are large and reduced to feature representation for quick classification. RGB and HSI color models are used for representing images of mangoes [10][11][12]. The image is modelled as a stack of three planes viz. Red, Green and Blue. The hue-saturation and intensity model separates the intensity component from color information in a color image. Dissimilarities in illumination intensity can be minimized using HSI model [9].

Ten statistical features [7] [16] and twenty four color features [1][2][10] are extracted. Contrast, correlation, energy, homogeneity, mean, standard deviation, variance, Root Mean Square value, inverse difference moment, smoothness are the important statistical features obtained from the dataset.

From the RGB color plane features like highest values of RGB, lowest values of RGB, average values of RGB, median values of RGB (RHV, GHV,BHV, RLV, GLV, BLV, Rmean, GMean and Bmean, RMedian, Gmedian, Bmedian)[20] are extracted. Median values are more robust to outliers if any.

From the HSI plane, features related to highest values, lowest values, mean values, median values for HIS (HHV, SHV, IHV, HLV, SLV, ILV, Hmean, Smean, Imean, Hmedian, Smedian, Imedian) are extracted using the mathematical formulae[20]. Table 1 describes mathematical equations used for obtaining the statistical features used.

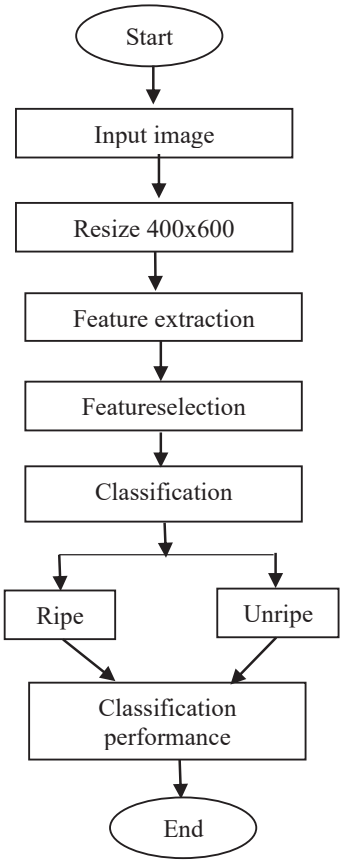

Fig. 2. Flow chart.

D. Standardization and dominant feature selection

The extracted statistical and color features are standardized to have consistency within the data i.e. global mean value of the data is made to zero and standard deviation as one. Dominant feature selection is necessary to speed up the process of classification which employs correlation with other features to find the most significant features. The

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dominant features are found using neighborhood component analysis (NCA) for reducing large set of features onto a new feature subspace of lower dimension without losing high-ranking data results in dimensionality reduction. Contrast, Energy, Homogeneity, Standard deviation, variance, Lowest value of green (GLV), Mean of red color (Rmean) are the high ranking features after Neighborhood component analysis as shown in Fig. 3.

E. Implementation of Classifiers

For ripening stage detection, variousclassifiers such as ensemble and discriminant analysis classifier are used to evaluate the performance metrics of each classifier.

F. Discriminant analysis classifier:

Discriminant analysis[12] is mostly used classification problems under supervised learning. 'diagquadratic' discriminant type function and cross validation of metrics which gave better prediction results.The average accuracy has been evaluated. Fig. 3 describes the extraction of prominent features using NCA.

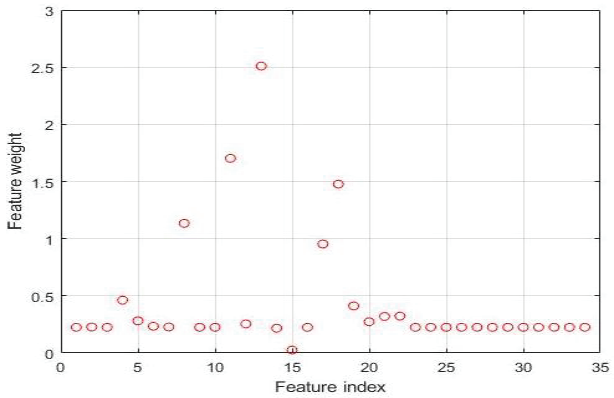
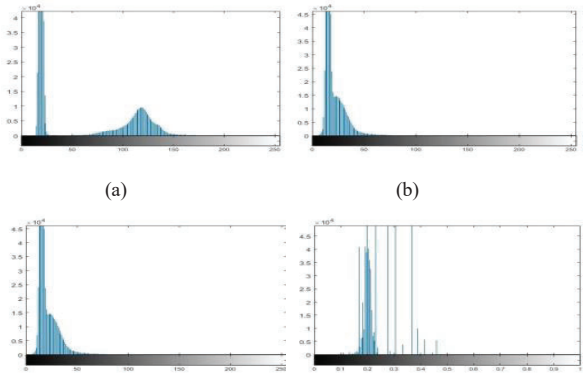


Fig. 3. Prominent features obtained by applying NCA.

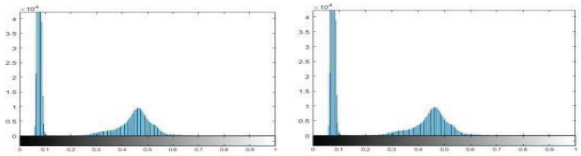
G. Ensemble classifier:

Ensemble classifier combines multiple classification models to improve the overall accuracy of the classifier. This classification approach gives better predictive performance compared to individual model. Reduction in variance and bias are carried out to improve the overall performance and prediction accuracy of the classifier. The combination of decision tree and discriminant analysis is employed and cross validation of metrics to evaluate the results.The average accuracy has been evaluated. Fig. 4 discusses the histograms ofred, green, blue, hue, saturation, and intensity using histogram plots.



(a) (b)

(c) (d)



(e) (f)

Fig. 4. Histogram of (a) Red (b) Green (c) Blue (d) Hue (e) Saturation (f) Intensity.

Table 1. Statistical features.

Name of the feature	Formulae
Mean	$\frac{1}{N}\sum_{i=1}^{N} M_i$
Homogeneity	$\sum_{i,j=1}^{N} \frac{M_{ij}}{1+\lvert i-j\rvert}$
Energy	$\sum_{i,j=1}^{N} {M_{ij}}^2$
Correlation	$\sum_{i,j=1}^{N} \frac{M_{ij}(i-\mu)(j-\mu)}{\sigma^2}$
Variance	$\sum_{i,j=1}^{N} (i-\mu)^2 M_{ij}$
Root mean square	$\sqrt{\frac{1}{N}\sum_{i,j=1}^{N} {M_{ij}}^2}$
Contrast	$\sum_{i,j=1}^{N} \lvert i-j\rvert^2 M_{ij}$
Inverse different moment(IDM)	$\sum_{i=0}^{N-1}\sum_{j=0}^{N-1} \frac{1}{1+(i-j)^2} M(i,j)$
Standard deviation	$\frac{1}{N-1}\sum_{i=1}^{N} [(M_i-\mu)^2]^{1/2}$
Entropy	$\sum_{i=0}^{N-1}\sum_{j=0}^{N-1} M(i,j) * (-\ln(M(i,j)))$

IV. Results and Discussion

A. Classification of ripe and unripe mangoes

The prediction performance of each classifier is described in Table 2, in terms of confusion matrix, accuracy, precision, specificity, sensitivity and F-score.

Table 2. Performance characteristics.

Classifier	Confusion matrix		Accuracy	Specificity	Precision	Sensitivity	F-score	Avg. Accuracy(%)
Ensemble	7	0	0.96	0.95	0.87	1	0.9	96.67
	1	22	0.96	1	1	0.95	0.9	
Discriminant	6	0	0.93	0.95	0.75	1	0.8	93.33
	2	22	0.93	1	1	0.91	0.9	

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B. *Performance measurements*

A confusion matrix for ensemble and discriminant classifier is obtained to evaluate the performance metrics.

$$\text{Accuracy} = \frac{\text{TP} + \text{TN}}{TP + TN + FP + FN} * 10 \quad \ldots\ldots\ldots\ldots (1)$$

"The proportionof total number of correctly classified positive inputs to total number of predicted positive inputs",defined as precision [21][22].

$$\text{Precision} = \frac{\text{TP}}{\text{TP} + \text{FP}} \quad \ldots\ldots\ldots\ldots (2)$$

"The proportionof the total number of correctly classified positive inputs to the total numbers of positive inputs", defined as sensitivity[22].

$$\text{Sensitivity} = \frac{\text{TP}}{\text{TP} + \text{FN}} \quad \ldots\ldots\ldots\ldots (3)$$

TP =True positive, TN=True negative, FP=False positive, FN=False negative[21][22].

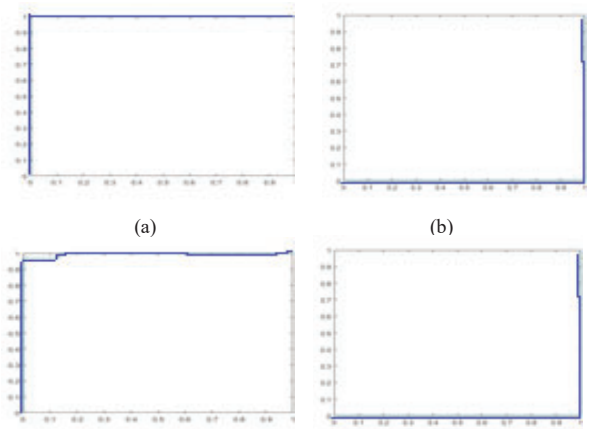
"The measure of weighted harmonics of sensitivity and precision", is defined as F-measure.

$$\text{Fmeasure} = \frac{2}{\text{Sensitivity}^{-1} + \text{precision}^{-1}} \quad \ldots\ldots\ldots\ldots (4)$$

"The proportionof actual negatives which are predicted as true negatives similarly ratio of actual negatives which are predicted as false positive", is defined as specificity [21].

$$\text{Specificity} = \frac{\text{TN}}{\text{TN} + \text{FP}} \quad \ldots\ldots\ldots\ldots (5)$$

Fig. 5 describes the ROC curves for each classifier and Fig. 6 describes the percentage of average accuracy visualized as bar plots for each classifier.



(a) (b) (c) (d)

Fig.5. Receiver operating characteristics (ROC)ofEnsemble classifier for (a) Unripe (b) Ripeand Discriminant classifiers for (c) Unripe (d) Ripe.

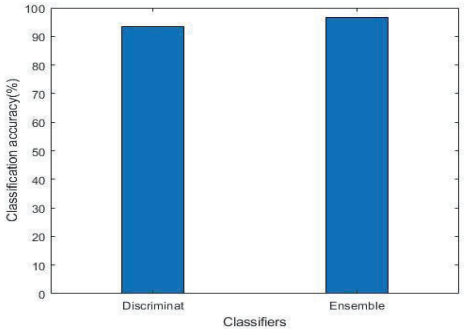


Fig. 6. Classification accuracy percentages with different ensemble and discriminant classifiers plotted as bar graphs.

CONCLUSION

ripening stage classification ensemble classifier outperformed discriminant classifier. The mango ripeness index works well using ensemble classifier with 96.67% where as 93.33% for discriminant classifier. Neural networks can be employed for getting high classification accuracy.

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