Third International Conference on Materials, Computing and Communication Technologies ICMCCT-2022

Organized By

Annai Vailankanni College of Engineering,
AVK Nagar, Pothaiyadi Salai, Azhagappapuram.
P. O, K. K. District, Tamil Nadu, India

VOLUME 9, ISSUE 12, MAY-JUNE-2022

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH IN SCIENCE, ENGINEERING AND TECHNOLOGY

Third International Conference on Materials, Computing and Communication Technologies
ICMCCT-2022
20th June, 2022

Organised by

Annai Vailankanni College of Engineering, AVK Nagar, Pothaiyadi Salai, Azhagappapuram. P. O, K. K. District, Tamil Nadu, India
Recognized under section 2(f) of UGC Act, 1956
Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai, India

In Association with

International Journal of Scientific Research in Science, Engineering and Technology
Online ISSN : 2394-4099 | Print ISSN : 2395-1990

Volume 9, Issue 12, May-June-2022

Published By

website : www.technoscienceacademy.com

ORGANIZING COMMITTEE - CHIEF PATRONS

Dr. D. Peter Jesudhas, Chairman, AVCE

Er. P. Praveen Jesudhas, Vice-Chairman, AVCE

PATRONS

Dr. A. Benham, Principal, AVCE

CONVENOR

Dr. J. Sunil, Vice Principal and HOD/Mechanical

EXECUTIVE HEADS

Er. D. David Philip Daniel, Director, AVCE

Mr. B. Manikandan, Manager, AVCE

COORDINATORS

Dr. D. David Neels Ponkumar, Professor/CSE

Dr. S. Sebastin Antony Joe, Professor/CSE

Dr. J. Jereesha Mary, Professor, CSE

Dr. R. Anila Rose, Professor, S&H

Dr. M. Supriya, Asst. Prof., CSE

Dr. G. Golding Sheeba, AP/S&H

Mrs. M. Anugraha, Asst. Prof., CSE

Mrs. S.Berlin Shaheema, Asst.

Prof., AI&DS Mr. J.JayaKumar, Asst. Prof., EEE

Mrs. M.Morrin Gracida, Asst. Prof., Civil

GUESTS OF HONOUR

Dr. M.P. POONIA
Vice Chairman

All India Council for Technical Education

Dr. R. SRINIVASAN
The Member Secretary

Tamilnadu State Council for Science and Technology

ORGANIZING COMMITTEE :

Dr. M. Leenus Jesu Martin, SRM Institute of Science and Technology, Chennai

Dr. V. A. Nagarajan, University College of Engineering, Nagercoil

Dr. T. Sree Renga Raja, University College of Engineering, Nagercoil

Dr. S. Athimoolam, University College of Engineering, Nagercoil

Dr. S. Sheeju Selva Roji, University College of Engineering, Nagercoil

Dr. Nidhi Lal, Indian Institute of Information Technology, Nagpur

Dr. D. Arumuga Perumal, NIT Karnataka, Surathkal

Dr. S. Sreejith, National Institute of Technology, Silchar

Dr. R. Murugan, National Institute of Technology, Silchar

Dr. Naresh Babu Muppalaneni, National Institute of Technology Silchar

Dr. P. Suresh Babu, National Institute of Technology, Warangal

Dr. S. Senthil Kumar, National Institute of Technology, Tiruchirappalli

Dr. G. Lloyds Raja, National Institute of Technology, Patna

Dr. M. S. Senthil Saravanan, Buddha College of Engineering, Pattoor

Prof. Sherin Sam Jose, Amal Jyothi College of Engineering, Kerala

Dr. A. Haiter Lenin, Wollo University, Ethiopia.

Dr. Ammu Susanna Jacob, Center for Study of Science, Technology and Policy, India

Dr. F. Laroche, Ecole Centrale de Nantes, France

Dr. Sandeep Singh Sengar, Cardiff Metropolitan University, United Kingdom

Dr. Yu-Chen Hu, Providence University, Taiwan

Dr. Kishor Kumar Sadasivuni, Qatar University, Qatar.

Dr. Roberto D'Amato, Universidad Politécnica de Madrid, Spain

Dr. Mehjabeen, Hilimits Groups, Ghana

Dr. X. Ascar Davix, RVR & JC College of Engineering, Guntur

Dr. S. Kalpana , Amet University, India

Dr. Rashmi Singh, Central University of Allahabad

Dr. Surya Prakash, IIHMR University, Jaipur

Dr. Vivek Upadhyaya, Poornima University, Jaipur

ABOUT AVCE

Annai Vailankanni College of Engineering (AVCE), AVK Nager, is a private, self-financing, co-educational Engineering College established in the year 2008. The college is approved by AICTE, New Delhi and affiliated to Anna University. The college is surrounded by an array of green-clad, sky scrapping mountains of the Western Ghats. The weather is cool and breezy with clouds drifting high over the mountains giving frequent drizzles. AVCE is an institution where students are trained not only to equip themselves with knowledge but also to cope with the tasks that are in store for them. We also develop other aspects of personality to sustain themselves in their life. Our aim is to provide education to one and all, especially in the rural community. AVCE has always aimed at providing quality education: social moral value based and need-based education to the students and at empowering the local community. Our students are encouraged to participate in inter-college and open state level / national level technical, cultural and sports activities.

Aerial view of AVCE

QUALITY OBJECTIVES

✓ To provide quality technical education through outcome-based teaching learning process.

- ✓ To facilitate the all-round personality of students through extracurricular and social activities.
- ✓ To enhance industry institute interaction through testing and consultancy services.
- ✓ To provide assistance for campus placement and entrepreneurship development and promote initiatives for digital India.
- ✓ To motivate faculty for higher education and skill upgradation for achieving world class excellence.
- ✓ Promote research and development activities among faculty and students to develop new technologies.
- ✓ To strengthen the institute through network of alumni

SALIENT FEATURES

- ✓ Renowned educators, technology experts from various industries to create future ready citizens (industry-ready professionals).
- ✓ Outcome-based teaching and learning methods.
- ✓ Received Anna University Patent Award, Best Agro project Award, Best auto solution award etc.
- ✓ Robotics Centre - Advanced center with 3D Printing technology to carry out study and research (First of its Kind in the district)
- ✓ Filed first pattern right for the solar tricycle for fish vending women.
- ✓ Approved by MHRD & AICTE to run Pradhan Mantri Kaushal Vikas Yojana (PMKVY).
- ✓ MoU with BOSCH INDIA to conduct AVCE-BOSCH joint certification program.
- ✓ Center for advance digital learning, AMAZO web services, PALO ALTO USA.
- ✓ The college is committed to create a balanced atmosphere of academic, cultural and sports activities.
- ✓ Well furnished smart classrooms.
- ✓ Dedicated Training and Placement Cell marching towards 100% placement record.
- ✓ AVCE Research and Development cell to promote innovative projects.
- ✓ Wi-Fi enabled campus Well established laboratories with the latest equipment and instruments.
- ✓ Sophisticated indoor and outdoor sports complex.
- ✓ Nodel center of NPTEL.
- ✓ NCC, NSS, YRC, Sports and fine arts club-nurturing the talents.

ABOUT THE CONFERENCE

It is our great pleasure to announce the " Third International Conference on Materials, Computing and Communication Technologies" (ICMCCT-2022) to be held in Annai Vailankanni College of Engineering (AVCE), AVK Nagar, India on June 20, 2022. ICMCCT-2022 will explore the new horizon of innovations from distinguished researchers, scientists, and eminent authors in academia and industry working for the advancements in Science, Engineering and Technology from all over the world. It also aims to bring together Academicians, Scientists, Research scholars and Students, to share and disseminate information on knowledge and scientific research works and confers the practical challenges encountered and the solutions adopted.

The conference will create a path to establish a research relation for the authors and listeners with opportunities for National and International collaboration and networking among the universities and institutions from India and abroad for promoting research and developing technologies. Authors are solicited to contribute to the conference by submitting articles that illustrate research results, projects, surveying works and industrial experiences that describe significant advances in Materials, Computing and Communication Technologies.

It is not confined to a specific topic or region; you can exhibit your ideas in similar or mixed or related technologies bloomed from anywhere around the world because "An idea can change the future and its implementation can build it". Annai Vailankanni College of Engineering (AVCE), AVK Nagar, India is a great platform to make your Idea (s) penetrated into the world. We give as best as we can in every aspect related. Our environment leads you to a path on your idea, our people will lead your confidence and finally, we give our best to make yours. Our intention is to make Intelligence in engineering to fly higher and higher. That is why we are dropping our completeness into the event. You can trust us on your confidentiality. Our review process is double blinded through Easy Chair.

CONFERENCE TRACKS :

- ✓ Mechanical Engineering
- ✓ Computer Science and Engineering
- ✓ Artificial Intelligence & Data Science
- ✓ Electrical Engineering
- ✓ Electronics Engineering
- ✓ Communication Technologies
- ✓ Civil Engineering

CONTENTS

Smart Ploughing System

Gokul J[1], Devanand R[2], Mathan Kumar D[2], Thileep Kumar M[2]

[1]Assistant Professor, Department of Electrical and Electronics Engineering, Jai Shriram Engineering College, Tirupur, Tamil Nadu, India

[2]UG Student, Department of Electrical and Electronics Engineering, Jai Shriram Engineering College, Tirupur, Tamil Nadu, India

ABSTRACT

In India, near about 70% people are dependent upon agriculture. So the agricultural system in India should be advanced to reduce the efforts of farmers. Various numbers of operations are performed in the agriculture field like seed sowing, weeding, cutting,pesticide spraying etc. But the present methods of seed sowing are problematic. The real power required for machine equipment depends on the resistance to the movement of it. Even now, in our country 98% of the contemporary machines use the power by burning of fossil fuels to run IC engines or external combustion engines. This evident has led to wide spread air,water and noise pollution and most importantly has led to a realistic energy crisis in the near future. Now the approach of this project is to develop the machine to minimize the working cost and also to reduce the time for digging and seed sowing operation by utilizing solar energy to run the robotic machine.

This work aims on the design, development of simple module to make agriculture smarter. Here two stages are involved: one is by monitoring the field by using moisture sensor and automatic monitoring by NodeMcu technology to maximize the plant growth and yield which makes the system portable, economical and less maintenance for irrigation applications. Second stage is to reduce human resource by making agriculture robot for plough, crop cutting, pesticides spraying and seeding applications. This robot is controlled by WIFI technology. The robot works with the battery and the solar power. More than 70% of the population in India chooses agriculture as the primary occupation, in recent years the development of the agricultural vehicle or robot in the agriculture has experienced enhanced interest .The vehicle is controlled by DC Motor driver through WIFI input. The advantages of these robots are minimum man power and labour making it an efficient vehicle. Considering the above problems in mind, a system with the above features is designed.

I. INTRODUCTION

In olden days technology was not developed that much. So they were seeding plowing and plant cutting by hand. But nowadays technology is developed. So now it's not necessary to do seeding in sunlight. By using robot technology, one can sit in a cool place and can do seeding by monitoring the robot motion. Today's agricultural fielddemands to find new ways of agricultural operation to improve performance efficiency. In the

field of agriculture, various problems are faced by the farmers in the operations like seed sowing, plowing, and waste planet cutting,weeding. Also the equipment' s used to perform the operations are very heavy. Due to migration of human' s in the cities the labor problem occurs. Now day' s robotics technology plays a paramount role in all sections like medical field, industries and various organizations. In other countries robots are used to perform different operations in the agricultural field. We can make the use of available technologies and the robotics technology in the farming system to reduce the efforts of farmers and also to reduce time, energy and required cost.

II. BLOCK DIAGRAM
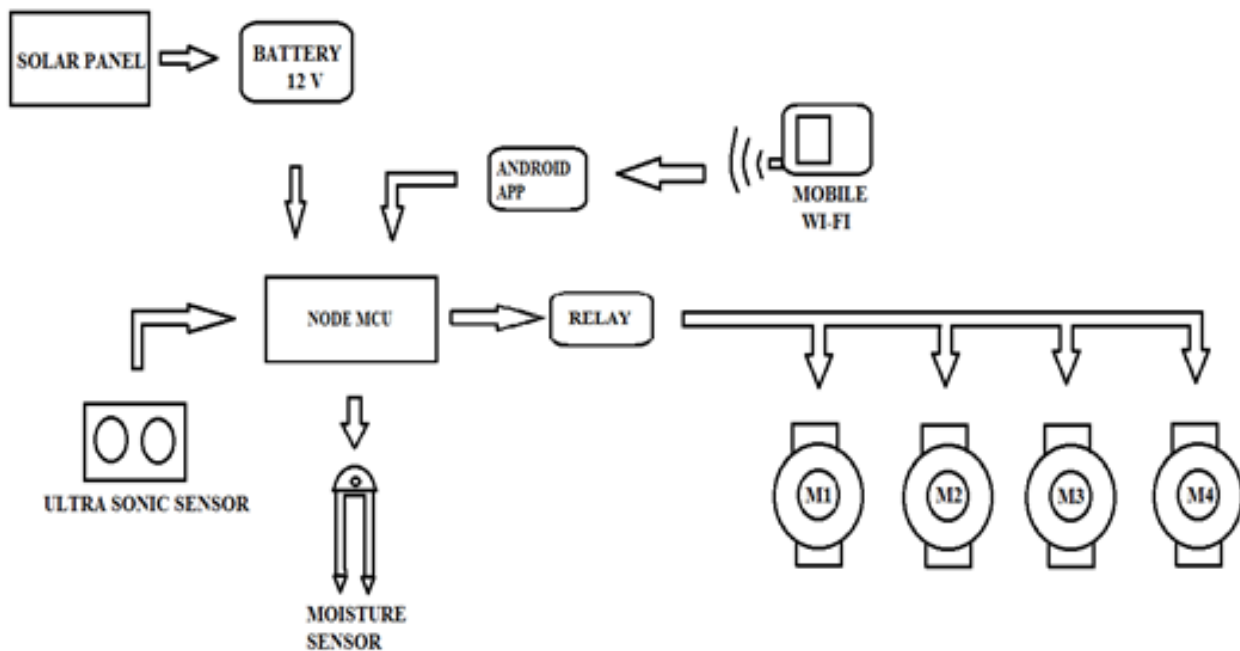
Our project aims at developing an advanced system for agriculture monitoring and agribot which can be controlled wirelessly through Wi-fi communication. Here our project to develop a mobile operated ploughing machine, which is operated using solar power. In this system we used a solar panel, which convert the received sunlight into electrical energy and which is stored in 12v a battery which in turn supplies the energy required for operation. In our project we made efforts to use both mechanical and electrical as we explained.

The Robot which can plough the soil put the seeds and sprays required pesticides to land and finally cut the crops. To overcome the problem faced by the farmers. Since all four operations are perform simultaneously, thus the productivity also increased and mean while saves the time. To complete the large amount of work is completed in less time. It is the farmer friendly robot can be operated through wi-fi controlled mobile. The use of solar reduce the burden to farmer as robot works in field or farm always the sunrise falls on solar converts the solar energy to electrical and stores in battery. To enhance the efficiency and productivity and solar system is use and which in term help for increasing both of the problems.

1.　Node MCU :

Node MCU is the major part of the system.Here we used Node MCU esp8266 Wi-fi inbuilt version..It provides the task to the individual element for different command. It connects to the Mobile through Wi-fi. All command provided with help of android application, where an individual tasks are assigned in the application. For example choose an option for move forward in application. Signal reaches Node MCU by Wi-fi and start respond to it.

Specifications:

- ➢ Microcontroller: Tensilica 32-bit RISC CPU Xtensa LX106
- ➢ Operating Voltage: 3.3V
- ➢ Input Voltage: 7-12V
- ➢ Digital I/O Pins (DIO): 16
- ➢ Analog Input Pins (ADC): 1
- ➢ Flash Memory: 4 MB
- ➢ SRAM: 64 KB
- ➢ Clock Speed: 80 MHz

2.　Controlling elements :

Controlling elements act as a heart of the system. Let see some of the controlling element used here.
- ✓ RELAY
- ✓ BLYNK APPLICATION

RELAY:

Here relay controls the various type of task. It means each relay response for each work. Relay module used here is 5v 4 channel relay. The 4 Channel Relay Module is a convenient board which can be used to control

high voltage, high current load such as motor, solenoid valves, lamps and AC load. It is designed to interface with microcontroller such as Arduino, PIC and etc. The relays terminal (COM, NO and NC) is being brought out with screw terminal. It also comes with a LED to indicate the status of relay. Terminal ' in' connected to the Node MCU. When command Node MCU receives the relay becomes closed, then particular motor turn on. Likewise Ploughing, sowing, and seeding motor turned on and off by the relay.

Specification:

- Normal Voltage is 5V DC.
- Normal Current is 70mA.
- AC load current Max is 10A at 250VAC or 125V AC.
- DC load current Max is 10A at 30V DC or 28V DC.
- It includes 5-pins & designed with plastic material.
- Operating time is 10msec.
- Release time is 5msec.

BLYNK APPLICATION:

Entire system controlled through this application. In this **Smart Ploughing System**, we will control **4 home appliances** as ploughing, sowing, seeding, watering, harvesting connected to **Relay** using BLYNK Application. The Wi-Fi Module **Node MCU ESP8266** will receive commands from the smart phone wirelessly through the internet. To encode the **ON/OFF** signal and send it to Server and to ESP8266 Board we need the best IOT Platform. So we chose BLYNK as no other application can be better than this one. This application requires **internet connectivity.**

3. Sensing elements :

Sensor used to detect object or material, to analysis its state without contact. Here sensor such as

- ➢ ULTRASONIC SENSOR
- ➢ MOISTURE SENSOR

Ultrasonic sensor:

HR- SR04 ultrasonic sensor used in our project. HC-SR04 is a really common distance sensor available in the market. It is very easy to use and gives almost correct detection of distance. But as stated above, it sometimes gives some error in the distance. This sensor works on the principle of reflection of sound.

It works like this first a sensor sends a beam of sound for some time and then receives the sound back after it reflects it from any obstacle. Basically, it records the time in milliseconds during which ultrasonic sound has been sent and received. The pulse function is used for this purpose. But in this, we'll use some manual commands to control the Ultrasonic sensor.

Specifications
1. Power Supply: $3.3V - 5V$.
2. Operating Current: 8mA.
3. Working Frequency: 40Hz.
4. Ranging Distance : $3cm - 350cm/3.5m$.
5. Resolution : 1 cm.
6. Measuring Angle: 15 degree.
7. Trigger Input Pulse width: 10uS TTL.
8. Dimension: 50mm x 25mm x 16mm.

Moisture sensor:
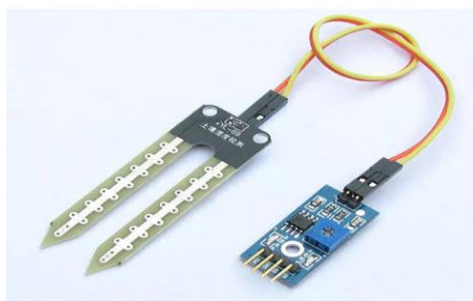
The Soil Moisture Sensor is a straightforward breakout for determining the moisture content of soil and other similar materials. The soil moisture sensor is simple to set up and operate. The sensor' s two big exposed pads serve as probes, and combined they operate as a variable resistor.The greater the amount of water in the soil, the better the conductivity between the pads will be, resulting in a lower resistance and a larger SIGout. It' s commonly used in greenhouses to regulate water supply and other bottle enhancements. Experiment in biology to track the amount of water in the soil.

Specifications:

- Working voltage: 5V
- Working current: <20 mA
- Interface: Analog
- Working Temperature: 10℃~30℃

4. Power system:

Power system is provides a required power to the Node MCU, motor and other components. Here two components provide a requiredpower for it. They are

- ❖ BATTERY
- ❖ SOLAR PANEL

Battery

A battery is a device that stores chemical energy and **converts it to electrical energy**. The chemical reactions in a battery involve the flow of electrons from one material (electrode) to another, through an external circuit. The flow of electrons provides an electric current that can be used to do work.

Lead acid batteries used in the RV and Marine Industries usually consist of two 6-volt batteries in series, or a single 12-volt battery. These batteries are constructed of several single cells connected in series each cell produces approximately 2.1 volts. A six-volt battery has three single cells, which when fully charged produce an output voltage of 6.3 volts.

A twelve-volt battery has six single cells in series producing a fully charged output voltage of 12.6 volts.A battery cell consists of two lead plates a positive plate covered with a paste of lead dioxide and a negative made of sponge lead, with an insulating material (separator) in between. The plates are enclosed in a plastic battery

case and then submersed in an electrolyte consisting of water and sulfuric acid. Each cell is capable of storing 2.1 volts.

Voltage:	12 Volt
Capacity:	7 Ah
Type:	Sealed Lead Acid
Length:	5.95"
Width:	2.56"
Height:	3.71"
Shipping Weight:	7.00Lbs

Solar panel

Photovoltaic directly convert solar energy into electricity. They work on the principle of **the photovoltaic effect**. Solar panels make 100w / 12v = **8.33 amps of charge per hour during sunlight**. An average of 2 amps is used to power the fridge leaving 6.33 amps to charge the battery. ... This means we have a positive additional charge during the day to ensure the battery is 100% before the sun goes down.

Specification:
➢ Poly crystalline Cells type Panel.
➢ Capacity - 40 W, 12V.
➢ Voltage: Voltage at Max Power (Vmax) - 18V, Open Circuit Voltage (Voc) - 22V.
➢ Current: Current at Max Power (imax) - 2.23A, Short Circuit Current (isc) - 2.42A.

III. FUTURE SCOPE

The main focus of this research is theimplement of smart tractors in agriculture. Weunderstand the present manual work, texture andcontour of the terrain and detect the color samplefrom the terrain. We design and

gesture of vehicle using IoT and insert the color sensor in vehicle.Then the vehicle is testing and determines the performance. In future, this technology may be implemented in real tractor.

IV. CONCLUSION

The smart farming system gives an advanced method to sow plough and cut the crops with minimal man power. The mechanism includes the cultivation of crops by considering the specific rows and specific column at fixed distance depending on crops. The sensors are used to collect the detailed information regarding the environmental changes and crop conditions. The obstacle detection problem will also be considered, sensed by sensor. The information are directly transmitted to the farmers through IOT. In agriculture, the opportunities for robot enhanced productivity are immense and robots are appearing on farms in various increasing numbers. This technology makes the agriculture crop productivity easy and efficient.

V. REFERENCES

[1]. S.BlackmoreandK.Apostolidi,"TheEuropeanfarmoftomorrow,"TransactionsoftheASABE,vol.18,no.1,p.6,2011

[2]. Y. Chen, X. Peng, and T. Zhang, "Application of wireless sensor networks in the field of agriculture," in Proceedings of the ASABE Annual International Meeting, publication no. 1110617, Louisville, Ky, USA, 2011.

[3]. Ryerson A E F, Zhang Q. Vehicle path planning for complete field coverage using genetic algorithms. Agricultural Engineering International: the CIGR Ejournal. Manuscript ATOE 07014.Vol. IX (July). 2007.

[4]. J. A. Heraud and A. F. Lange, "Agricultural automatic vehicle guidance from horses to GPS: how we got here, and where we are going," in Proceedings of the Agricultural Equipment Technology Conference, vol. 33, ASABE publication no. 913C0109, pp. 1-67, Louisville, Ky, USA, 2009.

[5]. T. Bakker, K. Asselt, J. Bontsema, J. Muller, and G. Straten, "Systematic design of an autonomous platform for robotic weeding," Journal of Terramechanics, vol. 47, no. 2, pp. 63.73, 2010. View at Publisher "E View at Google Scholar "E View at Scopus

[6]. C. Cariou, R. Lenain, B. Thuilot, and M. Berducat, "gAutomatic guidance of a four-wheel-steering mobile robot for accurate field operations,"h Journal of Field Robotics, vol. 26, no. 6-7, pp. 504.518, 2009. View at Publisher "E View at Google Scholar "E View at Scopus

[7]. Y. Nagasaka, H. Saito, K. Tamaki, M. Seki, K. Kobayashi, and K. Taniwaki, "gAn autonomous rice transplanter guided by global positioning system and inertial measurement unit,"h Journal of Field Robotics, vol. 26, no. 6-7, pp. 537.548, 2009. View at Publisher "E View at Google Scholar "E View at Scopus

Design of Compact Internal Antenna for Sub-6 GHz 5G Radio Application

T. Aatmanesan, K. Sai Bhargav, M. Nithya Nanda Guptha, V. Yamuna

Department of Electronics and Communication Engineering, Veltech Rangarajan Dr. Sagunthala R&D Institute
of Science and Technology, Tamil Nadu, India

ABSTRACT

This paper is about the designing the compact internal antenna for radio applications in 5G which operates in sub 6GHz band and it is made up by circular patch antenna. We have gone through so many changes for antenna design to bring the novelty and made as the circular patch antenna with FR4 substrate which holds dielectric permittivity of 4.4 and height 1.6mm is used to design a circular patch antenna. This antenna design is made up of the complexity solver software Hfss used for high resonant frequency and obtained VSWR of 1.08. Return loss of -28.29dB with gain of 4.77dbi at the resonant frequency of 3.5 GHz.

KEYWORDS: Circular patch Antenna, Sub 6GHz, HFSS, Compact internal Antenna.

I. INTRODUCTION

Now-a-days the communication playing as vital role in everywhere but this communication is depending on the antenna design. There are so many bands are there for carrying the information by using this in that one of the band called sub 6GHz used in this paper for our antenna design. This is a band that which useful for the 5G cellular Network/communication purpose that supports Two frequency ranges FR1 & FR2 but we are using FR1 because of the Indian government rules it's about of range from 410 MHz to 7125 MHz. This Band mostly useful for our Radio application purpose.

5G radio appliances is a stable mobile technology that gives more advanced functionalities. It is designed to meet the exponential demand for connectivity and covers new applications to very high data speeds, high responsiveness and strong Reliability. The main purpose is the most and accurate and also from starting onwards the 5G development takes place mainly in the 3.5GHz frequency bandwidth.

Therefore, In this paper circular patch antenna is required for the radio application in 5G which operates in sub 6GHz band. This circular antenna has to developed and designed according to the operating functionalities of sub 6 GHz band and must have the resonant frequency of 3.5 GHz that which presented to Radio application.

In this paper maximum Novelty of the design has been tried on the circular patch and ground. This antenna design is made up on the software called HFSS. It is the software that finite element method solves for electromagnetic structure from it and also it is a 3D EM simulating High frequency antenna designs. The main purpose of using this circular patch antenna is the circularly polarized in a specific orientation and good

immunity of signals in the multiple path and also low cost , less weight. The main advantage is it countless antenna features like return loss, radiation adjustment, bandwidth, directivity, antenna gain.

II. LITERATURE REVIEW

The main User effects on the circular polarization of 5G mobile Terminal Antenna is proposed by Igor syrystin, shuai Zhang, Zhinong Ying published in IEEE gives the information about the coverage efficiency and slan pattern by talk & data mode[1].The wide band dual polarized end time Antenna Based on Compact Open Ended cavity for 5G mm wave mobile phones proposed by Libin Sun, Yue Li, Zhijun Zhong. Published in IEEE give the information about compactness and construction of antenna in vertical polarization by integrating[2].Size reduction of self-Isolated MIMO antenna system for 5G mobile phone Applications has proposed by Anping Zhao, Zhouyou Reu published in IEEE given the information on Reduction the size of antenna that improves the gain and return loss in a accurate values in 5G applications[3].

III. ANTENNA DESIGN

Now coming to antenna design it has been divided into two parts front view and back view. Coming to front view it has the one circular patch antenna having 1.6 mm thickness and having electric conductivity 5.e+007. The back view consists of rectangular ground.

The electric antenna is designed of with FR4 material of having 1.6mm height & 4.4 of permittivity and loss tangent of 0.02 and input feeding with 50 ohm.
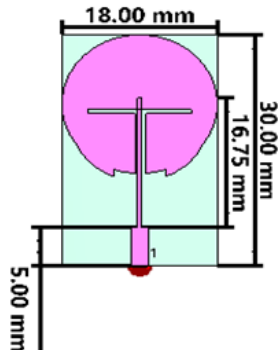
Fig: 4.1 Front view

The front view which consists of circular antenna shoped copper has been given as feeding by using excitation. Inset feeding given more/better impedence than the often feeding method. The circular patch having diameter 5mm and feeding having length 16.75 mm and Probe strip length 5.00 mm and height 1.6mm.

Table-1:Front-view parameters

Parameter	Dimension
Strip length	16.75mm
Probe length	5.00mm

Height	1.6mm

The back view is having the main purpose that giving proper ground that have the connection between patch and ground. And in between the substrate also place a major role for the design.
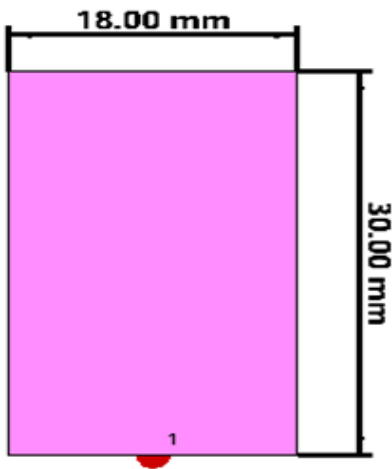
Fig:4.2 Back view

Table-2:Back-View parameters

Parameter	Dimension
Length	30.00mm
Breadth	18.00mm

IV. RESULTS

The proposed antenna design is simulated in HFSS and we got the results has been discussed below.

1. RETURN LOSS:

We have obtained a minimum return loss of -28.29dB around 3.5GHz as shown in the below fig.
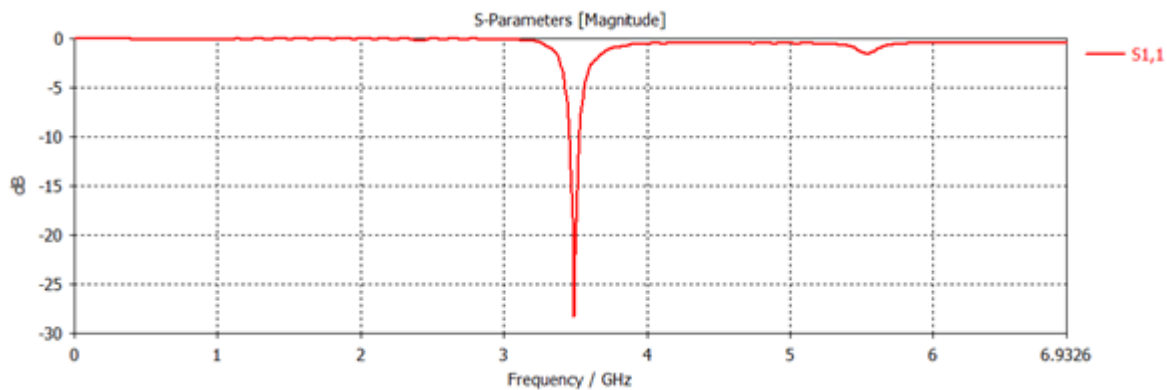
Fig:5.1 Return loss

2. VSWR:

We have obtained Voltage Standing Wave Ratio (VSWR) around 1.08 around 3.5 GHz shown in the below fig.
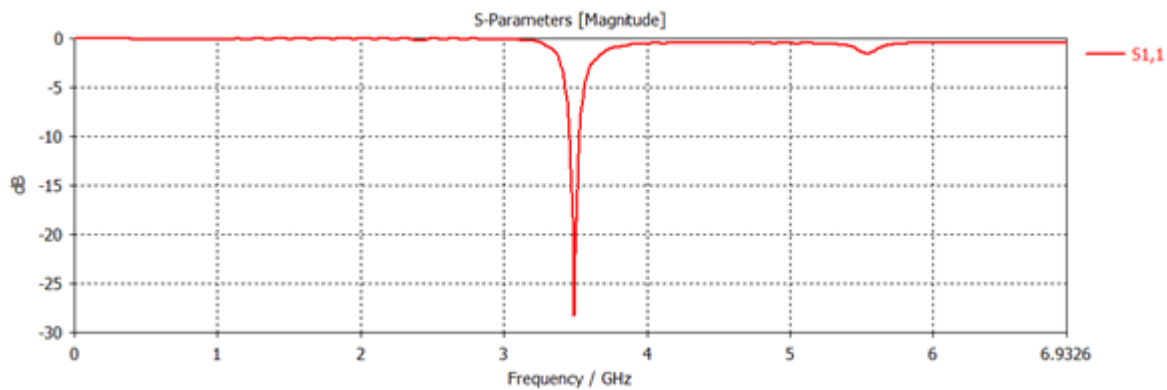
Fig:5.2 Voltage Standing Wave Ratio (VSWR)

3. GAIN :

We have obtained total gain of about 4.77dB around 3 .5 GHz as shown in below fig.

Frequency = 3.49 GHz
Main lobe magnitude =   4.76 dBi

Fig:5.3.1 Theta 0

Frequency = 3.49 GHz
Main lobe magnitude =   4.76 dBi
Main lobe direction =   1.0 deg.
Angular width (3 dB) = 143.8 deg.

Fig:5.3.2 Phi 0

Farfield Directivity Abs (Theta=90)

— farfield (f=3.49) [1]

Phi / Degree vs. dBi

Frequency = 3.49 GHz
Main lobe magnitude =   0.725 dBi
Main lobe direction =   1.0 deg.
Angular width (3 dB) = 102.0 deg.
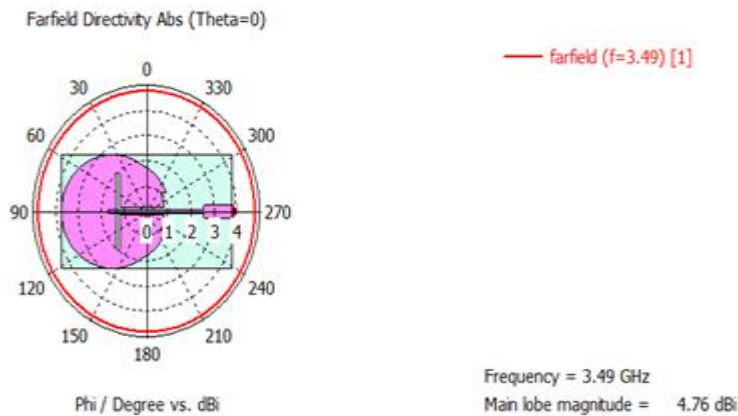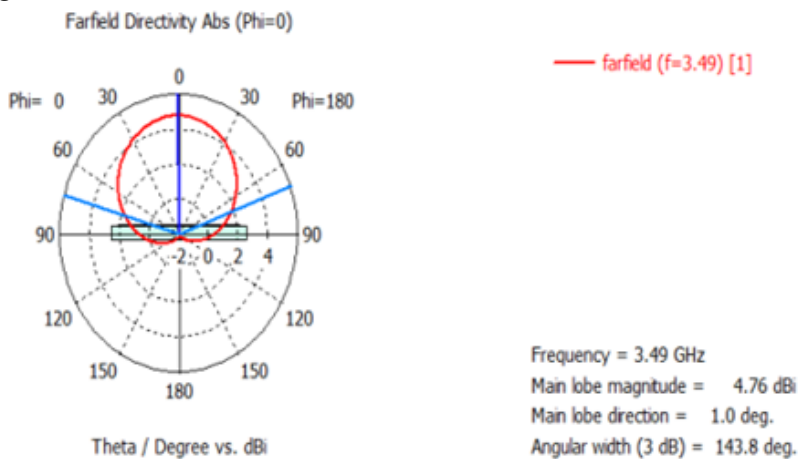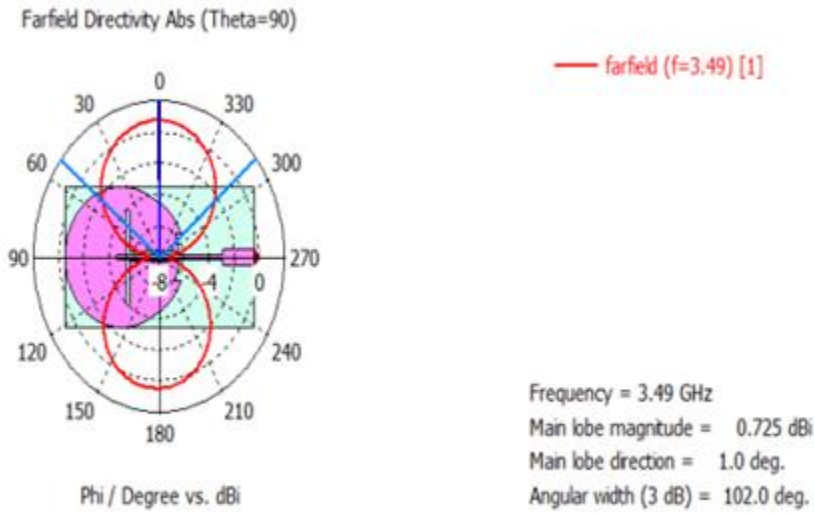
Fig:5.3.3 Theta 90

V. OVER ALL RESULTS

Parameter	Value
FREQUENCY BAND	SUB 6 GHZ
OPERATING FREQUENCY	3.5GHZ
WAVE LENGTH	85.7mm
RADIUS OF CIRCULAR PATH	5mm
SUBSTRATE DIELECTRIC USED	Fr4
SUBSTRATE DIELECTRIC CONSTANT	4.4
SUBSTRATE THICKNESS	1.6mm
FEEDING TECHNIQUE	PROBE FEEDING
GROUND PLANE	FULL GROUND
RETURN LOSS	-28.29dB
GAIN	4.77dbi
BANDWIDTH	70MHZ
EFFICIENCY	85%
VSWR	1.08

Farfield Directivity Abs (Phi=90)

farfield (f=3.49) [1]

Frequency = 3.49 GHz
Main lobe magnitude =   4.77 dBi
Main lobe direction =   4.0 deg.
Angular width (3 dB) =   91.5 deg.
Side lobe level =   -6.5 dB

Theta / Degree vs. dBi
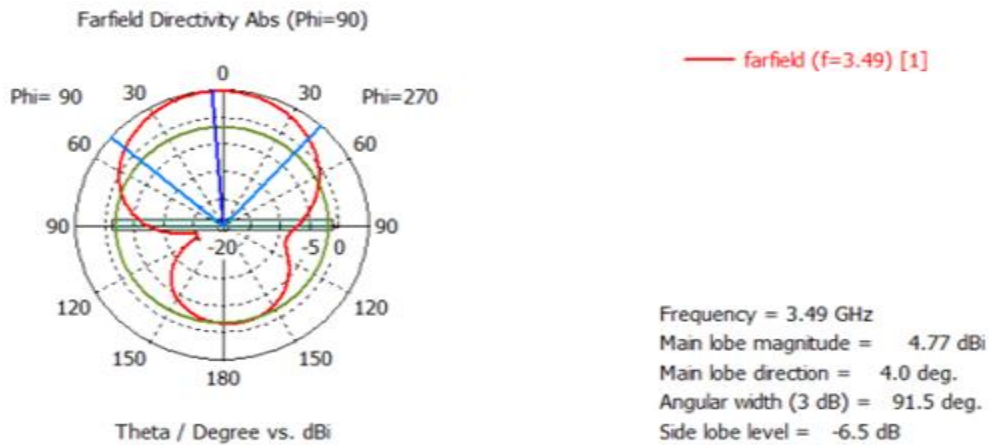
Fig:5.3.4 Phi 90

VI. CONCLUSION

By this paper we are concluding is we got the return loss of 28.29dB for 3.5GHZ frequency which is used for the 5g application with an efficiency of 85%and vswr of 1.08 and gain of 4.77dBi and bandwidth of 70MHZ for the antenna design we made .But in future we can make this antenna design for same application by changing the frequency , bands and also size which reduces space and cost of antenna.

VII.   REFERENCES

[1]. Anping Zhao, Zhouyou Ren,"Size Reduction of Self-Isolated MIMOAntennaSystem for 5G Mobile Phone Applications",Senior Member, IEEE, VOL-18,NO1,Jan-2019.

[2]. Zhijiao Chen, Jie Tian, Jing-Ya Deng, Haiwen Liu, Zhewang Ma, Junsheng Yu, and Xiaodong Chen."Low-profile Circularly Polarized Staircase Curl Antenna Array with 2:1 Impedance and 50% AR Bandwidths for 5G mmW Communications", IEEE,pp1(1)(2),2021

[3]. ModesYi Luo, Lei Zhu, Fellow, , Ying Liu, Nengwu Liu, Shuxi Gong,"Multi-Band Monopole SmartphoneAntenna with Bandwidth Enhancement under Radiation ofMultiple Same-Order", IEEE, Senior Member, IEEE, , Member, IEEE, and Member, IEEE,pp5(ii),2021.

[4]. Igor Syrytsin, Shuai Zhang, Gert Frølund Pedersen, and Zhinong Ying "User Effects on the Circular Polarization of 5G Mobile Terminal Antennas",IEEE,VOL6,N09,PP 1(II),Sep-2018.

[5]. Le Chang and Haiwen Liu "Low-Profile and Miniaturized Dual-Band Microstrip Patch Antenna for 5G Mobile Terminals",IEEE,PP1109-3118730,no3,2021.

[6]. Yixiang Fang, Ying Liu, Yongtao Jia, YunxueXu, and Ben Lai "5G SAR-Reduction MIMO Antenna withHigh Isolation for Full Metal-Rimmed Tablet Device",Senior Member,IEEE, , Member, IEEE,pp6(iv),2021.

[7]. Jingtao Zeng, Kwai-Man Luk, Fellow,"Single-Layered BroadbandMagnetoelectric Dipole Antenna for New 5G Application", Student Member, IEEE, and, IEEE,VOL-18,NO.5,May-2019

[8]. Zhouyou Ren, Anping Zhao, Shengjie Wu,"MIMO Antenna With Compact Decoupled Antenna Pairs for 5G Mobile Terminals",Member, IEEE, , Senior Member, IEEE, VOL-18,NO.7,July-2019.

[9]. Yue Li , Zhijun Zhang , Libin Sun,"Wideband Dual-Polarized Endfire AntennaBased on Compact Open-Ended Cavity for 5G mm-Wave Mobile Phones", Member, IEEE, , Senior Member, IEEE, , Fellow, IEEE,2021

[10]. Ju-lk Oh, Hye-Won Jo, Kwang-Seok Kim, Jong-Won Yu, Dong-Jin Lee, "28/38 GHz Dual-Band Vertically Stacked Dipole Antennas on Flexible Liquid Crystal Polymer Substrates for Millimeter-Wave 5G Cellular Handsets", Member, IEEE, Member, IEEE, Hwang, In-June 2021

[11]. M. Li, M. Villa, D. Ding, R. Chen and G. Vecchi, "Mixed-form nested approximation for wideband multiscale simulations," IEEE Trans. Antennas Propag., vol. 66, no. 11, pp. 6128–6136, 2018.

[12]. K. Niu, Z. Huang, X. Ren, M. Li, B. Wu and X. Wu, "An optimized 3-D HIE-FDTD method with reduced numerical dispersion," IEEE Trans. Antennas Propag., vol. 66, no. 11, pp. 6435–6440, Nov. 2018.

[13]. Z. Zhang, "Antenna design for mobile devices, , John Wiley and Sons (Asia) Pte Ltd",IEEE, 16 March 2011.

[14]. H. Zhang, G. Yu, Y. Liu, Y. Fang, G. Shi and S. Wang, "Design of low-SAR mobile phone antenna: theory and applications," IEEE Trans. Antennas Propag., vol. 69, no. 2, pp. 698-707, 2021.

[15]. Geetharamani Gopal and Aathmanesan Thangakalai, "Cross Dipole Antenna for 4G and Sub-6 GHz 5G Base Station Applications", ACES Journal, vol. 35, no. 1, pp. 16–22, Jan. 2020.

[16]. Aathmanesan, T. Gain improvement of THz antenna using semicircular slot and modified ground plane. Int J Commun Syst. 2022; 35(7):e5103. doi:10.1002/dac.5103

[17]. G. Geetharamani, T. Aathmanesan,Split ring resonator inspired THz antenna for breast cancer detection,Optics & Laser Technology,Vol 126,2020,106111, https://doi.org/10.1016/j.optlastec.2020.106111.

Development of EBG Based Novel Patch Antenna for Improvement of Gain in Indoor Wireless Applications

Dr. T. Aathmanesan, E. Kushi Priya, S. Dharani, K. Vamsinath Reddy

Department of Electronics and Communication Engineering, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, Chennai, Tamil Nadu, India

ABSTRACT

Over the past decade, the production of various applications involving wireless communication has been increasing rapidly. All such wireless systems efficiency depends upon the antenna's design and its proper functioning. Microstrip patch Antenna is the most desired antenna that is being used by various communication systems nowadays. The fabrication of microstrip antenna is easy because of its low material cost, it is having a wide variety of applications. The Electromagnetic Bandgap is the artificially fabricated structures that allow the propagation of electromagnetic band of frequency at any incident angles and polarizations. The principle issue in the microstrip antenna configuration is the surface wave that proliferates inside the substrate. Because of expanding the side and back radiation, the surface wave travel on the substrate, and there is a reduction in the gain and bandwidth of the antenna. Electromagnetic bandgap structure prevent the surface wave propagation and proposes the multilayer electromagnetic bandgap structure for gain enhancement. EBG based Microstrip Novel patch Antenna with increased gain is to be developed.

Keywords - Microstrip Antenna, Electromagnetic Band gap, Antenna gain.

I. INTRODUCTION

At present, we are living in the era of communication system, where communication is a process of exchanging information between the two points. There are many ways of communication but most preferred way is wireless communication technology. The use of wireless technology changes the way of human thinking . In wireless communication systems, antenna plays a vital role, it is a metallic device used for radiating and receiving the information in the form of radio waves. The wireless communication system without proper antenna setup encounters problems. Any perversion in the transmission and reception of information causes complete system failure. A proper design selection of an antenna is the most important factor for the designing of wireless communication system. Due to rapid growth of devices in wireless communication, there is requirement of antenna which has compact size, low cost, easy handling and better performance. Microstrip antenna is the best suited option which fulfils all the necessary requirements of wireless communication system.

In telecommunication, a microstrip antenna also known as printed antenna usually means an antenna fabricated using photolithographic techniques on a printed circuit board. Microstrip antenna approach was first introduced in 1950, but the genuine consideration on the microstrip antenna was received in 1970. It is a kind of internal antenna. Microstrip antennas have become very popular in recent times due to their thin planar profile. Microstrip antenna has few preferences over conventional antenna because of light weight, economical and easy to integrate narrow bandwidth. Microstrip antenna structure are divided into four main parts i. e; ground plane, dielectric substrate, patch and feeding line. Ground plane is etched on bottom side of a dielectric substrate and conducting in nature. There are several types of dielectric substrates which are used for designing this antenna and the value of dielectric constant used is ranges between 2.2 and 12. Low dielectric constant values are preferred for high frequency or power applications to minimize power loss. The radiating patch is a conductor which is etched on dielectric substrate along with feed lines. Shape of radiating patch may be square, rectangular, circular etc. But Rectangular and square shaped are mostly used because of their easy analysis and fabrication.

Feeding techniques used in designing of antenna are: coaxial probe feed, Microstrip line feed, Aperture coupled feed method and proximity couples feed method. In this paper, the coaxial probe feed is used. In this feeding method, inner conductor of coaxial cable is connected to microstrip patch of an antenna and outer one is connected with ground plane. The most serious limitation of microstrip antenna is low gain. This is because of the surface wave propagation. Generally we want all our energy to be radiated, but due to these surface waves the energy is lost in the conductor due to its finite conductivity. This results in reduced gain.

One of the method to develop the performance of microstrip antenna for various wireless applications is using EBG structure. EBG structure is a periodic dielectric metallic or composite structures that exhibit a forbidden band of frequency in which the incident wave does not propagate. The novel EBG structures have the capability of suppressing the propagation of surface wave .As a result , the performance of antenna would get better.

II. METHODOLOGY

The approaches of the project design are represented in the flowchart in Fig.1. The methodology of the project starts by understanding the Microstrip antenna technology. This includes the properties study of antenna such as operating frequency, radiation pattern , antenna gain and polarization. The antenna design started by calculating the dimensions of Microstrip patch antenna operate at frequency 5.8GHz. The simulation has been done by using High frequency structure simulator(HFSS). Considering the poor performance of antenna, Microstrip patch antenna loaded with parasitic Mushroom type structure has been designed. The EBG structure is utilized for antenna design in wireless application. In this design parasitic mushroom type Electromagnetic band gap design are used on the substrate. Electromagnetic Band gap design is a perfect electric conductor. The structure has frequency range where the surface impedance is very high. The equivalent LC circuit acts as a two – dimensional electric filter in this range of frequency to block the flow of the surface waves. The measurement and simulation result has been compared in term of Return loss, Radiation pattern and gain of the antenna.

Firstly, Microstrip patch antenna dimensions are calculated and designed. The value of dielectric constant is 4.4, Operating frequency = 5.8GHz and the substrate thickness, h = 1.6mm, the parameters are W=15mm and L=11mm.

PARAMETR	VALUES
Frequency	5.8GHz
Substrate material	FR$_4$
Permittivity	4.4
Height	1.6
Gain	1.23dB
Return loss	-13.9dB
VSWR	3.5
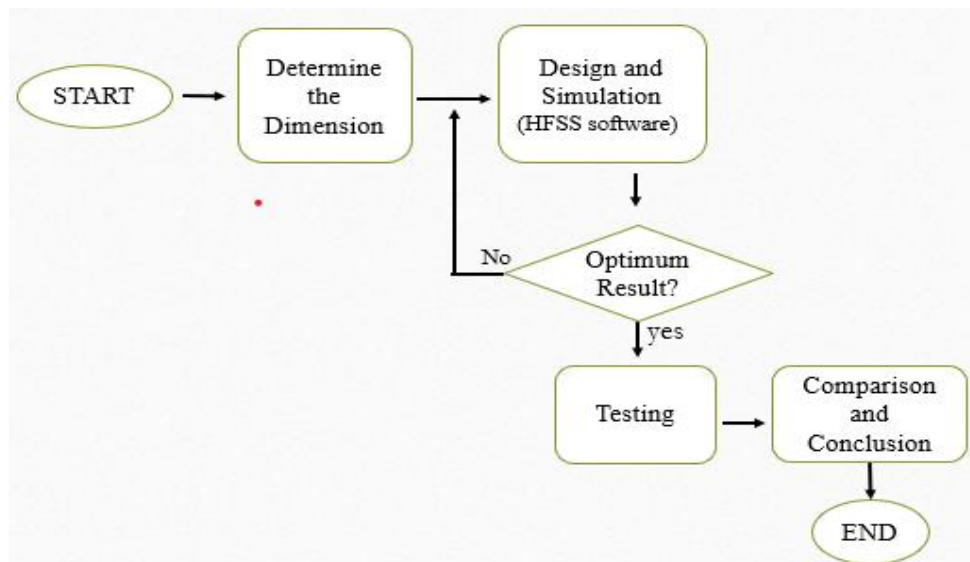
Fig. 1. Flow Chart

Secondly, the EBG structure is introduced to the patch antenna. In microstrip antennas, EBG structures surrounding patch element to suppress surface waves to achieve better radiation efficiency and antenna gain. EBG structures reflect back a part of the energy that propagates along the substrate of the antenna, thus acting as reflecting walls around the antenna. With EBG, in addition to suppression of the surface waves, an increased bandwidth can be achieved.
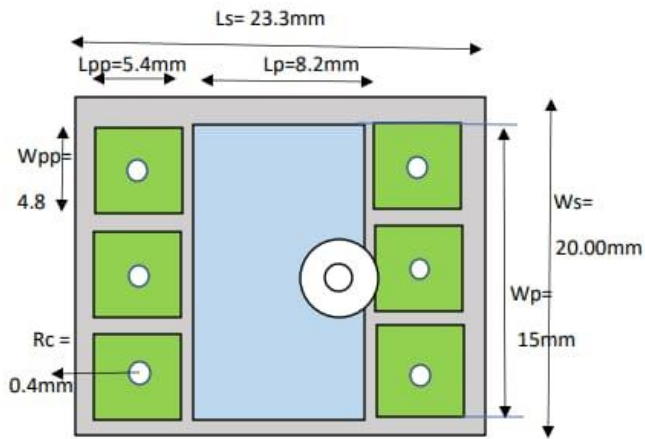
Fig. 2. Geometry of Antenna design.

PARAMETER	VALUES(EBG)
Frequency	5.4GHz
Substrate Material	FR$_4$
Gain	7.4dB
Return loss	-24.6dB
VSWR	0.9

III. RESULTS AND DISCUSSION

The results of the EBG based microstrip patch antenna design such as return loss, radiation pattern, antenna gain can be obtained by using the Ansys HFSS software. After simulating both the designs, Microstrip patch antenna shows the resonant frequency 5.8GHz with return loss -13.9dB. The Return loss value for EBG based microstrip patch antenna is about -24.6dB.The incorporation of the parasitic mushroom type Electromagnetic Band gap design with microstrip antenna enhances gain. Microstrip antenna without EBG results in antenna gain of 1.23dB. By using Electromagnetic Bandgap design, the surface wave effect is diminished resulting to the improvement of the antenna gain to 7.4dB.
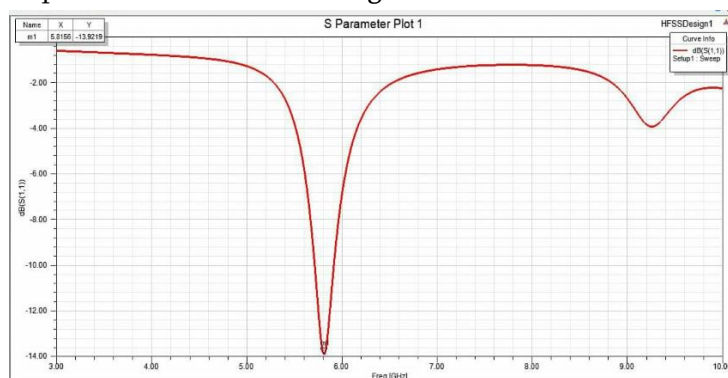
Fig.3. Microstrip patch antenna design(Return loss)
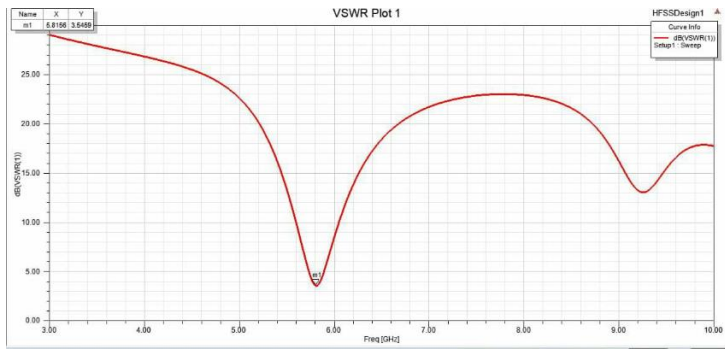
Fig. 4. Microstrip patch antenna design(VSWR)
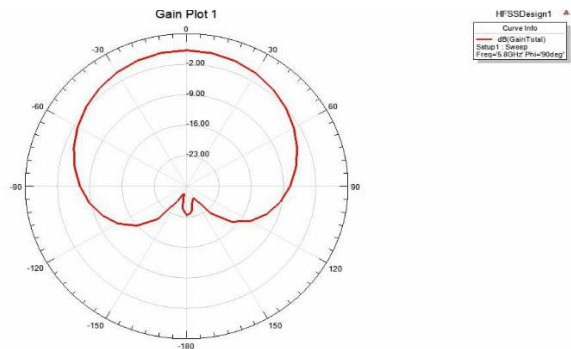
Fig. 5. Polar plot of radiation for microstrip patch antenna design.
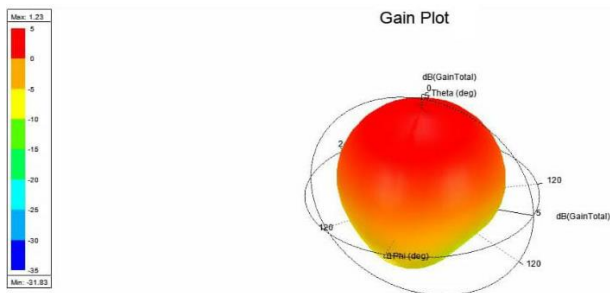
Fig.6. Three dimensional pattern of radiation for microstrip patch antenna design.
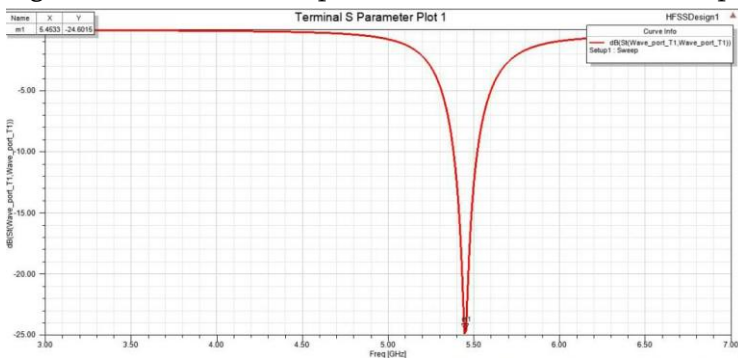
Fig.7. Microstrip patch antenna using EBG (Return loss)
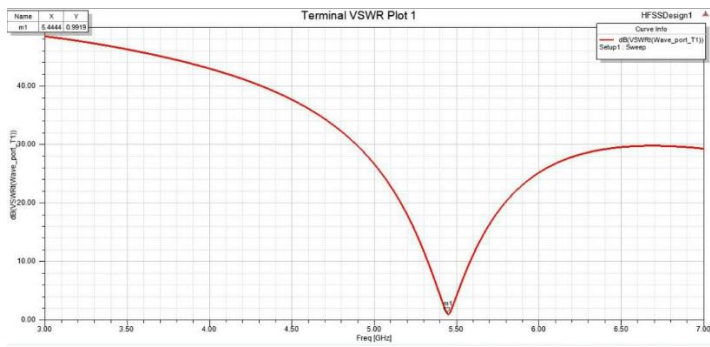
Fig.8. Microstrip patch antenna with EBG(VSWR)
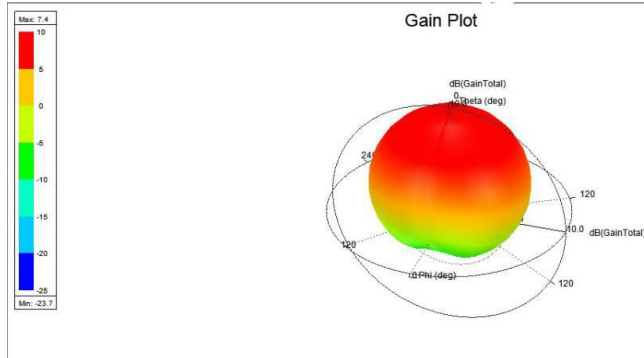
Fig. 9 .Three dimensional pattern of Radiation of Microstrip patch antenna with EBG

IV. CONCLUSION

The integration of EBG design in microstrip antenna improved the antenna performance. The EBG structure has been incorporated with microstrip antenna to see how the antennas perform by introducing this EBG structure. The antenna with EBG structure operates at a low frequency compared to the antenna without EBG structure. Normally, to design the microstrip antenna operates at lower frequency, the larger size of the substrate is needed. Integrating EBG structure can reduce the size of the antenna and the fabrication cost. Next, the EBG structure can enhance the gain of the original antenna structure. The antenna design with EBG structure shown a good return loss of -24.6dB. By utilizing the EBG structure, the gain of the antenna is increased to 7.4dB.

V. REFERENCES

[1]. Liang, Bin, et al. "A frequency and polarization reconfigurable circularly polarized antenna using active EBG structure for satellite navigation." IEEE Transactions on Antennas and Propagation 63.1 (2014): 33-40.

[2]. Chen, Zhijian, Weisi Zhou, and Jingsong Hong. "A miniaturized MIMO antenna with triple band-notched characteristics for UWB applications." IEEE access 9 (2021): 63646-63655.

[3]. Mantash, Mohamad, and Tayeb A. Denidni. "CP antenna array with switching-beam capability using electromagnetic periodic structures for 5G applications." IEEE Access 7 (2019): 26192-26199.

[4]. Peng, Lin, et al. "CPW fed UWB antenna by EBGs with wide rectangular notched-band." IEEE access 4 (2016): 9545-9552

[5]. Haraz, Osama M., et al. "Dense dielectric patch array antenna with improved radiation characteristics using EBG ground structure and dielectric superstrate for future 5G cellular networks." IEEE Access 2 (2014): 909-913.

[6]. Ashyap, Adel YI, et al. "Highly efficient wearable CPW antenna enabled by EBG-FSS structure for medical body area network applications." IEEE Access 6 (2018): 77529-77541.

[7]. Mabrouk, Ismail Ben, et al. "Hybrid isolator for mutual-coupling reduction in millimetre-wave MIMO antenna systems." IEEE Access 7 (2019): 58466-58474.

[8]. He, Zhongxia Simon, et al. "Integrated-EBG Ridge Waveguide and Its Application to an E-Band Waveguide 32× 32 Slot Array Antenna." IEEE Open Journal of Antennas and Propagation 1 (2020): 456-463.

[9]. Lee, Jae-Yeong, et al. "Performance enhancement in compact inverted-L antenna by using 1-D EBG ground structures and beam directors." IEEE Access 7 (2019): 93264-93274.

[10]. Abbas, Anees, et al. "Triple rectangular notch UWB antenna using EBG and SRR." IEEE Access 9 (2020): 2508-2515.

[11]. Geetharamani Gopal and Aathmanesan Thangakalai, "Cross Dipole Antenna for 4G and Sub-6 GHz 5G Base Station Applications", ACES Journal, vol. 35, no. 1, pp. 16–22, Jan. 2020.

[12]. Aathmanesan, T. Gain improvement of THz antenna using semicircular slot and modified ground plane. Int J Commun Syst. 2022; 35(7):e5103. doi:10.1002/dac.5103.

[13]. G. Geetharamani, T. Aathmanesan,Split ring resonator inspired THz antenna for breast cancer detection,Optics & Laser Technology,Volume 126,2020,106111, https://doi.org/10.1016/j.optlastec.2020.106111.

A Review of DE Speckling of Images using Existing Methods

Shabana Sulthana S L[1], Dr. M. Sucharitha[2]

[1]Assistant Professor, Department of Electronics and Communication Engineering, Noorul Islam University, Thakkala, Kanyakumari, Tamil Nadu, India

[2]Associate Professor, Department of Electronics and Communication Engineering, Vellore Institute of Technology, Tamil Nadu, India

ABSTRACT

Images are influenced by the speckle phenomenon, a multiplicative in that aggravate image quality. Various methods for denoising have been designed in present years, based on numerous approaches. Images are becoming widely used in medical field as well as remote sensing applications also. Correct photos are critical to the application's ability to make accurate observations. Medical image despeckling has become a pressing problem in image processing. Samples are dishonoured by Speckle noise as a consequence of fading effects. To minimise the speckle effect, a wide variety of algorithms have been developed. There are currently commercially acceptable semi-automatic techniques in place. Speckle noise has been the subject of substantial investigation in both medical imaging and remote sensing in the past. Edge preservation is a common feature of most approaches, however because of the high levels of noise or the lack of edge distinction, these filters are unable to provide accurate edge detection. This paper discusses few techniques for despeckling photos that uses different approaches. To deal with the multiplicative non-Gaussian nature of speckle noise on data, these methods propose some speckle filtering algorithm. In addition, there is a thorough investigation of each technique's challenges in this study. The essential differences between various methodologies were explored as a result of reviewing multiple research publications.

Keywords--- Speckle noise, Bayesian Estimation, Filter, Segmentation, Recursive Bayesian Algorithm

I. INTRODUCTION

An important aspect in the visual perception and processing of ultrasound and SAR images and movies is the presence of speckle noise. Diagnostic ultrasound imaging's contrast resolution is limited by speckle noise, which makes it difficult to detect small, low-contrast lesions and, as a result, difficult for non-specialists to interpret the ultrasound pictures. Ultrasound experts with significant knowledge may find it difficult to derive meaningful conclusions from the images because of the speckles [1]. Ultrasound speckle noise occurs when ultrasound waves reflected from microscopic scattering through tissue interfere with each other. One definition of ultrasonics is "sound with a frequency greater than or equal to 20 kHz". As a pulsing pressure wave, it carries

energy and spreads via several mechanisms. To minimize the speckle effect, a wide variety of algorithms have been developed. There are currently commercially acceptable semi-automatic techniques in place. Coherent accumulation of back-scattered signals and random electromagnetic signal interference result in speckle noise [24]. The nature of degradation makes reducing speckle noise a difficult task in image processing at the moment [3]. Image despeckling [3] is the subject of numerous investigations. In light of the large range of real-world applications in which image processing is used, there is a high need for processing the same. Despeckling big amounts of image data while using as little processing power and memory as possible is a common requirement in today's world [4 and 5]. Consequently, there is always a need for a low-memory recursive framework for image estimation. If we want to reduce the amount of memory used during processing, we need an enhanced and simplified technique that operates on a pixel-by-pixel basis (not an image-by-image basis). Normal despeckling methods require a significant amount of memory, and the new approach is projected to eliminate that requirement. A piece pixel in the image is despeckled and the following pixel is recursively calculated in this method [6]. As a result, compared to iterative approaches, the memory required is drastically reduced. According to Bayesian theory, this technique relies on Bayesian Filtering and Bayesian Theory. However, only a small amount of research has been done on recursive image processing approaches. Because of this, we are more inclined to follow the suggested course of action.

Speckle [15] is another name for this multiplicative noise. It is challenging to understand images taken with coherent imaging techniques like ultrasound because of the speckle noise. Image denoising is therefore necessary in order to separate the nodule from the glandular region. There is a thorough investigation of each technique's challenges in this study. The essential differences between various methodologies were explored as a result of reviewing multiple research publications. Speckle noise reduction can be done by filtering methods and multiscale methods, and Enhanced image is retrieved. Despeckling strategies are discussed in Section 3. Section 4 brings things to a close.
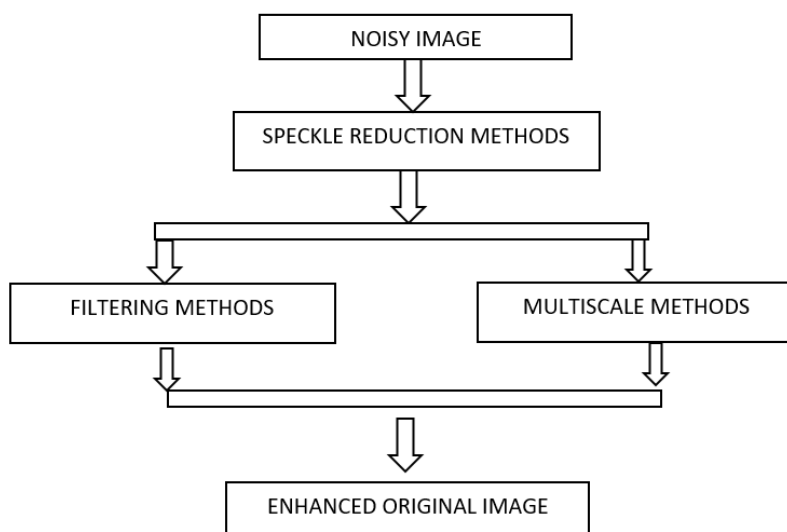
Figure 1: Classification of Speckle Reduction Method

Filters come in a variety of shapes and sizes. Adaptive speckle filters can be categorised as scalar Mean and Median filters. A movable window is used for both sorts of filters. They differ primarily, in that adaptive filters often contain a multiplicative model and utilises local statistics.

II. SPECKLE NOISE

Noise, a random variation in intensity, is a common problem in images taken by sensors. The noise can be caused by changes in brightness, or by the sensor itself, depending on the situation. Using ultrasound images, the noise is directly tied to the intelligible nature of the ultrasound system. Speckle [15] is another name for this multiplicative noise. It is challenging to understand images taken with coherent imaging techniques like ultrasound because of the speckle noise. Image denoising is therefore necessary in order to separate the nodule from the glandular region. Speckle noise is evident in the ultrasound image displayed in figure 2. This is why digital image processing systems aim to remove speckle while keeping key elements such as borders, corners, and textures from the original image.
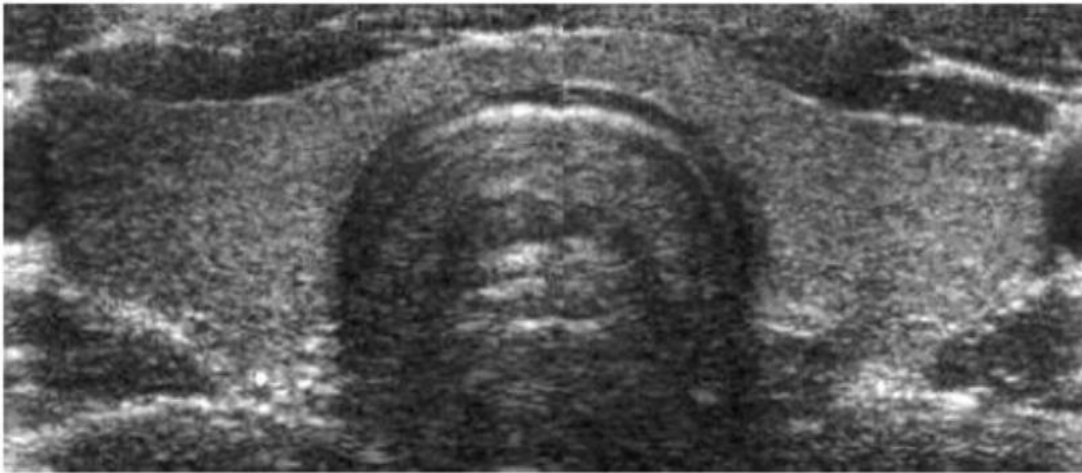
Figure 2: Image corrupted by Speckle noise

III. REVIEW AND CLASSIFICATION

The digital image processing systems aim to remove speckle while keeping key elements such as borders, corners, and textures from the original image. The first method uses a sigma filter to automatically estimate the filter's input parameters. The neural network is used in the second method. This filter is capable of reducing speckle noise and producing an efficient image. These two despeckling methods for ultrasound pictures were devised by Shaimas [7].

Adaptive weighted median filter-based speckle discount approaches for ultrasound images were developed by Loupas et al. [14]. Smoothing has been achieved by modifying weight coefficients based on local statistics. Fixed-width window and restricted noise-reduction capabilities are the main drawbacks of this software.

A speckle reduction filter based on diagnostic ultrasound images' homogeneity map was proposed by Murat Alparslan et al [10]. In order to create a homogeneity map, the local statistics of the window constructed for each pixel are used. The edge-sensitive filter is not as good at smoothing as this method. Better despeckling and edge preservation are the hallmarks of this filter.

In the homogeneity domain, a technique based on directed averaging filters was proposed by Bhateja et al. [8]. Law's mask is employed to glean information from the written word. Pixels are categorised into homogeneous and non-homogeneous regions based on the maximum entropy principle's threshold value. Directional average filter is applied to the non-homogeneous zone, while the homogeneous region is not subjected to a filtering process. Denoising and edge preservation both suffer as a result of the filtering process.

To reduce speckle, Norashikin Yahya and colleagues [9] devised a procedure based on the subspace approach. By eliminating the noise subspace and approximating the noise-free image from the remaining signal subspace, image enhancement is achieved in this method. A linear estimator and a rank abridged subspace model are used for estimation. The filter's noise-reduction capabilities are superior.

Speckle Reduction Anisotropic Diffusion (SRAD) was proposed by Yu et al [59] as a method for removing speckle noise. Using four nearest neighbor windows, a diffusion coefficient is calculated by dividing the local standard deviation by the mean. As a diffusion threshold, it introduces a speckle scale function that acts as the level of smoothness control in this filter. This approach, on the other hand, results in softer edges and more rounded structural content.

Speckle noise reduction in ultrasonic images was proposed by Abd-Elmoniem et al [11] as a nonlinear coherent diffusion. When convolution is applied to the structure tensor, the tensor-valued diffusion function is created. This technique is more effective in reducing speckles and enhancing edges. The main issue is that ultrasound images of tiny features like cysts or lesions are not preserved well by this imaging technique.

The linear approximation of the multiplicative noise model was used by Kuan [12] to suggest a speckle reduction filter. The Lee filter [13] is a good example of how this filter works. The noise model is subjected to the Minimum Mean Square Error criterion, which yields this filter. Based on the weight parameter, it is an adaptive filter. The coefficient of difference of the noisy image and noise is taken into account while determining the weight parameter. In light of this, some minor adjustments have been made to the lines and edges.

A linear grouping of the local mean and the experiential pixel is used to approximate the multiplicative model in the Lee filter. The MMSE criterion is then used to derive the weighting constant (MMSE). Lee's local statistics technique and a non-stationary picture model are employed in the method. Frost [16] is the filter of choice since it is adaptive and exponentially weighted in its average. You can calculate the weights by dividing your image's local standard deviation by its local mean, which is expressed as a coefficient of variation (CV). The Lopes et al. [17] improved Lee and Frost filters by splitting a picture into homogeneous, heterogeneous, and isolated point targets based on the coefficient of variation (low, intermediate, and high, respectively).

3.1. Speckle Noise Removal Filtering Technique

In this paper [18] compared three different techniques, (1) Hybrid Weiner –H Algorithm, (2) LSH frequency domain filtering, (3) Advanced Mexican Hat Linear Spatial Filtering. Among all the three filter Advanced Mexican Hat Linear Spatial Filtering gives a higher PSNR value and lower RMSE value. And it is concluded that AMHLS has better reconstruction technique for ultra sound images. Usage of compression techniques may result in losing of data which cannot be recovered by logarithmic compressed data image or scan converted data image. Envelope detection method is used for optimum result in ultrasound imaging technique.

The PSNR measured in decibels and the equation is given by PSNR. RMSE value is inversely proportional to the equality of image. Outcome of the proposed algorithm is shown in the table.

Table 1 : Filtering Technique model results

Filtering Technique	PSNR	RMSE
Hybrid Weiner–H Algorithm	8.8058	92.8861
LSH frequency domain filtering	6.0148	128.0855
Advanced Mexican Hat Linear Spatial Filtering.	12.0179	64.1723
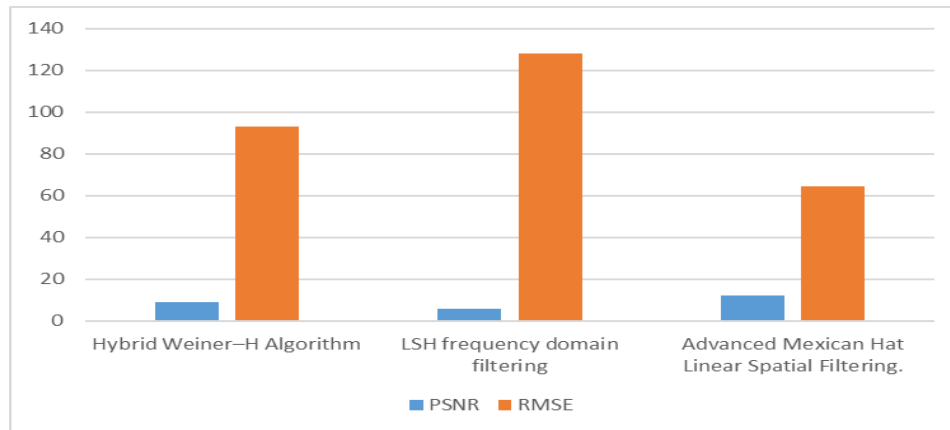
Figure 3: Graphical presentation of Filtering Technique Model results

3.2. Speckle: Modelling And Filtering

The amplitude statistics of coherent imaging may now be modelled using a combination of the Inverse Gaussian distribution [19]. New statistical distributions for modeling amplitude data have been presented by the researchers.

The Rayleigh distribution is not used in this method [20]. The Rician Inverse Gaussian distribution is the name given to this type of distribution. Allows the distribution to be more customizable because it includes three parameters. An EM-type technique can be used to estimate these parameters from real data. For modelling medical ultrasonography and SAR data, the experimental investigation demonstrates that the new pdf is suitable. Their MAP filter has also been updated to account for the new distribution. A closed-form a posterior distribution makes this a simple implementation. The filter output is hence given explicitly. Finally, a comparison of performance of multilook processing, wavelet based despeckling, contourlet based despeckling, and contourlet-based despeckling with cycle spinning is provided for both simulated and actual SAR images. It is shown that the contourlet methods have better performance than multilook or wavelet methods. [4]

A despeckling method based on wavelets for SAR images that uses dyadic wavelet decomposition to break down the original image. On real SAR images, this method blurs strong scatterers but reduces noise in homogenous areas better than any of the other methods examined [20]. SAR speckle reduction using a new

curvelet-domain Bayesian technique. SAR picture interpretation relies heavily on the removal of speckles without sacrificing critical textural and structural information [21].
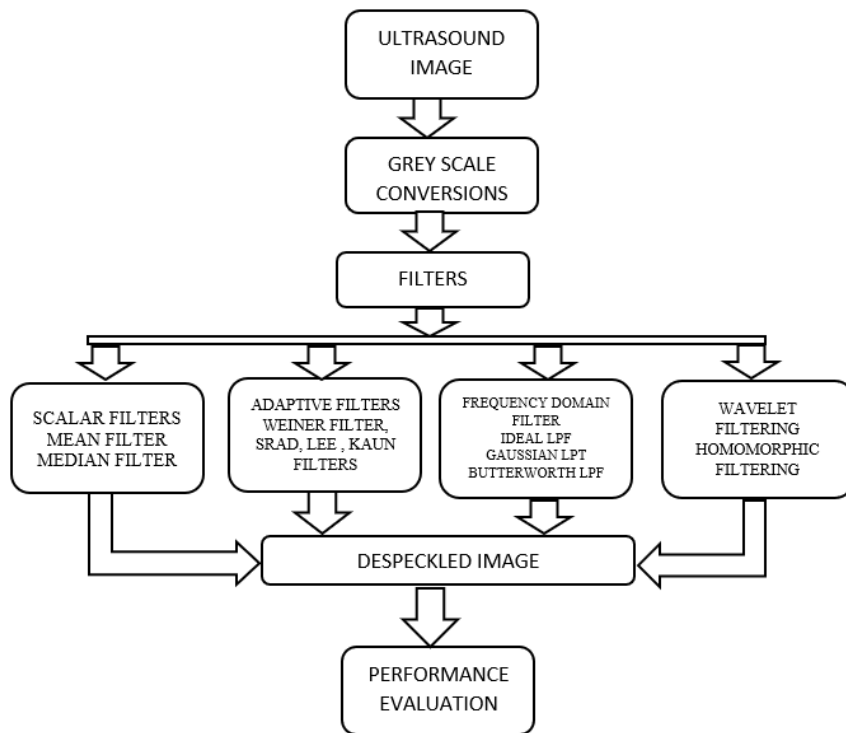
Figure 4: Different kinds of filtering technique

3.3. Image Processing Techniques used in Medical Image

Speckle noise in medical images can be reduced using adaptive median filters and associated to the mean and median filters in this research [22]. This filter, when tested against other options, outperformed them all by 80% in various sorts of medical images. Noises of various kinds are contrasted and analysed. Impulsive Noise, Additive Noise, and Multiplicative Noise are only a few of the noises that are being compared. The most common causes of an Impulsive Noise (Salt & Pepper) include data transmission faults. Natural noise processes, such as those caused by electrical noise in an image acquisition system, are typically modelled using Additive Noise. There are two steps to the proposed adaptive median filter: the first begins with the mean filter, and the second stage begins with the median filter. Using ultrasound images, all algorithms are tested. Based on simulations, the Proposed Adaptive Median Filter was found to perform better than the competition.

3.4. A Bilateral Filter for Ultrasound Images De-speckling

In this paper Sameera et al., [23] proposes an algorithm which works on two steps. In high frequency band non parametric wavelet approximation and in low frequency band guided bilateral filter. Wavelets give both the time and frequency representation of a particular signal simultaneously. The size of the wave is determined by a finite window function. A wavelet is a wave like oscillation in amplitude of the signal.
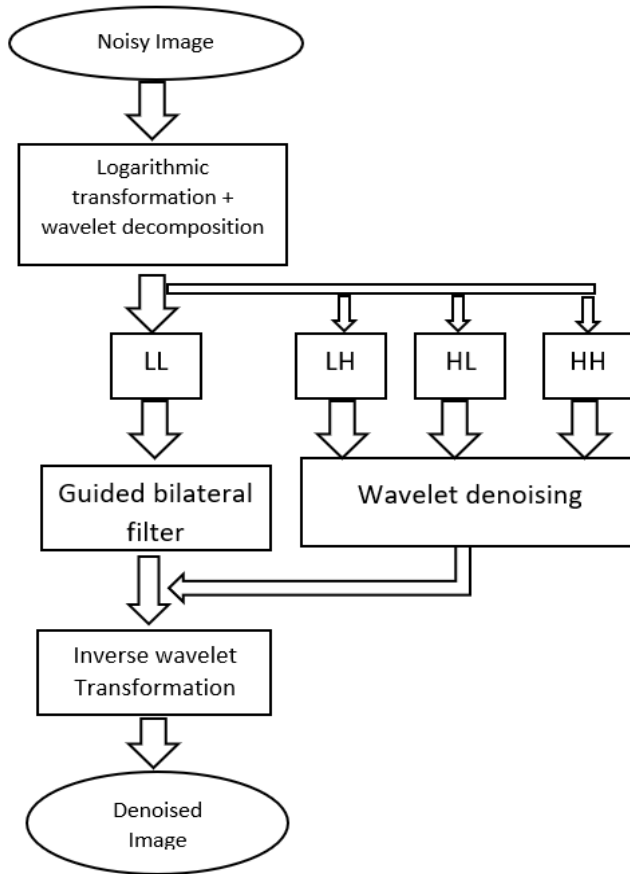
Figure 5: Transformation Technique for Denoising

Wavelet decomposition is used to obtain the frequency component of the image and Bayesian framework is applied to despeckle the low noise components. Existing methods such as the Bayesian non-local means filter (OBNLM), wavelet estimation using a non-parametric model, and fast bilateral filtering were all compared to the suggested method. Both edge preservation and visual quality were shown to be improved quantitatively by the proposed technique. The good edge preservation of a bilateral filter makes it a popular choice for reducing speckle noise from images in three-dimensional (3D) space. Wavelets and a bilateral filter work together to reduce noise while maintaining the edges. In the suggested approach, the PSNR and EPI values are improved by using a MAP estimator and a guided bilateral filter.

IV. MULTISCALE METHODS

In the Multiscale Methods, we describe the four technologies to reduce the noise in the images as Recursive Filter, Comprehensive Guided Filter With Bayesian Nonlocal Means, Wiener Filtering and Adaptive Wavelet Thresholding and Image Segmentation. These methods are discussed in following section.

4.1. A Despeckling SAR Images using Recursive Filter.

A recursive technique for image despeckling is presented in this publication [24]. A discontinuity-adaptive Markov random field prior is included into the unscented Kalman filter architecture through significance sampling to provide outstanding despeckling and feature preservation. On both synthetic and actual photos, the performance is demonstrated. Random multiplicative noise is used to represent fully-developed speckle. It is assumed that noise is uncorrelated with variance and has a unit mean and standard deviation.

SAR image speckle noise can be effectively suppressed while still keeping the image's properties, thanks to a new recursive technique based on the unscented Kalman filter (UKF).A discontinuity-adaptive Markov conditional PDF can be incorporated into the UKF. When estimating, UKF incorporates multiplicative noise. The UKF multiplicative measurement equation uses a collection of sigma points to compute the final image estimations using the prior and the speckle noise statistics. This method is less computationally intensive but more flexible in terms of location. With this filter, there is no need for an explicit detection of edges because of the discontinuity preserving prior. It is not necessary to deduce the AR parameters of the original image, as in the ABKF [25]. Non-Gaussian priors can be incorporated into the proposed filter without the need for parameter estimation or optimization.

4.2. Generalized Guided Filter

It is suggested in this study [29] that a generalized guided filter with Bayesian nonlocal means be used as an expanded despeckling strategy (GGFBNLM). An original image and a guiding picture are both taken into account when determining how the guided filter's output should be computed. The desired guided filter does the following: When it comes to the first phase, it stretches the linear-guided filter (GGF) to a nonlinear one (BNLM framework) and uses input images and original images to figure out a nonlinear weight kernel.

In the second step, it creates a guiding image based on the homogeneity of local regions and the ML algorithms used. The BNLM framework is used to derive the expression of the GGF with a nonlinear weight kernel in guided filter. Frost, GM, BNLM, BM3D and LHRS-PRM are compared to the suggested technique in terms of speckle filters. Filtering and multi-look processing are the two most common approaches for reducing speckle. Speckle noise is reduced, but the spatial resolution of the image is degraded. It is possible to reduce noise in particular sections of an image by using local pixel intensity statistics, but this can result in the loss of features when applied to edges and textures, which are more difficult to deal with in terms of noise removal.

4.3. Wiener Filtering and Adaptive Wavelet Thresholding for Speckle Noise Reduction in Images

Using spatial and frequency field approaches, this paper [30] removes speckle noise. The Wiener Filter is used for spatial preprocessing, while the wavelet transform coefficient of adaptive soft thresholding is used for frequency preprocessing. Logarithmic transform to Wiener filtered image is used since speckle is multiplicative in this work. The wavelet transform is decomposed into two levels, and only the detail coefficients are subjected to thresholding. The standard deviation of each decomposition level and subband is used to calculate the threshold value. For this image, the threshold is calculated by selecting the most homogeneous sub-block of the image. PSNR and SSIM measures are used to quantitatively analyze the data. It has already been stated that the Despeckling Algorithm is used.1) Filtering is done using Wiener filtering on the speckled image. 2) The

logarithm of the resulting image transforms the multiplicative noise model into an additive one. 3) The picture is subjected to Discrete Wavelet Transform and decomposed using Meyer Wavelet up to level 2. Each subband except the lowest level LL band has a threshold calculated. All LH, HL, and HH subbands are soft-thresholded. Approximation and thresholded detail coefficients are used to construct the Inverse Wavelet transform on the approximation coefficients. This image is despeckled using the exponent. This new approach has the potential to drastically reduce speckle noise while still being applicable to a wide range of tasks.

4.4. Image Segmentation and Ultrasound Imaging

This paper [31] emphasised a medical imaging technique, segmentation is still necessary in order to collect both qualitative and quantitative measures. This includes the position of an object of interest as well as its volume, area, or dynamic behaviour over time. They're important since they can be produced at video-rate and so allow for dynamic analysis of touching structures. In addition, compared to additional medical imaging procedures, the gathering of these pictures is non-invasive, inexpensive, and does not necessitate the use of ionising radiation. Anatomical features in ultrasound images, on the other hand, are difficult to segment due to the inherent acoustic interference (speckle noise) and artefacts in these images

4.5. Improved Non-Local Means Filtering

Non-local means approaches uses Euclidean distance for finding similar blocks. Euclidean distance is a good choice for additive noises where the noise statistics is known. But in multiplicative random scenario like speckle where the noise statistics is unpredictable, Euclidean is not a good choice. Herefore the computational efficiency of NLMF can be improved by modifying the distance. Refining the similarity estimates in different iterations Brox and Cremers. Distance is the measure of dissimilarity that is smaller distance corresponds to better similarity between the patches. Similarity is a factor that quantifies the dependency between the pixels in the image. Euclidean Distance represents the shortest distance between two points. It is given as the square root of the sum of the squares of the differences between two data points. Identical points will have Euclidean distance as zero and points with less similarity will have higher values. In additive noise statistics Euclidean distance makes perfect sense but in multiplicative scenario like SAR where noise statistics constantly changes, Euclidean distance loses its significance. So, in order to find out suitable distance measure that can improve the efficiency of non-local means filtering, different distance measure.

4.6. Despeckling Using Lee Filter

Lee is a non-adaptive filter using the first order local statistics of the neighborhood pixels. It converts the multiplicative model into additive and approximates the value by a linear combination of the local mean of the pixel. The MSE can be easily estimated from the local mean and variance. Brighter areas are affected more by noise than dark areas. Therefore, the brighter regions near the neighborhood are redefined by incorporating local gradient. Then the weighting constant is determined by a MMSE estimator. Lee uses a linear statistic for approximation. Mean and variance of the pixel of interest is the local mean and local variance of all pixels within the moving window selected by the user. That is Lee uses the statistical distribution of the pixels in the area of interest in order to carry out denoising.

V. CONCLUSION

We've looked at a variety of methods for despeckling photos in this literature study. We could learn and evaluate despeckling strategies so that the best method for each case can be selected This paper provides a quick overview of a brand-new despeckling method. A review of many works led us to conclude that a Bayesian strategy can yield superior results since speckle noise is multiplicative. An enhanced, more straightforward method that uses pixels rather than images like it does in wavelet transform, filtering techniques, wavelet transformation, soft/hard thresholding, multi-spinning concepts and normalized convolution would help reduce processing memory requirements. We hope that this document will be useful to others in their search for the best despeckling method.

VI.REFERENCES

[1]. Singh, P., & Shree, R. (2016). Speckle Noise: Modelling and Implementation, published in International Journal of Control Theory and Applications, 9 (17).

[2]. de Jesus Torres, A., Sanguinetti, L., & Björnson, E. (2021). Electromagnetic interference in RIS-aided communications. IEEE Wireless Communications Letters.

[3]. Szkulmowski, M., Gorczynska, I., Szlag, D., Sylwestrzak, M., Kowalczyk, A., & Wojtkowski, M. (2012). Efficient reduction of speckle noise in Optical Coherence Tomography. Optics express, 20(2), 1337-1359.

[4]. Fracastoro, G., Magli, E., Poggi, G., Scarpa, G., Valsesia, D., & Verdoliva, L. (2021). Deep learning methods for synthetic aperture radar image despeckling: An overview of trends and perspectives. IEEE Geoscience and Remote Sensing Magazine, 9(2), 29-51.

[5]. Lapini, A., Bianchi, T., Argenti, F., & Alparone, L. (2013). Blind speckle decorrelation for SAR image despeckling. IEEE transactions on geoscience and remote sensing, 52(2), 1044-1058.

[6]. Li GT, Wang CL, Huang PP, Yu WD. SAR image despeckling using a space-domain filter with alterable window. IEEE Geoscience and Remote Sensing Letters. 2012 Jul 3;10(2):263-7.

[7]. El-Said, S. A., & Azar, A. T. (2012). Speckles suppression techniques for ultrasound images. Journal of medical imaging and radiation sciences, 43(4), 200-213.

[8]. Bhateja, V., Srivastava, A., Singh, G., & Singh, J. (2014). A modified speckle suppression algorithm for breast ultrasound images using directional filters. In ICT and Critical Infrastructure: Proceedings of the 48th Annual Convention of Computer Society of India-Vol II (pp. 219-226). Springer, Cham.

[9]. Attlas, N., & Gupta, S. (2014). Wavelet based techniques for speckle noise reduction in ultrasound images. International Journal of Engineering Research and Applications (ijera) vol, 4, 508-513.

[10].Gungor, M. A., & Karagoz, I. (2015). The homogeneity map method for speckle reduction in diagnostic ultrasound images. Measurement, 68, 100-110..

[11].Yu, Y., & Acton, S. T. (2002). Speckle reducing anisotropic diffusion. IEEE Transactions on image processing, 11(11), 1260-1270.

[12].Abd-Elmoniem, K. Z., Youssef, A. B., & Kadah, Y. M. (2002). Real-time speckle reduction and coherence enhancement in ultrasound imaging via nonlinear anisotropic diffusion. IEEE Transactions on Biomedical Engineering, 49(9), 997-1014.

[13].Kuan, D. T., Sawchuk, A. A., Strand, T. C., & Chavel, P. (1985). Adaptive noise smoothing filter for images with signal-dependent noise. IEEE transactions on pattern analysis and machine intelligence, (2), 165-177.

[14].Loupas, T., McDicken, W. N., & Allan, P. L. (1989). An adaptive weighted median filter for speckle suppression in medical ultrasonic images. IEEE transactions on Circuits and Systems, 36(1), 129-135.

[15].Bianco, V., Memmolo, P., Leo, M., Montresor, S., Distante, C., Paturzo, M., ... & Ferraro, P. (2018). Strategies for reducing speckle noise in digital holography. Light: Science & Applications, 7(1), 1-16.

[16].Subrahmanyam, G. R. S., Rajagopalan, A. N., & Aravind, R. (2008). A recursive filter for despeckling SAR images. IEEE transactions on image processing, 17(10), 1969-1974.

[17].Porwal, S., Kumar, S., Joshi, J., Madhur, V., & Khan, S. (2016, March). Speckle noise removal filtering techniques for ultrasound image with comparison between technique according to standard measures. In 2016 3rd International Conference on Computing for Sustainable Global Development (INDIACom) (pp. 2910-2914). IEEE.

[18].Pickens, J., Bello, J. P., Monti, G., Sandler, M., Crawford, T., Dovey, M., & Byrd, D. (2003). Polyphonic score retrieval using polyphonic audio queries: A harmonic modeling approach. Journal of New Music Research, 32(2), 223-236..

[19].Dai, M., Peng, C., Chan, A. K., & Loguinov, D. (2004). Bayesian wavelet shrinkage with edge detection for SAR image despeckling. IEEE Transactions on Geoscience and Remote Sensing, 42(8), 1642-1648.

[20].Misra, S., & de Matthaeis, P. (2014). Passive remote sensing and radio frequency interference (RFI): An overview of spectrum allocations and RFI management algorithms [technical committees]. IEEE Geoscience and Remote Sensing Magazine, 2(2), 68-73.

[21].López-Martínez, C., & Fabregas, X. (2003). Polarimetric SAR speckle noise model. IEEE Transactions on Geoscience and Remote Sensing, 41(10), 2232-2242.

[22].Yang, A. (2010, October). Research on image filtering method to combine mathematics morphology with adaptive median filter. In 9th International Conference on Optical Communications and Networks (ICOCN 2010) (pp. 55-59). IET.

[23].Sagheer, S. V. M., & George, S. N. (2016, March). A novel approach for de-speckling of ultrasound images using bilateral filter. In 2016 3rd International conference on recent advances in information technology (RAIT) (pp. 453-459). IEEE.

[24].Subrahmanyam, G. R. S., Rajagopalan, A. N., & Aravind, R. (2008). A recursive filter for despeckling SAR images. IEEE transactions on image processing, 17(10), 1969-1974.

[25].Salehi, M., Mohammadzadeh, A., & Maghsoudi, Y. (2017). Adaptive speckle filtering for time series of polarimetric SAR Images. IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, 10(6), 2841-2848.

[26].Porwal, S., Kumar, S., Joshi, J., Madhur, V., & Khan, S. (2016, March). Speckle noise removal filtering techniques for ultrasound image with comparison between technique according to standard measures. In

2016 3rd International Conference on Computing for Sustainable Global Development (INDIACom) (pp. 2910-2914). IEEE.

[27].Anilkumar, K. K., Manoj, V. J., & Sagi, T. M. (2020). A survey on image segmentation of blood and bone marrow smear images with emphasis to automated detection of Leukemia. Biocybernetics and Biomedical Engineering, 40(4), 1406-1420.

[28].YOONG, L. K., HOU, C., LIEW, S. C., & KWOH, L. K. (2021). Speckle Filtering and Physical Scattering Decomposition for ALOS-2 PALSAR-2 Polarimetric Mosaic.

[29].Ni, W., & Gao, X. (2015). Despeckling of SAR image using generalized guided filter with Bayesian nonlocal means. IEEE Transactions on Geoscience and Remote Sensing, 54(1), 567-579.

[30].Mridula, S., & Mohanan, P. (2016, November). Speckle noise reduction in images using Wiener filtering and adaptive Wavelet thresholding. In 2016 IEEE region 10 conference (TENCON) (pp. 2860-2863). IEEE.

[31].Anilkumar, K. K., Manoj, V. J., & Sagi, T. M. (2020). A survey on image segmentation of blood and bone marrow smear images with emphasis to automated detection of Leukemia. Biocybernetics and Biomedical Engineering, 40(4), 1406-1420.

Synthesis, Physical and Optical Properties of Titanium Doped Tellurium Oxide Glasses

Ramkrishna Mahato[1], Sukhdev Bairagi[1], S. K. Dhiman[2], Ghizal F. Ansari[1*]

[1]Department of Physics, Madhyanchal Professional University, Bhopal, Madhya Pradesh, India
[2]Departments of Mechanical Engineering, Birla Institute of Technology, Mesra, Ranchi, Jharkhand, India

ABSTRACT

Titanium tellurite (TTN) glasses with the composition (90-x) %TeO2 –x% TiO2– 10%Na2O (where x varies 5 to 20% in the gap of 5%). Melt quenching was used to make them. These glass samples were studied using XRD at room temperature. The XRD signals corroborated the amorphous nature of the glass samples. The glass transition temperature of TTN4 glass was measured using differential scanning calorimetry (DSC), and the results demonstrate that as the TiO2 content of the glass increases, the glass's stability factor ΔT improves. Other characteristics of glass samples were computed, including density ρ, molar volume Vm, polaron radius Rp, oxygen packing density (OPD), intermolecular distance Ri and molar refraction Rm. In terms of the variation of TiO in the glass composition, the change in density and molar volume has been explored. The UV-VIS-IR spectra of samples were recorded in the 400nm to 1000nm spectral region, and the refractive index (n), absorption coefficient (α), direct and indirect forbidden energy band gaps (Eopt), and Urbach energy (Eu) were shown to decrease with TiO2 compositions.

Key Words: Tellurite glasses; Absorption Spectra; Structure analysis; Refractive index; Optical energy band gap; Urbach Energy.

I. INTRODUCTION

Tellurite glass systems were more appealing than oxide glass formers because of their low phonon energy (around 800 cm1), which increases the quantum efficiency from excited states of rare-earth ions in these matrix and allows for the implementation of efficient lasers and opticalamplifiers [1, 2]. These properties, due to the high polarisability of Te4+-ions (with a solitary electron pair 5s2), can be even more enhanced by means of the incorporation of other heavy metals oxides that can be easily polarised (e.g., Bi3+, Pb2+) or with empty d orbital (Ti4+, Nb5+). [3] Apart from these special optical properties, other advantages of such glasses are their good thermal and chemical stability, high rare earth ions solubility and high linear and nonlinear refractive indices, with a wide transmission window (typically 0.4–6 μm). The structure and optical properties of many kinds of tellurite glass have been studied, such as Te02 - Zn0[4], Te02-W03[5], Te02- K2O[6] and some ternary glass

systems'" [7-8]. Other authors have enlarged the field of knowledge about tellurite glasses with research concerning ternary and quaternary systems.[9–13].

In this work, we report the synthesis, physical and optical properties of tellurite   base glass of composition TeO2–TiO2–Na2O system. Afterwards, some of such glasses will be selected as the best for a further study focused on their application as photonic materials.

II. MATERIALS AND METHOD

Traditional melting and quench method has been implemented to prepare Titanium Oxide tellurite glass samples. High purity chemical substances (Otto) Tellurium oxide, Titanium Oxide and sodium oxid were taken in following composition:

I.   TTN1≡85%TeO2-10%Na2O- 05%ZnO

II.   TTN2≡80%TeO2-10% Na2O -10%ZnO

III.   TTN3≡75%TeO2-10% Na2O -15%ZnO

IV.   TTN4≡70%TeO2-10% Na2O -20%ZnO

For proper mixing mortar and pestle were used. Then the batch mixer was melted in alumina crucibles in a muffle furnace. Temperature was taken as high as 1100°Cto introduce molten vitreous property in it followed by physically stirring ensuring homogeneity in the mixture. It was further heated to 1200°Cfor 1 and ½ hour and then poured in stainless steel moulds to form pellets of diameter 10mm and thickness of 2 mm. For annealing a hot oven maintained at 250 °C was used for 60 minutes. X-RAY diffraction of sample glasses were studied for the endorsement of amorphous nature. Differential Scanning Calorimetry for the analysis of thermal properties. Absorption spectroscopy has been carried in the spectral range of 350 - 1000nm spectral range.

III. RESULTS AND DISCUSSION

3.1. Differential Scanning Calorimetry (DSC)

Titanium Tellurium Oxide the DSC curve of sampleTTN4 glass with 70%TeO2- 20%Ti2O3-10%Na2O chemical mixture is studied (Fig.1). It is possible to see the glass transition temperature Tg and the start crystallisation temperature Tc. In the temperature range of 30°C to 500°C, Differential Scanning Calorimetry is investigated. The scan clearly shows that the glass transition temperature Tg of synthesised ternary glass is mild at 320°C. The melting temperature Tm is 350 degrees Celsius, while the crystallisation temperature Tc is 470 degrees Celsius. The difference $\Delta T = Tc-Tg$ is commonly utilized as a key criterion for determining glass thermal stability [14]. It's worth noting that the higher the value of T, the greater the anti-crystallization ability. T of glasses is 150 degrees Celsius in our measurements, which is higher than that of glass tellurite glass (102 degrees Celsius) [15] and fluorophosphate glass (87 degrees Celsius) [16], but the modest value of T suggests that the thermal characteristics of glasses are unstable. However, if the T value is more than 100 degrees Celsius, the produced glass is stable and suitable for applications such as fiber and laser elements.
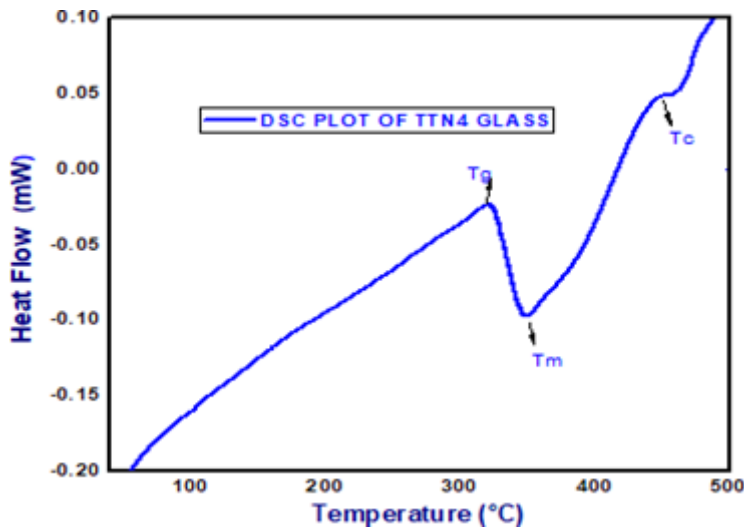
Fig. 1. DSC plot of TTN4 glass of composition 70%TeO2-20%Ti2O3-10%Na2O

3.2. Structure analysis

The representative powder XRD pattern of titanium -tellurite glasses of chemical compositions (90-x) %TeO2 – x% TiO2–10%Na2O (where x is 5, 10, 15 and 20%) are shown in Fig.2, justify the glassy natures of synthesized titanium- tellurite glasses. X-Ray differactogram is carried by Rigaku, Japan, Smart Lab 9kW at room temperature in the range of 10° to 80° value of 2θ. The diffractograms of the TTN samples contain a broad hump at near 30°, and no other sharp spike were observed, which indicate the absence of crystallinity in samples .
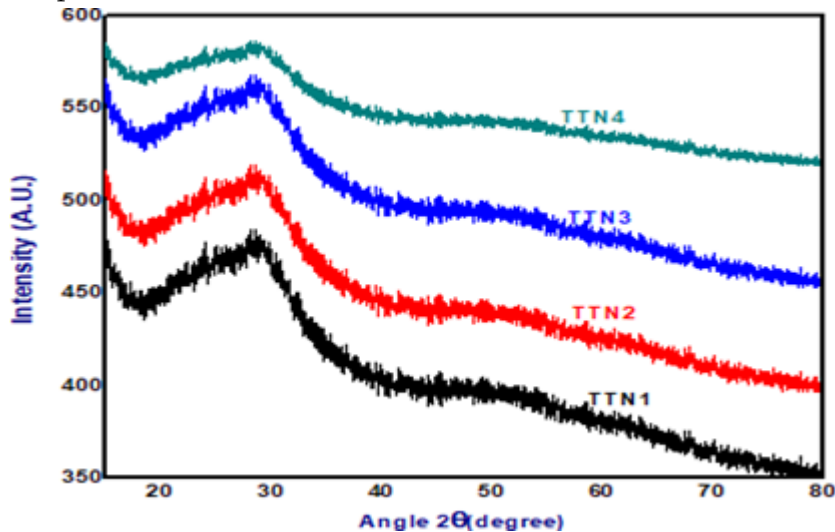
Fig.2.XRD plot for TTN glasses of chemical compositions (90-x)%TeO2 –x% TiO2– 10%Na2O

3.3. Physical Properties

The Archimedes principle was used to determine the densities (ρ) of produced ternary titanium tellurite glasses at room temperature. As a buoyant liquid, distilled water is employed. The glass samples TTN were weighed ωa in the air and ωl while dipped in a floating liquid (distilled water with a density of ρw = 1 g cm–3at ambient temperature). The following relationship was used to determine the densities of TTN glasses:

$\rho = (\omega a) \ldots\ldots (1)$

$\omega a - \omega l$

Figure 3 depicts the relationship between density and molar volume as a function of TiO concentration. The relationship between increasing density and decreasing molar volume is linear.

The molar volume (Vm) of TTN glasses was estimated using the following relation, with the help of computed densities and molecular weight

$Vm = M/ \rho$ (2) …. (2)
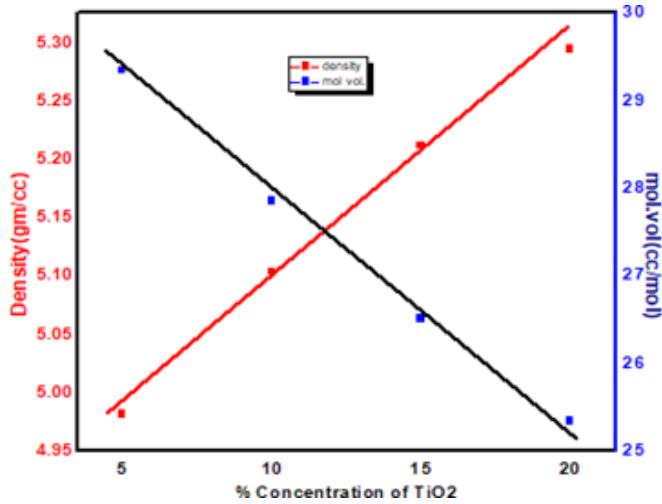
Fig. 3 Plot of variation of density and molar volume with varying TiO2 concentration

The oxygen packing density (OPD) of oxide glasses is a measure of the spatial layout of the oxide network. The oxygen packing density (OPD) is determined by the glass sample's molar volume (Vm) and the amount of oxygen atoms (n) accessible. The equation for determination of OPD is given as [17]

$OPD = 1000 \times n$

$Vm\ldots\ldots (3)$

By using the following relation the content of titanium ions in glass samples' N (ion/cm3) was estimated. [18]

N = mole% of **Ti** ions $\times \rho \times NA$

Vm

… (4)

Where NA is Avogadro'snumber. Further the polaron radius (Rp), internuclear distance (Ri) and molar refraction (Rm),are calculated by using the ion concentration [19]

$Rp = 1/2 (6\pi N) 1/3$ (5)

$Ri = (1/N) 1/3$ (6)

$Rm = \{(n2-1)/n2+1)\} \times Vm$ (7)

Table 1 shows the computed values of physical attributes. With increasing TiO concentration, density values rose from 4.982 to 5.294 g/cm3. The average Ti-Ti distance, internuclear distance (Ri), Polaron radius (Rp),

molar refraction (Rm) and Oxygen Packing density (OPD) were computed from density and molar volume measurements. When the concentration of TiO mole percent increases, the interionic distance (Ri), Polaron radius (Rp) and molar refraction (Rm) decrease.

Table 1. The physical attributes of TeO2–TiO2–Na2O glass system

Name of the Sample	TTN1	TTN2	TTN3	TTN4
Batch composition in percent (TeO2: TiO2: Na2O)	85:05:10	80:10:10	75:15:10	70:20:10
Molar Mass (M) gm/mol	146.2	142.2	138.2	134.2
ρ (g/cm³)	4.982	5.104	5.212	5.294
V_m (cm³/ mol)	29.345	27.860	26.516	25.349
OPD (mol/l)	68.153	71.786	75.427	78.897
N($\times 10^{23}$) (ions cm⁻³)	1.026	2.162	3.407	4.752
R_p (nm)	0.277	0.216	0.186	0.166
R_i (nm)	0.991	0.773	0.664	0.595
Rm(cm³)	15.067	14.304	13.614	13.015

3.4. Absorption Spectra

UV-VIS-IR absorption spectra of ternary titanium tellurite glass samples have been taken in the wavelength range from 400nm to1000nm at room temperature are shown in Fig. 4. The absorption coefficient α is inversely depend on the thickness t of the sample and given by $\alpha = 2.302A/t$ [20], where A is the sample's absorbance.
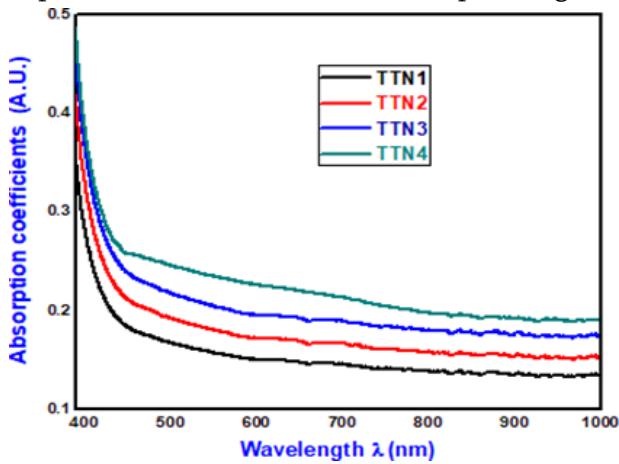
Fig. 4. Absorbance plot of TTN Glasses

3.4.1. Optical Energy Band Gap

In amorphous materials, it is well known that the absorption coefficient α depends on hv according to the following equation (7)

$\alpha\,hv = C(hv{-}Eg)\,m$ (7)

Where "C" stands for the proportionality constant, Eg for the optical band gap, and m for the transition process index. If m = 1/2, the allowable transition is direct, and if m = 2, the allowed transition is indirect. As a result, m = 1/2 has been used in equation(7) to compute the direct optical band gap in TTN glasses. Figure 5 depicts the curves of $(\alpha hv)2$ versus incoming radiation energy " hv (in eV)" for synthesized TTN glasses. Extrapolating the linear component of the exhibited curves up to $(\alpha hv)2 = 0$ yielded the optical band gap values. The value of Eg For the synthesized TTN1, TTN2, TTN3, and TTN4, glasses are found to be 3.15,3.12,3.10 and 3.08 eV.
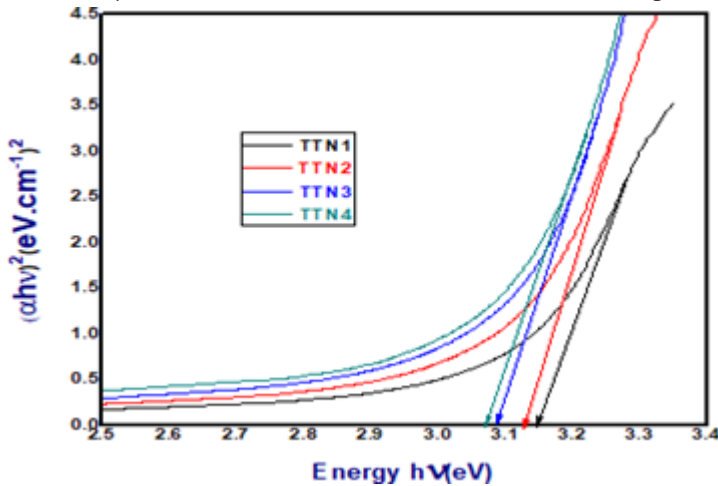
Fig. 5. Tauc's plots for direct band gap of TTN glasses

Indirect bandgap in Figure 6 shows the relationships between $(\alpha hv)1/2$ and incoming radiation energy " hv (in eV)" for synthesized TTN glasses. Indirect optical band gap values calculated are 3.10, 3.05, 3.02, and 3.0 eV. As the TiO2 concentration increases, the values of the of optical band gaps decrease. This tendency may be explained in terms of structural changes occurring in glass systems [21].
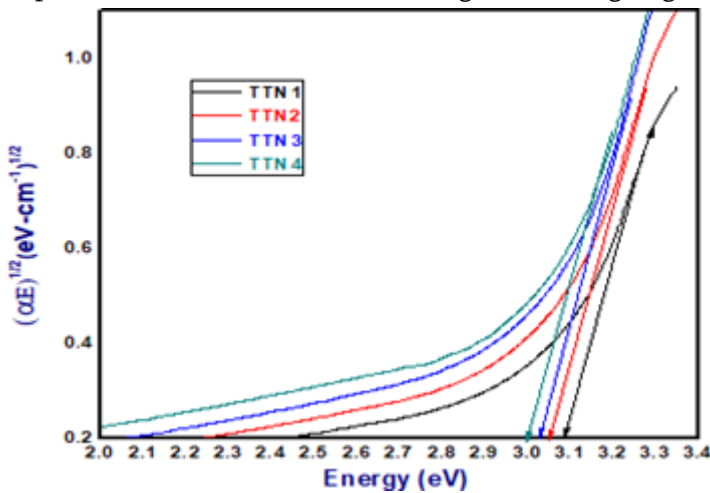
Fig. 6. Tauc's plots for indirect band gap of TTN glasses

3.4.2.   Refractive index

The optical energy gap is dependent on the refractive index n.,and the optical energy gap Eg was investigated by the relationship (22)

$\dfrac{n^2-1}{n+2} = 1 - \sqrt{Eopt}/20$ .... (8)

The refractive index of TTN glasses rises with increasing in TiO_2 concentration. In TTN glasses Titanium ions are present in the form of Ti^{4+} ions [23].

Variation of Eg and 'n' with increase in TiO_2 concentration in glass network is shown in fig.7.
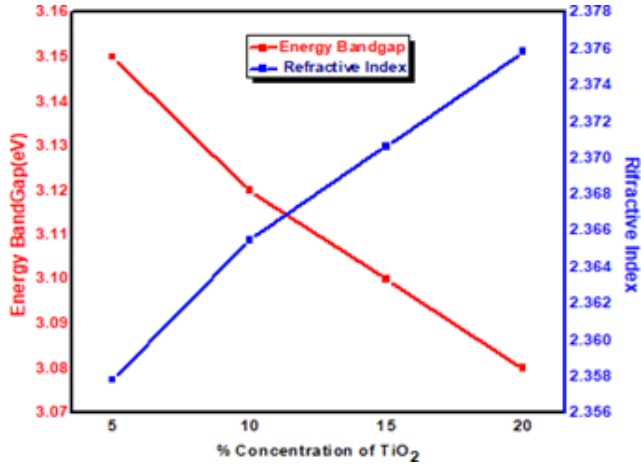
Fig.7. Variation of optical energy band gap and refractive index with TiO_2 concentration

3.4.3. Urbach Energy

According to Urbach, in an amorphous material, the relation between the absorption coefficient and incident photon energy can be expressed as [24].

$\alpha = \alpha_0 e^{hv/Eu}$ ...... (9) where, α_0 is proportionality constant Eq. (9) can be rewrite as

$ln\alpha = hv/Eu + consta$ ....(10)

The exponential behavior given in equation(9) has been demonstrated and the curves are plotted between logarithmic values of the absorption coefficient versus incident photon energy. The reciprocal of the slope of the linear portion of the curve between $ln(\alpha)$ versus hv (shown in Figure 8) provides the value of Urbach energy[25]. The values of Urbach energy of the prepared TTN samples are found 0.261, 0.212, 0.184 and 0.176 eV respectively.
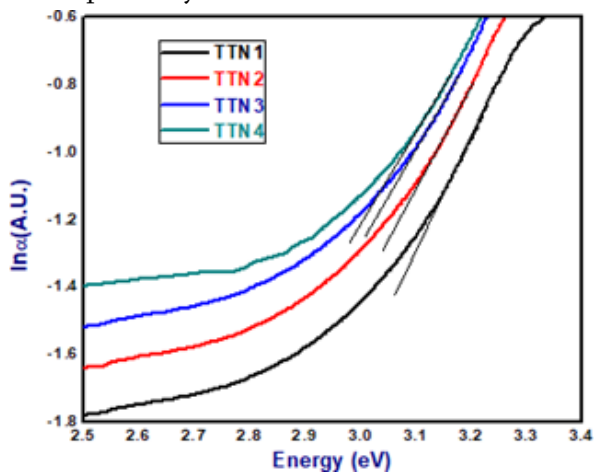
Fig. 8The Urbach's plot of synthesized TTN glasses

Table 2 Optical properties of ternaryxTiO-(90-x) TeO2 -10Na2O glasses

Glasses code	TTN1	TTN2	TTN3	TTN4
Direct energy band gap(eV)	3.15	3.12	3.10	3.08
Indirect energy band gap(eV)	3.10	3.05	3.02	3.0
Refractive index	2.357	2.365	2.370	2.375
Urbach energy (eV)	0.261	0.212	0.184	0.176

IV. DISCUSSION

The titanium tellurite glass systems of composition (90-x) %TeO2 –x% TiO2–10%Na2O (where x is 5, 10, 15 and 20%) were prepared successfully using conventional melt quenching method. Synthesized tellurite glasses having low transition temperature confirmed by DSC characterization and also the glass thermal stability ΔT =Tc–Tg . The XRD spectra confirmed the amorphous nature of synthesized glasses. Measured maximum refractive index and higher density are 2.375 and 5.294 g/cm3 respectively for TTN glasses. The OPD and ρ are found to increase with increasing TiO2 content. The expected decrease in the Rp and Ri with increasing concentration of TiO2 is observed. The optical absorption behavior of the samples is measured through UV–VIS-NIR spectroscopy. With increase of TiO2, optical bandgap decreases and refraction index increases. The maximum observed values of both the optical band gap and refractive index TTN glass samples are Eopt. = 3.15 eV (TiO2 -5%)and n=2.375 (TiO2 - 20%)respectively.

V. ACKNOWLEDGMENT

VI.REFERENCES

[1]. Wang J S, Vogel E M and Snitzer E 1994 Opt. Mater. 3 187

[2]. El-Mallawany R A H 2001 Tellurite 2.Glasses Handbook—Physical Properties and Data (Boca Raton, FL: CRC Press)

[3]. Lines, M. E., Influence of d orbitals on the non linear optical response of transparent transition metal oxides. Phys. Rev. B, 1990, 41, 3383–3390

[4]. FiorenzoVetrone, John-Christopher Moyer, John A. Capobianco 980 nm excited upconversion in an Er3+ doped ZnO-Te02 glass [J 1. Applied Physics Letters, 2002, 80: 1752.

[5]. Nunzi G, Bemeschi S, Bettinelli M. Rare earth doped tungsten glassed and waveguides : fabrication and characterization [J] . Journal of Non-Crystalline Solids , 2003, 345&346: 343.

[6]. Yasuhiko Iwadate, Takeshi Mori, Takeo Hattoria. Xray diffraction study on the short- range structure of K20- TeO, glasses and melts [J] . Journal of Alloys and Compounds, 2000, 311: 153

[7]. Xu Shiqing, Dai Shixun, Zhang Junjie, Hu Lili, Jiang Zhonghong. Broadband 1. 5 pm emission of erbiumdoped TeOz-W03-Nb203 glass for potential WDM amplifier [J] . Chinese Optics Letters, 2004, 2: 106.

[8]. Liu Y H, Chen D D, Zhang Q Y, Jiang Z H, Frequency up-conversion properties of Er3 +-doped TeOz-ZnOPbClz oxyhalide tellurite glasses [J] . Optical Materials , 2006, 28: 302.

[9]. Lezal, D., Pedlikova, J., Kostka, P., Bludska, J., Poulain, M. and Zavadil, J., Heavy metal oxide glasses: preparation and physical properties. J. NonCryst. Solids, 2001, 284, 288– 295.

[10]. Zhang J., Tao H., Cheng Y., Zhao X. (2007). Structure, Upconversion and Fluorescence Properties of Er3+ doped TeO2 – TiO2 – La2O3 Tellurite Glass. Journal of Rare Earths 25:108 – 112.

[11]. G. Lakshminarayana, J. Qiu, M. G. Brik, G. A. Kumar and I. V. Kityk, "Spectral analysis of Er3+, Er3+/Yb3+ and Er3+/Tm3+/Yb3+-doped TeO2-ZnO-WO3-TiO2-Na2O glasses," Journal of Physics : Condensed Matter, vol. 20, pp. 375101-375109, 2008.

[12]. Abouhaswa, A.; Zakaly, H.M.; Issa, S.A.; Rashad, M.; Pyshkina, M.; Tekin, H.; El- Mallawany, R.; Mostafa, M.Y. Synthesis, physical, optical, mechanical, and radiation attenuation properties of TiO2–Na2O–Bi2O3–B2O3 glasses. Ceram. Int. 2021, 47, 185– 204.

[13]. Murugan, G. S. and Ohishi, Y., Structural and physical properties of a novel TeO2–BaO– SrO–Ta2O5 glass system for photonic device applications. J. Non-Cryst. Solids, 2005, 351, 364–371

[14]. Dietzel, A. Glass structure and glass properties. Glasstech Ber. 22, 41–48 (1968). 15. 22. Yuan, J. et al. J. Appl. Phys. 114, 133506 (2013).

[15]. Liao, M., Sun, H., Wen, L., Fang, Y. & Hu, L. Mater. Chem. Phys. 98, 154–158 (2006).

[16]. V. C, VeeranaGowada, Effect of Bi3+ ions on physical, thermal, spectroscopic and optical properties of Nd3+ doped sodium diborate glasses, Phys. B: Condens. Matter 426 (2013) 58-64,https://doi.org/10.1016/j.physb.2013.06.007.

[17]. Y.S.M. Alajerami, S. Hashim, W.M. saridan , W. Hassan, A.T. Ramli, A. Kasim Optical properties of lithium magnesium borate glasses doped with Dy3+ and Sm3+ ions Phys. B: Condens. Matter407 (2012) 2398-2403, https://doi.org/10.1016/j.physb.2012.03.033.

[18]. Y.Wang, S. Dai, , F.Chen, , T. Xu, and Q. Nie, Physical Properties and Optical Band Gap of New Tellurite Glasses within the TeO2-Nb2O5-Bi2O3 System. Mater. Chem. Phys. 113(2009) 407-411, https://doi.org/10.1016/j.matchemphys.2008.07.117.

[19]. Ofelt G S1962J. Chem. Phys. 37 511.

[20]. Y.B. Saddeek, K.A. Aly, A. Dahshan, I.M.E. Kashef, Optical properties of the Na2O– B2O3–Bi2O3–MoO3 glasses, J. Alloys Compd. 494 (2010) 210–213, https:// doi.org/10.1016/j.jallcom.2009.11.123.

[21]. V. Dimitrov, S. Sakka, Electronic Oxide Polarizability and Optical Basicity of Simple Oxide. J. Appl. Phys. 79(1996) 1736-1740, https://doi.org/10.1063/1.360962.

[22]. J.C. Sabadel, P. Armand, P.E. Lippens, D. Cachau-Herreilat, E. Philippot, J. NonCryst. Solids. 244 (1999.

[23]. Urbach, F. The long-wavelength edge of photographic sensitivity and of the electronic absorption of solid. Phys. Rev. 1953, 92, 1324.

[24]. Jlassi, I.; Elhouichet, H.; Ferid, M. Thermal and optical properties of tellurite glasses doped erbium. J. Mater. Sci. 2011, 46

Using Wavelet Transform and Features of Visual Descriptor to Detect the Copy-Move Image Forgery

E. Anie Josephin

Assistant Professor, Department of Electronics and Communication Engineering, Grace College of Engineering, Thoothukudi, Tamil Nadu, India

ABSTRACT

The purpose of this paper is to propose a robust and efficient detection technique for the image forgery. Copy-move image forgery is one type of image forgery where a part of the image is copied and then it is pasted in the same image to hide or add some important object(s) within the image. Most image forgery detection models are unable to detect forgery in the image if the copied portion has noise or it is rotated or scaled before pasting. Firstly, the image is converted to gray scale. Discrete Wavelet Transform (DWT) is used to decompose the gray scale image into four parts and Scale Invariant Feature Transform (SIFT) algorithm is used to extract the key-points from the approximate part of the decomposed image. Using parallel matching take the decision whether the image is forgery or not. The proposed model shows 96% accuracy over a certain dataset of images.

Keywords: Discrete Wavelet Transform, Scale Invariant Feature Transform algorithm, parallel matching, Simple Linear Iterative Clustering.

I. INTRODUCTION

Digital image is a memorandum of precious moments of human life. It expresses vast amount of pictorial information like a witness. Hence, imagery information is used as a vital proof against various types of crime and acts as evidence for multi various purposes. However, the availability of many image editing software and tools has made image manipulation easier. This process of manipulation of original image by applying various types of geometric transformations, adding or removing an object in the real image is called digital image forgery [1]. To ensure the authenticity of image, there are many algorithms and models that are being developed to solve this issue. However, most of these models have limitations either in time complexity or in detection accuracy.

So, the detection system should overcome these limitations and difficulties.

Digital image forgery detection can be classified into two major categories: active method and passive method [2,3]. In active method some preprocessed digital information like signature or watermarking is embedded in the image. However, most of the digital images that have already been created are not authenticated with embedded information. As a result, we need a different method that helps to verify authenticity without any

prior information. This requirement is satisfied by passive approach of image forgery detection. There are a number of ways to identify image tampering using passive method while at the same time there are various ways to tamper an image such as retouching, splicing, enhancing, copy-move(cloning) etc. [5]. In copy-move image forgery, a part of image is copied and then it is pasted in the same image having an intention to make a false image or hide some important object within the image [4].

The goal of this proposed method is to detect image forgery irrespective of all the ways of copy- move tampering including tampering with geometric transformation giving importance to reduce time complexity. The outline of the proposed model of this paper follows this sequence: Section (ii) presents related work of existing detection methods for digital image tampering. Section (iii) presents detailed description of algorithms required for the implementation of proposed model. Section (iv) presents experimental result and performance analysis of proposed model. Section (v) presents conclusion and future work. The proposed model shows 96% accuracy over a certain dataset of images.

Example for Forgery

○ Copy-Move manipulation in Fig 1 is typically done to make an object' disappear' from the original image by covering it with a small fragment copied from another partof the same image.

○ This method is also used to duplicate existing objects in the picture.

Fig 1: Copy move manipulation

II. EXISTED SYSTEM

In this existing system copy-move forgery detection scheme which can accurately localize duplicated regions with a reasonable computational cost. In existed system detect forgery object new interest point detector algorithm is used utilizing the advantages of both block-based and traditional keypoint-based methods. The detected key points adaptively cover the entire image, even low contrast regions, based on a uniqueness metric. Moreover, a filtering algorithm is employed which can effectively prune the falsely matched regions. Considering the new interest point detector, an iterative improvement strategy is used.

Drawback
- Medium accuracy of filter algorithm
- Execution time is high
- Need more performance.

III. PROPOSED SYSTEM

In this paper, we propose a novel copy-move forgery detection scheme which can accurately localize duplicated regions with a high accuracy. The purpose of proposed method is to detect copy-move forgery in digital image. First, the input image is decomposed with DWT which is later segmented with Simple Linear Iterative Clustering. After segmented image extract key-point features by applying SIFT.

The extracted feature is used to form clusters which help to find matching between copied and forged region. We use parallel matching algorithm used purpose of improve speed of the system. To get the final result of matching outliers are removed. Here we used an algorithm for collection of forgery and non- forgery images. Finally our algorithm classifies the forgery and non-forgery images with high accuracy.

Block Diagram
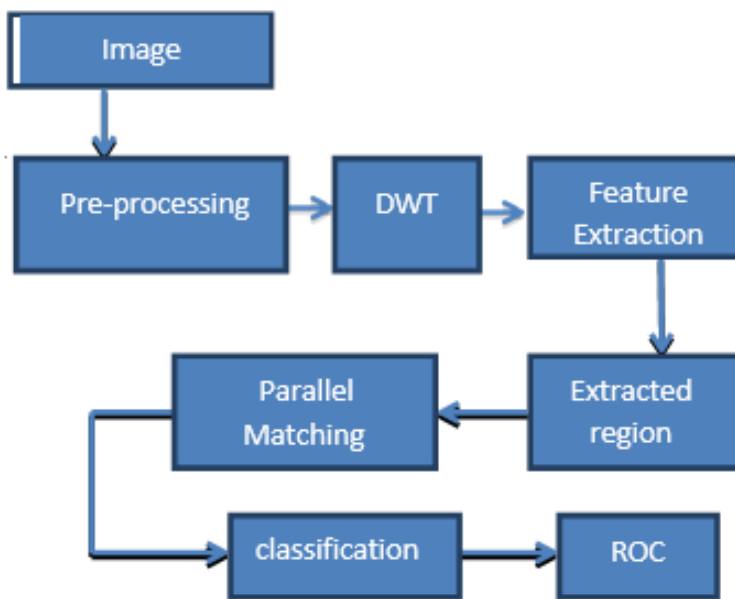
Fig 2: Block Diagram

Working Principle

We proposed a new model in fig 2 specifically designed for CMFD (Copy-Move Forgery Detection). The model comprises of four sub steps. Firstly, the input image is segmented with DWT and Simple Linear Iterative Clustering. Segmented area extracts Visual descriptors like SIFT (Scale Invariant Feature Transform) algorithm. Using Parallel computing matching model works detecting the forgery areas. Finally we can be classify the forgery and non-forgery images.

Pre-processing

The preprocessing step of the model comprises of two sub-steps. Firstly, the input image is converted to grayscale if it is a RBG image. The reason behind converting it into grayscale is to reduce complexity by converting a 3D pixel value (R, G, B) to a 1D value. Besides the color information does not contribute in identifying key-point features. The following formula is used to convert the RGB values to grayscale value.

$Y = 0.2989R + 0.5870G + 0.1140B$

Secondly, DWT is used to obtain four sub bands such as approximate (DWA), horizontal (DWH), vertical (DWV), diagonal(DWD).
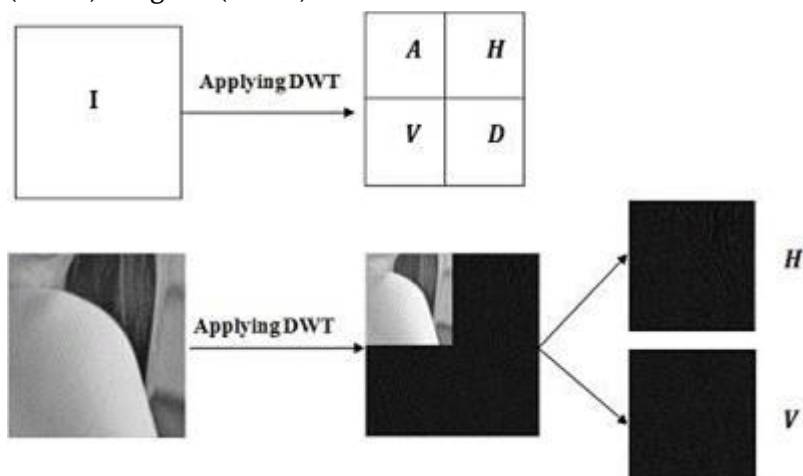
Fig 3: DWT

The approximate sub band is later passed as input parameter in SIFT algorithm to extract key-points features. The primary reason for choosing DWT is that it is shift invariant, translation invariant and efficient at finding similarities and dissimilarities despite of having noise or blurring in the image shown in fig 3.

SLIC (Simple Linear Iterative Clustering) Algorithm for Superpixel generation

A superpixel can be defined as a group of pixels that share common characteristics (like pixel intensity). Superpixels are becoming useful in many Computer Vision and Image processing algorithms like Image Segmentation, Semantic labeling, Object detection and tracking etc. because of the following-

They carry more information than pixels.Superpixels have a perceptual meaning since pixels belonging to a given superpixel share similar visual properties. They provide a convenient and compact representation of images that can be very useful for computationally demanding problems.

This algorithm generates superpixels by clustering pixels based on their color similarity and proximity in the image plane. This is done in the five-dimensional [labxy] space, where [lab] is the pixel color vector in color space and xy is the pixel position.

We need to normalize the spatial distances in order to use the Euclidean distance in this 5D space because the maximum possible distance between two colors in the CIELAB space is limited whereas the spatial distance in the xy plane depends on the image size. Therefore, In order to cluster pixels in this 5D space, a new distance measure that considers super pixel size was introduced.

SIFT Feature Extraction

SIFT is one of the best feature extracting algorithm proposed by David Lower. It is invariant to image rotation, geometrical transformation, intensity and change of viewpoint in matching features.

In this step Gaussian of Difference (DoG) is used to find possible points of interest which are invariant to orientation and scaling. To make the detection of key-points more reliable, efficient and stable DoG Function D (x, y, σ) is required. The key-points that are initially identified on the approximate component of decomposed image.

Key-point Matching

The extracted key-points from SIFT algorithm are used to find a pool of matching pairs of key-points. Euclidian distance is computed for finding the matched pairs of key¬points from a certain key-point to remaining key-points. This process repeats iteratively and based on pre-defined threshold value a set of matched pairs are identified.

IV. RESULTS AND DISCUSSION

Fig.4 Input Image
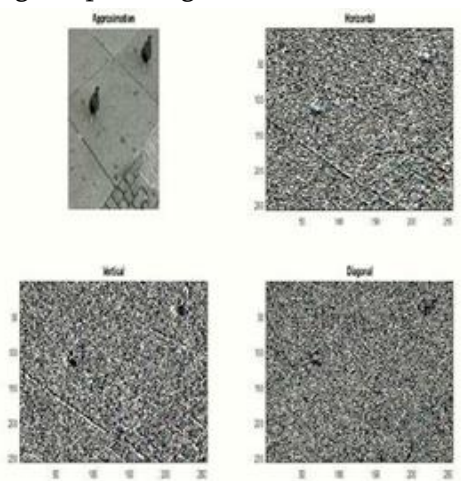
Fig.5 DWT Image
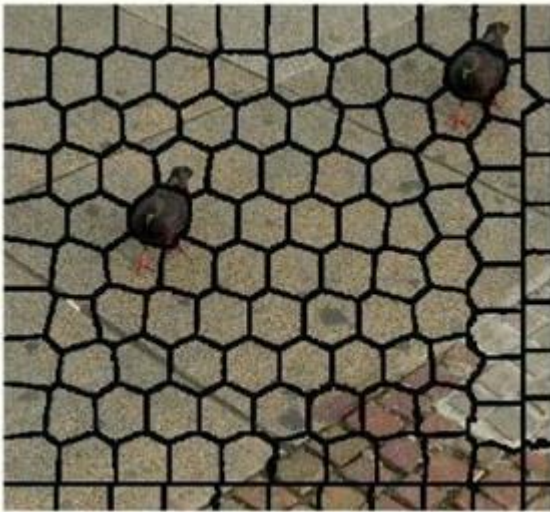
Fig.6 SLIC Image

Fig.7 Key points matching

Fig.8 Extract forgery point image

Fig.9 Morphological merging neighbors Image

Figure 4 and 5 shows the forged image and the bottom image shows the output after applying the DWT. Figure 6 shows the SLIC based segment forgery image into small clusters Figure 7 shows the forged images SIFT based features key points matching in forged region. Figure 8 and 9 shows the forged region extracted by morphological operations
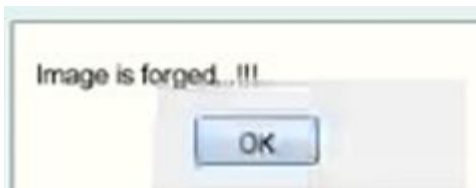
Fig 10: Output image

Finally image is detected forged by number of matched keypoints, If matched keypoints equal to zero mean that image is not forged.
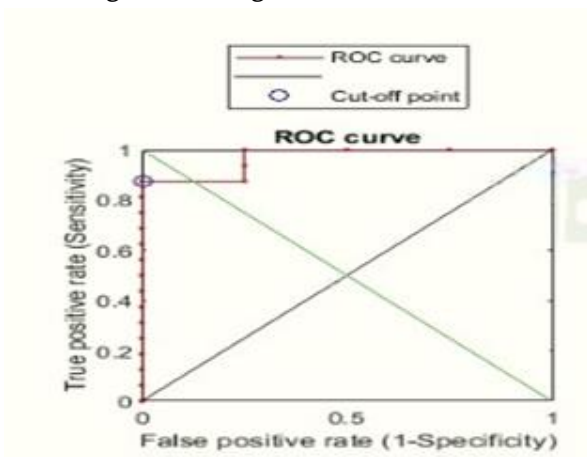
Fig.11 ROC graph image

The ROC curve is created by plotting the true positive rate (TPR) against the false positive rate (FPR) at various threshold settings. The true-positive rate is also known as sensitivity, recall or probability of detection in machine learning. Figure 11 shows the ROC graph of binary classification.

V. CONCLUSION

This project presents a robust key-point based copy-move forgery detection method in digital image by applying the DWT decomposition technique with SLIC method and SIFT feature extraction algorithm. DWT is shift invariant, blur and noise invariant. With the simulation performed on original and copied images, it shows that DWT and SIFT perform better in terms of time complexity and accuracy. From the performance analysis and experimental result it is evident that the proposed model shows better accuracy and efficiency than other existing copy-move forgery detection techniques. In our future work, we will improve the detection technique reducing the false positive rate and increasing percentage of accuracy.

VI.REFERENCES

[1]. Khan, U. A., Kaloi, M. A., Shaikh, Z. A., & Arain, A. A. (2018). A Hybrid Technique for Copy-Move Image Forgery Detection. 2018 3rd International Conference on Computer and Communication Systems (ICCCS).

[2]. Bi, X., Pun, C.-M., & Yuan, X.-C. (2016). Multi-Level Dense Descriptor and Hierarchical Feature Matching for Copy–Move Forgery Detection. Information Sciences, 345, 226–242.

[3]. Jian Li, Xiaolong Li, Bin Yang, & Xingming Sun. (2015). Segmentation-Based Image Copy-Move Forgery Detection Scheme. IEEE Transactions on Information Forensics and Security, 10(3), 507–518.

[4]. Muzaffer, G., Erdol, E. S., & Ulutas, G. (2018). A copy-move forgery detection approach based on local intensity order pattern and patchmatch. 2018 26th Signal Processing and Communications Applications Conference (SIU).

[5]. Dixit, R., Naskar, R., & Sahoo, A. (2017). Copy-move forgery detection exploiting statistical image features. 2017 International Conference on Wireless Communications, Signal Processing and Networking (WiSPNET).

[6]. Weiqi Luo, Jiwu Huang, Guoping Qiu, "Robust Detection of Region-Duplication Forgery in Digital Images", In proceedings of the International Conference on Pattern Recognition, Washington, DC, pp. 746-749, 2006.

[7]. Weihai Li and Nenghai Yu, "Rotation Robust Detection of Copy-move Forgery", In proceedings of the IEEE 17th International Conference on Image Processing, Hong Kong, 2010.

[8]. Yanping Huang, Wei Lu, Wei Sun and Dongyang Long, "Improved DCT-based Detection of Copy-Move Forgery in Images", Forensic Science International, vol. 206, pp. 178-184,2011.

[9]. Yanjun Cao, Tiegang Gao, Li Fan, Qunting Yang, "A robust detection algorithm for copy-move forgery in digital images", Forensic Science International, vol. 214, pp.33–43, 2012.

[10]. http://www.cs.albany.edu/~xypan/researc h/duplication/main.html

[11].V. Christlein, C. Riess, J. Jordan, C. Riess, and E. Angelopoulou, "An Evaluation of popular copy-move forgery detection approaches," IEEE Trans. Inf. Forensics Security, vol. 7, no. 6, pp. 1841–1854, Dec. 2012.

[12].Huang, W. Guo, and Y. Zhang,"Detection of copy-move forgeryin digital images using sift algorithm," in Proc. Pacific-Asia WorkshopComputational Intell. and Industrial Applicat. (PACIIA), vol. 2, 2008,pp. 272–276.

[13].S. J. Nightingale, K. A. Wade, and D. G. Watson, "Can people identify original and manipulated photos of real- world scenes?" Cognitive research: principles and implications, vol. 2, no. 1, p. 30, 2017.

Video Fire Detection based on Attention Mechanism

Mrs. D. Kanchana1[1], Ms. K. Chithra[2]

[1]Assistant Professor, Department of Computer Applications, SRM Institute of Science and Technology, Ramapuram, Chennai, Tamil Nadu, India

[2]Final MCA Student, Department of Computer Applications, SRM Institute of Science and Technology, Ramapuram, Chennai, Tamil Nadu, India

ABSTRACT

When compared to traditional fire identification systems that rely on sensors, vision-based fire detection systems have recently gained favor. The demand for video perception in private, modern, business areas, and wooded areas has increased the adoption of vision-based fire detection systems. Recently, a number of fire-related incidents have happened as a result of insufficient surveillance or the inability to cover certain risky locations, such as limited areas in forests or industry buildings. To avoid such mishaps, the system proposes a novel way based on convolutional neural networks (CNN).To solve these problems, a more advanced fire detection scheme proposing the use of CNN technology. instead of feature description has attracted more and more attention. In this article, we propose an efficient neural network architecture for forest fire detection and recognition based on CNN.

Keywords: Deep Learning, CNN, Attention Mechanism, Fire Detection

I. INTRODUCTION

In the 350-image training dataset, identify how many photos have fire and how many do not. The Back-propagation technique was used to train the Convolution Neural Network (CNN). 220 random photos will be used to train the CNN model, and 100 further images will be utilized to evaluate the model. the trained CNN model to extract the fire from the testing image/video after we've verified its correctness. The labels to display the fire detection result. Researchers have presented both classical and learnt representation-based fire detection approaches for detecting fire. According to the literature, traditional fire detection systems use either colour or motion properties. Color features, for example, were used for fire detection by experimenting with a variety of colour models, including HSI, Ycbcr, YCbCr, RGB, and YUC. The high percentage of false alarms associated with these approaches is a key drawback. There have been several attempts to solve this challenge, including merging colour information with motion and analyzing the shape and other characteristics of fire. A comprehensive literature review is usually beneficial. The system believes that an effective CNN-based system for fire detection in films taken in uncertain surveillance circumstances should be suggested. This method

employs light-weight deep neural networks with no dense fully connected layers, resulting in a low computational cost. Experiments are carried out using benchmark fire datasets, and the findings show that our technique outperforms the state-of-the-art. We feel that our system is a good choice for fire detection in an unpredictable IoT environment for mobile and embedded vision applications during surveillance because of its accuracy, false alarms, size, and operating time. By allowing intelligence via mobile edge computing and data transfer across a 5G network, the tactile Internet may combine several technologies. Several convolutional neural networks (CNN)-based algorithms based on edge intelligence have recently been used for fire detection in a specific environment with respectable accuracy and run time. These systems, however, fail to detect fire in an unpredictable IoT environment with smoke, fog, and snow. Furthermore, for resource-constrained systems, attaining acceptable accuracy while reducing operating time and model size is difficult. When detecting fires, the CNN design is often altered so that the final fully linked layer has two classes: fire and non-fire.

The input data is transferred to the proposed CNN for training, which entails altering and learning the weights of a large number of neurons to categories them as fire or non-fire. The adoption of a region-based convolutional neural network in this study represents a considerable improvement. CNN is a classification technique that uses machine learning to categories pictures. It does not determine the position and orientation of the item. Working efficiently need extensive training. For object detection, R-CNN (Region based CNN) is used. CNN may not perform properly if there are several objects in the visual area owing to interference. In R-CNN, the image is divided into about 1000 region recommendations, and then CNN is applied to each area. The right region is added into the artificial neural network when the size of the regions is decided. The system utilizes real-time databases to save time and money when paired with Mobile Net. The Mobile Net (v2) model outperforms other models. Alex Net, Google Net, and Squeeze Net are just a few examples. As a result, in an unpredictable surveillance environment, a model with a similar architecture to Mobile Net is utilized and changed according to fire detection. To achieve this, the number of neurons in the last layer of this design is restricted to two instead of 1000, allowing categorization into fire and non-fire. It is more feasible than other CNN algorithms for memory and bandwidth-constrained hardware architectures

II. LITERATURE SURVEY

The risk management for forest fire has been focused in this research [1], and it involves several methods such as fire prevention and firefighter preparedness. Enhancement of spatial data, such as the creation of themed layers creation of a digital landscape model, matrix analysis All of the recorded risk objects, regardless of substrate or soil type, will be destroyed. Assist in the fight against forest fires.

Yen Feng, Luo Ning Zhao, and Wu Benxiang describe fire detection based on flame colour utilizing RGB, HSV, and YCVCR colour models in paper [2.] To detect the location of numerous classes at once, algorithms such as YOLO and YOLOv2 are utilized. The fire and smoke are detected in the acquired photographs, and the accuracy value is determined using the fire and smoke score.

In previous work [4], the researchers present various frameworks for predicting and detecting the fire zone area using various technologies. The fire detection algorithm uses a support vector machine, with the input being a video image, from which the moving region is extracted and resampling for the same size is performed, after

which flame features such as texture and colour moment are extracted and data is normalized to obtain the eigen values, and finally SVM recognition is performed, which produces the result.

III. PROPOSED METHODOLOGY

CONVOLUTIONAL NEURAL NETWORK (CNN) Convolutional neural networks (CNNs) are a type of artificial neural network that is used in image identification and processing. They are specifically designed to analyze pixel input. A neural network is a hardware and/or software system modelled after the way neurons in the human brain operate.
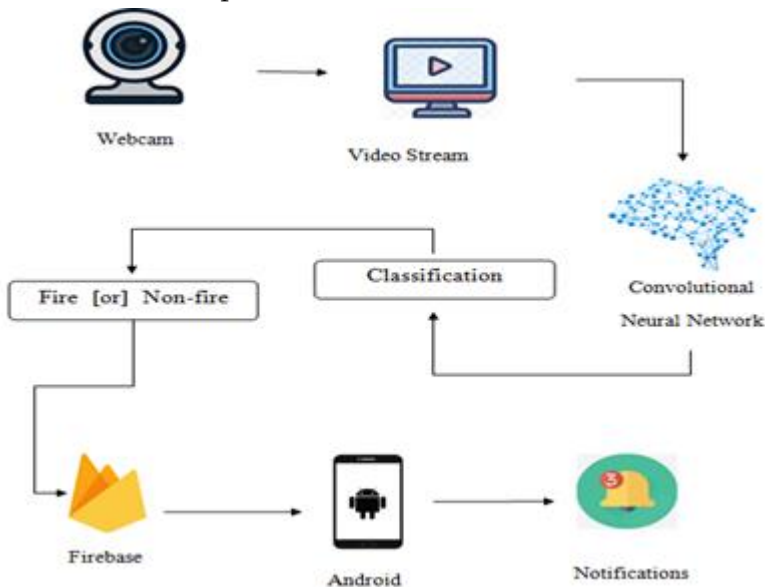
Figure. 3.1 Architecture for fire detection using video survilance

In first video will be streeming by using the web camera by using CNN (Convolutional neural network) Algorithm the system will classify the fire . If fire occur the system will send the fire alert messege to the fire base . Fire base is nothing but it is a type of cloud database. Then the firebase will send the alert notification to the mobile phone this is the working process of the system.

IV. EXPERIMENTS AND RESULTS

This system will recognize fire in a video frame based on a portion of the pictures. Each video frame, we detect and track the fire picture. The angle of the eye is used to compensate for the CNN's recognition limitations.

4.1. DATA SET COLLECTION
There are many types of data sets like raw data set, image data set, audio data set etc… The dataset consists of images chips extracted from Kaggle. We have collected two types of images.
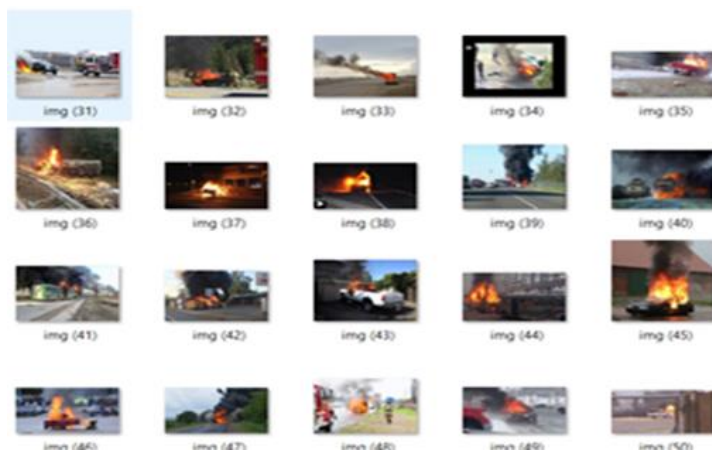
Figure 4.1.1 Fire images

Figure 4.1.2 Non fire images

4.2. DATA REPROCESSING

In data preprocessing, the image data is converted to NumPy array, and it is normalized to avoid over fitting. Also, the images are reshaped to fit into our model.

4.3. ALGORITHM MPLEMENTATION

Implementing the CNN (Convolutional neural network) Algorithm. Then train the both fire and non-fire images separately, multiple time for getting an accurate detection. The goal behind CNN is to predict the firing by comparing the datasets images

4.4. FIRE DETECTION

Fire detection can be done using the video streaming with webcam. In the video, if fire occurs then the system will send the alert message to the firebase. Through firebase will get a alert notification to the android mobile phone

Fig 4.3.1 Input video for training model

Fig 4.3.2 Fire Detection

Fig 4.3.3 Sending Message to firebase
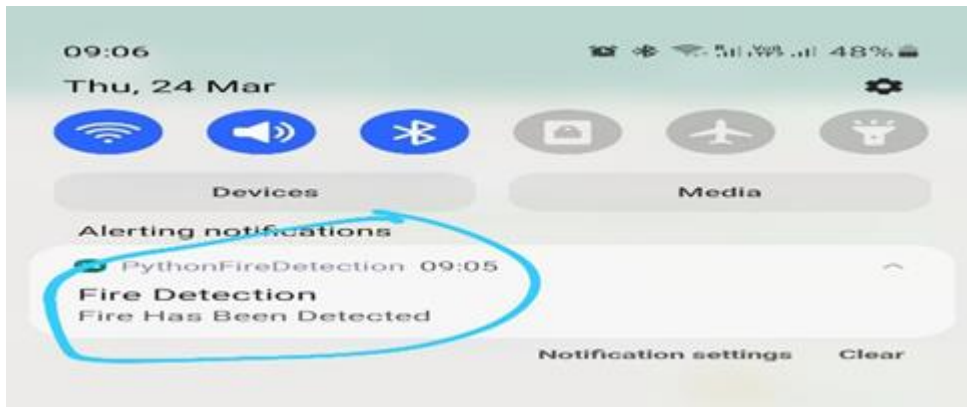
Fig 4.3.4 Fire Detection Notification

V. CONCLUSION

Object detection and identification research is gaining popularity. This work employs a deep learning technique to recognize fire from an input video. As part of this work, the CNN model was tested on a range of movies and photos, and the results show that our model can anticipate nearly every fire in a video frame. It also features a colorful border that identifies the frame and indicates the boundary. To train our model, we used a clean picture dataset, and the videos/images being evaluated are also free of environmental influences. According to the study, the most prevalent components that influence fire detection accuracy are changing weather conditions, which affect visual features and haze, and so on. When it comes to selecting a good fire detection technology, these criteria give rise to a plethora of options. The goal of future study should be to establish a comprehensive fire collection that includes both actual and synthetic images for a wide range of climatic conditions. Overall, we can conclude that video-based fire detection is a hot research issue with significant operational promise in the near future due to the vast amount of data available for free on the internet.

VI.REFERENCES

[1]. PETKOVIC, M., GARVANOV, I., KNEZEVIC, D., & ALEKSIC, S. (2020). Optimization of Geographic Information Systems for Forest Fire Risk Assessment. 2020 21st International Symposium on Electrical Apparatus & Technologies (SIELA).

[2]. Yen Feng, Luo Ningzhao, Wu Benxiang (2019) Design and Experimental research video detection system for ship fire, 2019 2nd International Conference on Safety Produce InfromationS.

[3]. H.-C. Shin, H. R. Roth, M. Gao, L. Lu, Z. Xu, I. Nogues, et al., "Deep convolutional neural networks for computer-aided detection: CNN architectures dataset characteristics and transfer learning", IEEE Trans. Med. Imag., vol. 35, no. 5, pp. 1285-1298, May 2016.

[4]. Chen, K., Cheng, Y., Bai, H., Mou, C., & Zhang, Y. (2019). Research on Image Fire Detection Based on Support Vector Machine. 2019 9th International Conference on Fire Science and Fire Protection Engineering (ICFSFPE).

[5]. J. Fu, J. Liu, H. Tian, Y. Li, Y. Bao, Z. Fang, and H. Lu, "Dual attention network for scene segmentation," in Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition, 2019, pp. 3146–3154.

[6]. Martin Maier, Mahfuzulhoq Chowdhury, Bhaskar Prasad Rimal, and Dung Pham Van (2016). The Tactile Internet: Vision, Recent Progress, and Open Challenges.

[7]. Pasquale Foggia, Alessia Saggese, and Mario Vento (2015), Real-Time Fire Detection for Video-Surveillance Applications Using a Combination of Experts Based on Color, Shape, and Motion.

[8]. K. Hung, L. Chen and J. Wu, "Wildfire Detection in Video Images Using Deep Learning and HMM for Early Fire Notification System", 2019 8th International Congress on Advanced Applied Informatics (IIAI-AAI), pp. 495-498, 2019.

[9]. Sebastien Frizzi Rabeb Kaabi Moez Bouchouicha Jean-Marc Ginoux Eric Moreau Farhat Fnaiech (2016). Convolutional Neural Network for Video Fire and Smoke Detection.

[10].Senthil Vadivu, M.N. Vijayalakshmi (2018). An Efficient Multi-Feature Best Decision Based Forest Fire Detection (MF-BD-FFD) From Still Images.

[11].Thamburu T. R (2017). A Survey on Trust Management Models in Internet of Things Systems.

[12].T. Toulouse, L. Rossi, A. Campana, T. Celik, and M. A. Akhloufi, "Computer vision for wildfire research: An evolving image dataset for processiing and analysis," Fire Safety Journal, vol. 92, pp. 188–194, 2017.

[13].Udaya L. N. Puvvadi, Kevin Di Benedetto, Aditya Patil, Kyoung-Don Kang Kyoung-Don Kang (2017). Cost-Effective Security Support in Real-Time Video Surveillance.

[14].S. G. Benjamin, B. Radhakrishnan, T. G. Nidhin and L. P. Suresh, "Extraction of fire region from forest fire images using color rules and texture analysis", 2016 International Conference on Emerging Technological Trends (ICETT), pp. 1-7, 2016.

[15].S. Frizzi, M. Bouchouicha, J.-M. Ginoux, E. Moreau, and M. Sayadi, "Convolutional neural network for smoke and fire semantic segmentation," IET Image Processing, vol. 15, no. 3, pp. 634–647, 2021.

Smart Irrigation Management System Using IoT

S. K. Kabilesh*, G. Nishanth, A. Mayavan, J. Kesavamoorthi, S. Suryakala

Department of Electronics and Communication Engineering, Jai Shriram Engineering College, Tiruppur, Tamil Nadu, India

ABSTRACT

The agricultural industry plays a vital role in the economic health of every nation due to the fact that it contributes to Gross Domestic Product and food production. Several issues are related to traditional methods of agriculture, such as waste of water during irrigation, dependency on non-renewable power sources, time, money, human resources, etc. A smart development of agriculture sector is essential for the growth of the country since every activity today is becoming more and smarter. IoT Technology is used in this paper to create the Smart Irrigation System through the monitoring of soil moisture and climate conditions thus, preventing water wastage and maximizing crop productivity. IOT technology is being used to inform farmers about the status of sprinklers and measure soil moisture. This value enables the system to use the right quantity of water without over or under irrigation. The sensors measure soil moisture levels. The water sprinklers are regularly turned ON/OFF through a webpage using a GSM-GPRS SIM900A modem that updates the information from the sensors on a regular basis

Keywords: IOT, Agriculture, Bylnk, Water management

I. INTRODUCTION

Agricultural growth is India's main focus. A country with consistent agriculture growth can become an economic powerhouse. A country like India has very favorable climatic conditions to grow various agriculture crops. The two most important resources in India are land and water. A deficiency of water resources has heavily influenced the yield of agricultural crops. So, water scarcity has a consequently immense impact on food production. In the absence of water, farmers are unable to cultivate crops, which results in a decline in food production to ensure there is enough to feed every human on this planet. [1] The use of irrigation systems hasn't been done in an efficient way, reducing water utilization in an efficient manner. It is a method of conveying water to crops to maximize yields. As a result, this study proposes using a distributed network of sensor nodes and dispersed pumping units to give water to the sensor units' precise locations. We present an automated irrigation system using a low-cost moisture sensor. An automated irrigation unit with a low-cost moisture sensor and a distributed network of sensor nodes covering specific areas is proposed in this research. A distributed number of pumping units were used to accomplish this. [2] This system consists of a distributed

wireless sensor network (WSN) that includes soil moisture and temperature sensors. This automated water irrigation uses a wireless sensor network and a GPRS module with the purpose of maximizing the use of water for agriculture crops. Farmers will be able to control irrigation remotely by monitoring moisture levels in the field and enabling sprinklers to be turned on automatically at a certain level when necessary. The Internet of things will make this possible. [3,8,9]

II. LITERATURE SURVEY

Based on GSM-SMS, A Remote Measurement and Control System for Greenhouse Is Developed the proposed system employed a GSM-SMS [11] system to measure and control greenhouses, while using a PC-based database system connected to a mobile base station in actual operation, the central station sends and receive messages via GSM module[10]. The parameters, such as air temperature, humidity, that must be measured by every base station are chosen by the central station and have a criterion value set by it. [4,7] A notification will be sent to the user if any unauthorized entry has happened or the door has been opened. The user can then take the appropriate action. The ESP8266 will be used to connect over the internet, as well as with an microcontroller, a magnetic Reed sensor, and a buzzer to sound an alarm. The key advantages of an irrigation system based on soil moisture are ease of installation, low cost, and low maintenance. Parameswaran et al. discussed a soil moisture-based irrigation system. [5,6]

III. MATERIALS AND METHODOLOGY

This system is configured by various essential components listed below.
- NodeMcu ESP8266
- Soil Moisture Sensor
- Relay board
- Water pump

Some of the software requirements are Blynk application, Arduino application, Java programming for NodeMcu.

1. NodeMcu

NodeMCU is a platform based on the ESP8266 that can connect objects and transfer data using the Wi-Fi protocol. In addition, it provides the most important aspects of microcontrollers, such as GPIO, PWM, ADC and others. It can solve many of the project's needs alone. A wireless Wi-Fi transceiver, operating in the unlicensed 2400-2484 MHz frequency range of IEEE 802.11 b/g/n, is integrated into the module, as well as a TCP/IP stack and Wi-Fi___33 security, including WAP3.
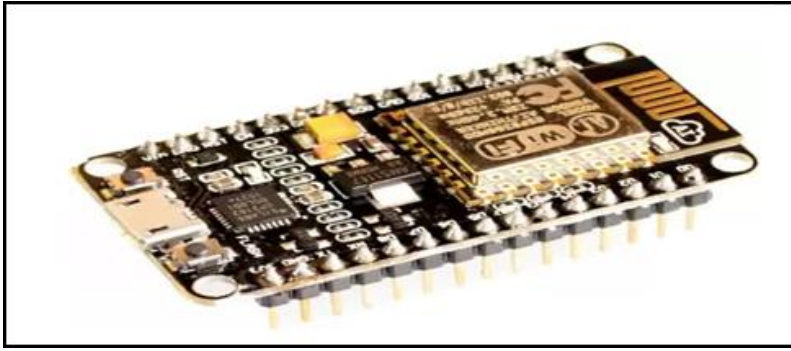
Fig 1. NodeMCU

2.   Soil Moisture Sensor

The soil moisture sensor measures or estimates the amount of water in the soil. These sensors are portable or stationary. A stationary soil moisture sensor is placed at predetermined depths and locations in the field, whereas a portable probe measures soil moisture at various locations. In order to measure electrical resistance through the sensor, electrodes are charged. When water is used by plants or when soil moisture decreases, water is withdrawn from the sensor, which increases resistance. Conversely, as soil moisture increases, resistance decreases.
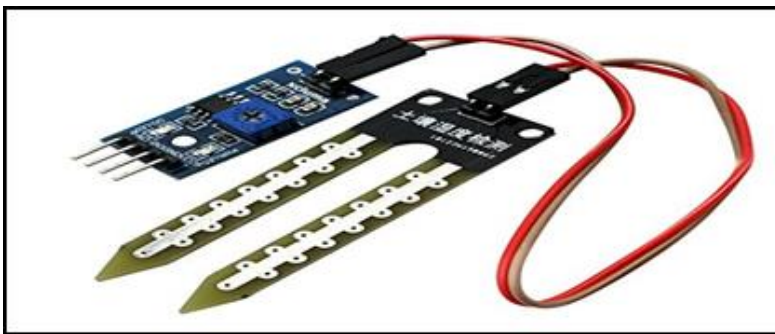
Fig 2. Soil Moisture Sensor

3.   Water pump

Water pumps are widely used in households for use in cooking, cleaning, bathing, heating, watering flowers, and other purposes. Water pumps are widely used in households for use in cooking, cleaning, bathing, heating, watering flowers, and other purposes. Pumps should be operated at, or close to, the best efficiency point (BEP), which is about 85 percent of the shutoff head.

Fig 3. Water pump

4.   Relay board

Designed as a relay interface board, it can be controlled directly by various microcontrollers such as Arduino, AVR, PIC, ARM, etc. The module uses a low level trigger signal (3.3-5VDC) to control the relay. Triggering the relay operates the normally open or normally closed contacts. It is frequently used in automatic control circuit. To put it simply, it is an automatic switch to controlling a high-current circuit with a low-current signal.

Fig 4. Relay Board

IV. PROPOSED SYSTEM

The data is first collected from various sensors, such as soil moisture and water levels. The sensors are connected to the NodeMcu Board via a breadboard. The Blynk application receives the data from the board. The programming language utilised executes instructions that extract and reflect data. Data will be sent to the blynk application every second. The user may see the soil's precise moisture level. He can turn on/off the motor from anywhere if he wants.
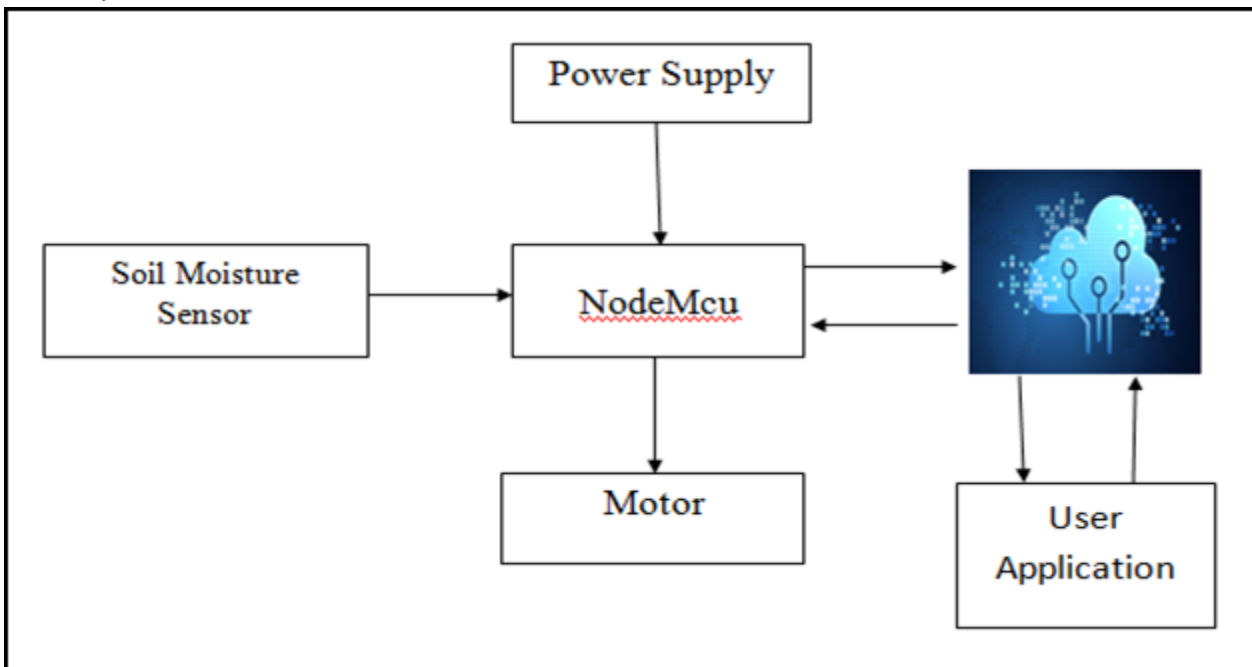
Fig 5. Proposed Methodology
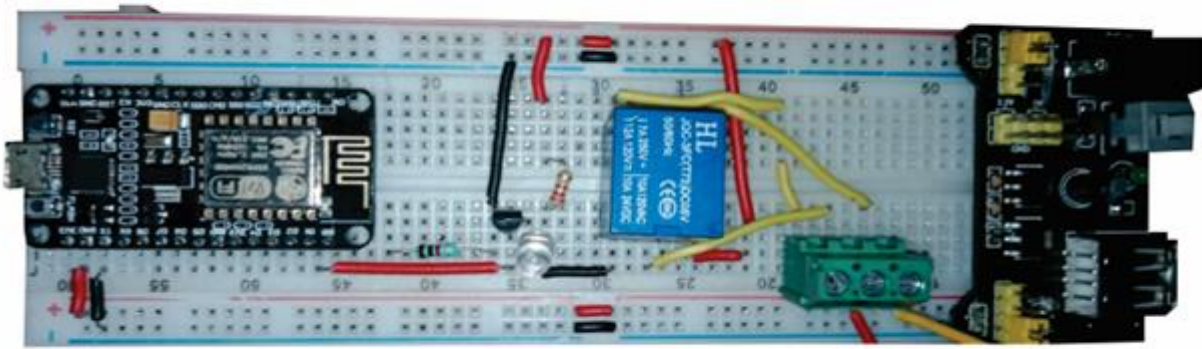
Fig. 6. Hardware Connection

V. RESULT AND DISCUSSION

Here, the analog output of soil moisture sensor is processed using ADC. The moisture content in terms of on the serial monitor. The output of the soil moisture sensor changes in the range of ADC value from 0 to 1023. This can be represented as moisture value in terms of percentage using formula given below. ADC is used to process the analogue output of the soil moisture sensor. On the serial monitor, the moisture content is represented as a percentage. The output of the soil moisture sensor varies across the ADC value range of 0 to 1023. This can be expressed as a moisture value in percentages using the formula below. Data is continuously transmitted to the bylnk application whenever the water level fall from desired water level then the mobile application sent the alert message to the user. Based on the water level action should be taken.

Fig 7. Bylink app indication of Moisture level

VI. CONCLUSION

As a result, this initiative will be very valuable for all those people who own farms and want to contribute to the country's agriculture but are limited by staff and time due to their everyday responsibilities. This initiative also enables for the monitoring of employees and crops in order to prevent losses. Anyone with a Smartphone can use it, and once set up, it doesn't require any upkeep.

VII.   REFERENCES

[1].   Anitha, A., Sampath, N. and Jerlin, M.A., 2020, February. Smart irrigation system using Internet of Things. In 2020 International Conference on Emerging Trends in Information Technology and Engineering (ic-ETITE) (pp. 1-7). IEEE.

[2].   AdityaRajgor, P., Nikam, D., Mishra, D. and Sanket, B., 2021. A Study on Smart Irrigation System Using IoT for Surveillance of Crop-Field. NEW ARCH-INTERNATIONAL JOURNAL OF CONTEMPORARY ARCHITECTURE, 8(2), pp.2332-2335.

[3].   Pimpalkar, P., Pedsangi, N. and Phapale, P., Smart Irrigation System.

[4].   Rawal, S., 2017. IOT based smart irrigation system. International Journal of Computer Applications, 159(8), pp.7-11.

[5].   Sangeetha, B.P., Kumar, N., Ambalgi, A.P., Haleem, S.L.A., Thilagam, K. and Vijayakumar, P., 2022. IOT based smart irrigation management system for environmental sustainability in India. Sustainable Energy Technologies and Assessments, 52, p.101973.

[6].   Kabilesh, S.K., Sivashree, K.C., Sumathiiswarya, S., Narmathadevi, G. and Panjavarnam, R., 2021. Self-Regulated Anaesthesia Feeder for Surgical Patients. Research and Applications: Embedded System, 4(3).

[7].   Menaga, S., Paruvathavardhini, J., Kalaivani, P. and Haribabu, S., 2019. Air quality monitoring system using vehicles based on the IoT. International Research Journal of Engineering and Technology (IRJET), 6(03).

[8].   Menaga, S., Paruvathavardhini, J., Pragaspathy, S., Dhanapal, R. and Immanuel, D.J., 2021. An efficient biometric based authenticated geographic opportunistic routing for IoT applications using secure wireless sensor network. Materials Today: Proceedings.

[9].   Shivakumar, D., Gayathri, P., Muthukumar, M. and Menaga, S., 2020. Measurement of Temperature and Humidity Using DHT11 Sensor. Journal of Advancement in Communication System, 2(3).

[10].Anas, R.M., Nandhini, P. and Deepika, N.M., 2018. Design and implementation of smart basket cart using near field communication. Indian Journal of Emerging Electronics in Computer Communications-IJEECC, 5(1), pp.778-785.

[11].Manikandan, T., Kalaiyarasi, G., Priyadharshini, P.K. and Priyanga, R., 2015. Conductor less bus ticketing system using RFID and accident information through GPS and GSM. IJISET-International Journal of Innovative Science, Engineering & Technology, 2(9), p.885.

Design of Patch Antenna for High Gain WIFI Applications

Dr. T. Aathmanesan, S. Ramanjaneyulu , K. Praneeth kumar, M. Teja Naga Phanindra

Department of Electronics and Communication Engineering. Vel Tech Rangarajan Dr. Sagunthala R&D
Institute of Science and Technology, Chennai, Tamil Nadu, India

ABSTRACT

Due to the existence of growth in development of low cost, less weight, highly reliable, minimal profile antennas for wireless devices, it poses a new challenge for the design of antenna in wireless communications. This paper presents design and simulation of a rectangular micro strip patch array antenna at 2.4 GHz for wireless communications that provides a radiation pattern along a wide angle of beam and achieves a gain of 4.4 dB The rectangular micro strip patch antenna was analysed using Ansof/Ansys HFSS and also made a comparison among the different substrates which shows different results based on same parameters.

I. INTRODUCTION

At present, we are living in the era of communication system, where communication is a process of exchanging information between the two points. There are many ways of communication but most preferred way is wireless communication technology. The use of wireless technology changes the way of human thinking. In wireless communication systems, antenna plays a vital role, it is a metallic device used for radiating and receiving the information in the form of radio waves. The wireless communication system without proper antenna setup encounters problems. Any perversion in the transmission and reception of information causes complete system failure. A proper design selection of an antenna is the most important factor for the designing of wireless communication system. Due to rapid growth of devices in wireless communication, there is requirement of antenna which has compact size, low cost, easy handling and better performance. Microstrip antenna is the best suited option which fulfils all the necessary requirements of wireless communication system. In telecommunication, a microstrip antenna also known as printed antenna usually means an antenna fabricated using photolithographic techniques on a printed circuit board. Microstrip antenna approach was first introduced in 1950, but the genuine consideration on the microstrip antenna was received in 1970. It is a kind of internal antenna. Microstrip antennas have become very popular in recent times due to their thin planar profile. Microstrip antenna has few preferences over conventional antenna because of light weight, economical and easy to integrate narrow bandwidth. Microstrip antenna structure are divided into four main parts i. e; ground plane, dielectric substrate, patch and feeding line. Ground plane is etched on bottom side of a dielectric substrate and conducting in nature. There are several types of dielectric substrates which are used for designing this antenna and the value of dielectric constant used is ranges between 2.2 and 12. Low dielectric constant

values are preferred for high frequency or power applications to minimize power loss. The radiating patch is a conductor which is etched on dielectric substrate along with feed lines. Shape of radiating patch may be square, rectangular, circular etc. But Rectangular and square shaped are mostly used because of their easy analysis and fabrication.

Feeding techniques used in designing of antenna are: coaxial probe feed, Microstrip line feed, Aperture coupled feed method and proximity couples feed method. In this paper, the coaxial probe feed is used. In this feeding method, inner conductor of coaxial cable is connected to microstrip patch of an antenna and outer one is connected with ground plane. The most serious limitation of microstrip antenna is low gain. This is because of the surface wave propagation. Generally we want all our energy to be radiated, but due to these surface waves the energy is lost in the conductor due to its finite conductivity. This results in reduced gain.

II. LITERATURE REVIEW

A.B. MUTIARA, R.REFIANTI, RACHMANSYAH et al There is a various number of dielectric substrate available for the Microstrip patch antenna (MPA). Material selection for the dielectric substrate in microstrip patch antenna can be considered in three classes of wireless communication given as the millimeter-wave applications and the mobile base station applications and mobile phone miniaturization applications [1].Praveen Kumar Patidar ,Nidhi Tiwarib et al the radiation pattern is mostly directional and The proposed antenna is designed and the optimized using two commercial 3D full-wave software, viz. CST microwave studio and Ansoft HFSS. A prototype of the designed antenna that was fabricated and showed good agreement between the actual measurements of S11 & VSWR and the simulation results using both software [2].Ahmed Mahfuz Tamim,Md. Abdur Rahman Chowdhury et al An antenna is a device that transmits and receives radio frequency signals for the standard of an antennas that means for radiating or receiving radio waves and the Inmodern era, for microwave and wireless engineering, the demand of miniature antenna is so high that it is one of themost demandable topics in antenna theory and design. Fromdifferent types of antenna, MPA have attracted moreconcentration because of their light weight, low profile nature,low cost, easy fabrication process, and conformity etc[3].Kukunuri Suraj and M. Neelaveni Ammal et al Due to the existence growth in the development of low cost, less weight, highly reliable, minimal profile antennas for the wireless devices and it poses a new challenge for the design of antenna in wireless communications and As communication devices become smaller due to the greater integration of electronics, the antenna becomes a significantly larger part of the overall package volume. and this results in a demand for the similar reductions in an antenna size. In addition to this, low profile antenna designs are also important for fixed wireless application[4].Niamat Hussain , Uktam Azimov , Minjoo Jeong , Seungyeop Rhee et al a microstrip patch antenna with the multiple superstrates for performance enhancement operating at the central frequency of 5.5 GHz for high-gain WLAN application and the The performance of the antenna in terms of reflection loss and the gain are investigated using multiple high dielectric constant and the different ways of the antenna in micro strip and the frequency bands are assigned based on the technology, purpose, network size, and requirements of the communication [5].

III. METHODOLOGY

The approaches of the project design are represented in the flowchart in Fig.1. The methodology of the project starts by understanding the Microstrip antenna technology. This includes the properties study of antenna such as operating frequency, radiation pattern , antenna gain and polarization. The antenna design started by calculating the dimensions of Microstrip patch antenna operate at frequency 2.4Ghz The simulation has been done by using High frequency structure simulator(HFSS). Considering the poor performance of antenna, Microstrip patch antenna loaded with parasitic Mushroom type structure has been designed. The Rectangle structure is utilized for antenna design in wireless application. In this design parasitic mushroom type Electromagnetic band gap design are used on the substrate. Electromagnetic Band gap design is a perfect electric conductor. The structure has frequency range where the surface impedance is very high. The equivalent LC circuit acts as a two – dimensional electric filter in this range of frequency to block the flow of the surface waves. The measurement and simulation result has been compared in term of Return loss, Radiation pattern and gain of the antenna.

Firstly, Microstrip patch antenna dimensions are calculated and designed. The value of dielectric constant is 4.4, Operating frequency = 2.4GHz and the substrate thickness, h = 1.6mm, the parameters are W=27.9mm and L=38mm.

PARAMETR	VALUES
Frequency	2.4GHz
Substrate material	FR$_4$
Permittivity	4.4
Height	1.6
Gain	2.32dB
Return loss	-27.32dB
VSWR	0.8322
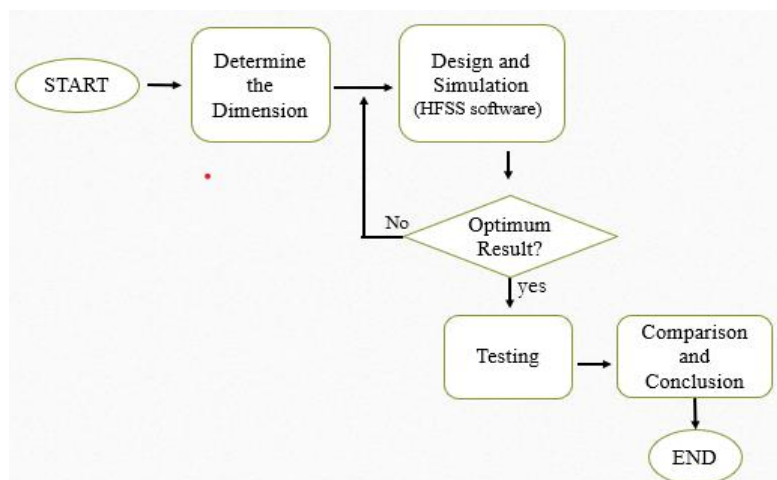
Fig. 1. Flow Chart

Secondly, the Rectangle structure is introduced to the patch antenna. In microstrip antennas, Rectangle structures surrounding patch element to suppress surface waves to achieve better radiation efficiency and antenna gain. Rectangle structures reflect back a part of the energy that propagates along the substrate of the antenna, thus acting as reflecting walls around the antenna. With Rectangle patch antenna, in addition to suppression of the surface waves, an increased bandwidth can be achieved.
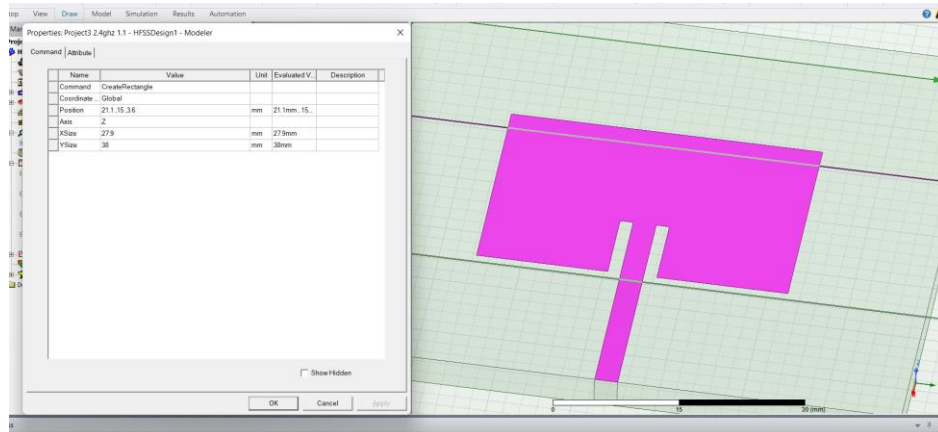
Fig. 2. Geometry of Antenna design.

PARAMETER	VALUES(Rectangle Patch)
Frequency	2.4GHz
Substrate Material	FR_4
Gain	4.4dB
Return loss	-27.32dB
VSWR	0.8

IV. RESULTS AND DISCUSSION

The results of the Rectangle based microstrip patch antenna design such as return loss, radiation pattern, antenna gain can be obtained by using the Ansys HFSS software. After simulating both the designs, Microstrip patch antenna shows the resonant frequency 2.4GHz with return loss -27.32dB. The Return loss value for Rectangle based microstrip patch antenna is about .The incorporation of the parasitic mushroom type Electromagnetic Band gap design with microstrip antenna enhances gain. Microstrip antenna without Rectangle results in antenna gain of 0.8322dB. By using Electromagnetic Bandgap design, the surface wave effect is diminished resulting to the improvement of the antenna gain to 4.4dB.
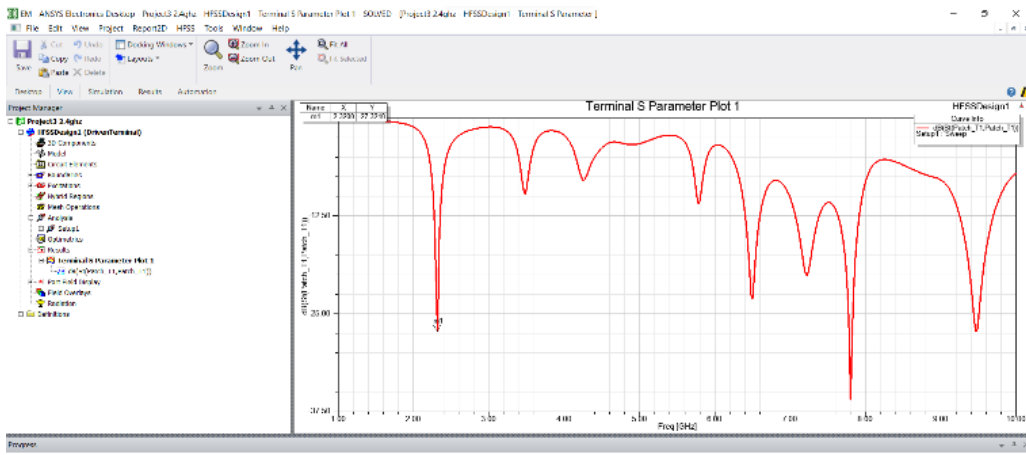
Fig.3. Microstrip patch antenna design(Return loss)
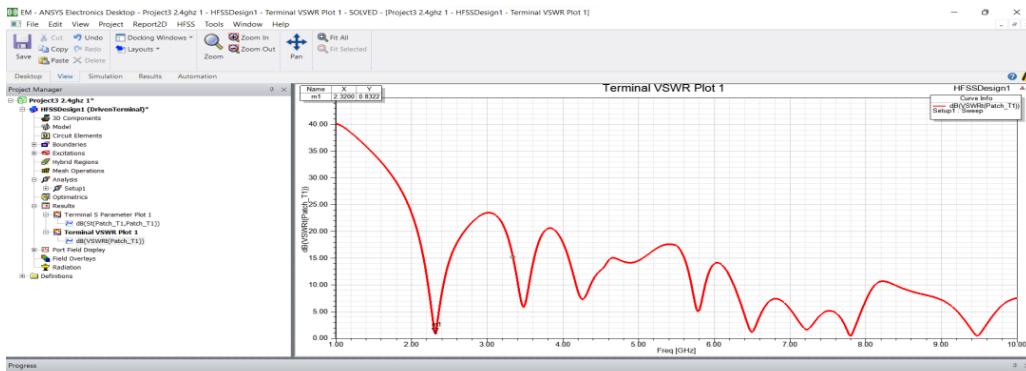
Fig. 4. Microstrip patch antenna design(VSWR)
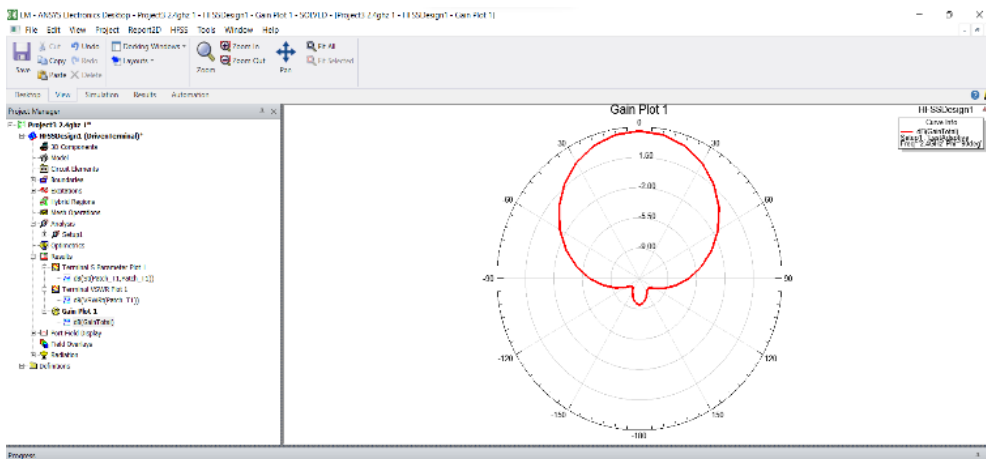
Fig. 5. Polar plot of radiation for microstrip patch antenna design.
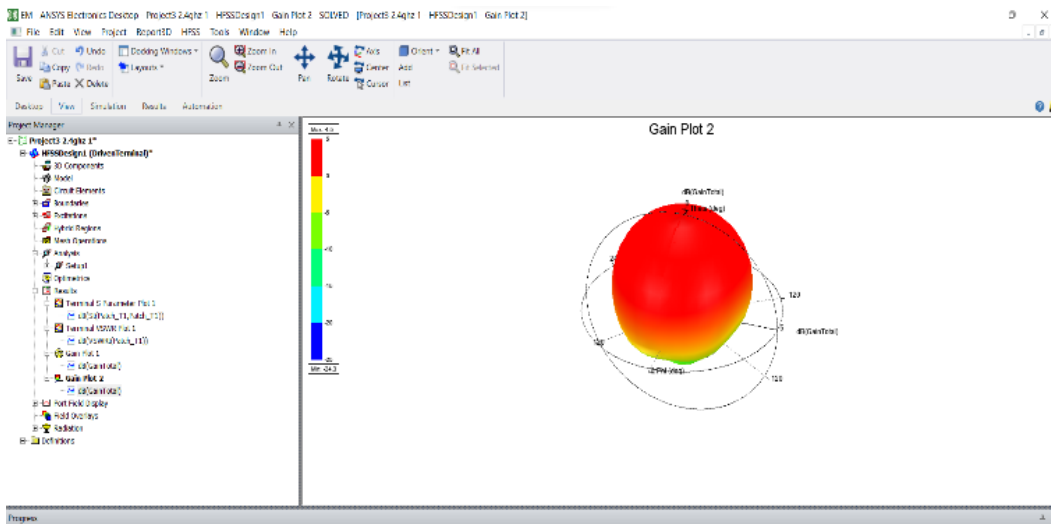
Fig.6. Three dimensional pattern of radiation for microstrip patch antenna design.
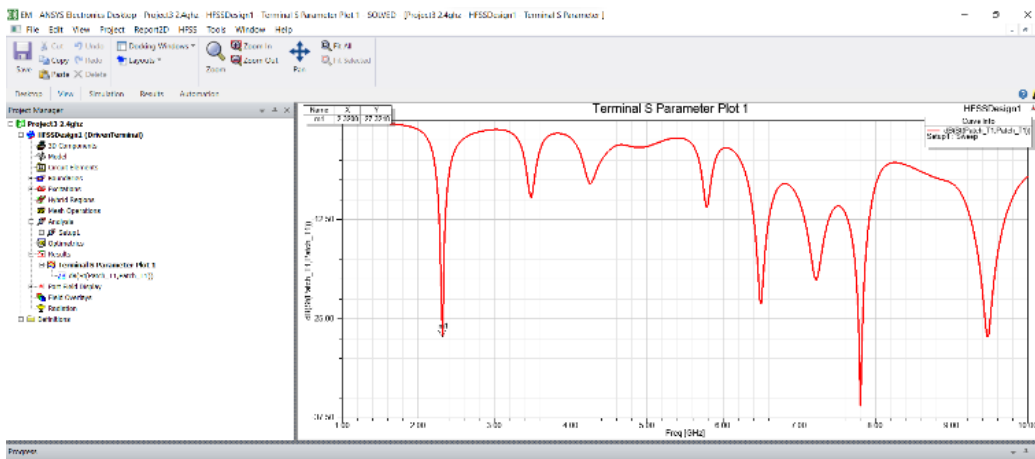
Fig.7. Rectangle Microstrip patch antenna (Return loss)
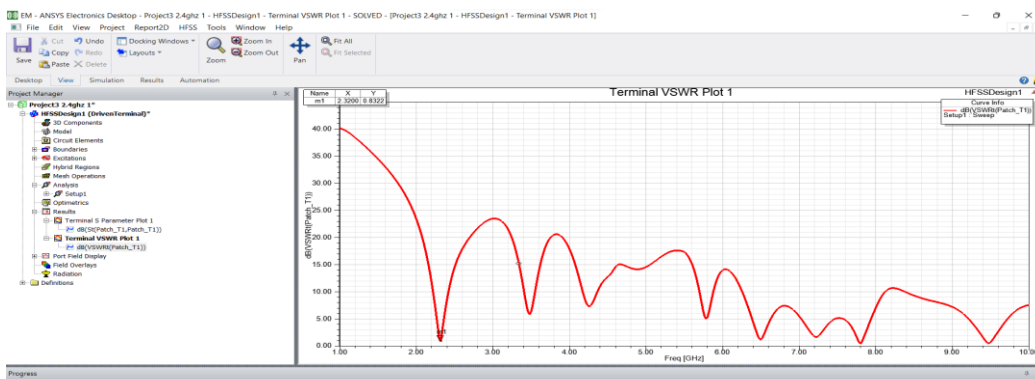
Fig.8. Rectangle Microstrip patch antenna (VSWR)
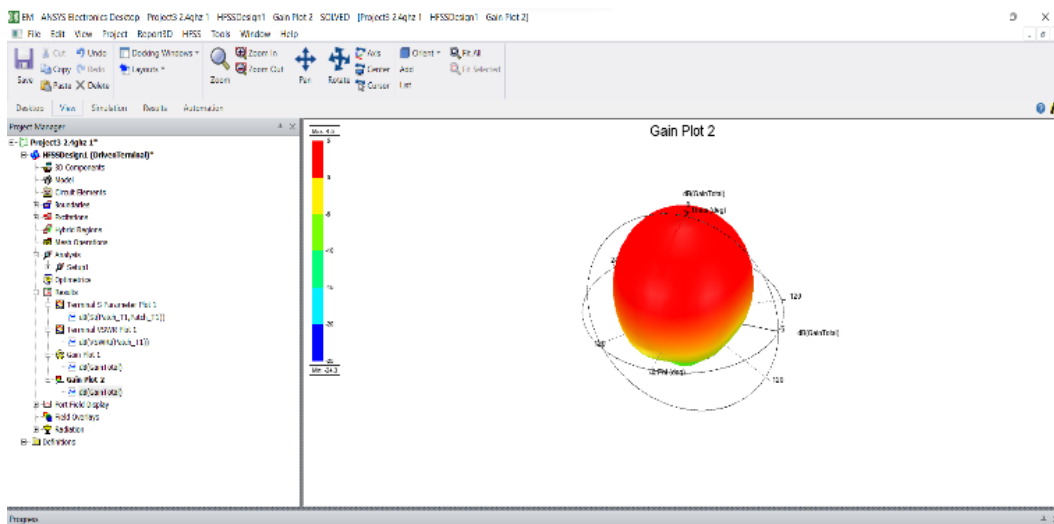
Fig. 9 .Three dimensional pattern of Radiation of Rectangle Microstrip patch antenna

V. CONCLUSION

The integration of EBG design in microstrip antenna improved the antenna performance. The Rectangle structure has been incorporated with microstrip antenna to see how the antennas perform by introducing this Rectangle structure. The antenna with Rectangle structure operates at a low frequency compared to the antenna without Rectangle structure. Normally, to design the microstrip antenna operates at lower frequency, the larger size of the substrate is needed. Integrating Rectangle structure can reduce the size of the antenna and the fabrication cost. Next, the Rectangle structure can enhance the gain of the original antenna structure. The antenna design with Rectangle structure shown a good return loss of -27.32dB. By utilizing the Rectangle structure, the gain of the antenna is increased to 4.4dB.

VI.REFERENCES

[1]. Liang, Bin, et al. "A frequency and polarization reconfigurable circularly polarized antenna using active EBG structure for satellite navigation." IEEE Transactions on Antennas and Propagation 63.1 (2014): 33-40.
[2]. Chen, Zhijian, Weisi Zhou, and Jingsong Hong. "A miniaturized MIMO antenna with triple band-notched characteristics for UWB applications." IEEE access 9 (2021): 63646-63655.
[3]. Mantash, Mohamad, and Tayeb A. Denidni. "CP antenna array with switching-beam capability using electromagnetic periodic structures for 5G applications." IEEE Access 7 (2019): 26192-26199.
[4]. Peng, Lin, et al. "CPW fed UWB antenna by EBGs with wide rectangular notched-band." IEEE access 4 (2016): 9545-9552
[5]. Haraz, Osama M., et al. "Dense dielectric patch array antenna with improved radiation characteristics using EBG ground structure and dielectric superstrate for future 5G cellular networks." IEEE Access 2 (2014): 909-913.

[6]. Ashyap, Adel YI, et al. "Highly efficient wearable CPW antenna enabled by EBG-FSS structure for medical body area network applications." IEEE Access 6 (2018): 77529-77541.

[7]. Mabrouk, Ismail Ben, et al. "Hybrid isolator for mutual-coupling reduction in millimetre-wave MIMO antenna systems." IEEE Access 7 (2019): 58466-58474.

[8]. He, Zhongxia Simon, et al. "Integrated-EBG Ridge Waveguide and Its Application to an E-Band Waveguide 32× 32 Slot Array Antenna." IEEE Open Journal of Antennas and Propagation 1 (2020): 456-463.

[9]. Lee, Jae-Yeong, et al. "Performance enhancement in compact inverted-L antenna by using 1-D EBG ground structures and beam directors." IEEE Access 7 (2019): 93264-93274.

[10].Abbas, Anees, et al. "Triple rectangular notch UWB antenna using EBG and SRR." IEEE Access 9 (2020): 2508-2515.

[11].Geetharamani Gopal and Aathmanesan Thangakalai, "Cross Dipole Antenna for 4G and Sub-6 GHz 5G Base Station Applications", ACES Journal, vol. 35, no. 1, pp. 16–22, Jan. 2020.

[12].Aathmanesan, T. Gain improvement of THz antenna using semicircular slot and modified ground plane. Int J Commun Syst. 2022; 35(7):e5103. doi:10.1002/dac.5103.

[13].G. Geetharamani, T. Aathmanesan,Split ring resonator inspired THz antenna for breast cancer detection,Optics & Laser Technology,Volume 126,2020,106111, https://doi.org/10.1016/j.optlastec.2020.106111.

Recent and Old Developments in Tunnel Field Effect Transistor

C Reeda Lenus[1], M Haris[1], C. Sheeja Herobin Rani[2]

[1]Karunya Institute of Technology and Sciences, Coimbatore, India

[2]St. Xavier's Catholic College of Engineering, Nagercoil, India

ABSTRACT

In this paper, from old developments to new/advanced developments in Tunnel Field Effect Transistor (TFET) is reviewed. The history, device Physics and performance boosting methodology has been investigated. The vertical and planer tunnel FET are contrasted. Further, Tunnel FET is benchmarked with CMOS technology. The on-current, transconductance and power conversion performance are extracted from reported works and a new perception on the extracted data is presented. The TFET is also presented as beyond FinFET. Based on the review made in this paper, impact of drain doping on capacitance is identified as left-out analysis. Thus, role of drain doping on capacitance is demonstrated using TCAD simulation.

Keywords—TFET, MOSFET, Tunneling, Silicon, Capacitance

I. INTRODUCTION

Silicon based CMOS technology shouldered the burden of semiconductor industry. TFET emerged as alternative device to CMOS based MOSFET.However, there are lot of limitations in practical implementation.Further, TFET might be also taken as hypothetical device. In this paper, a review of Tunnel FET is carried out.

II. HISTORY OF TUNNELING DEVICE

Tunnelling mechanism has a long history and implemented in semiconductor device, which is dated back to 1950s. Device with tunnelling progress opened a regime of semiconductor device. Advancements in the studies of tunnelling phenomena leads to the fabrication of tunnel diode. Negative resistance is the novel property in the tunnel diode. Further, the energy barrier does not vary monotonically with applied electric field. One can see the tunnel device is the next generation semiconductor device, on the perspective of "Beyond-CMOS". MOSFET works on the transport of carrier over a barrier while in tunnel FET (TFET) carrier tunnels. In tunnel FET, the carrier tunnels from source side valance band to channel side conduction band. The TFET can break the 60 mV/dec sub-threshold swing of MOSFET. The principle in MOSFET stems from thermionic transport over channel to source region. The tunnel FET is commonly characterized using band-gap barrier. The

experimental and theoretical feasibility of this TFET is also possible. Experimental feasibility is also possible for silicon-on-insulator (SOI), strained semiconductor, graphene nanoribbons, double gate device, carbon nanotubes and III-V materials.

III. THE PHYSICS OF TFETS

In MOSFET, the carriers are injected thermionically over the energy barrier. In TEFT, inter-band tunnelling is the carrier transport mechanism, which is due to heavily doped P-N junction. Zener in 1934 identified this tunnelling mechanism. The TFET can be abruptly turned on and turned off by bending the band by means of gate voltage. This on-off function could be realized p-i-n stack, where, i is intrinsic layer. In principle, the Tunnel FET has n-type and p-type behaviour with dominant electron and hole conduction, respectively. Thus, by nature, the TFET is a bidirectional or ambipolar semiconductor device.

However, heterostructure can be used to restrict one-type of carrier movement or design of asymmetric doping profile can be used to widen the energy barrier at drain side. Therefore, ambipolar current is supressed. Apart from this, asymmetric doping concentration also has the capability of achieving lower off-state current [1].

IV. BASIS OF PERFORMANCE BOOSTING

The simultaneous achievement of highest on-current and lowest subthreshold voltage slope is the design goal of tunnel FET[1]. With this, the lowest possible off-current should be achieved. To outperform complementary metal oxide semiconductor device, the parameters targeted in tunnel FET are: drain voltage lower than 0.5 V, on-off ratio >105; on-current in the order of 100s of mill-amperes; sub-threshold swing (SS) distant below 60 mV/decade. As SS diminutives with gate bias, TFET are naturally targeted low and ultra-low power operation.

To achieve a steep slope and high on-current, tunnelling probability has to approach the unit for a tiny change in gate voltage. The tunnelling probability (Tprob) proportional to mass, which can be extracted from following expression

$$T_{prob} = exp\left(-\frac{4\gamma\sqrt{2m}\sqrt{E_g}^3}{3qh(E_g+\Delta\theta)}\right) \qquad (1)$$

where, E_g andm are energy and mass, respectively.

V. DEVELOPMENTS OF TFET IN 2018 AND 2019

A.   Low power applications

Vertical-Structured Electron-Hole Bilayer Tunnel Field-Effect Transistor (V-EHBTFET) decreases the device ON voltage with the help of workfunction engineering and using narrow bandgap materials at the virtual junction region. As a result of this the V-EHBTFET can be used for Low power applications.

Gate engineered InGaN DL-TFET (Dopingless) has improved drain current and reduced subthreshold swing which results the device will work properly for low power applications.

B. ESD protection devices

The electrostatic discharge due to double current flow in the device, which was suppressed as reducing the charge flow at source channel interface by the grounded gate TFET structure.

C. Digital Logic Circuits

The twofold TFET (TF-TFET) is a mixture of n-type and p-type TFETs. Since it has both n-type and p-type, the TF-TFET was used as an inverter. A single device will act as inverter as a result the number of transistors that was used in the logic circuits were reduced also the miller capacitance be reduced.

D. Biosensors

Circular gate TFET and heterojunction TFET are used as biosensors, by dielectric modulation, compared to MOSFET both the CG and HJ TFETs perform far more better in the biomolecules sensing.

E. Memory Design

The development of SRAM cell using TFET particularly Dual pocket double gate TFET shows improved current ratio and subthreshold swing. Due to this factors the memory cell was designed for low power applications and improved write margin.

F. Logic Circuit Implementation

Double Gate TFET (DG-TFET) with independently controlled gate is used in the realization of compact logic gates. This type of logic function implementation exhibits compactness, improved propagation delay and low power dissipation.

G. Low-Cost Radio Frequency and Low Power Application

In0.53Ga0.47As/In0.52Al0.48As Heterojunction Dopingless TFET (HDL-TFET) exhibits low subthreshold swing and effectively suppressed the ambipolar characteristics due to heterogate HfO2 /SiO2. As the result HDL-TFET exhibits cutoff frequency in the order of GHz with low power consumption.

VI. NEW DEVELOPMENTS IN TFET

A. Line-Tunneling and Buried N+ Drain FETs

Line tunnelling method can be to obtain simultaneous improvement of on-current and reduction of subthreshold slope[2].However, in this method, isolation drain and source is a challenging one. In normal tunnelling, the channel is next to source in lateral direction (source-to-drain direction). In the case of line tunnelling, the channel is placed over source in vertical direction (channel-to-gate direction). The leakage current degrades the off-state characteristics severely. Air-bridge or cantilever are the common method of cutting the leakage path. However, it brings additional process complexity and induces reliability issues. Buried +N doping also used to cut-off the leakage path. This N+ doping act as reversed P-N junction. The merit of N+

buried drain keep the device planner, so, this technique could be taken for future experimental investigation. In line tunnelling, carrier sees a longer path than that of direct tunnelling.

B. DRAM

In order to retain the data statistically, DRAM uses Negative Differential Resistance (NDR) and storage capacitor leakage. Retention of data statistically eliminates data refreshment. Design of TFET based DRAMachieves higher throughput, which is owing to removal of data refreshment[3].

C. SRAM

Forward p-i-n current in TFET is avoided to reduce leakage power conception. In contrast to 6 transistor (6T) based SRAM design, 10 tunnel FTET transistor (10T) is used to improve noise margin and reduce power conception[4].

D. TFET with Ternary CMOS

TFET with ternary CMOS method to obtain half supply voltage (drain voltage) operation. Two kind of tunnelling is used in T-CMOS such as: (1) source-drain tunnelling and (2) source-channel tunnelling[5].

E. Implanted Drain and Face-Tunneling

N-type ion can be implanted in drain side and this implantation is compatible with standard CMOS fabrication process flow. The drain ion implantation is an effective method to reduce the leakage. Along with ion implantation, face tunnelling can be used to achieve higher tunnelling current[6].

F. Anisotropic Insulator

Managing electrostatic field in MOSFET and TFET is important as it has great influence sub-threshold swing. Further, anisotropic insulator can outperform the HfO2. The use of anisotropic insulator in TFET manipulates the electrostatic field. The anisotropic insulator can be implementedusing gate-insulator and spacer layer.In this implementation, permittivity modulates the fringing field between the contact metals. Permittivity also modulates the subthreshold voltage swing[7].

G. Transient Response for Sensing application

For sensing neutral and charged biomolecule, transient analysis a promising method as it provides good selectivity. In transient simulation, the variation is more sensitive to the variation of permittivity. Assorted permittivity could be used to mimic the presence of the variety of biomolecule in the sensing region[8].

H. 12 Transitor SRAM

The leakage current can be reduced in different level such as device level and circuit level. In circuit level reduction, 12 transistors effectively reduce the reverse current in SRAM. Adopting write-assist-circuit in 12T SRAM cell enable it perform well compared to 7T SRAM [9].

VII.　　BEYOND FINFET

For the past two decades, in the development of semiconductor products, Finfet technology started its footprint by replacing planar devices. Evolution is a slow process, as it doesn't allow any sudden changes, so, the Finfet technology uses some advancement from the earlier like the use of the high-k metal gate, varied source/drain structures. The worldwide accepted aspect that Finfet is replaced by TFETs. But this replacement cannot be explained clearly when the scaling of the device below 7nm. To overcome this and also incorporate the pros of Finfet into TFETs will be done by varying the structure of TFET resembles Finfet as FIN enabled area scaled TFET as proposed recently shown in FIG

The operation of the device is similar to TFET, as it has great control over the gate channel interface. Due to this the device performance is improved, shown in FIG from the simulation results, the performance of the device improved very well with 10nm gate length, from the following parameters as HIGH ON current, improved transconductance, output resistance, unity gain frequency. Also, the simulation results show reduced OFF current and Area of the chip. Ultimately the Subthreshold Swing has reduced very much in the order of 11mV/dec and the average SS is about 40mV/dec. Since the device exhibits tremendous improvement it is compatible with various analog, digital and RF applications.

VIII.　　BEYOND CONVENTIONAL SEMICONDUCTORS

In electronics applications, the role of 2D materials like Graphene, Nitrides and dichalcogenides are increased in recent times. Due to this inclusion of 2D materials, the developed electronics products are used in low power areas. The reason for these low power applications is channel properties, thin channel at the atomic level which leads to improved gate control and scalability. The flexibility of 2D materials and the uniform surface helps in the improvement of device reliability.

TMDC based TFET exposes increased gate control over tunnelling junction, absence of TAT leakage and broken band gap TFET architecture. Since the emerging technology has so many advancements it has to grow more to fulfil the needs of the semiconductor industry.

IX. ON-CURRENT

Gate work function, source doping, pocket and oxide material control the On-current (ION) [10, 11]. Ids increases in direct band-gap feature, smaller electron and hole effective mass in InGaN. Tunnelling gate (TG) act as virtual pocket and this leads to have higher field and smaller tunnelling distance. So TG enhances ion. ION improves with increasing "In" fraction in InGaN[10]. As gate/channel length reduces, current will increase, which is shown in Fig. 1. The on-current with respect to channel /gate length is expressed as

$$I_{ON} = -15L_G + C \qquad\qquad (2)$$

where ION and C are the On-current and level shifting parameter. The value of C is 600 µA/µm. The -15 in eq. (2) is the negative slope in drain current and it indicates that the On-current is inversely proportional to the gate length.
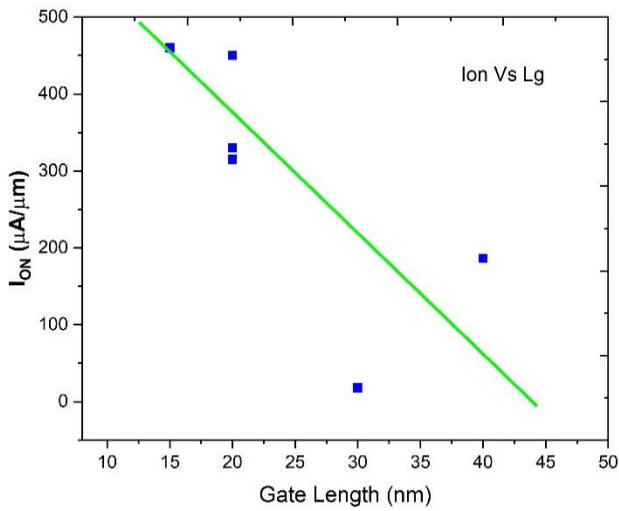
Fig. 1 On-Current versus gate or channel length.

X.   DC-DC AND RF-DC POWER CONVERSION EFFICIENCY
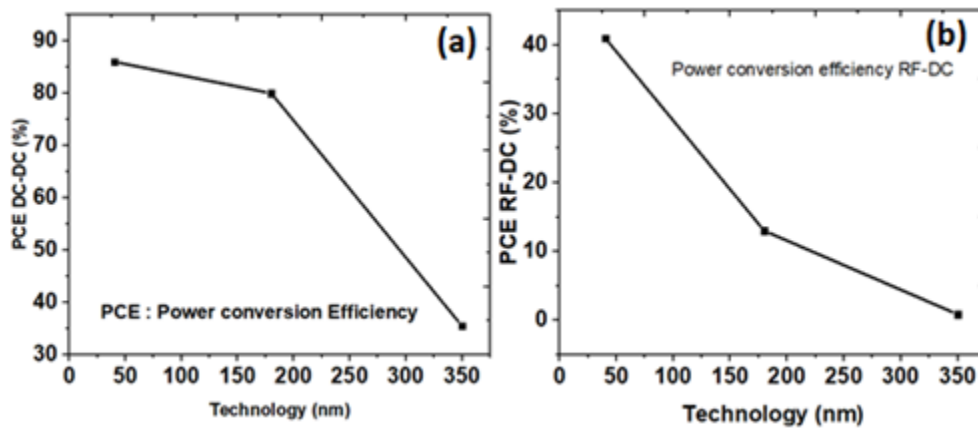
Fig. 2 (a) DC-DC and (b) RF-DC Power Conversion efficiency versus technology (nm).

The power conversion efficiency is very much important in front end RF receiver. In USA and Canada, the transmitted power is 4W at 915 MHz. The distance between transmitter and receiver is 30 m. Thus, the power at receiver antenna is 36 mW. This small received power demands for efficient power conversion device. The DC-to-DC and RF-to-DC power conversion efficiency versus technology node is shown in Fig. 2. As it can be seen, both DC-DC and RF-DC conversion efficiency diminishes with increase in technology node. It could be stated that lower technology node device is preferable for RF front end rectification.

Table I Transconductance and drain current.

VGS (V)	VDS (V)	ID (A/ μm)	Gm (S/ μm)	DEVICE STRUCTURE	REFERENCE SOURCE
-1V	-1V	4x10-8 A	4x10-8 S	P-CHANNEL CG-TFET	[12]
1.5V	0.7V	3x10-12 A/μm	3.18x10-5 S/ μm	SOI-TFET	[13]

1.5V	0.7V	--	4.28x10-5 S/ μm	SELBOX	[13]
1.5V	1V	4x10-10A/ μm	2.01x10-9 S/ μm	SOI-TFET	[14]
1.4V	0.5V	4x10-8A/ μm	1.6x10-7 S/ μm	C-TFET	[15]
1.4V	0.5V	4x10-6A/ μm	7.1x10-6 S/ μm	V-DMGTFET	[15]
1.5V	1V		4x10-8 S/ μm	CG-TFET	[15]
1.5V	1V		2.25x10-7 S/ μm	DCG-TFET	[16]
1.5V	1V	2x10-5 A/ μm	820x10-6 S	DOPINGLESS TFET	[17]
1.5V	1V	2x10-6 A/ μm	0 S/ μm	CONVENTIONAL TFET	[18]
1.5V	1V	6x10-6 A/ μm	0 S/ μm	L-TFET WITH HGD	[18]
1.5V	1V	1x10-3 A/ μm	2.15 S/ μm	L-TFET WITH Ge SOURCE AND HGD	[18]
1.5V	1V	1x10-4 A/ μm	2.15 S/ μm	L-TFET WITH Ge SOURCE	[18]

The drain current and transconductance of various tunnel FET is given in table I. It is observed that dopingless TFET, L-TFET WITH Ge SOURCE AND HGD, and L-TFET WITH Ge SOURCE demonstrate the higher transconductance.

XI. SIMULATION ANALYSIS OF DRAIN SIDE DOPING

The impact of drain side doping on capacitance not analysed yet. Thus, in this paper, doping impact on capacitance is analysed. The device considered for the analysis is shown in Fig. 3, which is reported by C. SheejaHerobin Rani et. Al [19]. The analysis is carried out using TCAD physical simulator. Various physics based model is used in the simulation.
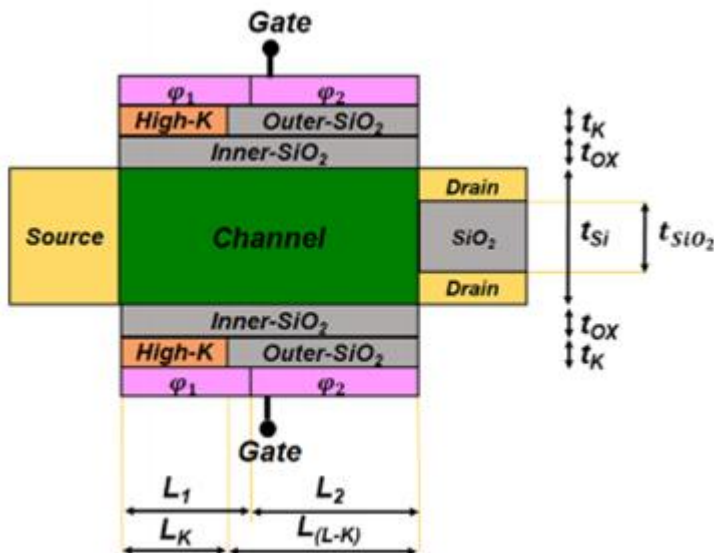
Fig. 3 Schematic of Tunnel Field Effect transistor with reduced High-K material.
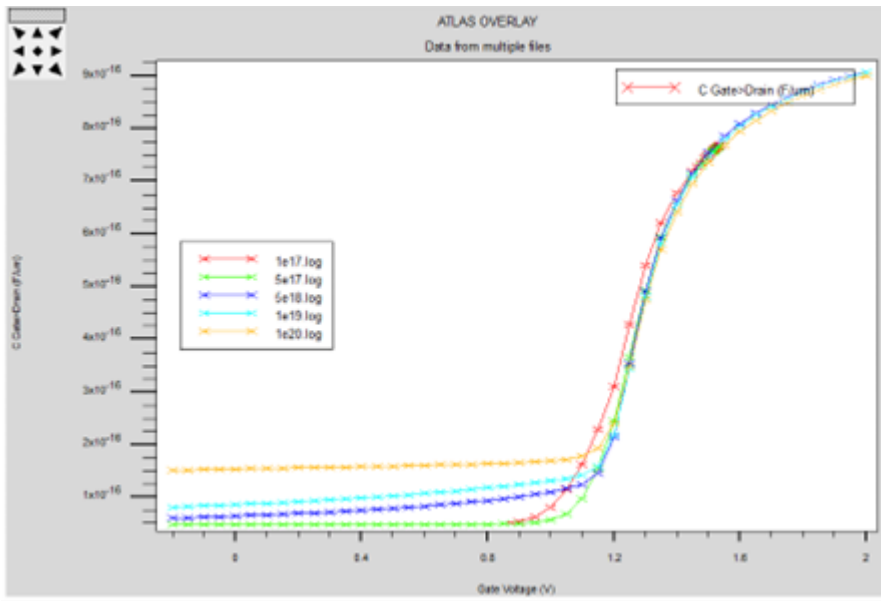
Fig. 4 Gate-source capacitance for various drain side doping ranging from 1e17 cm-3 to 1e20 cm-3.

Fig. 4 shows the gate-to-drain capacitance for various drain side doping. The doping in drain side is varied from 1e17 cm-3 to 1e20 cm-3. The gate voltage is swept from -2V to 2V at drain voltage of 5V. It is interesting to note that the drain side doping affects the gate-source capacitance only around subthreshold voltage and off-state region. In off-state region, it is found that the gate-drain capacitance increases with increase in drain side doping.
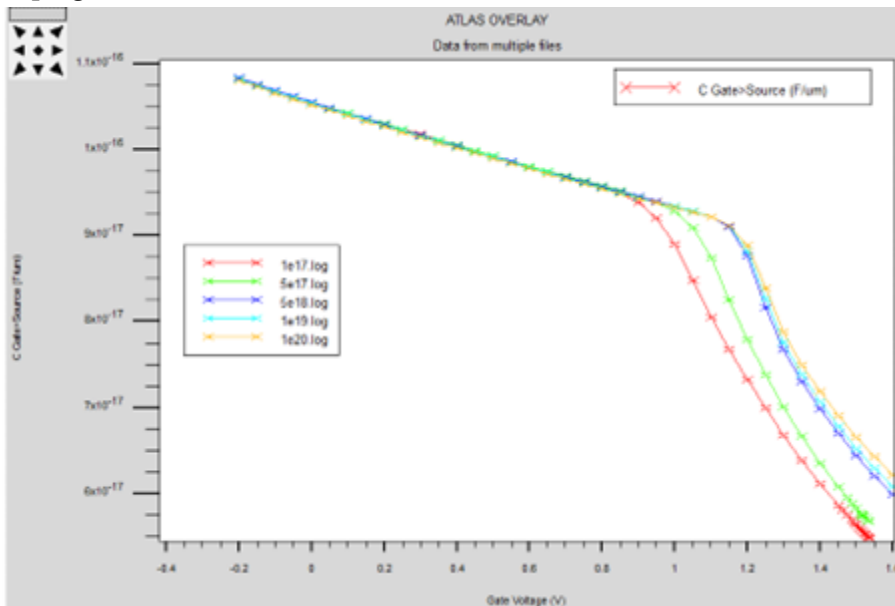
Fig. 5 Gate-source capacitance for various drain side doping.

Fig. 5 shows the gate-source capacitance (Cgs) for assorted drain side doping. The Cgs in Fig. 5 is comparable to the Cgd in Fig. 4. The trend of Cgs with Vgs is inverse to the trend of Cgd with Vgs. It is unlike behaviour to

the MOSFET. In MOSFET, both Cgs and Cgd increases with respect to Vgs. Further, unlike in Cgd, the doping in drain side effects the on-state gate-source capacitance.

XII.CONCLUSION

Tunnel FET is investigated in this paper. The development of TFET in 2018 and 2019 is presented. The new development in TFET is also presented. The performance metrics are collected from reported work. The on-current and power conversion efficiency are extracted from reported work and summarized in this paper. An in-depth inference of these collected data is provided in this paper. Furthermore, role of drain doping on capacitance of tunnel FET is investigated using TCAD simulator. The findings of this study are: (i) the gate-drain capacitance below subthreshold voltage increases with increase in drain doping and (ii) gate-source capacitance above subthreshold voltage decreases with increase in drain side doping.

Acknowledgment

XIII.   REFERENCES

[1]. Adrian M. Ionescu & Heike Riel Tunnel field-effect transistors as energy-efficient electronic switches" doi:10.1038/nature10679

[2]. Bin Lu , Yan Cui, Aixin Guo, Dawei Wang, Zhijun Lv , Graduate Student Member, IEEE, Jiuren Zhou , Member, IEEE, and Yuanhao Miao Characteristics of InAs/GaSb Line-Tunneling FETs With Buried Drain Technique" IEEE TRANSACTIONS ON ELECTRON DEVICES, 2021

[3]. Navneet Gupta1,2, Adam Makosiej2 , Hitesh Shrimali4 , Amara Amara1, Andrei Vladimirescu1,3, Costin Anghel1 1 "Tunnel FET Negative-Differential-Resistance based 1T1C Refresh-Free-DRAM, 2T1C SRAM and 3T1C CAM"

[4]. Zhiting Lin, Senior Member, IEEE, Luanyun Li, Xiulong Wu, Chunyu Peng, Wenjuan Lu, and Qiang Zhao "Half-Select Disturb-Free 10T Tunnel FET SRAM Cell with Improved Noise Margin and Low Power Consumption"

[5]. HYUN WOO KIM, AND DAEWOONG KWON "Low-Power Vertical Tunnel Field-Effect Transistor Ternary Inverter"

[6]. Zhijun Lyu , Graduate Student Member, IEEE, Hongliang Lv , Senior Member, IEEE, Yuming Zhang , Senior Member, IEEE, Yimen Zhang , Senior Member, IEEE, Yi Zhu, Graduate Student Member, IEEE, Jiale Sun, Student Member, IEEE, Miao Li, and Bin Lu "A Novel High-Performance Planar InAs/GaSb Face-Tunneling FET With Implanted Drain for Leakage Current Reduction" IEEE TRANSACTIONS ON ELECTRON DEVICES, VOL. 68, NO. 3, MARCH 2021

[7]. Robert K. A. Bennett and Youngki Yoon , Member, IEEE Using "Anisotropic Insulators to Engineer the Electrostatics of Conventional and Tunnel Field-Effect Transistors" IEEE TRANSACTIONS ON ELECTRON DEVICES, VOL. 68, NO. 2, FEBRUARY 2021

[8]. Praveen Dwivedi , Member, IEEE, Rohit Singh , Member, IEEE, Brajendra Singh Sengar , Member, IEEE, Amitesh Kumar, Member, IEEE, and Vivek Garg , Member, IEEE, "A New Simulation Approach of Transient Response to Enhance the Selectivity and Sensitivity in Tunneling Field Effect Transistor-Based Biosensor," IEEE SENSORS JOURNAL, VOL. 21, NO. 3, FEBRUARY 1, 2021

[9]. Chunyu Peng , Member, IEEE, Zhou Yang , Zhiting Lin , Senior Member, IEEE, Xiulong Wu , Member, IEEE, and Xuan Li "Reverse Bias Current Eliminated, Read-Separated, and Write-Enhanced Tunnel FET SRAM," IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS—II: EXPRESS BRIEFS, VOL. 68, NO. 1, JANUARY 2021

[10]. IEEE TRANSACTIONS ON ELECTRON DEVICES, VOL. 65, NO. 3, MARCH 2018 1223 A High-Performance Gate Engineered InGaN Dopingless Tunnel FET, Xiaoling Duan , Jincheng Zhang, Shulong Wang, Yao Li, Shengrui Xu, and Yue Hao,

[11]. Applied Physics A (2018) 124:306 https://doi.org/10.1007/s00339-018-1670-x, A novel approach for the improvement of electrostatic behaviour of physically doped TFET using plasma formation and shortening of gate electrode with hetero gate dielectric, Deepak Soni1 · Dheeraj Sharma1 · Mohd. Aslam1 · Shivendra Yadav

[12]. R1 - A 2D analytical cylindrical gate tunnel FET (CG-TFET) model: impact of shortest tunneling distance

[13]. R2 - Reduction of the kink effect in a SELBOX tunnel FET and its RF/analog performance Puja Ghosh1 · Brinda Bhowmick

[14]. R3 - Impact of technology scaling on analog and RF performance of SOI–TFET P Kumari1, S Dash2 and G P Mishra1

[15]. R4 - Temperature sensitivity analysis of vertical tunneling based dual metal Gate TFET on analog/RF FOMs Neha Paras1 · Sudakar Singh Chauhan1

[16]. R5 - Improved cut-off frequency for cylindrical gate TFET using source delta doping Sidhartha Dasha, Girija Shankar Sahoob, Guru Prasad Mishrab*

[17]. R6 - Temperature based performance analysis of doping-less Tunnel Field Effect Transistor Dharmendra Singh Yadav, Dheeraj Sharma, Rahul Agrawal, Gaurav Prajapati , Sukeshni Tirkey, Bhagwan Ram Raad and Varun Bajaj

[18]. R7 - Ge/Si heterojunction L-shape tunnel field-effect transistors with hetero-gate-dielectric_ Cong Li, Zhi-Rui Yan, Yi-Qi Zhuang, Xiao-Long Zhao, and Jia-Min Guo

[19]. C. Sheeja Herobin Rani & K. Bhoopathy Bagan & D. Nirmal3 & R. Solomon Roach "Enhancement of Performance in TFET by Reducing High-K Dielectric Length and Drain Electrode Thickness" Silicon 2020. https://doi.org/10.1007/s12633-019-00328-w.

Design of Hexagonal Microstrip Patch Antenna for Wireless Applications

K. Dinakaran[1], A. Anandkumar[1], Dr.M. Kathirvelu[2], N. Lavanya[3], S. Vanitha[3], M. Indraja[3]

[1]Assistant Professor, Department of Electronics and Communication Engineering, Jai Shriram Engineering
College, Tiruppur, Tamil Nadu, India

[2]Professor, Department of Electronics and Communication Engineering, KPR Institute of Engineering and
Technology, Coimbatore, Tamil Nadu, India

[3]UG Scholar, Department of Electronics and Communication Engineering, Jai Shriram Engineering College,
Tiruppur, Tamil Nadu, India

ABSTRACT

A microstrip patch antenna plays an important role in wireless communication. Because of its low profile, compact size, lighter in weight and easy of fabrication. In this paper, Hexagonal microstrip patch antenna is designed and the performance was analysed. The substrate is a dielectric material. The proposed design consist of FR4-epoxy dielectric material which having relative permittivity of 4.4 between the patch and ground plane. The antenna parameters such as gain, return loss and radiation pattern has been analysed using HFSS 13.0 software.

Index Terms: Antenna, microstrip patch antenna, Hexagonal patch antenna, feeding.

I. INTRODUCTION

Microstrip antenna was first introduced in the year of 1950s. The purpose of antenna is to transmit or receive electromagnetic waves. The reducing the size of antenna and bandwidth enhancement are the important design issues for real-world applications In recent times lots of studies have been done to improve the performance of an antenna by improving the bandwidth and efficiency of an antenna. The patch can be of various geometrical configuration such as square, rectangular, circular, elliptical, E-shaped, H-shaped etc.
The suggested antenna is largely made up of a conducting channel on one side of a dielectric substrate with a ground plane on the other. The thickness, size, form, and dielectric constant (ϵr) of the substrate material are all measured. it is used to separate the patch and the ground plane is determined on the basis of operating frequency of the patch antenna. They have been widely used for military and civilian application such as satellite communication, global positioning system (GPS), remote sensing, radio frequency identification (RFID), etc. The basic structure of microstrip patch antenna is shown in Fig. 1.
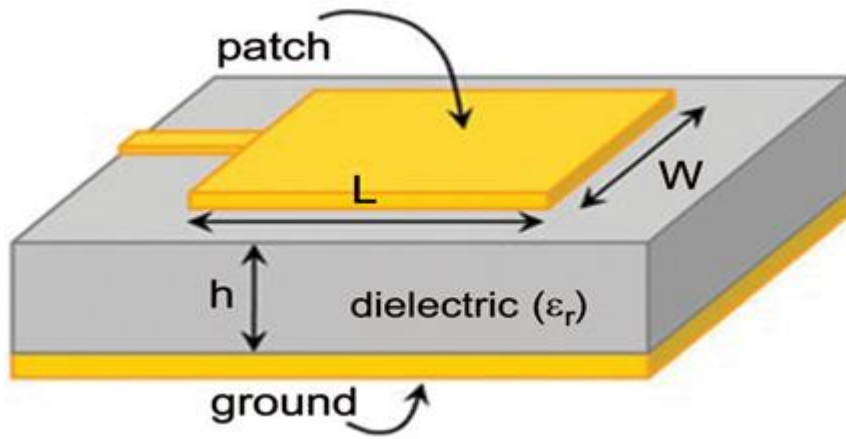
Fig.1.Basic Structure of Microstrip Patch Antenna

Wireless Standards	Frequency
1G analog cellular standard	824-849 MHz 869-895 MHz
2G GSM standards	890-915 MHz; 935-960 MHz
Cellular video	28GHz
Wireless LAN	2.40-2.48 GHz 5.4 GHz band
WAN Networks	60 GHz
Global Positioning System(GPS)	1575 MHz band, 1227 MHz band
Collision Avoidance Radar System	60,77 and 94 GHz band
Automatic Toll Collection System	905 MHz; 5-6GHz
Direct Broadcast Satellite(DBS)	11.7-12.5GHz band

Table 1: Application Area of Microstrip Antenna

A.   Hexagonal Patch

The study and the design of Hexagonal patch antenna is presented in this paper is shown in Fig.1. Hexagonal patch is smaller in size when compared to circle and square for a given frequency.
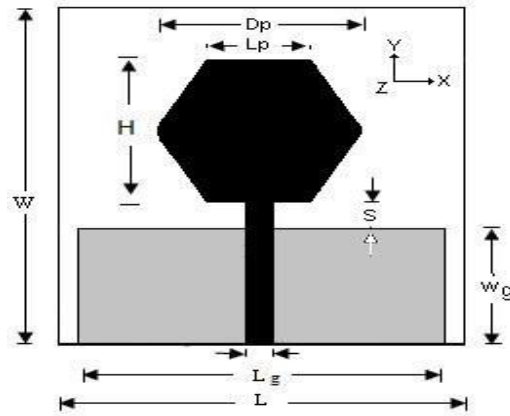
Fig..2..Hexagonal Patch Antenna

B. Feeding Techniques

The efficiency of the antenna is calculated using feedline. There are numerous strategies for feeding the signal into microstrip patch antenna. Some of the popular feeding methods are microstrip line feeds, coaxial probe feeds and aperture coupled feeds.

In this paper inset feeding method can be used to radiate the power of the proposed antenna and it is easy to implement.

II. DESIGN METHODOLOGY

The following steps is used to design and developing a microstrip patch antenna.

- Step1: Calculate the width of microstrip patch:

$$W = \frac{c}{2f_r}\sqrt{\frac{2}{\varepsilon_r + 1}} \qquad (1)$$

Where,

c =free space velocity of light.

fr = resonating frequency.

ε_r= relative permittivity of substrate.

- Step 2: Effective dielectric constant:

$$\varepsilon_{reff} = \frac{\varepsilon_r + 1}{2} + \frac{\varepsilon_r - 1}{2}[1 + 12\frac{h}{W}]^{-\frac{1}{2}} \qquad (2)$$

Where,

h = Thickness of the substrate.

W= Width of the patch.

- Step 3: Effective length:

$$L_{eff} = \frac{c}{2f_r\sqrt{\varepsilon_{reff}}} \qquad (3)$$

- Step 4: Extension length:

$$\Delta L = 0.412h\frac{(\varepsilon_{\text{reff}}+0.3)(\frac{w}{h}+0.264)}{(\varepsilon_{\text{reff}}-0.258)(\frac{w}{h}+0.8)} \qquad (4)$$

- Step 5: Length of the patch:

$$L = L_{\text{eff}} - 2\Delta L \qquad (5)$$

- Step 6:Width of the substrate:

$$W_g = 6h + W \qquad (6)$$

- Step 7:Length of the substrate:

$$L_g = 6h + L \qquad (7)$$

PARAMETER	DIMENSION
Substrate Width(Ws)	80 mm
Substrate Length(Ls)	90 mm
Substrate Height(h)	3.6 mm
Ground Length(Lg)	90 mm
Ground Width(Wg)	80 mm
Operating Frequency(fr)	1.8 GHz
Relative Permitivity (ϵr)	4.4 mm

Table 2: Dimensions of the Antenna

Fig.3 shows the general configuration of proposed hexagonal shaped patch is placed over the substrate having dielectric constant of 4.4 mm and the thickness of substrate is 3.6mm and ground plane is placed on other side of the patch.
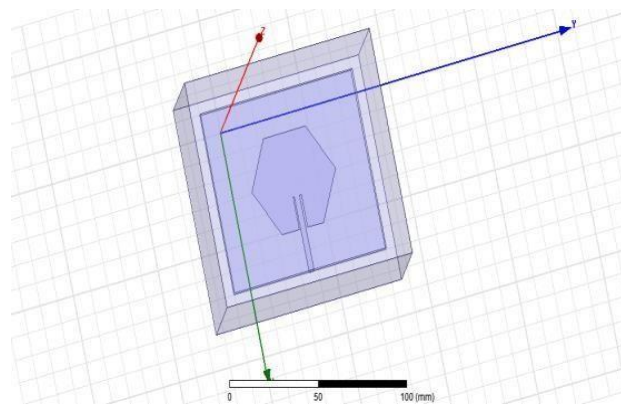
Fig.3.Hexagonal Patch Antenna

III. SIMULATION RESULT

A. Return loss:

In antenna design, return loss is one of the important parameter while designing an antenna is shown in Fig.4 & 5.The simulated results shows the maximum return loss -20 dB at 1.79 GHz and VSWR 1.6 dB at 1.79 GHz, which can cover wireless application.
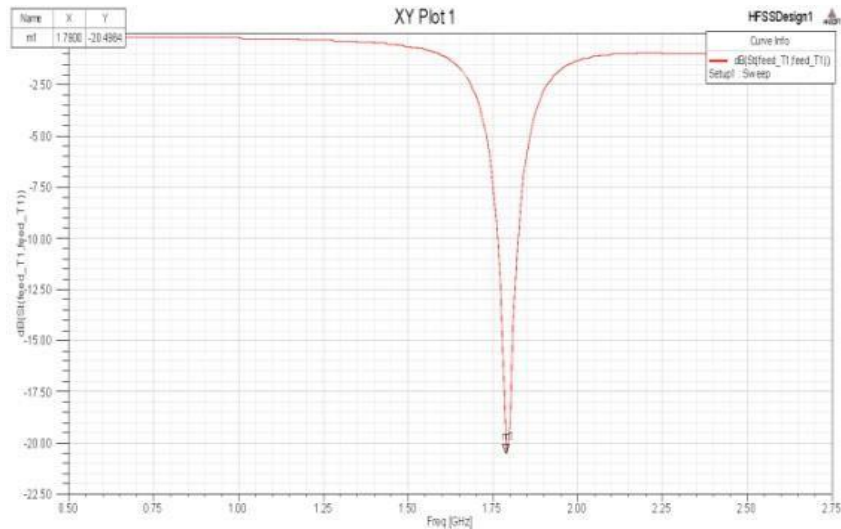
Fig..4.Simulation Result XY Plot 1
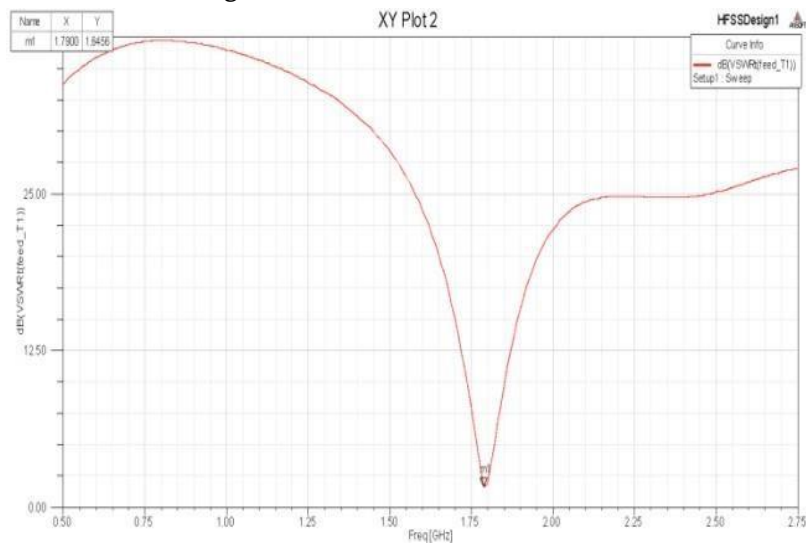
Fig..5.Simulation Result XY Plot 2

B. Radiation Pattern:

The Radiation pattern of the proposed antenna is plotted using HFSS simulation software is shown in Fig.6. In Radiation pattern shows the energy radiated through an antenna.
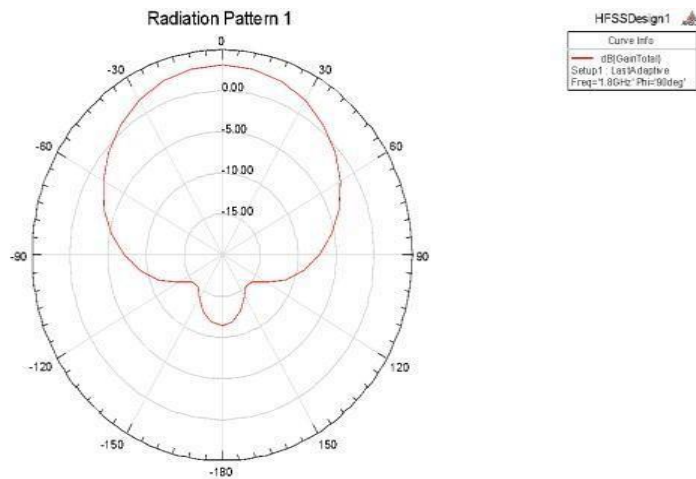
Fig.6.Radiation Pattern

C. Gain

Gain is defined as a conversion of input power into radio waves towards a desired direction. This antenna got a overall gain of 3.21dbi is shown in Fig.7.
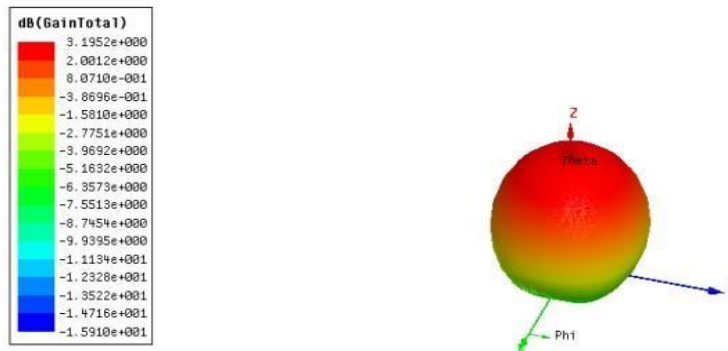
Fig..7. 3D Polar Plot

IV. CONCLUSION

Using the HFSS 13.0 software tool, we evaluated and stimulated a hexagonal microstrip patch antenna with feed line in this research. The proposed antenna was created on a dielectric constant of 4.4 FR4 - EPOXY substrate. The suggested antenna's resonance frequency is 1.8 GHz. The gain of an antenna in the direction of main beam emission is 3.19 dB, and the return loss is -20 GHz. This antenna is suitable for mobile wireless applications. Furthermore, depending on the application, the antenna's performance can be increased.

V. REFERENCES

[1]. T.L.Singal, Anuj Bhardwaj and Mohit Goyal, "Methodology for design and development of microstrip patch antenna".International Journal of Engineering Applied Science and Technology(2020).Vol-5,Issue-3.

[2]. Rana, S. and Rahman, M., 2022, January. Study of Microstrip Patch Antenna for Wireless Communication System. In 2022 International Conference for Advancement in Technology (ICONAT) (pp. 1-4). IEEE.

[3]. Bhavna Sharma,Punam Rani and Prachi Gupta, "Design and Analysis of Circular Monopole antenna for WLAN and WI-Max Application in S band".International Journal of Innovative and Exploring Engineering(IJITEE) (2020) Vol-9, Issue-9.

[4]. Hire, M.R. and Ahire, C.S., 2022. A Review on Microstrip Patch Antenna Design and its Applications. Available at SSRN 4043696.

[5]. Demirbas, G. and Ekrem, A.K.A.R., 2022. Design and Interpretation of Microstrip Patch Antenna Operating at 2.4 GHz for Wireless WI-FI Application. Avrupa Bilim ve Teknoloji Dergisi, (34), pp.672-675.

[6]. Qian, B., Chen, X. and Kishk, A.A., 2021. Decoupling of microstrip antennas with defected ground structure using the common/differential mode theory. IEEE Antennas and wireless propagation letters, 20(5), pp.828-832.

[7]. Przesmycki, R., Bugaj, M. and Nowosielski, L., 2020. Broadband microstrip antenna for 5G wireless systems operating at 28 GHz. Electronics, 10(1), p.1. [8].

[8]. Dinakaran, K., Vajikabanu, M., Piriyadharsini, M. and Rajeshwari, D., 2016. Design of Microstrip Patch Antenna for Wi–Fi Applications. International Journal of Advanced Research in Electronics and Communication Engineering, 5(1), pp.38-41.

[9]. Zhang, C., Gao, J., Cao, X., Xu, L. and Han, J., 2018. Low scattering microstrip antenna array using coding artificial magnetic conductor ground. IEEE Antennas and Wireless Propagation Letters, 17(5), pp.869-872.

Improving The Security of Internet Banking System Using Three Level Security Implementation

(Smt) K. Amutha MCA M.Phil.[1], V. Deivanai[2]

[1]Assistant Professor, Department of Computer Science, Sri Sarada College for Women (Autonomous), Tirunelveli, Tamil Nadu, India

[2]II MSc Computer Science, Department of Computer Science, Sri Sarada College for Women (Autonomous), Tirunelveli, Tamil Nadu, India

ABSTRACT

Bank server is an innovative technology that can be used for processing and sharing data in a safe manner. Data may be processed and shared securely across an inconsistent network using a bank server, This project proposes with a brief history of the security system and explain some of the most important aspects of this new technology. When it comes to identify the potentially harmful transactions on an untrusted network, machine learning may be an effective tool for deciphering massive datasets. Using these clever strategies in conjunction with each other is critical in banking and finance. The public Elliptic dataset from many banks is utilized as a baseline for our proposal, which is then implemented to Secure this system. SHA Secure Hash Algorithm is used as a trustworthy gateway to the internet banking since the latter is not completely labeled. The data is then classified using four machine learning approaches. When CNN Convolutional Neural Network and random forest classifier are combined, the suggested method displays promising results

Indexed terms: Machine Learning, Secure Hash Algorithm, Convolutional Neural Network, Principal Component Analysis (PCN).

I. INTRODUCTION

Online banking is now the subject of a great deal of study, and a large number of financial institutions provide their services over the internet. However, there are some limitations to this method, such as the fact that if a family has many members, visiting various websites and memorizing numerous login passwords is necessary in order to get information about each member's transactions and accounts. A single login ID and password is all that is required for the customer to access the integrated system in this suggested solution. It is possible for the user to conduct many bank transactions with a single identification number[1]. The system administrator and the bank administrator are the other two users of this suggested system.

New banks and branches may be added by system administrators who can also see information on branch managers and approve or reject registrations for these institutions. They may register themselves and if the

bank's administrator approves, they can access information about their branch clients' accounts. Cyber-attacks on Internet banking systems are increasing in number, complexity, and pervasiveness at an accelerating rate. This raises the issue of whether the online business model is sustainable. There is a lack of effort to address the vulnerabilities connected with the client's soft-components (PC, Internet browser, and End User) in most Banks' current security systems, which instead focus on offering a distinct method for remotely verifying transaction data.[6]. Using a PC infected with financial malware and a non-hardened Internet browser to conduct financial transactions is a risk that cannot be ignored, according to this paper's findings. Because there are so many active endpoint attack vectors, cybercriminals may create sophisticated assaults that affect the behavior of the End User, resulting to either canceled or fraudulent transactions. End users who are the victims of cyber crime are not only financially harmed, but their privacy and security may be affected for a long time after the fraud is done and perhaps compensated. This is contrary to what most people believe. As a result of this study, it is possible to increase Internet banking security and efficiency by incorporating both hardware and software components into the transaction system, but yet maintain user convenience and privacy. As it turns out, a PC-connected piece of hardware is necessary for providing tamper-proof storage and a safe environment for hardened software programs to run on. It is hoped that by providing End Users with a workable solution, the hackers' work would be made much more difficult, cutting their profit margins and helping to restore a more even playing field in the war against cybercrime.

II. EXISTING SYSTEM

The existing online banking system has its own user interface and database which maintains all the records of its customers and branch managers. For accessing different bank accounts, the user has to visit multiple bank websites which enquires the user to remember multiple login credentials. It may not be easy for all the users to remember all the login ids and passwords. Also, the current banking system has certain limitations such as the transactions can be made only between certain timings and sometimes the user is not provided the access to many functions in the application[3]. The existing work on security for Internet Banking talks about a model that solves most of the security related problems encountered in internet banking systems.

- Digital Certificates: Digital certificates are used to authenticate both the users and the banking system itself. This kind of authentication depends on the existence of a Public Key Infrastructure (PKI) and a Certificate Authority (CA), which represents a trusted third-party who signs the certificates attesting their validity.

- One-Time Password Tokens: One-Time Password devices are used as a second authentication factor. This kind of devices render captured authentication data useless for future attacks through the use of dynamically changing passwords which can be used only once.

- Browser Protection: In this model, the system is secured at the Internet browser level, which is used to access the banking system. The user and their browser are protected against known malware by monitoring the memory area allocated by the browser in order to detect such malware and hinder credential theft and capturing of sensitive information.

- CAPTCHA: Completely Automated Public Turing test to tell Computers and Humans is a method adopted to render automated attacks against authenticated session effective. This method requires the legitimate user to input information conveyed as scrambled images which are difficult for automated robots to process and recognize.

- Transaction Monitoring: This is currently applied in all online banking systems, using different techniques. Artificial intelligence, transaction history analysis, intrusion detection system, intrusion prevention system and other methods that identify fraud patterns in previously processed transactions are among the various approaches used. But there are certain issues with above mentioned implementations.

III. PROPOSED SYSTEM

Online banking provides countless advantages for both banking industry and its users. It enables the customers to make huge transactions worth several millions or simple transactions worth few rupees in matter of seconds without visiting the bank physically. Thus, customers have no need to wait in long queues to retrieve bank services. Online banking is ease of access and time serving[2]. From banks perspective, saving can be made from reducing staff remuneration, branch office, and Automatic Teller Machine (ATM) and Electronic Funds Transfer at Point of Sale (EFTPOS) transaction maintenance budgets.[10] Providing banking services with the necessary security from a remote location through the internet is a challenging process in banking sector. Probability of attacks increase with the advancement of online banking services. Billions of financial data transaction is conducted online every day. Thus not achieving a perception of security will have the wider effect of reducing customers' trust in internet banking as well as the bank. Skilled criminal hackers' carryout bank cyber-crime attacks everyday by manipulating the banks' online information system. Ensuring perfect security in online banking is hard to achieve target with rational client.[5]-[6].

Emerging new Technologies and large-scale businesses have made this world, a global village. Many business organizations provide online services targeting global consumer bases. Transaction in international scale has been enabled by banks all around the world through E-banking in order to supply the needs of above business organizations[5]. E-banking serves lots of benefits to both customers of banks and banks itself. It adds value to customer's satisfaction with better service quality and enables banks to gain a competitive advantage over other competitors
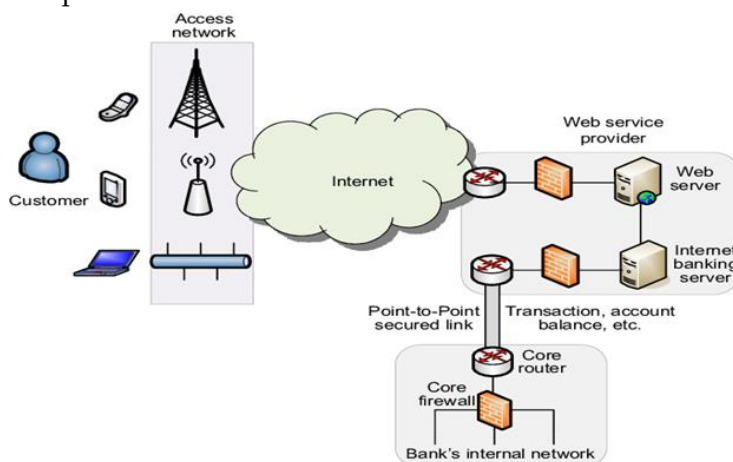
IV. RESULT
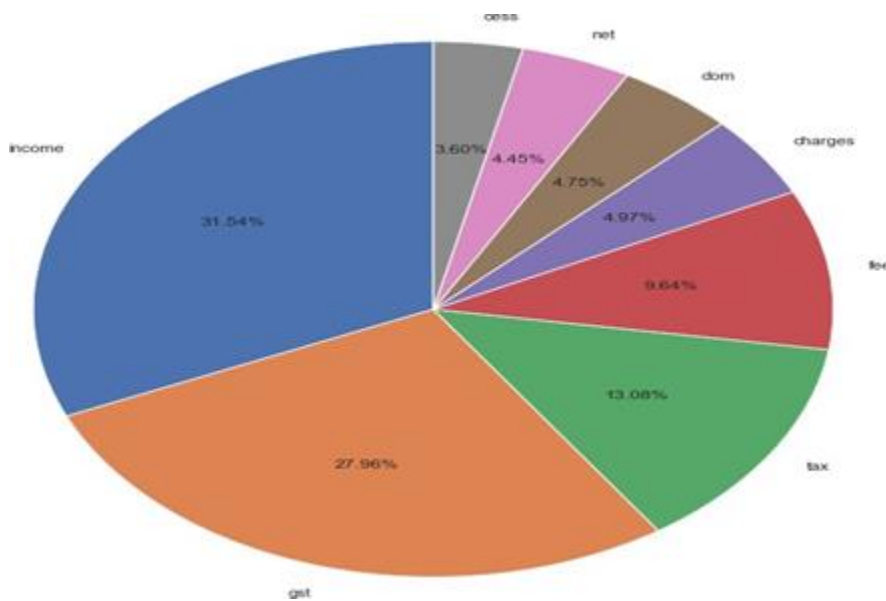
In this diagram Data analyzation of gst, tax, income charges are shown in percentage mode to accomplished in priority order.

V. CONCLUSION

As the crave for a more secure Internet banking system and service continues to rise, there is no doubt that the development and deployment of the system proposed in this work will go a long way in solving our Internet banking security needs. The system proposed here will guarantee a trusted path to the customer rather than trusting the customers computers. This will eliminate any possible occurrence of the "Man in the Middle" attacks or other attacks which have been recurrent. This proposed system will not only solve our security needs, but will also make Internet banking affordable to the majority of the world population, guaranteeing security of customers' accounts and information. The Internet enhances the interaction between two businesses as well as between individuals and businesses[9]. As a result of the growth of the Internet, electronic commerce has emerged and offered tremendous market potential for today's businesses. One industry that benefits from this new communication channel is the banking industry.

VI.REFERENCES

[1]. W. Henecka, S. K Ögl, A.-R. Sadeghi, T. Schneider, and I. Wehrenberg, "TASTY: Tool for automating secure two-party computations," in Proc.17th ACM Conf. Comput. Commun. Secur. (CCS), 2010, pp. 451–462.

[2]. R. Bost, R. A. Popa, S. Tu, and S. Goldwasser, "Machine learning classification over encrypted data," in Proc. Netw. Distrib. Syst. Secur. Symp.,2015, p. 4325.

[3]. R. Shokri and V. Shmatikov, "Privacy-preserving deep learning," in Proc. 53rd Annu. Allerton Conf. Commun., Control, Comput. (Allerton),Sep. 2015, pp. 1310–1321.

[4]. R. Gilad-Bachrach, N. Dowlin, K. Laine, K. Lauter, M. Naehrig, and J. Wernsing, "Cryptonets: Applying neural networks to encrypted data with high throughput and accuracy," in Proc. Int. Conf. Mach. Learn.,2016, pp. 201–210.

[5]. A. Nordrum, "Popular Internet of Things forecast of 50 billion devices by2020 is outdated," IEEE Spectr., vol. 18, Aug. 2016.

[6]. X. Liu, R. Deng, K.-K.-R. Choo, and Y. Yang, "Privacy-preserving outsourced clinical decision support system in the cloud," IEEE Trans. Services Comput., early access, Nov. 15, 2017, doi: 10.1109/TSC.2017.2773604.

[7]. T. Feng, D. J. Wu, M. Naehrig, and K. Lauter, "Secure computer evaluationof k-nearest neighbor models," U.S. Patent 9 825 758, Nov. 21, 2017.

[8]. D. Reinsel, J. Gantz, and J. Rydning, "Data age 2025: The evolution ofdata to life-critical," Don't Focus Big Data, pp. 2–24, Apr. 2017.

[9]. H. Park, P. Kim, H. Kim, K.-W. Park, and Y. Lee, "Efficient machine learning over encrypted data with non-interactive communication," Comput.Standards Interfaces, vol. 58, pp. 87–108, May 2018.

[10].X. Liu, R. H. Deng, K.-K.-R. Choo, and Y. Yang, "Privacy-preserving outsourced support vector machine design for secure drug discovery,"IEEE Trans. Cloud Comput., vol. 8, no. 2, pp. 610–622, Apr. 2020.

Real-Time Facial Emotion Recognition Using Machine Learning

Dr. (Smt.) V. Vallinayagi M.Sc. M.Phil. Ph.D.[1], R. Soorya Praba[2]

[1]Head and Associative Professor, Department of Computer Science, Sri Sarada College for Women (Autonomous), Tirunelveli, Tamil Nadu, India

[2]II M.Sc. Computer science, Department of Computer Science, Sri Sarada College for Women (Autonomous), Tirunelveli, Tamil Nadu, India

ABSTRACT

Face detection has been around for ages. Taking a step forward, human emotion displayed by face and felt by the brain, captured in either video, electric signal (EEG) or image form can be approximated. Human emotion detection is the need of the hour so that modern artificial intelligent systems can emulate and gauge reactions from the face. This can be helpful to make informed decisions, be it regarding identification of intent, promotion of offers or security related threats. Recognizing emotions from images or video is a trivial task for the human eye, but proves to be very challenging for machines and requires many image processing techniques for feature extraction. Several machine learning algorithms are suitable for this job. Any detection or recognition by machine learning requires training algorithms and then testing them on a suitable dataset. This paper explores a couple of machine learning algorithms as well as feature extraction techniques which would help us in accurate identification of the human emotion. Facial recognition is a technology that is capable of recognizing a person based on their face. It employs machine learning algorithms which find, capture, store and analyze facial features in order to match them with images of individuals in a pre-existing database.

INDEX TERMS: Facial recognition, expression recognition, machine learning, image recognition, Facial technology, emotion recognition, image classification.

I. INTRODUCTION

Human emotion detection is implemented in many areas requiring additional security or information about the person. It can be seen as a second step to face detection where we may be required to set up a second layer of security, where along with the face, the emotion is also detected. This can be useful to verify that the person standing in front of the camera is not just a 2-dimensional representation. Another important domain where we see the importance of emotion detection is for business promotions[1]. Most of the businesses thrive on customer responses to all their products and offers. If an artificial intelligent system can capture and identify real time emotions based on user image or video, they can make a decision on whether the customer liked or disliked the product or offer. We have seen that security is the main reason for identifying any person. Human

emotions can be classified as: fear, contempt, disgust, anger, surprise, sad, happy, and neutral. These emotions are very subtle. Facial muscle contortions are very minimal and detecting these differences can be very challenging as even a small difference results in different expressions. Also, expressions of different or even the same people might vary for the same emotion, as emotions are hugely context dependent While we can focus on only those areas of the face which display a maximum of emotions like around the mouth and eyes , how we 2 extract these gestures and categorize them is still an important question. Neural networks and machine learning have been used for these tasks and have obtained good results. Machine learning algorithms have proven to be very useful in pattern recognition and classification. The most important aspects for any machine learning algorithm are the features. In this paper we will see how the features are extracted and modified for algorithms like Support Vector Machines[4]. The human emotion dataset can be a very good example to study the robustness and nature of classification algorithms and how they perform for different types of dataset. It can employ various types of techniques to identify the emotion like calculating the ellipses formed on the face or the angles between different parts like eyes, mouth etc.

II. EXISTING SYSTEM

Now present the performance of the proposed model on the above datasets. In each case, we train the model on a subset of that dataset and validate on validation set, and report the accuracy over the test set. Before getting into the details of the model's performance on different datasets, we briefly discuss our training procedure. We trained one model per dataset in our experiments, but we tried to keep the architecture and hyper-parameters similar among these different models[6]. Each model is trained for 500 epochs from scratch, on an AWS EC2 instance with a Nvidia Tesla K80 GPU. We initialize the network weights with random Gaussian variables with zero mean and 0.05 standard deviation[7]. For optimization, we used Adam optimizer with a learning rate of 0.005 with weight decay (Different optimizer were tried, including stochastic gradient descents, and Adam seemed to be performing slightly better). It takes around 2-4 hours to train our models on FER and FERG datasets. For JAFFE and CK+, since there are much fewer images, it takes less than 10 minutes to train a model. Data augmentation is used for the images in the training sets to train the model on a larger number of images, and make the trained model for invariant on small transformations[9].

III. PROPOSED SYSTEM

The self-organizing map also known as a Kohonen Map is a well-known artificial neural network. It is an unsupervised learning process, which learns the distribution of a set of patterns without any class information. It has the property of topology preservation. There is a competition among the neurons to be activated or fired. The result is that only one neuron that wins the competition is fired and is called the"winner.A SOM network identifies a winning neuron using the same procedure as employed by a competitive layer. However, instead of updating only the winning neuron, all neurons within a certain neighborhood of the winning neuron are updated using the Kohonen Rule. The Kohonen rule allows the weights of a neuron to learn an input vector, and because of this it is useful in recognition applications[10]. Hence, in this system, a SOM is employed to

classify DCT-based vectors into groups to identify if the subject in the input image is "present" or "not present" in the image database.After the face has been located in the image or video frame, it can be analyzed in terms of facial action occurrence.

There are two types of features that are usually used to describe facial expression: geometric features and appearance features. Geometric features measure the displacements of certain parts of the face such as brows or mouth corners, while appearance features describe the change in face texture when particular action is performed. Apart from feature type, FER systems can be divided by the input which could be static images or image sequences[8]. The task of geometric feature measurement is usually connected with face region analysis, especially finding and tracking crucial points in the face region. Possible problems that arise in face decomposition task could be occlusions and occurrences of facial hair or glasses[2]. Furthermore, defining the feature set is difficult, because features should be descriptive and possibly not correlated.
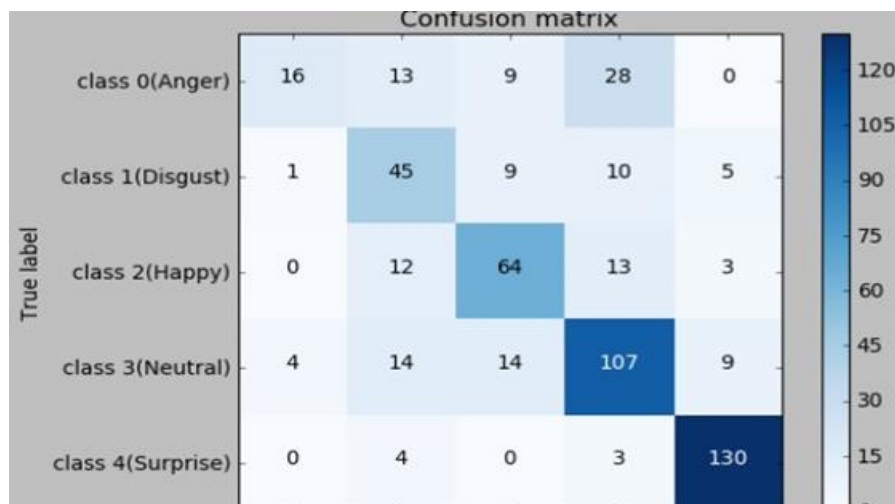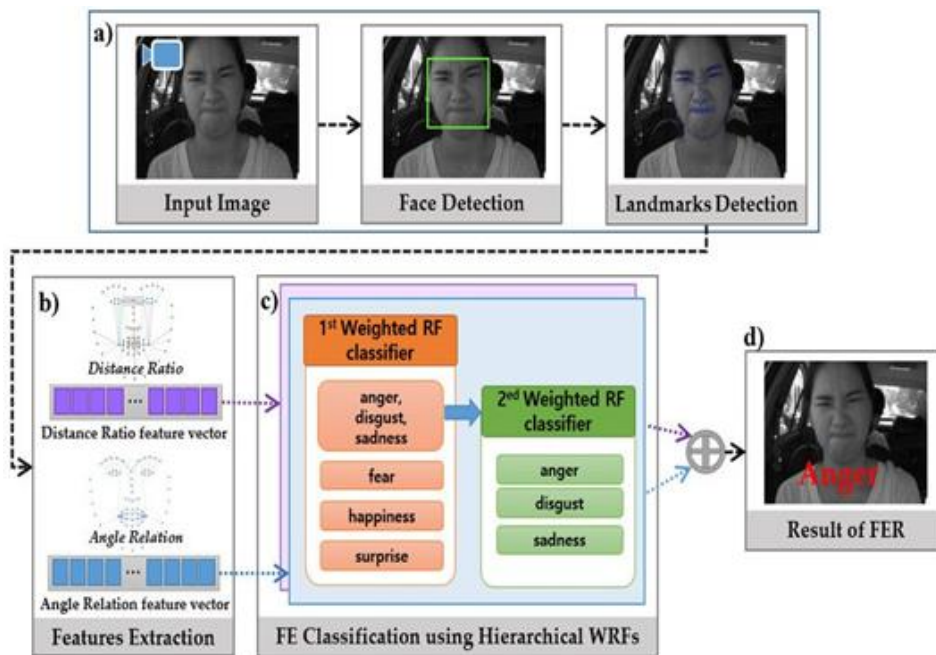
Random Forest Classifiers have also proven to have an upper hand over SVM in some of the cases [9]. Random forests are based on decision trees, but instead of just one classifier, use more forests or classifiers to decide the class of the target variable. The result of random forest classifier for detecting 6,7 and 8 emotions. Here, S1 to S5 represent the subset of emotion used for detection. K-Nearest Neighbor, Linear Discriminant Analysis and Neural Networks (ANN) are some of the algorithms used for classification of prediction of emotion.It tries to improve on the existing HMM by incorporating some characteristics of multiple classifiers. Also, HMM are used in sequence with algorithms such as k-Nearest Neighbor. Advantage of using both the methods is HMM can do the complex computations and k-NN just have to classify between the given samples. HMM decision is based on biggest output probability which might be mixed with noise, whereas K-NN can add a second layer of classification thereby increasing accuracy.

IV. CONCLUSION

This project proposes an approach for recognizing the category of facial expressions.Face Detection and Extraction of expressions from facial images is useful in many applications, such as robotics vision, video surveillance, digital cameras, security and human-computer interaction. This project's objective was to develop a facial expression recognition system implementing the computer visions and enhancing the advanced feature extraction and classification in face expression recognition.There is increasing integration of computers and computer interfaces in our lives, due to the arise in the need of computers in order to be able to recognize and respond to human communication and behavioral cues of emotions and mental states. The automated analysis of expressions is a challenging endeavor because of the uncertainty inherent in the inference of hidden mental states from behavioral cues. As the facial expression recognition systems are becoming robust and effective in communications, many other innovative applications and uses are yet to be seen. The objective of this research paper is to give brief overview towards the process, various techniques, and application of facial emotion recognition system.

V. REFERENCES

[1]. W. Swinkels, L. Claesen, F. Xiao and H. Shen, "SVM point-based real-time emotion detection," 2017 IEEE Conference on Dependable and Secure Computing, Taipei, 2017.

[2]. Neerja and E. Walia, "Face Recognition Using Improved Fast PCA Algorithm," 2008 Congress on Image and Signal Processing, Sanya, Hainan, 2008

[3]. H. Ebine, Y. Shiga, M. Ikeda and O. Nakamura, "The recognition of facial expressions with automatic detection of the reference face," 2000 Canadian Conference on Electrical and Computer Engineering. ConferenceProceedings. Navigating to a New Era (Cat. No.00TH8492), Halifax, NS, 2000, pp. 1091-1099 vol.2.

[4]. A. C. Le Ngo, Y. H. Oh, R. C. W. Phan and J. See, "Eulerian emotion magnification for subtle expression recognition," 2016 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Shanghai, 2016

[5]. V. Kazemi and J. Sullivan, "One millisecond face alignment with an ensemble of regression trees," 2014 IEEE Conference on Computer Vision and Pattern Recognition, Columbus, OH, 2014

[6]. M. Dahmane and J. Meunier, "Emotion recognition using dynamic grid-based HoG features," Face and Gesture 2011, Santa Barbara, CA, 2011

[7]. K. M. Rajesh and M. Naveen Kumar, "A robust method for face recognition and face emotion detection system using support vector machines," 2016 International Conference on Electrical, Electronics, Communication, Computer and Optimization Techniques (ICEECCOT), Mysuru, 2016.

[8]. C. Loconsole, C. R. Miranda, G. Augusto, A. Frisoli and V. Orvalho, "Real-time emotion recognition novel method for geometrical facial features extraction," 2014 International Conference on Computer Vision Theory and Applications (VISAPP), Lisbon, Portugal, 2014

[9]. J. M. Saragih, S. Lucey and J. F. Cohn, "Real-time avatar animation from a single image," Face and Gesture 2011, Santa Barbara, CA, USA, 2011.

[10].G. T. Kaya, "A Hybrid Model for Classification of Remote Sensing Images With Linear SVM and Support Vector Selection and Adaptation," in IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, vol. 6, no. 4, pp. 1988-1997, Aug. 2013.

Detection of Duplicate Medical Image using Convolution Neural Network

S.K. Kabilesh, D. Divya, C. Blessy Vinolin, D. Priyadharshini, S. Saravanakumar

Department of Electronics and Communication Engineering, Jai Shriram Engineering College, Tiruppur, Tamil
Nadu, India

ABSTRACT

New features are introduced in the realm of healthcare as new technologies are developed. The additional features and capabilities allow consumers to easily access medical records and receive accurate and real-time healthcare services. We must exercise extreme caution and security when it comes to our health. Because image counterfeiting is a big concern in the world of healthcare these days, image counterfeit detection has become critical. More attention is needed in the domain of medical image counterfeit detection to gain patients' trust and avoid shame. . If an image counterfeit appears in a healthcare database, it must be discovered before a condition may be diagnosed. A new method based on the Modified Convolutional Neural Network (CNN) algorithm is proposed for detecting counterfeit photographs. With this suggested method, counterfeit images are recognised with high accuracy, and efficiency is increased, allowing clients to receive highly secure smart healthcare.

Keyword – counterfeit detection, Modified Convolutional Neural Network, smart healthcare

I. INTRODUCTION

Because of the ubiquity of image editing software, changing the content of an image has become more common. When two data from the same image do not match, the image is considered counterfeit or forgery. If the image content is modified or not, two ways are used. These can be both obtrusive and non-intrusive. Some watermarking information is blended with the data in the intrusive manner. The received image's watermark did not match the aboriginal watermark on the same image. There is no watermarking in the data for non-intrusive purposes. There is no need for a watermark of the same image to validate if the received image content has changed or not. Image counterfeiting techniques are now widely employed. The following are some of the most common image faking techniques. Copy move attack, image splicing, and image retouching are examples.

Copy Move attack:

A section of a picture was copied and pasted in the same image in the copy move assault. Enlarge the region of a specific one using copy move forgery. This was necessary in order to keep some essential image information hidden.

Image Splicing:

Image splicing involves copying and pasting a single or many parts of one image into another image. The society considered picture splicing to be libellous.

Image Retouching:

It was the process of elevating picture features by attaching or subtracting something from the image. Forgery detection is critical, especially in the medical industry.

MACHINE LEARING:

Machine learning is an application of artificial intelligence (AI) that allows systems to learn and improve on their own without having to be explicitly programmed. Machine learning is concerned with the creation of computer programmes that can access data and learn on their own.

Building algorithms that can collect input data and utilise statistical analysis to anticipate an output while updating output as new data becomes available is what machine learning is all about.

DEEP LEARNING

Deep learning is an AI function that mimics the human brain's processing of data and pattern creation in order to make decisions. Deep learning is a type of machine learning in artificial intelligence (AI) that uses neural networks to learn unsupervised from unstructured or unlabeled data.

Machine learning, a self-adaptive algorithm that improves its analysis and patterns with experience or fresh data, is one of the most common AI approaches used for processing massive data.

Deep learning, a subset of machine learning, performs machine learning using a hierarchical level of artificial neural networks.

MODIFIED CONVOLUTIONAL NEURAL NETWORK

A Convolutional Neural Network (CNN) is a Deep Learning method that can take an image as input, assign importance (learnable weights and biases) to distinct aspects/objects in the image, and distinguish one from the other.

II. EXISTING METHOD
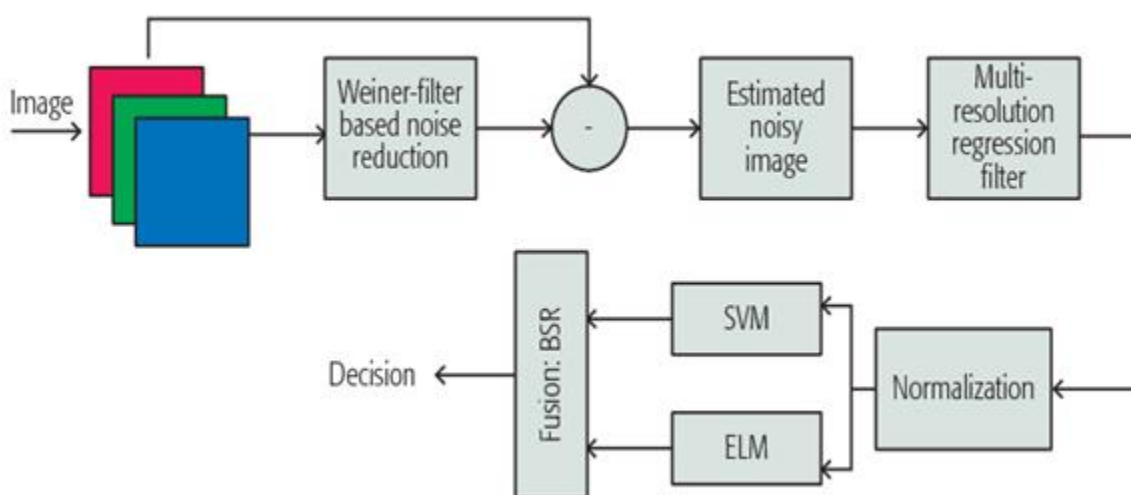
Fig 1. Proposed Methodology

The healthcare framework's medical picture forgery detection system verifies that photographs connected to healthcare have not been edited or manipulated. Decompose the image into Red, Green, and Blue channels if it's a colour image. Each component of the colour or monochrome image is subjected to the Wiener – filter. The original image is subtracted from the noise-free image to provide an estimated noise pattern. The image's fingerprint is regarded the noise pattern. This fingerprint is altered if it is forged.

The system uses an image's noise map to apply a multi-resolution regression filter, then feeds the output to support-vector-machine and extreme-learning-based classifiers. The noise map is built in an edge computing resource, while filtering and classification are performed in a core cloud computing resource. As a result, the system runs smoothly and in real time. Using the data base, the system obtained an 84.3 percent success rate.

III. PROPOSED SYSTEM

There are various components to the suggested smart healthcare architecture. Patients (clients) and doctors are represented by one component, edge computing by another, and cloud computing by yet another. Patients could live in smart homes in a smart city, while doctors and caregivers could work in any of the designated hospitals and clinics. They don't have to interact face to face; instead, they can use web or mobile apps. Any smart gadget or IoT can gather photographs or data from patients and upload them to a web app or a mobile app.

Image

Pre-processing

Feature Extraction

Classification

Record Keeping

Image Comparison
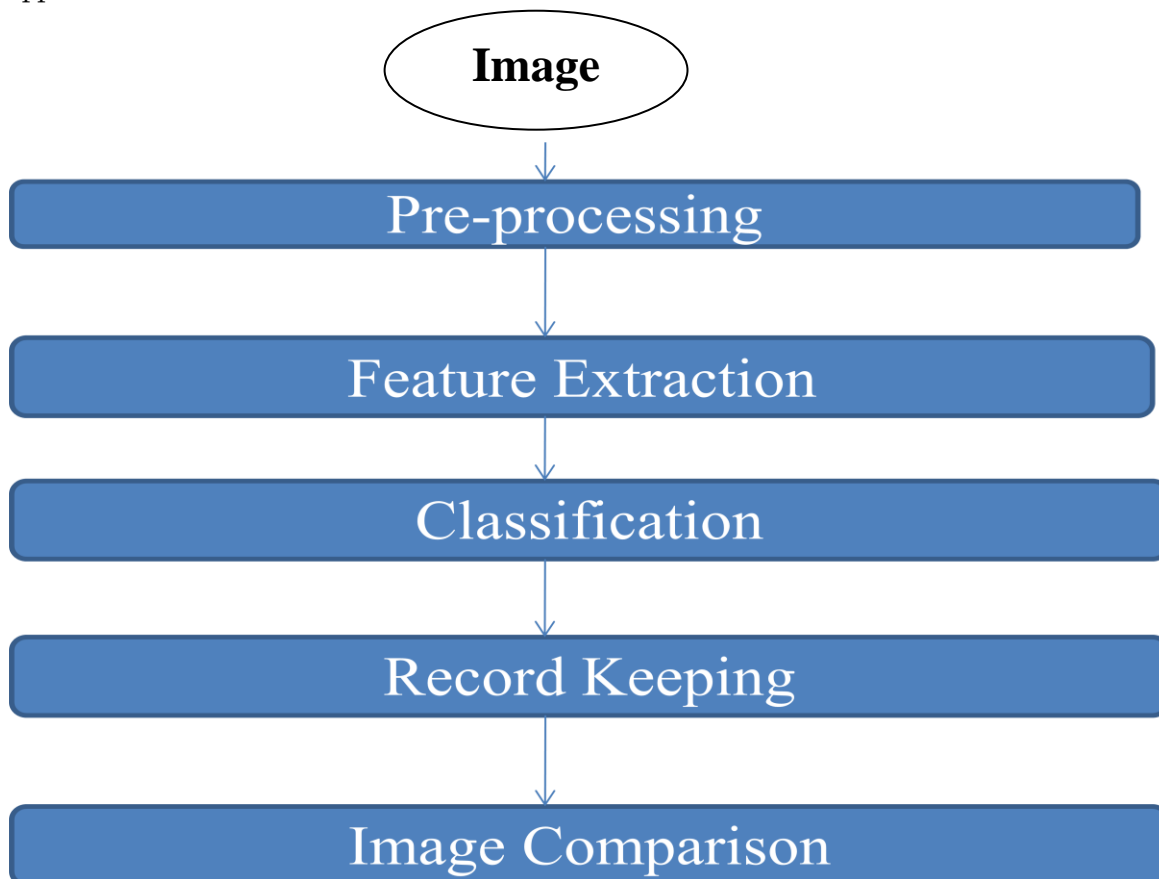
Fig 2. Flow diagram

IV. PREPROCESSING

Pre-processing is used to improve image data by suppressing undesired distortions or enhancing certain visual qualities that are relevant for later processing. Image pre-processing techniques take advantage of image redundancy. In a true image, adjacent pixels pertaining to the same item have roughly the same or similar brightness values. As a result, a deformed pixel can frequently be recovered as the average value of nearby pixels.

FEATURE EXTRACTION

Feature extraction is the process of detecting and representing specific aspects of interest inside an image for subsequent processing. It denotes the transition from visual to non-pictorial (typically quantitative) data representation. The resulting representation can then be fed into a variety of pattern recognition and classification algorithms to label, categorise, or recognise the semantic contents of the image or its objects.

CLASSIFICATION

The numerical qualities of numerous image features are analysed in image classification. CNNs are employed for picture classification and recognition because of their excellent accuracy, e.g. Mean, Euclidean distance, and so on. The CNN uses a hierarchical model that builds a network in the shape of a funnel and then outputs a fully-connected layer in which all neurons are connected to one another and output is processed.

RECORD KEEPING

To guarantee that records are easily accessible and that security needs are met. Not to be considered a diversion from patient care. By assuring high standards and continuity of care, it aids in the protection of patients' welfare. There is a desire to increase communication among healthcare professionals.

IMAGE COMPARISON

Finding differences or similarities between two photos is referred to as comparing two photographs. There may be quantitative or qualitative differences. Compare the two numerical value images and determine if they are the same or not.

The clustering algorithm K Means is used. Clustering algorithms are unsupervised algorithms, meaning they don't use labelled data. It is used to distinguish between different classes or clusters of data based on how similar the data is. Data points from the same group are more similar to each other than data points from other groups.

One of the most widely used clustering methods is K-means clustering. The number of clusters is represented by k.

Let's have a look at how K-means clustering works.

● Select k as the number of clusters you want to find.
● Assign the data points to one of the k clusters at random.
● Then figure out where the clusters' centres are.
● Calculate the distance between the data points and the cluster centres.
● Reassign the data points to the clusters closest to them, based on their distance from the cluster.
● Calculate the new cluster centre once more.
● Repeat steps 4,5 and 6 until the data points do not affect the clusters or the number of iterations is reached.

We utilize the K-Means clustering and ELM classifiers in the system since they are both excellent binary classifiers and complementary in nature. The K-Means clustering and ELM classifiers have both been successful in numerous image processing applications; however, their combination in the image forgery detection challenge has never been investigated. We explored the usage of the K-Means clustering and the ELM independently and in combination in the studies.
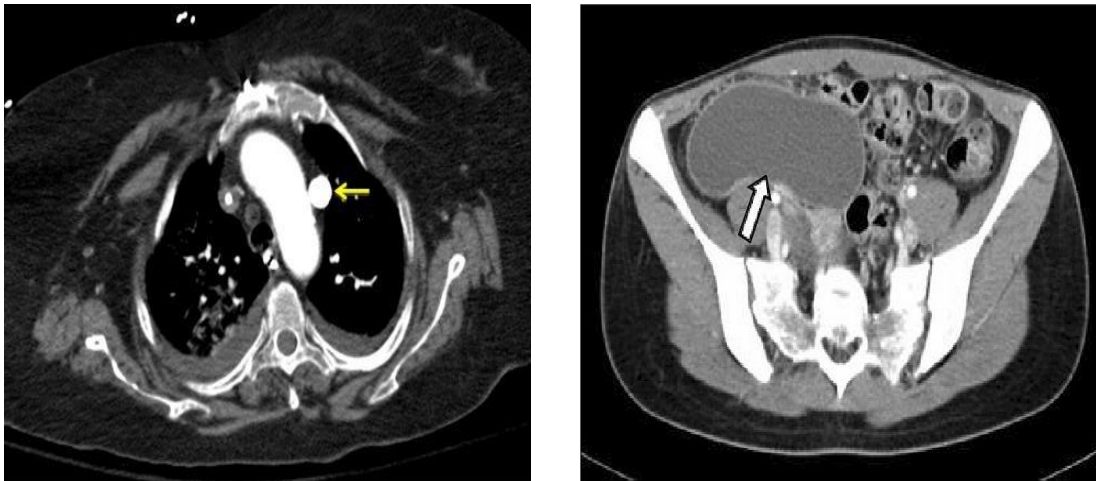
Fig 3. Duplicate Images

V. RESULT

For the two databases, the system using the ELM as the classifier achieved 97.4 and 98.2 percent accuracy, respectively. The system that used the BSR on the SVM and the ELM had the best accuracy: 98.8% and 98.9% for the two databases, respectively. The results show that the suggested system performed best when the two classifiers were combined. We can conclude from the data that the suggested method was successful in determining whether a picture was fabricated or not.
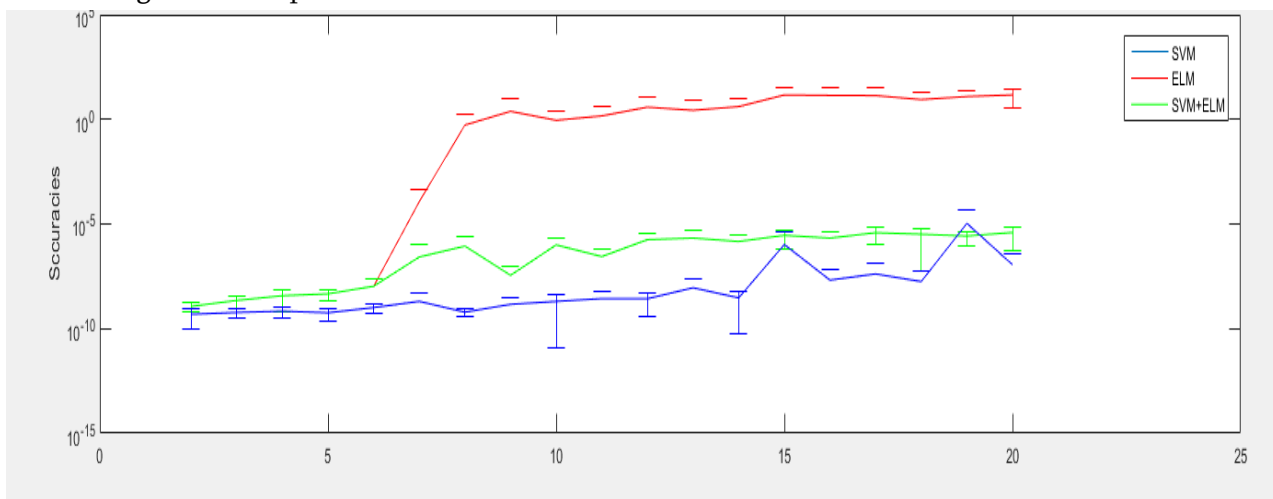
Fig 4. Result comparision

Based on the foregoing findings, we may conclude that the suggested method was successful in determining whether or not an image was fabricated. Using the database, the proposed technique achieved great accuracy. It is more accurate than other methods.

VI. ADVANTAGES

The proposed system's bandwidth need is likewise fair. We focus on non-intrusive strategies for detecting image forgery in this paper.

VII.   CONCLUSION

This document is used to accurately detect the fake image. To earn patients' trust and avoid embarrassment, the field of medical image forgery detection requires further attention. CNN correctly detects the copy move photographs with an accuracy of more than 90%, while the spliced images have an accuracy of 99 percent. The proposed model will be tested on a difficult dataset in the future to ensure that it is better than the current model.

VIII.   REFERENCES

[1]. Ghoneim, A., Muhammad, G., Amin, S. U., & Gupta, B. (2018). Medical image forgery detection for smart healthcare. IEEE Communications Magazine, 56(4), 33-37.

[2]. Gomase, M. P., & Wankhade, M. N. (2014). Advanced digital image forgery detection: a review. In International Conference on Advances in Engineering & Technology–2014 (ICAET-2014), www. iosrjournals.org.

[3]. Kaushik, M. S., Saikia, R., & Kandali, A. B. (2019). Digital Image Forgery Detection using Local Binary Patterns (LBP) and Histogram of Oriented Gradients (HOG).

[4]. Thakur, S., Kaur, R., Chadha, R., Kaur, J. (2016) A Review Paper on Image Forgery Detection In Image Processing. IOSR Journal of Computer Engineering (IOSR-JCE), 18(4), 86-89. www.iosrjournals.org.

[5]. Shakir, S.H., Zwyer, N. (2008) Forgery detection based Image Processing Techniques. International Journal of Scientific & Engineering Research, 9(11).

[6]. Dhir, V. (2017). A Review on Image Forgery & its Detection Procedure. International Journal of Advanced Research in Computer Science, 8(4).

[7]. Zhang, J., Li, Y., Niu, S., Cao, Z., & Wang, X. (2019). Improved Fully Convolutional Network for Digital Image Region Forgery Detection. CMC-Computers Materials & Continua, 60(1), 287-303.

[8]. Sharma, V., Jha, S., & Bharti, R. K. (2016). Image forgery and it's detection technique: a review. International Research Journal of Engineering and Technology (IRJET), 3(3), 756-762.

[9]. Ansari, M. D., Ghrera, S. P., & Tyagi, V. (2014). Pixel-based image forgery detection: A review. IETE journal of education, 55(1), 40-46.

[10].Singh, A. B., & Sood, R. (2018). A hybrid algorithm for image forgery detection. IJCSMC, 7(3), 122 – 128.

[11].Sharma, P., Kaur, H. (2019). CopyMove Forgery Detection with GLCM and Euclidian Distance Technique in Image Processing. International Journal of Recent Technology and Engineering (IJRTE), 8(1C2).

[12].Shyry, S.P., Meka, S., & Moganti M. Digital Image Forgery Detection. International Journal of Recent Technology and Engineering (IJRTE). 8(2S3).

[13].Maind, R. A., Khade, A., & Chitre, D. K. (2014). Image copy-move forgery detection using block representing method. Int J Soft Comput Eng (IJSCE), 4(2), 2231- 2307.

[14].Krishna N.G., Pooja S.G., Sri Ram N.B., Radha Y.V, & Rajarajeswari P. (2019). Recognition of Fake Currency Note using Convolutional Neural Networks. International Journal of Innovative Technology and Exploring Engineering (IJITEE), 8(5).

[15].Purvisha, P., & Kumar, D. (2019). Smart healthcare forgery detection using deep learning. IJARIIE, 5(3).

[16].Sagayaraj, A.S., Kabilesh, S.K., Kumar, A.A., Gokulnath, S., Mani, T. and Dinakaran, K., 2021, March. Diabetes mellitus and diabetic retinopathy detection using tongue images. In Journal of Physics: Conference Series (Vol. 1831, No. 1, p. 012028). IOP Publishing.

[17].Sagayaraj, A.S., Kabilesh, S.K., Mohanapriya, D. and Anandkumar, A., 2021, January. Determination of Soil Moisture Content using Image Processing-A Survey. In 2021 6th International Conference on Inventive Computation Technologies (ICICT) (pp. 1101-1106). IEEE.

[18].Kabilesh, S.K., Revathi, K., Sabitha, K. and Sujithkumar, N., 2020. Medical image counterfeit detection for smart healthcare. Journal of Sensor Research and Technologies, 2(2), pp.1-6.

[19].Dinakaran, K., Sagayaraj, A.S., Kabilesh, S.K., Mani, T., Anandkumar, A. and Chandrasekaran, G., 2021. Advanced lane detection technique for structural highway based on computer vision algorithm. Materials Today: Proceedings, 45, pp.2073-2081.

A Cognitive Approach in Monitoring the Lifestyle of Rural People in Progress Towards Smart Village System

Dr. C R Raghavendran[1], Harshini Manoharan[2], Dr J Dhilipan[3]

[1]Assistant Professor, Department of Electrical and Electronics Engineering, Easwari Engineering College,
Ramapuram, Chennai, Tamil Nadu, India

[2]Research Scholar, Department of Computer Science, SRM Institute of Science and Technology, Ramapuram,
Chennai, Tamil Nadu, India

[3]Professor and Head, Department of Computer Applications, SRM Institute of Science and Technology,
Ramapuram, Chennai, Tamil Nadu, India

ABSTRACT

MEDIGENCE is an Android App designed mainly to assist the health care professionals, medical practitioners, and the patients by providing health care access through video chat or mobile internet in remote locations. The system is composed of a Smart ICU system that can trigger reminders, protocols, and alarms to other hospitals, family members or the police station in the event of an accident, as well as patient data recording. The prototype is designed to maintain the medical histories and clinical decision-support systems that are easily accessible and consistent across locations and time for improved care. This cloud-based application handles patient enrolment, diagnosis, treatment, medication, and follow-up for technology-enabled health workers and health-care centres providing low-cost, portable, timely health care access. Illness outbreak detection and mapping; epidemic prevention and containment; progress tracking via smart phones and social media can be managed to a greater extent through this application.

Keywords – Health Care, Smart Village, SOS, Cloud Server, Internet of Things (IoT)

I. INTRODUCTION

Healthcare is a right that everyone has, not just the wealthy. However, a lack of better infrastructure in terms of quality, lack of access to medical facilities and drugs essential in everyday life, and a paucity of skilled medical specialists have kept healthcare facilities from reaching 60% of the Indian population. In rural areas, medical services are generally terrible. Every village must have access to high-quality healthcare, and everyone, regardless of financial circumstances, must be able to make use of these benefits. Rural residents are more likely to travel considerable distances to obtain healthcare, especially subspecialist treatments. In terms of travel time, cost, and time away from the office, this can be a substantial strain. Furthermore, a lack of dependable

transportation creates a barrier to care. Patients in urban areas can usually take public transportation to their medical visits; however, these services are sometimes missing in rural places.

Rural areas have a higher percentage of elderly persons with chronic diseases that necessitate numerous trips to outpatient healthcare facilities. Without access to public or private transportation, this becomes difficult. The "Smart Village" approach is based on the idea that technology can help with education, power, farming, small-scale business prospects, better health care, entrepreneurship, internet access, and overall improvement of rural village residents. In India, rural populations face significant barriers to getting health-care services. It will play a critical role in providing health care to people in rural locations by monitoring the health care system via internet access and providing emergency notifications as well as precise data in real time for improved health decisions.

General practitioners, along with emergency and public health services, are the most basic and critical service required in rural areas. Primary care physicians provide a wide variety of services and treat a wide range of medical conditions. Smart health care will be one of the most important strategic ways to meet the healthcare needs of India's rural communities. India is a country where the village is home to a sizable portion of the population. Our country's success and development are dependent on improved living circumstances in rural areas, where all necessary life-supporting amenities, including healthcare, are readily available to everybody. Poverty, sickness, and a lack of sanitation characterise Indian villages. This project investigates the role of advanced technology in healthcare delivery, with a particular focus on smart health care from the Smart Village's perspective.

II. LITERATURE SURVEY

Through Information Technology, Smart Villages will be connected to towns and cities, and such technologies will undoubtedly benefit local, regional, and national initiatives in Smart Health Care. Smart health care including assistance for diagnosis and treatment, health management, disease prevention and risk monitoring, virtual assistance, smart hospitals, assistant drug research are implemented with technologies like IoT, Big data, Cloud Computing, Artificial Intelligence that could transform the traditional medical system into a more convenient and personalized manner [1]. Smart fitness mirror was proposed to monitor the fitness status of the user such as BMI, amount of fat present in the body, body temperature on daily basis and achieved an overall accuracy of 95.3% [2]. Atallah et al predicted the usage of mobile health application of among 376 participants from Saudi Arabia out of which 46% reported to use the app for monitoring their health [3].

With the advent of Electronic Health Record and ease of access to information, timely diagnosis is rendered to the patients. Added to EHR mHealth has become a boon to the Doctors in fetching the current and updated data from the server through which necessary steps for further treatment is taken care of. With the help of these biomarkers, we can correlate and predict the disease state [6]. A dedicated web application was developed to track the health parameters of the patients through the sensor network specially for the patients recovered from malaria and pneumonia [4,7]. Oxygen saturation, a major biomarker of COVID-19 and Chronic Obstructive Pulmonary Disease (COPD) was critically monitor in diagnosing the health conditions of the patients during the pandemic [5]. Lunde P et al assessed the effectiveness of app-based intervention for a

duration of 3 months in promoting the patient's lifestyle affected with Non-Communicable Disease for 1588 records [9].

Rutuja Somwanshi et al defined "Smart Village" as a catalyst in delivering bundle of services by accessing basic amenities in building a happier society through smart technologies and services [9]. The concept of smart village is categorized into 6 different dimensions such as Governance, Technology Resources, Village services, living and tourism to improve the overall quality of the villages [11]. Services like sanitation, education, drinking water, healthcare facilities, environment protection, smart agriculture are provided to leverage the standard of living of the villagers. The residents of the village are trained in accessing these services towards the development of better future [10].

Sustainable models for the development of Smart Villages based on renewable energy sources were implemented to meet the energy demands, creating a smart energy saving villages thereby resolving various global issues prevailing to climatic changes [11]. These services became the driving force for the development of Smart Village. Several researchers focused on the implementation of the Smart Village and very few could propose relevant concept and theories in building a potential solution for the rural problems. PRISMA a theoretical model composed of 4 main components: objectives, strategies, dimensions, and foundations were proposed to enrich the conceptualization of Smart Villages [12]. VDD model containing 5 dimensions covering resources, technology, service chains, institutions, and sustainability along with 4 development phases were introduces in Indonesia as a part of descriptive qualitative and documentation study [13]. Though several improvements were made for the enrichment of Smart Village, still there is a lag which needs to be bridged with the help of technology so that our next generation could enjoy the benefits.

III. METHODOLOGY

Rural residents encounter significant challenges in getting the medical treatment they require. In Indian states, there are few doctors to give vital medical care to all who require it, and the care that is available is out of reach for the rural population. As a result, the solution to these issues is "SMART Health Care," which is a more intelligent approach to dealing with healthcare. SMART Health Care is relying on the facilities of Internet of Things (IoT) to improve access to care, increase quality of care and most importantly reduce the cost of care. The Internet of Things (IoT) is used to describe systems that link to the internet for the purpose of exchanging data, tracking, and monitoring, as well as releasing localisation in health care administration. Smart Health Care's main strength is the global coverage it can offer. It's the idea of connecting everyone, anywhere, at any time, with any service or network. Next generation is a notion that, through connectedness, has the potential to have a significant impact on human lifestyle. Smart phones, tablets, and laptops connected to a network via 3G/4G will play a big role in improving health care access and involving people in their own treatment. The Internet of Things (IoT) is set to revolutionize the health-care industry all over the world.

This work involves the development of a Mobile Application which is user friendly without much complex UI and easily readable for the villagers and layman. The application is developed using the MIT App inventor through simple clicks and drags. At the initial step the user needs to register himself/herself with the application. Those who are in need of immediate recovery or assistance will contact the caretaker or helpline

and record their medical history. The recorded information will be stored in a centralized location restricted from unauthorized access and is shared to the nearby hospitals or police stations in case of assistance or accidents for further action. If the patient undergoes network failure, they can contact the helpline / caretaker for alternative arrangements. The locations of the patients will be shared using the GPS tracker so that they can track the position for quick assistance.
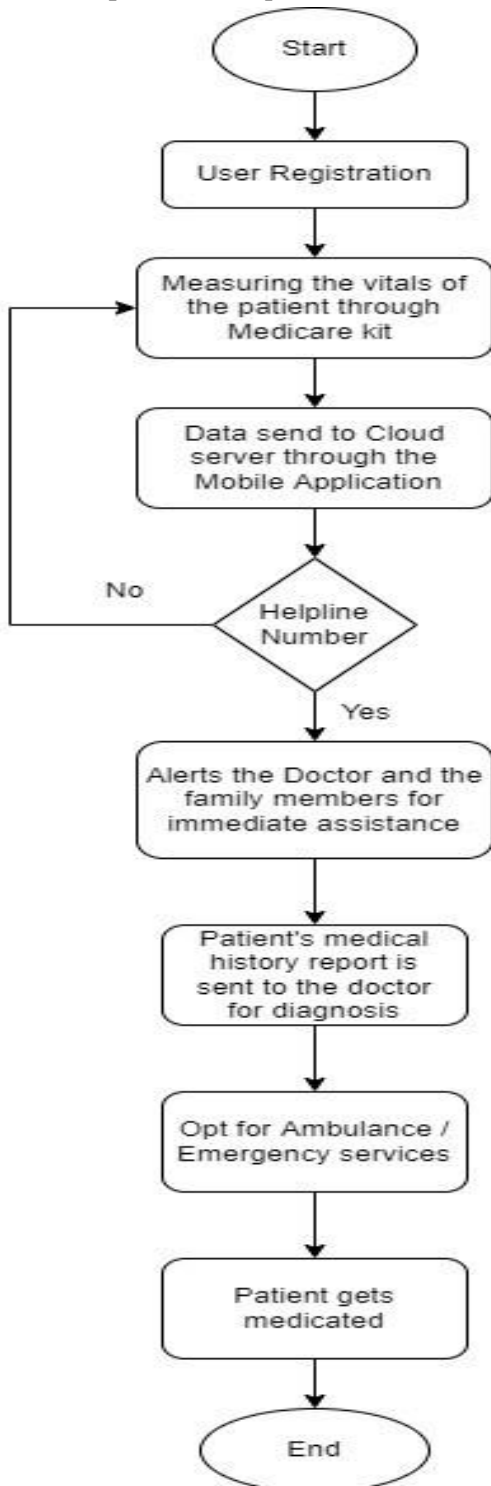
Fig 1.1 Overview of the proposed methodology – MEDIGENCE

In case of Physically challenged people or Heart patients or any special cases who need to be monitored regularly, a Medicare device Kit can be provided. The Medicare kit is developed using Raspberry PI that could continuously monitors the vitals of the patients including the heart rate, blood pressure and checks for any abnormality in the body. The data generated from the sensors is sent through the App and is circulated to the hospitals so that the doctors can regularly monitor their activities along with their traces of history. Through this work timely assistance can be provided to the patients thereby preventing them from entering stages of complications and saving their lives.

At the other end, the details of the Doctors are manually added by the patients for continuous monitoring of the patient in case of remote location. Through this we can to a great extend reduce the cost and the time involved in travelling to the hospitals. This Application highly benefits the pregnant women in providing them with timely medication. Through this we can prevent infant's death rate due to delayed medications. The patients can opt for ambulance and other emergency services through the SOS button that directly alerts the hospital for assistance. Our objectives can be highly successful for physically challenged persons, pregnant women and patients who must be regularly monitored.
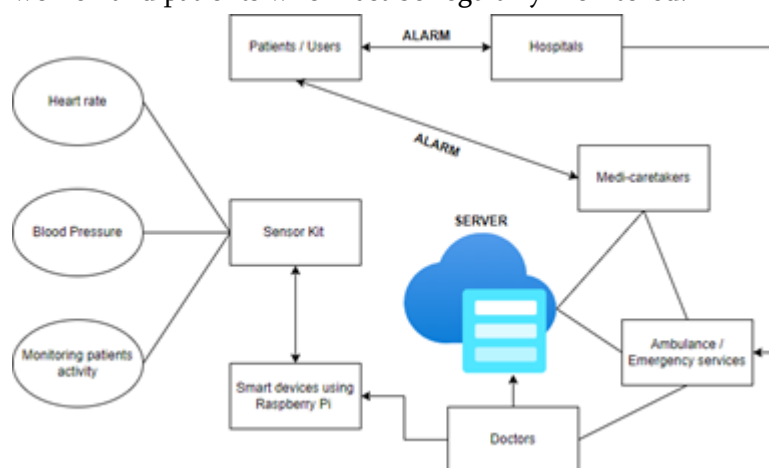
Fig 1.2 Block Diagram for Healthcare in Smart Village

IV. OUTCOMES

During the obstacles of rural India's evolution, Smart Village has a vision for proper village planning and development that will result in a clean and pollution-free environment, a green and healthy environment, a crime-free and disease-free environment, internet connectivity, and an overall improvement of rural village residents. As a result, the rural villages lacked access to primary health care, particularly for children and expectant mothers often requiring them to travel several miles on foot which can be overcome by extending healthcare to more village people, improving quality of care, and reducing the cost of care through empowerment of technology applications. Thus, Smart health Care can provide the required health care services to the remote villages through the advantages of technologies via internet of things (IoT) which will provide accessibility, better health outcomes, customized and targeted m-medicines for individual patients in rural villages of India.

V. CONCLUSION

In the forthcoming decade, Smart Health Care can widely organise the Smart Village model and lead the way in improving India's rural health care. SMART Healthcare should be an integral aspect of Smart Village efforts to improve and establish an effective health care system in rural areas. As a result, introducing smart health care will be one of the most important strategic methods to meet the health care needs of rural communities in India from a view of Smart Village Project. The suggested system application is also put in the ambulance to convey emergency information to the medical centre in a timely manner, allowing the patient to track the ambulance. The proposed system model and application allow a patient to send an emergency message to a designated emergency contact, which includes medical and location information. With a single press of a button, the user can get directions to the nearest hospital. This application can be enhanced in the future with security mechanisms to protect health information.

VI. REFERENCES

[1]. ShuoTian, WenboYang, Jehane Michael LeGrange, PengWang, WeiHuang, ZheweiYe "Smart healthcare: making medical care more intelligent", Global Health Journal, September 2019, Volume 3, Issue 3, http://dx.doi.org/10.1016/j.glohj.2019.07.001

[2]. Amgad Muneer, Suliman Mohamed Fati, Saddam Fuddah, "Smart health monitoring system using IoT based smart fitness mirror", TELKOMNIKA Telecommunication, Computing, Electronics and Control Vol. 18, No. 1, February 2020, pp. 317~331 ISSN: 1693-6930, accredited First Grade by Kemenristekdikti, Decree No: 21/E/KPT/2018   DOI:10.12928/TELKOMNIKA.v18i1.12434

[3]. Atallah N, Khalifa M, El Metwally A, & Househ M, "The prevalence and usage of mobile health applications among mental health patients in Saudi Arabia," Computer Methods and Programs in Biomedicine, vol. 156, pp. 163-168, 2018.

[4]. Yunzhou Zhang, Huiyu Liu, Xiaolin Su, Pei Jiang, and Dongfei Wei, "Remote Mobile Health Monitoring System Based on Smart Phone and Browser/Server Structure", Journal of Healthcare Engineering · Vol. 6 · No. 4 · 2015 Page 717–738

[5]. Mohammad Monirujjaman Khan, Safia Mehnaz, Antu Shaha, Mohammed Nayem and Sami Bourouis, "IoT Based Smart Health Monitoring System for COVID-19 Patients", Hindawi Computational and Mathematical Methods in Medicine Volume 2021, Article ID 8591036, https://doi.org/10.1155/2021/8591036

[6]. Joy P. Ku and Ida Sim, "Mobile Health: making the leap to research and clinics", npj Digital Medicine (2021) 4:83 ; https://doi.org/10.1038/s41746-021-00454-z

[7]. Ankita Gosavi, Harshvardhan Kariwala, Rohini Kaninde, Nilesh Rathod, "Remote Health Monitoring Using Non-invasive Mobile Technology", International Journal of Advance Research and Innovative Ideas in Education, Vol-3 Issue-2 2017 IJARIIE-ISSN(O)-2395-4396

[8]. Lunde P, Nilsson B. B, Bergland A, Kværner, K. J. and Bye A, "The effectiveness of smartphone apps for lifestyle improvement in noncommunicable diseases: systematic review and meta-analyse", J. Med. Internet Res. 20, e162 (2018).

[9]. Rutuja Somwanshi, Utkarsha Shindepatil, Deepali Tule, Archana Mankar, Namdev Ingle, Dr. V. S. Rajamanya, Prof. A. Deshmukh, "Study and development of village as a smart village", International Journal of Scientific & Engineering Research, Volume 7, Issue 6, June-2016, ISSN 2229-5518

[10].Omkar Takalkar, Dattatray Ghanwat, Avadhut Waghule, Roshan Hinge and Prof.Zope.M.T, "A Review Paper on- Development of Village As a Smart Village", Journal of Emerging Technologies and Innovative Research (JETIR), 2019 JETIR March 2019, Volume 6, Issue 3, JETIR1903734

[11].A A Aziiza and T D Susanto, "The Smart Village Model for Rural Area (Case Study: Banyuwangi Regency)", IOP Conference Series: Materials Science and Engineering, Volume 722, 3rd International Conference on Engineering Technology for Sustainable Development (ICET4SD) 23–24 October 2019, Yogyakarta, Indonesia

[12].Muhammad Mishbah, Betty Purwandari, Dana Indra Sensuse, "Systematic Review and Meta-Analysis of Proposed Smart Village Conceptual Model: Objectives, Strategies, Dimensions, and Foundations", 2018 International Conference on Information Technology Systems and Innovation (ICITSI), IEEE, DOI: 10.1109/ICITSI.2018.8696029

[13].Susy Ella and Rosita Novi Andari, "Developing a Smart Village Model for Village Development in Indonesia", 2018 International Conference on ICT for Smart   Society (ICISS),IEEE,   DOI: 10.1109/ICTSS.2018.8549973

Influence of IOT in Microbial Fuel Cell for Mass Production of Electricity

Dr. G. Puthilibai[1], Deepashri.R[2], Jeyashri.R[3], V. Devatarika[4], Saveetha.B[5], Anurega T R[5]

[1]Department of Chemistry, Sri Sairam Engineering College, Chennai, Tamil Nadu, India

[2]Department of EEE, Thiagarajar College of Engineering, Madurai, Tamil Nadu, India

[3]Department of EEE, Sri Sairam Engineering College, Chennai, Tamil Nadu, India

[4]Bachelor of Medicine and Bachelor of Surgery, Sri Muthukumaran Medical College Hospital & Research Centre, Chennai, Tamil Nadu, India

[5]Department of Information Technology, Sri Sairam Engineering College, Chennai, Tamil Nadu, India

ABSTRACT

Nowadays the major problem to be concerned is the energy crisis. By incorporating the emerging advancements in technologies in the electricity production we can increase the rate of production at reasonable cost. As the cost of electricity production is reaching its peak value, Microbial fuel cell is an effective technique from which we can obtain electricity at lower cost. Application of Microbial fuel cells towards environment is highly advantageous that can be applied in different sectors of industrial and agricultural waste management. Here we are using a digitalized approach to measure and maintain conductivity and pH of the sewage water that we use to generate electricity. The initial efficiency of power generation in MFC's was low. but incorporating the recent modification in its construction and components we can get the power output to a significant level. We can use household wastewater for the generation of electricity with adding some substrates and the whole system connected to the IOT technology. For the practical applications to increase their potential and efficiency, we can use the recent developments in the world of bio-technology and organic chemistry. This paper provides an outline and overview of the requirements, modifications and applications of MFC technology for various research areas and industrial needs.

Index Terms—Microbial fuel cell, IOT, AT mega controller, bio electrochemical system, Bio-electrodes, Reticulated polymeric coating, Hydrophobic polymers.

I. INTRODUCTION

IOT is an emerging technology which connects physical objects that are embedded with sensors, microcontrollers and some software that allows us the real time analysis of data and to exchange data with other devices and over the internet. IOT comprises various fields such as embedded systems, wireless sensor networks, automations and control system that perform together to achieve a function.

Microbial fuel cell is a bio-electrochemical system that converts organic substrates into electrical energy through redox reaction that are facilitated by microorganisms. It utilizes the energy present in the chemical bonds to generate current. Microbial fuel cell serves the best way for both the treatment of wastewater in eco-friendly way and production of electricity. This IOT connected MFC system allows the user to view the sewage water parameters which are collected by sensors, processed by microcontrollers, displayed on LCD display and also to store and process it in the cloud server. This type of IOT connected system yields more advantage when a greater number of MFC's are built for energy production.

II. DESCRIPTION

The Microbial fuel cell uses the organic substrates present in the wastewater to generate electricity with the help of anaerobic microbes. For the eco-friendly way, bio-electrodes are used instead of conventional electrodes. The bioanode is placed in the anode compartment (where oxidation occurs), biocathode placed in the cathode compartment (where reduction occurs) that are separated by cationic specific membrane.

The organic substrates present in the anode compartment consist of electron donor compounds such as hydrogen or sulphur. This helps for oxidation process and generates large number of protons, electrons and carbon dioxide. Even though some microorganisms will be present in the wastewater, anaerobic microorganism such as Escherichia coli, Geobacter sulfurenducens, Bacillus cereus, Clostridium butyricum are added for fast oxidation in the anode.

A. Electrodes and Electrically Conductivity Material

Compared to conventional electrodes, as bioelectrodes are coated with reticulated polymeric coating, that actively enhances the movement of ions which results in the increased production of electricity. Also has some pores which helps to reduce the flow through resistance thereby increasing the movement of electrons.

The bioelectrodes used in this process are enclosed by some electrically conductive material, either they are chemically bonded or attached to bioelectrode by a binder so that it provides electrically conductive surface for operation. These materials used to increase the electrical conductivity and do not harm the microorganisms as they are compatible to microbes.

Examples of such compounds are titanium, granular powdered carbon, graphene and even carbon nanotubes can be employed as they are enriched with carbon.

B. Microbial Fuel Cell and its Representations
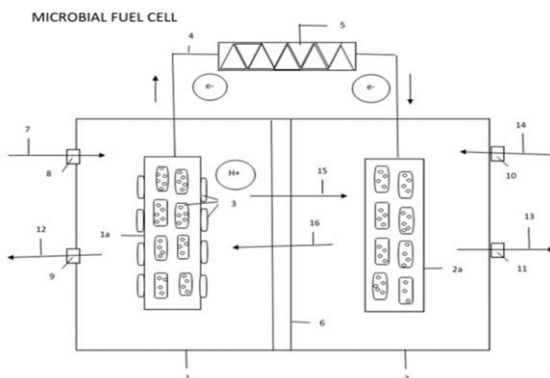
DIAGRAM REPRESENTATIONS

1 - Anode compartment
2 - Cathode compartment
3 - Bio-film
4 - Electrons
5 - External circuit
6 - Cation specific membrane
7 - Incoming fuel waste water
8 - Waste water inlet
9 - Anode outlet
10 – Electron receptor inlet
11 - Cathode outlet
12 - Treated waste water
13 - Hydrogen peroxide
14 - Oxygen
15 - Protons
16 - Hydrogen ions

C.   Working of MFC

Organic matter from the wastewater is introduced into fuel inlet. Anode is set up, microorganisms and some substrates are added to anode compartment. Organic matter is anaerobically decomposed by microbes that result in the release of carbon dioxide and generation of protons and electrons. Carbon dioxide flows through the anode outlet. Electron flows through the external circuit by which current can be generated. Proton flows from anode chamber to cathode chamber through cation specific membrane. The electron reduces oxygen provided from oxygen supply inlet to water and hydrogen peroxide and flows out of the cathode compartment.
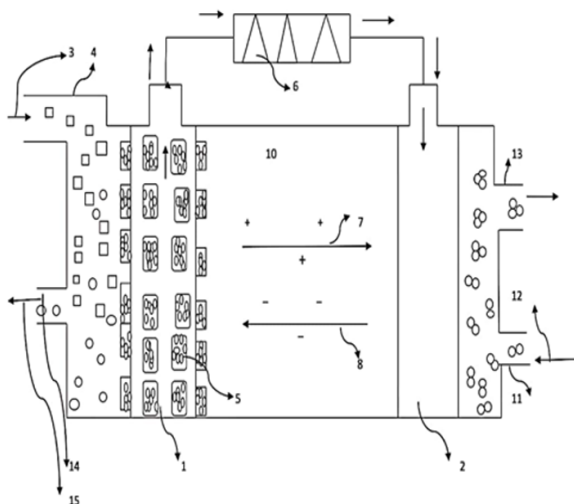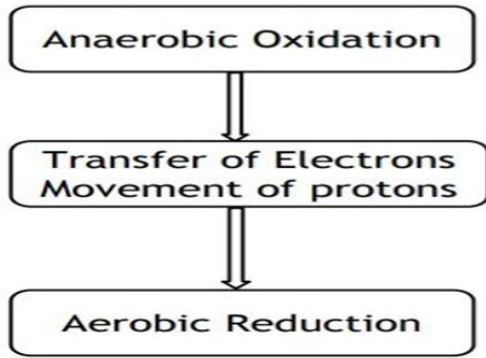
D.   Polymeric Foam in the Substrate

The polymeric foam makes the substrate more porous for the movement of ions throughout the MFC. For best power output, hydrophobic polymers are employed. These polymers are prepared using polyether polyol by addition of hydrophobicity inducing surfactant such as polyalkylene polymers and polysiloxane. These polymers are stable in organic substrate and do not get degraded.

The usage of polymer enhances the lifespan and they are impermeable to water environment.

III. INFLUENCE OF MFC BY IOT
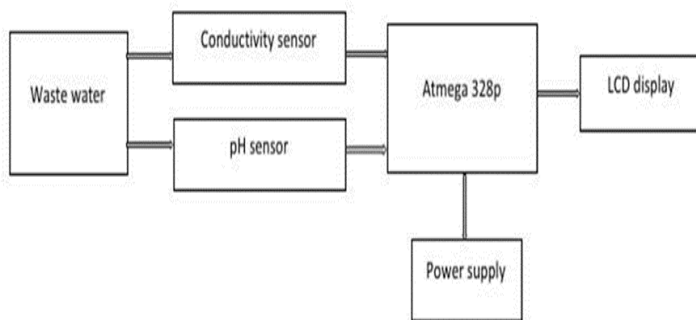
A.   CONDUCTIVITY SENSOR

The conductivity sensor used is CS547. It measures the conductivity by three passivated stainless-steel electrodes having dc isolation capacitors using A547 and datalogger. It has pH range of 3 to 9 with conductivity of accuracy of +5% or   -5%.

The operating temperature ranges between 0-50 degree Celsius. Its weight is about 0.3 kg with 3.05m cable. Requires one differential analog input, one single ended analog input and two excitation channels.

Code for Conductivity sensor

```
#include<LiquidCrystal.h>
LiquidCrystal display(2,3,4,5,11,12);

int pin=6;
int state=0;
int num;
void setup()
{
Serial.begin(4800);
display.begin(16,2);
pinMode(pin,INPUT):
}
void loop()
{
num=analogRead(A0);
int volt=num*(3/512);
display.setCursor(0,0)
display.print("The value of conductance is");
display.setCursor(0,1);
display.print(volt)
delay(25);
}
```

B.   pH SENSOR

The pH sensor used is CS526. This pH sensor is more reliable and provides accurate value in aqueous solutions. It can be inserted in to the container containing the wastewater for production of electricity.

This pH sensor is manufactured under the stringent quality control condition in ISO 9001 environment. This sensor can be easily cleaned and more rugged than traditional sensor.

Code for pH Sensor

```
int Volt;
int pH;
void setup()
{
  Serial.begin(4800);
  pinMode(pH, INPUT);
}
void loop()
```

```
{
  pH = analogRead(A0);
  Voltage = pH* (3 / 512);
  Serial.println(Volt);
  delay(500);
}
```

IV. ALGORITHM

1. Measure the conductivity and pH of the water using conductivity sensor and pH sensor.
2. Send the data collected to Atmega 328p microcontroller.
3. Data processed in the microcontroller and required values are displayed on LCD.
4. Required values: –

   1.Conductivity of water

   2.pH of water
5. Conductivity value that can be added to increase conductivity of water to reach maximum threshold value.
6. Value of pH that should be increased or decreased to maintain threshold pH value.
7. If the value of conductivity and pH value equals to the threshold value, display "threshold conductivity and pH value obtained, MFC can start its operation".
8. If the value of conductivity not equals threshold value, display "conductivity should be adjusted".
9. If pH value not equals to threshold value display "pH value to be adjusted".

V. FLOWCHART
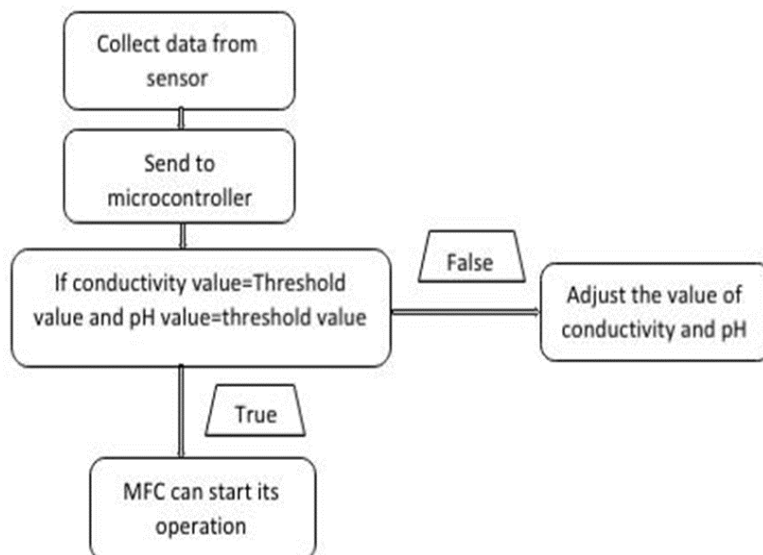
VI. SURVEY AND INFERENCE

MFC S.NO	Information collected by pH sensor	Information collected by conductivity sensor (S/cm)	Indication on LCD	Inference from LCD
1	6.96	55.053	Increase pH by 1.44 Decrease conductivity by 5.053 S/cm	Adjusting pH and conductivity to threshold value
2	7.35	57.065	Increase pH by 1.05 Decrease conductivity by 7.065 S/cm	Adjusting pH and conductivity to threshold value
3	8.17	59.432	Increase pH by 0.23 Decrease conductivity by 9.432 S/cm	Adjusting pH and conductivity to threshold value
4	6.89	61.753	Increase pH by 1.51 Decrease conductivity by 11.753 S/cm	Adjusting pH and conductivity to threshold value
5	7.56	52.952	Increase pH by 0.84 Decrease conductivity by 2.952 S/cm	Adjusting pH and conductivity to threshold value
6	7.92	63.653	Increase pH by 0.48 Decrease conductivity by 3.653 S/cm	Adjusting pH and conductivity to threshold value

CONCLUSION

Performance characteristics of Microbial Fuel cell at different pH values and different conductivity values are obtained. Maximum current density and power density is obtained at pH value of 8.4 and conductivity of around 50 S/cm. The main theme of this research work is to obtain information for the operation of Microbial fuel cell for the practical application towards the contribution for eco-friendly management of wastewater in a best way. Best output can be obtained when large number of MFC are built for mass production of electricity.

VII.   ACKNOWLEGEMENT

VIII.   REFERENCES

[1]. Y. Ahn and B. E. Logan, "Domestic Wastewater Treat- ment Using Multi-Electrode Continuous Flow MFCs with a Separator Electrode Assembly Design," Applied Micro- biology and Biotechnology, Vol. 97, No. 1, 2013, pp. 409-41

[2]. K. G. Cooke, M. O. Gay, S. E. Radachowsky, J. J. Guzman and M. A. Chiu, "BackyardNetTM: Distributed Sensor Network Powered by Terrestrial Microbial Fuel Cell Technology," Proceedings of SPIE 7693, Unat- tended Ground, Sea, and Air Sensor Technologies and Applications XII, Vol. 76931, 2010.

[3]. SR. L. Siddarth, J.Vijayalakshmi, G.Puthilibai, "Implementation of Ammonia Gas Leakage Detection and Monitoring System using Internet of Things", IEEE Explore, 778-781, 2019.

[4]. A. Shantaram, H. Beyenal, R. Veluchamy and Z. Lewandowski, "Wireless Sensors Powered by Microbial Fuel Cells," Environmental Science & Technology, Vol. 39, No. 13, 2005, pp. 5037-5042.

[5]. V. Chithra, J. R, D. R, K. Prathibanandhi and C. Priya, "Smart Sprinkler System Using Raspberry Pi," 2022 International Conference on Communication, Computing and Internet of Things (IC3IoT), 2022, pp. 1-5, doi: 10.1109/IC3IOT53935.2022.9767981

[6]. Aelterman P, Rabaey K, Pham TH, Boon N, Verstraete W. 2006. Continuous electricity generation at high voltages and currents using stacked microbial fuel cells. Environ Sci Technol. 40(10):3388–3394.

[7]. D K Singaravelu, Puthilibai G, C. Dinesh, M. Keerthika, S. Chitradevi, M.Sudhakar, "Experimental Investigation regarding emissivity of Black Nickel coated on Aluminium Surface", Material Today Proceedings, volume 37, 248-251, 2021.

[8]. G. Puthilibai, Jeyashri R, Sangavi T, "Power Production by Microbial Fuel Cell having Conductive Polymer Electrode and Bio Catalysts", IEEE Explore, 2020.

[9]. Cheng S, Liu H, Logan BE. 2006. Increased performance of single-chamber microbial fuel cells using an improved cathode structure. Electrochem Commun. 8(3):489–494.

[10]. C. R. Mahesha, R. Suprabha, G. Puthilibai, V. Devatarika, J. R and D. R, "Investigation of Surface Roughness in Machine using Artificial Intelligence Techniques," 2022 International Conference on Communication, Computing and Internet of Things (IC3IoT), 2022, pp. 1-4, doi: 10.1109/IC3IOT53935.2022.9767952.

[11]. Di Lorenzo M, Scott K, Curtis TP, Head IM. 2010. Effect of increasing anode surface area on the performance of a single chamber microbial fuel cell. Chem Eng J. 156(1):40–48.

[12]. G. Puthilibai, K. S. Gopika and R. Kaleeswari, "Urinal Microbial Fuel Cell: Electricity Generation — An Eco friendly Approach," 2020 International Conference on Power, Energy, Control and Transmission Systems (ICPECTS), 2020, pp. 1-6, doi: 10.1109/ICPECTS49113.2020.9337028.

[13]. Ghangrekar MM, Shinde VB. 2006. Wastewater treatment in microbial fuel cell and electricity generation: a sustainable approach. In 12th International Sustainable Development Research Conference; Vol. 8, p. 201.

[14]. Kim BH, Chang IS, Gil GC, Park HS, Kim HJ. 2003. Novel BOD (biological oxygen demand) sensor using mediator-less microbial fuel cell. Biotechnol Lett. 25(7):541–545.

[15]. Logan BE, Hamelers B, Rozendal R, Schröder U, Keller J, Freguia S, Aelterman P, Verstraete W, Rabaey K. 2006. Microbial fuel cells: methodology and technology. Environ Sci Technol. 40(17):518–519.

[16]. Moqsud AM, Omine K, Yasufuku N, Hyodo M, Nakata Y. 2013. Microbial fuel cell (MFC) for bioelectricity generation from organic wastes. Waste Manage. 33:2465–2469.

[17]. Niessen J, Schröder U, Scholz F. 2004. Exploiting complex carbohydrates for microbial electricity generation–a bacterial fuel cell operating on starch. Electrochem Commun. 6(9):955–958

[18]. Rabaey K, Clauwaert P, Aelterman P, Verstraete W. 2005. Tubular microbial fuel cells for efficient electricity generation. Environ Sci Technol. 39(20):8077–808

A Reversible Elastic, Plastic and Fracture Properties for Engineering Materials

Jitendra Sunte

Assistant Professor, Department of Mechanical Engineering, Lingaraj Appa Engineering College, Bidar,
Karnataka, India

ABSTRACT

This paper is dealing with duality of engineering material behavior of properties exhibiting lot of quantities at particular temperature that is called transition temperature. Further this will helpful for prediction for analysis of elastic properties, plastic properties and fracture properties. For this analysis material considered as homogeneous isotropic and anisotropic condition. By considering these obtained results are used in engineering and medical fields such as dental elastic materials as in engineering so many streams like manufacturing, production like at crystal structure level widely applicable.

Keywords: phase transformation, engineering materials, elastic-plastic stage

I. INTRODUCTION

The plastic deformation due to the formation of the Stone–Wales defects and the brittle fracture due to the bond breaking are also presented and discussed. The elastic region is referred to as reversible and elastic-plastic is referred to as irreversible. Here in irreversible region part of converted to elastic regains original so hence called elastic-plastic stage or irreversible one. Further breaking stage is called fracture as crack is initiated and finally propagates and ruptures. the energy is liberated in all stages.

Examples for reversible hydrocolloids are Van R, Surgident. The reversible hydrocolloids were prepared in accordance with the manufactorers directions. All tests were performed under uniform atmospheric conditions of 23 + 2~ and 50 + 10% relative humidity

An critical element of any specific idea of plastic substances is the assumed rule for the change of plastic deformation under change of frame. Recently proposed internal variable theories of plasticity anticipate that plastic deformations remain unaffected by using rigid-body rotations. On the alternative hand, for materials with elastic variety which might be isotropic and have annealed states, you possibly can anticipate that the permanent (i.E., plastic) deformation history transforms beneath a alternate of body in the equal way as the whole deformation records. The cause of this work is to show that for trendy (not necessarily isotropic) substances with elastic range, the transformation law proposed within the internal variable technique to plasticity is correct. + The dialogue of the transformation regulation for permanent deformation histories presented here is based on a cautious exploration of the Principle of Frame-Indifference for substances with

elastic range. In Section 2 a short overview of important ideas from the theory of Euclidean spaces and continuum mechanics is given, and sure basic properties of subsets of the set of all non-singular 2d-order tensors and frame-detached mappings are said. In Section three I provide definitions of elastic place, permanent + Of route the effects of OWEN I-three] continue to be valid; hence for materials with elastic range which can be isotropic and feature annealed states, transformation laws for permanent deformations are possible; the failure of the transformation law to be unique is associated with the reality that there are many everlasting deformation histories corresponding to one deformation records. 170M. ILHAV'Y deformation records, and structural mapping and I state assumptions about the elegance of materials to be considered. These assumptions are embodied in Axioms I, II, and III. Axiom I states that corresponding to every deformation records there's a maximal elastic vicinity. Axiom II states, roughly speaking, that similar to each records there are permanent deformation histories. Axiom III is the usual shape of the Principle of Frame-IndifferenceIn Sections 4 and 5 the restrictions which the Principle of Frame-Indifference places on various concepts derived from Axioms I and II are studied. The first non-trivial result of this work, Proposition 1, is proved in Section 4. Proposition 1 Asserts that the elastic range and the elastic reaction characteristic similar to a set deformation records are frame-detached. Once this outcome of the Principle of Frame-Indifference is established, different results are without problemsderived. In Section 5 Proposition 1 and Axiom III are employed to reveal that both the elastic range and the elastic reaction feature are unaffected by means of a trade of body (cf Proposition 2). + Frame-indifference of the elastic range and the elastic response characteristic, asserted by means of Proposition 1, mean body-indifference of the structural mapping (cf the proof of Proposition 3, Section 5). The predominant end result of the prevailing paintings is Proposition 4, which asserts that the set of all everlastingdeformation histories corresponding to a given total deformation records is invariant underneath a exchange of body. The evidence of this end result is based totally at the reality that the elastic variety and the elastic reaction features corresponding to a given overall records are invariant underneath exchange of body. Section five concludes with a dialogue of transformation laws for permanent deformation histories

Table 4. Hydrocolloid impression materials. Mean values ($\bar{x}_3$) of properties tested

Material	ED % 15′	1 h	24 h	PD % 15′	1 h	24 h	EM N/mm² 15′	1 h	24 h	SA 15′	1 h	24 h
Van R, pink	7,9	7,4	7,1	1,4	1,2	1,2	1,65	1,56	1,76			
reg	9,9	10,5	8.9	1,3	1,1	1,0	1,25	1,43	1,46			
h.b.	10,4	9,6	10,2	1,3	1,2	1,1	1,26	1,27	1,24			
Surgident, stick	9,0	8,5	8,1	1,3	1,1	1,2	1,35	1,43	1,56			
r.b.	6,8	6,6	6,0	1,5	1,1	1,1	1,96	1,91	2,15			
h.b.	6,0	5,2	4,9	1,4	1,2	1,1	1,91	2,09	2,21			
h.b. II	9,1	8,4	8,0	1,3	1,1	1,0	1,41	1,41	1,52			

Propagation of elastic-plastic boundariesWhen a semi-infinite medium is subjected to a loading at the open section, the pulsepropagates as a simple wave, namely 8:0. The Riemann invariant at the boundaryis assigneda s

(4.1) $$f = F(\alpha),$$

where α is the time measure at the boundary, whilst, through the relations (3.5), (3.6),

(4.2) $$\phi = F(\alpha) \quad \text{and} \quad u = -F(\alpha).$$

Equation (3.7) then provides

(4.3) $$t = \alpha + X/a(\alpha),$$

Fracture modes equations

$$G_I = \lim_{\delta a \to 0} \frac{1}{2\delta a} \int_0^{\delta a} v(r)\sigma_y(r)\,dr$$

$$G_{II} = \lim_{\delta a \to 0} \frac{1}{2\delta a} \int_0^{\delta a} u(r)\sigma_{xy}(r)\,dr$$
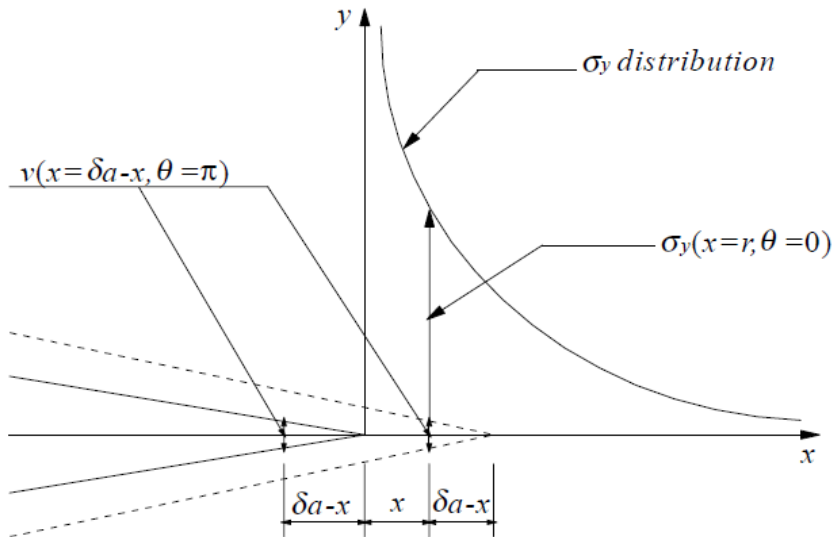
Figure : Irwin's concept of crack-closure integral

The concept of wave propagation is the same for elastic and elastic-plastic materials for a loading wherein the stress at the boundaryof a semi-infinite medium Increases constantly. When the stress at the boundary begins to decrease the wave propagation differsIn elastic-plastic materials.A specific state equationoverboth loading and unloading process elastic materials. In elastic-plastic materials loading and unloading occur according to different relations,and hysteresis neglected. Fig. shows the dynamicas stress-strain relation of polycrystalline metals such as aluminum, zinc, silver etc.. The material is loaded along OABE and plastic deformations start at the elasticlimit,four. The OA part of the curve is a straight line and unloading from any point on ABE happens alongside a line parallel to OA. CD is the importance of pressure launch during the unloadingand OC is the irreversible teach that depends upon the level of stress at which the unloading starts. The reloading from the 0 stress level C takes place alone. CBE.

Stress-strainrelation for a polycrystallinematerial'

Loading and unloading regions in the characterist[c field.
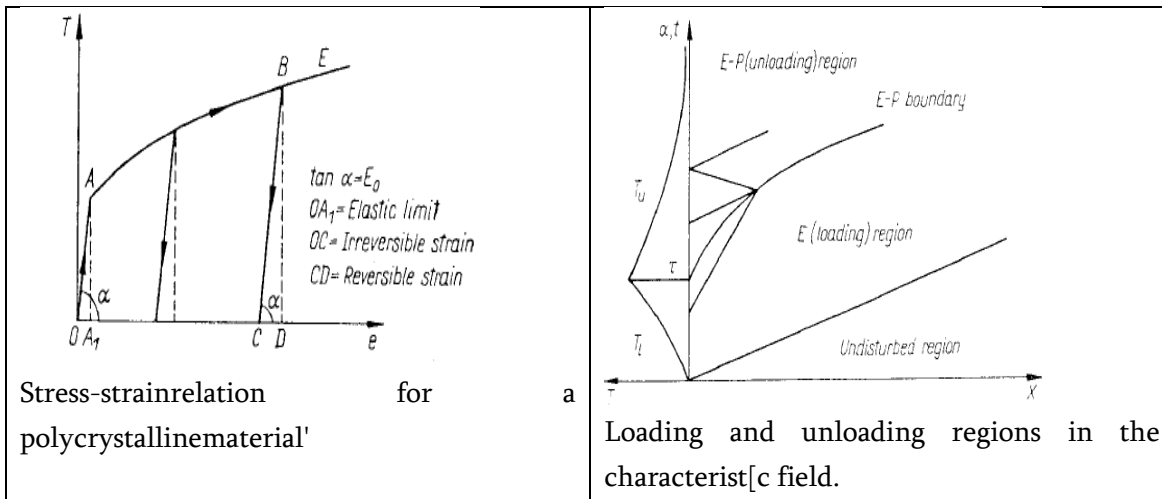
When the stress,rvhich is beyond the elastic limit, starts to decreasea t the boundary, the medium showsa n elastic-plasticresponseA. t this stage,t he unloading stateequation must account for the wave motion. The state equations T": T"(e) and T, :Tok) constitute, respectively, elastic and elastic-plastic regions, see Fig. 2. In the elastic region if, the medium is loaded

If the elastic –plastic range is assumed , then elastic response for a spectra at period Tn<33sec(Fn0.03Hz) displacements are same and at high Fn>33Hz and Tn<1/33 sec acceleration are equal and intermediate periods (frequencies) absorbed energy is preserved.
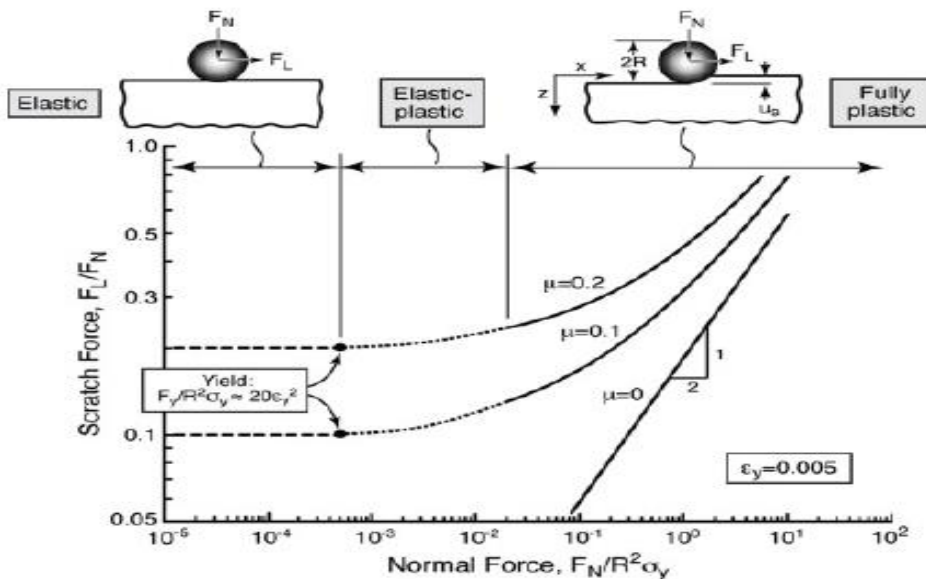
Magnetization technique is markedly influenced via microstructure inside the whole investigated induction range, extending over approximately 4 decades. While the conduct of the preliminary magnetization curve appears to require a novel framework of interpretation, as a way to reconcile models of domain-wall movement with the demonstrated deviation from the Rayleigh law, the phenomenology of losses at technically relevant inductions and their relation to grain size are in simple settlement

it's miles possible to represent the maximum critical fabric homes in paperboard and the parameters can be separated into elastic, plastic and delamination houses .To establish the role of the bifunctional pass-linker, we prepared a solution of CaM-(8)-Zip that lacked the go-linker. Addition of Ca2+ had no substantial impact on

viscosity, which suggests the need of the pass-linker Addition of Ca2+ to solutions of the move-linkers alone induces aggregation of the anionic colloidal debris used for the particle tracking; this effect isn't always determined in solutions containing CaM, which probably results from its excessive affinity for Ca2+. Although this aggregation prevented us from acquiring microrheological records, visible analysis revealed that those samples acted like beverages (the answers will be pipetted easily in the presence of Ca2+, whereas the samples pronounced in Figures 2 cannot be pipetted within the presence of Ca2+). We be aware that cationic microspheres are to be had, however, our protein linkers are polyanions and we needed to keep away from non-unique rate-price interactions with the microspheres
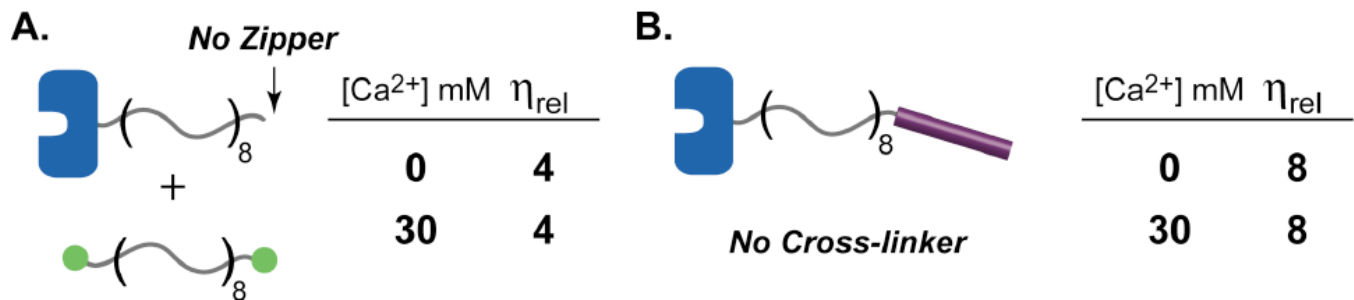
molecular materials is influenced by traps created on or in the vicinity of polar dopants. Relevant parametersof the dopant (dipole moments, ionization energies, electron affinities) can be changed by reversible photochemical reactions Photochromic molecules are a good example of bistablemolecular systems, extensively investigated due to emerging prospects of their use. Upon exposure to radiation of a specific wavelength, these systems undergo reversible photochemical reactions, reverting to their original when irradiated with light of a longer wavelength or stored in the dark (e.g. [1–3]). Such a process, manifesting itself in reversible changes of their absorption spectra and of several physical properties such as dipole moment, ionization energy etc., can be regarded as a switching between a stable state and metastable one. Photochromic molecules can be coupled with photoconducting polymers to develop materials whose electrical properties would be modified in a controlled way by incident light. Such materials could be used as a kind of direct 'opto-electronic transducers', on both, micro- and macroscopic scale. In our earlier papers [4,5], a concept of an electroactive molecular material was put forward whose electrical properties would be controlled by optical switching of photochromic species, either admixed into the polymer matrix or chemically attached to the polymer chain. The basic principle of action of such a material would consist in a controlled modulation of the mobility due to the creation and annihilation of local states trapping charge carriers

Dipole moments of *n*MPSi oligomers substituted with the SP/MRmoiety via the -C(O)- C(H)(OH) spacer (*trans* conformation).

Ionization energies of *n*MPSi, *n*MPSi–SP and *n*MPSI oligomers.

Fig.Dark current–voltage characteristics of an ITO/pMPSi–SP/Al sandwichsample before and after UV illumination. Curve 1, pristine sample;curve 2, measured immediately after UV illumination; curves 3 and 4, measuredafter 3 and 24 h, respectively, relaxation in vacuum, at room temperature.

Both experiments can be interpreted assuming a reversible advent of traps for cutting-edge vendors all through the illumination of the samples, and a next annihilation of the traps for the duration of the garage of samples within the dark

Absorption spectra of the substances used on this work. Dash-anddotted line: pMPSi in toluene answer; solid line: solid form of SP (earlier than UV illumination); dashed line: SP after the UV illumination.

The results stated on this paper reveal that it's far feasible to synthesize a photoconducting polymer containing photochromic species whose electric homes would be modified by a reversible photochemical response ensuing in the advent and annihilation of traps. Creation of two sorts of traps is possible: dipolar traps, where a service traveling on the polymer chain is localized due to electrostatic interactions with dipoles of a variable polarity, and/or chemical traps as a result of neighborhood adjustments of the HOMO electricity. The outcomes of quantum–chemical calculations as a result verify the conclusions drawn from the effects acquired from simply electrostatic calculations done on a model molecular crystal. The calculations are supported via experimental

results. Both the dark conductivity and photoconductivity of pMPSi + SP are reversibly modified because of the dipole and formation of dipolar traps.

II. CONCLUSION

1. The magnetization is reversible and permanent magnets demagnetization is applicable hold good foriron material helpful for switching field distribution
2. dipole moments, ionization energies, electron affinities) can be changed by reversible photochemical reactions
3. Photochromic molecules are a good example of bistable molecular systems, extensively investigated due to emerging prospects of their use. Upon exposure to radiation of a specific wavelength, these systems undergo reversible photochemical reactions, reverting to their original when irradiated with light of a longer wavelength or stored in the dark
4. Examples for reversible hydrocolloids are Van R, SurgidentThe reversible hydrocolloids were prepared
5. Plastic-like Hydrogels with Reversible Conversion of Elasticity and Plasticity

III.REFERENCES

[1]. G. Matsoukas, B. Cotterell and Y.W. Mai, Journal of the Mechanics and Physics of Solids 34, No. 5 (1986)499 510.
[2]. P.M. de Castro, J. Spurrier and P, Hancock, ASTM STP 677 (1979) 486-497.
[3]. J.D.G. Sumpter, International Journal of" Pressure Vessel and Piping 10 (1982) 169-180.
[4]. B. Cotterell, Q.F. Li, D.Z. Zhang and Y.W. Mai, Engineering Fracture Mechanics 21, No. 2 (1985) 239-244.
[5]. Q.E. Li, Engineering Fracture Mechanics 22, No. 1 (1985) 9-15.
[6]. Q.F. Li, L. Zhou and S. Li, Engineering Fracture Mechanics 23, No. 5 (1986) 925-928.
[7]. D.Z. Zhang and H. Wang, Engineering Fracture Mechanics 26, No. 2 (1987) 247-250.
[8]. T.L. Anderson, H.I. McHenry and M.G. Dawes, ASTM STP 856 (1985) 210-229.
[9]. F. Ebrahimi, ASTM STP 945 (1988) 555-580.
[10].W.A. Sorem, R.H. Dodds and S.T. Rolfe "An analytical comparison of short crack and deep crack CTOD fracture specimens of an A36 steel," to appear in ASTM STP for the 21st national symposium on fracturemechanics.
[11].W.A. Sorem, R.H. Dodds and S.T. Rolfe, "An analytical and experimental comparison of rectangular andsquare crack tip opening displacement fracture specimens of an A36 steel," to appear in ASTM STP 995,American Society for Testing and Materials.
[12].A.K. Shoemaker and R.R. Seeley, Journal o[Testing and Evaluation 11, No. 4 (1983) 261-272.
[13].R.H. Dodds and L.A. Lopez, International Journal fi)r Advances in Engineering Software 2 No. 4 (1980).
[14].R.H. Dodds and L.A. Lopez, International Journal for Engineering with Computers 13 (1985) 18 26.
[15].M.G. Dawes, ASTM STP 668 (1979) 307-333.
[16].G. Matsoukas, B. Cotterell and Y.W. Mai, International Journal q[" Fracture 26, No. 2 (1984) R49-R53.

[17]. R.H. Dodds, "'Plastic rotation factors for shallow crack bend bars," presented to ASTM Task GroupE24.08.02 (Computational Techniques and Procedures), November 8, 1988, Atlanta, GA.

[18]. K. Wallin, Engineering Fracture Mechanics 19, No. 6 (1984) 1085-1093.

[19]. T.L. Anderson and S. Williams, ASTM STP 905 (1986) 715-740.

[20]. A.R. Rosenfield and D.K. Shetty, Engineering Fracture Mechanics 14, No. 4 (1981) 833-842.

[21]. J.D. Landes and D.H. Shaffer, ASTM STP 700 (1980) 368-382.

[22]. W.A. Logsdon, ASTM STP 590 (1976) 43-60.

[23]. W.A. Logsdon and J.A. Begley, ASTM STP 631 (1977) 477-492.

[24]. A. AI-Ani and J.W. Hancock, in Proceedings.7th International Con/brence .for Fracture, March, 1989,Houston, TX.

[25]. J.R. Rice and G.F. Rosengren, Journal of the Mechanics and Physics of Solids 16 (1968) 1-12.

[26]. J.W. Hutchinson, Journal of the Mechanics and Physics of Solids 16 (1968) 13-31.

[27]. I. Milne and G.C. Chell, ASTM STP 668 (1979) 358-377,

[28]. H.G. Pisarski, International Journal of Fracture 17 No. 4 (1981) 427 440.

[29]. R.O. Ritchie, J.F. Knott and J.R. Rice, Journal of the Mechanics and Physics qfSolids21 (1973) 395-410.

[30]. F. Ebrahmi, D.K. Matlock and G. Krauss, ScriptaMetallurgica16, No. 8 (1982) 987-992.

[31]. G. Green and J.F. Knott, Journal of Engineering Materials and Technology 98, Series H, No. 1 (1976) 37 46.

[32]. W. Weibull, Journal (~] Applied Mechanics 18 (1951) 293-297.

Deep Learning-Based Person Re-Identification – A Comparative Study

S. Gomathi Meena[1], V. Kavitha[1], S.Sumithra[2], P.Bharathi[2]

[1]Assistant Professor, Department of Computer Science, Vidhya Sagar Women's College, Chennai, Tamil Nadu, India

[2]Student, Department of Computer Science, Vidhya Sagar Women's College, Chennai, Tamil Nadu, India

ABSTRACT

In a Pattern recognition problem the vision of computing technology is a challenging task for person re-identification in a real time scenario. Main target with the matching of person image in an existing with basic color and gray scale pattern coordinates points with implementing of three set of magnetic color.In homogenous matching the features of person re-identification model to image –image or video-video matching in tracking the location of a lost human and criminal tracking. Facing difficulties in solving the problem of illumination person, occlusion and changing of attitude with complex background it becomes a hot spot field in person re-identification research. This paper gives a small survey report on the traditional methods in the supervised frame work methods and unsupervised frame work on the basis of deep learning by fixing their Re-Id achievement. Finally, we summarise and propose the future directions and research on deep learning with public dataset is used for evaluating these improved system to be discussed in current issues.

Keywords:-Colour, Re-identification, Shape Feature, Texture, Colour, Re-identification, Shape Feature, Texture

I. INTRODUCTION

Person re-identification is an important process to be attracted recent in monitoring the behaviour activities of a person or an object by deploying camera network in public places to preventing crimes and terrorist activities for security purposes for surveillance system. Basically the two methods of person re-identification based on feature learning and distance learning. [1]. To analysis the properties of few existing system is to recognize an image of person based on the fixing to cameras.To recognize a person re-identification is very accurate which is based on fixing the camera in a distributed network to recognize the output. Really a challenging task in Person Re-ID is based on the different point view of observation points[2][3], very accurate resolution of an image[4][5],changes in the illumination[6], poses occlusions[7][8]. When compared to early researchers focuseswith hand-crafted body structured metric learning[9–19]. Two type of Person Re-Id techniques is one considered as image based and other one considered as video and they facing problem for matching is illustrated in *Figure1*. Matching is done between the two set of images fall under the category[20–29] with the hope of homogenous matching.
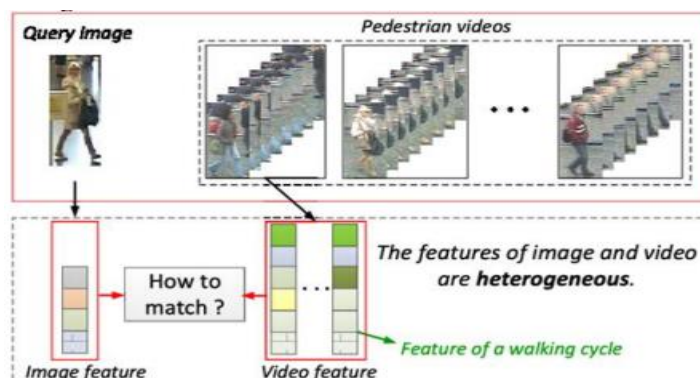
Fig 1 Facing problem in image and video

Challenges arise during the process of intra class variation of different set person appearance in person re-identification at different areas and inter class variation of the same person looks different areas. Accurate matching between the view pair of complex challenges in the minimum size of the person will move on the floor for learning with individual gallery of efficient of pose consistent. The main problem affects the accuracy in a time schedule for identifying person in a long term. Basically in many part of divisions areas a person may fails to identify clearly and properly with the effect of low quality of camera object in the presence of overlapping of other people wearing clothes. The problem is to be rectify with the help of segmentation algorithm is nothing but the process of classifying a single person from the remaining available person. Color changes at a significant accuracy that affects the color properties and appearance of images is given in *Figure 2*

Fig2 Image is the same with different dresses & Poses

Three modules for the query image at very first detection, next step need to track and last is to retrieval the image working together based on supervised learning process is shown in *Figure 3*
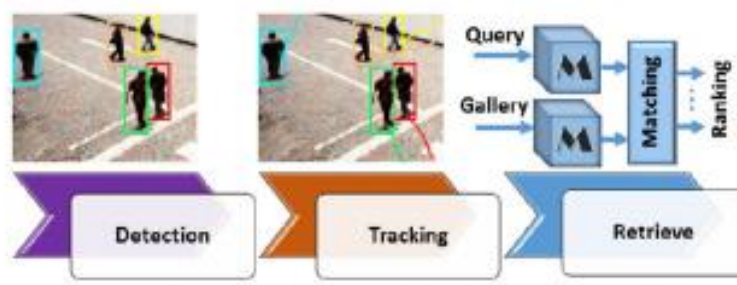
Fig 3 End- end operations for Person Re-ID

II. PERSON RE-ID METHODS

Recentupdated techniques of person re-id divided into feature based, content based and metric based with multi using camera for tracking approaches and classify the image still information among the large volume of data[30][31]. Appearance of person in image or video is to be captured by bounding the boxes for identity and classify into same identity with annotations of model learning and training data are correct in query image. Feature representation focus for development for future, deep metric learning aims is to design the training objectives using different loss function and sampling optimization strategies.

2.1 Person Re-Id based on image

Image based Person Re-ID focus on the feature representation of the image by matching with distinct feature[32]. Appearance based representation of an image is known as Symmetry Driven Accumulation of Local Features(SDALF). By follows this method first the horizontal axes of body symmetry divide the whole body into head, torso and legs and next with the same of vertical axis of symmetry is estimated into the effect of pose variations. Follow this features of matching the similarity measures between the image of candidate in a single or multiple shot frame to give the result of highest performance is observed. Different postures and viewpoints of each person is being monitored. To matching the image follow the specific learning metric method to achieve the improvement of two dimensional in Microsoft Kinect dataset compared to SDALF[33]. Propose in the non-overlapping cameras with clothing attributes, they facing difficulties in identifying the faces in images. By calculating the metric based on optimal distance follows the method on distance learning for large data using the equivalence constraints complexity use fo distance learning method similar to the ratio test using statistical inference perspective. This method refer in Keep It Simple and Straight(KISS) metric given to small size training set result in poor performance to the co-variance matrix[34].

2.2 Person Re-Id based on Video

In considering the method of video based Person Re-Id it must depend on single frame to refer the feature of an image and remove the unwanted information from the sequences of an image available in video based[35]. A new model is more reliable to select the video fragments are the most importance method is used to remove the noisy sequence of an image and this method also used in space time and appearances features computing to gain powerful in recognition an image. Spatial alignment is most commonly used with the appearance of different body parts and specify the issues in poses, illumination variations and occlusions with alignment of appearance of a body part issues by walking in a certain action primitives[36]. At last a fixed length vector is obtained.

III. PERSON RE-ID ON DEEP LEARNING

When considering the learning deep model the methods of Person Re-Id is divided into some parts of the model, they are hand fused crafted deep model of person image, learning representation model, local feature learning, video based deepest, GAN deep based model, unsupervised deepest model and metric learning model.

3.1 Fused hand-crafted features deep model

Taking advantages couldn't solve by CNN based method with insufficient dataset samples using the deep learning methods. Some works based on hand-crafted features in depth complementary features is achieved better performance when compared to early techniques of deeply based Person Re-ID[37–39]. Deeping learning alone will achieve with the best recognition rate of accuracy in the powerful performance increasing. Several methods of deep learning methods will gradually replace the hand-crafted feature methods and give the way for the researchers to analysis data based on performing such task of Person Re-ID.

3.2 Learning representation model

Deep learning success of Person Re-Idfor an individual image identity based on Convolution Neural network(CNN) which automatically learnt the representation of future from training data is to presented for verification and classification problem. Usually a pair of images is to be taken as input for verification and value of similar output is to be determine that it may be related to the same person under weekly supervised learning process and next classification it will be taken the same image from that and next implement to the train network the process of strongly supervised .

3.2.1 Mode of Verification

From the network of Siamese network basic structure the mode of verification takes an input be paired images and output will be also the similar pair only[40].

Model of verification the image is shown in *Figure4* for the purpose of using the Filter Pairing Neural Network(FPNN).
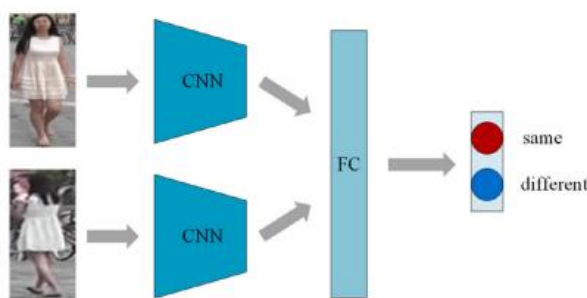
Fig4 Mode of Verification

To extract the different features view of camera filters for the different images with the method of block matching layer Atlast the layer soft max is to implement that the two input images will belong to the same person[41]. This technology will consequently divides the image into three overlapping parts into jointly trained with shared parameters. At the end i.e last stage all are connected to the similarity score of the two images as output with the frame of deep learning framework[42] to learn Single Image Representation(SIR) and Cross Image Representation(CIR) in high accuracy rate and efficient.

3.2.2   Mode of Classification

Classification mode tasks in the deep learning is same as that cognitive process. First to obtain the knowledge with new samples of training to obtain "knowledge"[43]be correctly classified in training subsequent and believed that multi-classification mode and is shown in *Figure 5* .
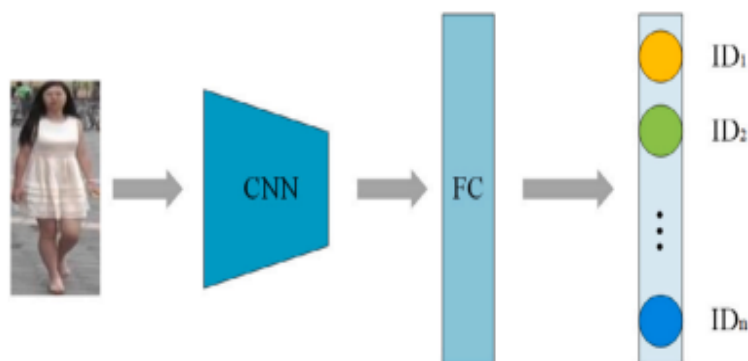
Fig 5 Mode of Classification

3.3   Metric learning model

It is very hard to evaluate the various factors in similarity of two person images in influence of resolution of an image with changes of pose and illumination, Deep learning is an effective tool to learn the non-linear metric function. Most common learning in loss function are loss of continuous, triplet & quadric loos[44–46], Centre loss. Basically the network uses the paired images as an input optimized by loss of continuous[47] and triplet loss is aimportant type of loss in identification of an images to overcome the pose changes of global and local feature of an images. Many set of variants of triple loss in metric learning is an application of triple loss in metric learning[48–50]. To calculate the loss function of triplet is composed of positive and negative sample is employed to calculate the better loss function with poor generalization performance on the test set of data in the intraclass gap on a triplet loss. This method implement the four set of input images with margin based online hard negative mining and adaptively selects difficult. Main purpose of learning metric is to reduce the distance and similarity between similar classes for the various classes set of images in training phase. Both the training and testing phase of metric are same when combined together for the representation learning end-end framework capable with the feature of discriminative learning features is shown in *Figure 6*.
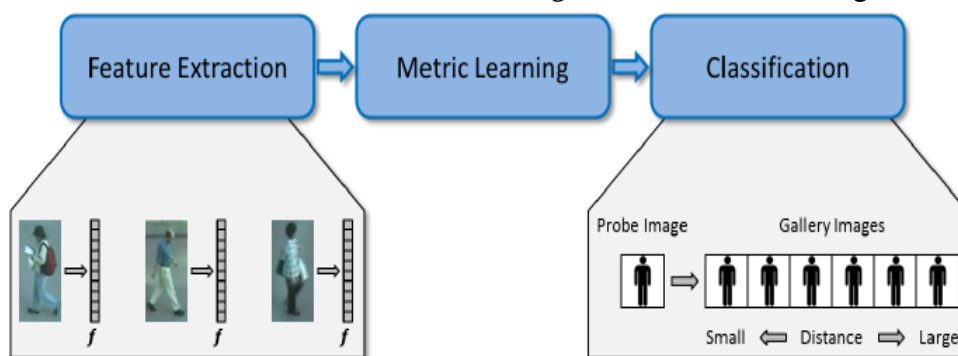
Fig 6 Sample of metric learning model

3.4 Part based deep learning for Person Re-Id

Input of deep hashing is employed as the input image of deep hashing in the Part-based Deep Hashing(PDH). Triplet sample contains two set of pedestrian images one set of images with the same identity of same person image and next with the different identity of one part of the image. With the hamming distance of same image with different part of an image using of triplet loss function to show that part based deep hashing deep algorithm. Local feature generation region of the image into three categories, first to locate the region of part from prior knowledge with estimation of pose, key point estimation [51–53] with deep block points.

3.4.1 Estimation of Pose

Fourteen key points to estimate the feature weighting subnet with the Pose Driven deep Convolution to six body region parts of the human image in *Figure 7* be single with different local and global features to locate the part area in the severe misalignment problem matching and reduce the power of semantic information of the personal retrieval algorithm with the different parts to fuse local and global feature for solving the severe misalignment problem and to reduce the error in weightage of estimation of pose[52]
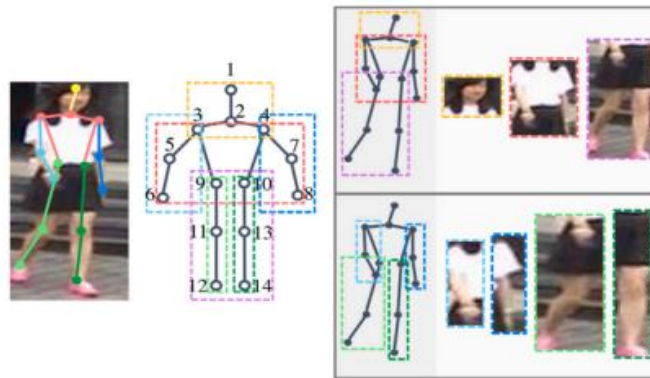
Fig 7 Key point estimation of an image

3.4.2 Mechanism of attention

Some sequences of recognition data with excellent performance is more challenging sequence of data implicit sentiment analysis [54,55] to locate the end to end. How human will process the some information be visual and incorporates level of timing to locate discriminative part of Re-Id region with local areas.

3.5 Video-based model

Video based Person Re-ID is a challenging task to solve the problem in the amount of data. In recent years, with the increase in the amount of data, research onvideo-based person Re-ID has been increasing. The image-based personReID method can only obtain limited information from a single image,and it is challenging to solve the problems of occlusion, pose change,and camera perspective in a single image. In contrast, video-basedpeople's ReID contains more information than a single image. Becauseimage sequences usually contain rich temporal information, they aremore suitable for Re-ID of persons in complex environments. Moreover,the video sequence-based method is more in line with the requirementsof the person Re-ID task of the actual monitoring system. It can avoidsome pre-processing processes of the monitoring video.

IV. CONCLUSION AND FUTURE WORK

In the field of computer vision Person Re-identification is a effective and most interested the researcher hotspot topic till now proposed and side by side it is very difficult for maintaining the security of social and stability. Anyhow updated technology was developed so far, but still it reaches the success with the excellent performance on existing datasets and also facing a hug set of problems for image based or video based in many aspects areas like pose person transformation and view of camera changes under the different focus of research on person Re-ID tasks. Most the updated research use the feature learning to solve the local feature complexity address of camera scene perceptive to learn further study. A large amount of training data for model the deep learning concept will realize the training and large scale in environmental dataset. Future research needs to effectively combine these three technology to complete and achieve good in image and video based surveillance system.

V. REFERENCES

[1]. F. Ma, X.Y. Jing, X. Zhu, Z. Tang and Z. Peng, "True-Color and Grayscale Video Person Re-identification," IEEE 2019.

[2]. S. Karanam, Y. Li, and R. J. Radke, "Person re-identification with discriminatively trained viewpoint invariant dictionaries,"in ICCV, 2015, pp. 4516–4524.

[3]. S. Bak, S. Zaidenberg, B. Boulay, and F. Bremond, "Improvingperson re-identification by viewpoint cues," in AVSS, 2014, pp.175–180.

[4]. X. Li, W.-S. Zheng, X. Wang, T. Xiang, and S. Gong, "Multi-scalelearning for low-resolution person re-identification," in ICCV,2015, pp. 3765–3773.

[5]. Y. Wang, L. Wang, Y. You, X. Zou, V. Chen, S. Li, G. Huang,B. Hariharan, and K. Q. Weinberger, "Resource aware person re-identification across multiple resolutions," in CVPR, 2018, pp.8042–8051

[6]. Y. Huang, Z.-J.Zha, X. Fu, and W. Zhang, "Illumination-invariant person re-identification," in ACM MM, 2019, pp. 365–373

[7]. Y.-J. Cho and K.-J.Yoon, "Improving person re-identification via pose-aware multi-shot matching," in CVPR, 2016, pp. 1354–1362.

[8]. H. Zhao, M. Tian, S. Sun, J. Shao, J. Yan, S. Yi, X. Wang, and X. Tang, "Spindle net: Person re-identification with human bodyregion guided feature decomposition and fusion," in CVPR, 2017, pp. 1077–1085.

[9]. A. Wu, W.-s.Zheng, H.-X.Yu, S. Gong, and J. Lai, "Rgb-infrared cross-modality person re-identification," in ICCV, 2017, pp. 5380–5389.

[10].M. Farenzena, L. Bazzani, A. Perina, V. Murino, and M. Cristani, "Person re-identification by symmetry-driven accumulation of local features," in CVPR, 2010, pp. 2360–2367.

[11].Y. Yang, J. Yang, J. Yan, S. Liao, D. Yi, and S. Z. Li, "Salient color names for person re-identification," in ECCV, 2014, pp. 536–551.

[12].S. Liao, Y. Hu, X. Zhu, and S. Z. Li, "Person re-identification by local maximal occurrence representation and metric learning," in CVPR, 2015, pp. 2197–2206.

[13]. T. Matsukawa, T. Okabe, E. Suzuki, and Y. Sato, "Hierarchical gaussian descriptor for person re-identification," in CVPR, 2016, pp. 1363–1372.

[14]. M. Kostinger, M. Hirzer, P. Wohlhart, and et al, "Large scale metric learning from equivalence constraints," in CVPR, 2012, pp. 2288–2295.

[15]. W.-S. Zheng, S. Gong, and T. Xiang, "Person re-identification by probabilistic relative distance comparison," in CVPR, 2011, pp. 649–656.

[16]. F. Xiong, M. Gou, O. Camps, and M. Sznaier, "Person re-identification using kernel-based metric learning methods," inECCV, 2014, pp. 1–16.

[17]. M. Hirzer, P. M. Roth, M. K¨ostinger, and H. Bischof, "Relaxed pairwise learned metric for person re-identification," in ECCV, 2012, pp. 780–793.

[18]. S. Liao and S. Z. Li, "Efficient psd constrained asymmetric metric learning for person re-identification," in ICCV, 2015, pp. 3685–3693.

[19]. H.-X. Yu, A. Wu, and W.-S.Zheng, "Unsupervised person re-identification by deep asymmetric metric embedding," IEEETransactions on Pattern Analysis and Machine Intelligence (TPAMI),2018

[20]. J. Ma, P. C. Yuen, and J. Li, "Domain transfer support vector ranking for person re-identification without target camera label information," in Proc. IEEE Conf. ICCV, Dec. 2013, pp. 3567–3574.

[21]. C. Liu, C. C. Loy, S. Gong, and G. Wang, "POP: Person re-identification post-rank optimisation," in Proc. IEEE Conf. ICCV, Dec. 2013, pp. 441–448.

[22]. Q. Qiu, J. Ni, and R. Chellappa, "Dictionary-based domain adaptation methods for the re-identification of faces," in Person Re-Identification. London, U.K.: Springer-Verlag, 2014, pp. 269–285.

[23]. E. Ahmed, M. Jones, and T. K. Marks, "An improved deep learning architecture for person reidentification," in Proc. IEEE Conf. CVPR, Jun. 2015, pp. 3908–3916.

[24]. D. Chen, Z. Yuan, G. Hua, N. Zheng, and J. Wang, "Similarity learning on an explicit polynomial kernel feature map for person re-identification," in Proc. IEEE Conf. CVPR, Jun. 2015, pp. 1565–1573.

[25]. X. Liu, M. Song, D. Tao, X. Zhou, C. Chen, and J. Bu, "Semi-supervised coupled dictionary learning for person re-identification," in Proc. IEEE Conf. CVPR, Jun. 2014, pp. 3550–3557.

[26]. X.-Y. Jing et al., "Super-resolution person re-identification with semicoupled low-rank discriminant dictionary learning," in Proc. IEEE Conf. CVPR, Jun. 2015, pp. 695–704.

[27]. S. Li, M. Shao, and Y. Fu, "Cross-view projective dictionary learning for person re-identification," in Proc. IJCAI, 2015, pp. 2155–2161.

[28]. L. Zheng, L. Shen, L. Tian, S. Wang, J. Wang, and Q. Tian, "Scalable person re-identification: A benchmark," in Proc. IEEE Conf. ICCV Dec. 2015, pp. 1116–1124.

[29]. Raja, S. KanagaSuba, and T. Jebarajan. "Reliable and secured data transmission in wireless body area networks (WBAN)." European Journal of Scientific Research 82, no. 2 (2012): 173-184 Musa, Z.B., Watada, J.: 'A particle filter approach for multi-camera tracking systems in a large view space',Int. J. Innov. Comput.Inf.Control, 2010, 6, (6), pp. 2827–283629 Zuriarrain, I., Aizpurua, J.I., Lerasle, F., Arana, N.: 'Multiple-person tracking devoted to distributed multi smart camera networks'. Proc. IEEE Int. Conf. Intelligent Robots and Systems, Taipei, Taiwan, October 2010, pp. 2469–2474

[30].Musa, Z.B., Watada, J.: 'A particle filter approach for multi-cameratracking systems in a large view space',Int. J. Innov. Comput.Inf.Control, 2010, 6, (6), pp. 2827–283629 Zuriarrain, I., Aizpurua,

[31].J.I., Lerasle, F., Arana, N.: 'Multiple-persontracking devoted to distributed multi smart camera networks'. Proc.IEEE Int. Conf. Intelligent Robots and Systems, Taipei, Taiwan,October 2010, pp. 2469–2474.

[32].M. Farenzena, L. Bazzani, A. Perina, V. Murino, and M. Cristani,"Person re-identification by symmetrydriven accumulation of local features," in Proc. IEEE Conf. CVPR, Jun. 2010, pp. 2360–2367.

[33].S. Sunderrajan and B. S. Manjunath, "Context-aware hypergraph modelling for re-identification and summarization," IEEE Trans. Multimedia, vol. 18, no. 1, pp. 51–63, Jan. 2016.

[34].D. Tao, L. Jin, Y. Wang, Y. Yuan, and X. Li, "Person re-identification by regularized smoothing KISS metric learning," IEEE Trans. Circuits Syst. Video Technol., vol. 23, no.10, pp. 1675–1685, Oct. 2013.

[35].T. Wang, S. Gong, X. Zhu, and S. Wang, "Person re-identification by discriminative selection in video ranking," IEEE Trans. Pattern Anal Mach. Intell., vol. 38, no. 12, pp. 2501–2514, Dec. 2016.

[36].K. Liu, B. Ma, W. Zhang, and R. Huang, "A spatio-temporal appearance representation for viceo-based pedestrian re-identification," in Proc.IEEE Conf. ICCV, Dec. 2015, pp. 3810–3818.

[37].S. Wu, Y. Chen, X. Li, A. Wu, J. You, W. Zheng, An enhanced deep feature representation for person re-identification, 2016, pp. 1–8.

[38].L. Zheng, S. Wang, L. Tian, F. He, Z. Liu, Q. Tian, Query-adaptive late fusion for image search and person re-identification, 2015, pp. 1741–1750.

[39].Y. Li, L. Zhuo, X. Hu, J. Zhang, A combined feature representation of deep feature and hand-crafted features for person re-identification, 2016, pp. 224–227.

[40].J. Bromley, I. Guyon, Y. Lecun, E. Sackinger, R. Shah, Signature verification using a "siamese" time delay neural network, 1993, pp. 737–744.

[41].D. Yi, Z. Lei, S. Liao, S.Z. Li, Deep metric learning for person re-identification, 2014, pp. 34–39.

[42].F. Wang, W. Zuo, L. Lin, D. Zhang, L. Zhang, Joint learning of single-image and cross-image representations for person re-identification, 2016, pp. 1288–1296.

[43].L. Zheng, H. Zhang, S. Sun, M. Chandraker, Y. Yang, Q. Tian, Person re-identification in the wild, 2017, pp. 3346–3355.

[44].S. Ding, L. Lin, G. Wang, H. Chao, Deep feature learning with relative distance comparison for person re-identification, Pattern Recognit.

[45].(10) (2015) 2993–3003. [44] D. Cheng, Y. Gong, S. Zhou, J. Wang, N. Zheng, Person re-identification by multi-channel parts-based CNN with improved triplet loss function, 2016, pp. 1335–1344.

[46].A. Hermans, L. Beyer, B. Leibe, Indefense of the triplet loss for person re-identification, Comput. Vis. Pattern Recognit. (2017) arXiv:

[47].J. Wang, Y. Song, T. Leung, C. Rosenberg, J. Wang, J. Philbin, B. Chen, Y. Wu, Learning fine-grained image similarity with deep ranking, 2014, pp. 1386–1393.

[48].F. Schroff, D. Kalenichenko, J. Philbin, FaceNet: A unified embedding for face recognition and clustering, 2015, pp. 815–823.

[49].H. Chen, Y. Wang, Y. Shi, K. Yan, M. Geng, Y. Tian, T. Xiang, Deep transfer learning for person re-identification, 2018, pp. 1–5.

[50].H.O. Song, Y. Xiang, S. Jegelka, S. Savarese, Deep metric learning via lifted structured feature embedding, 2016, pp. 4004–4012.

[51].C. Su, J. Li, S. Zhang, J. Xing, W. Gao, Q. Tian, Pose-driven deep convolutional model for person re-identification, 2017, pp. 3980–3989.

[52].L. Zheng, Y. Huang, H. Lu, Y. Yang, Pose invariant embedding for deep person re-identification, Comput. Vis. Pattern Recognit. (2017) arXiv:.

[53].H. Zhao, M. Tian, S. Sun, J. Shao, J. Yan, S. Yi, X. Wang, X. Tang, Spindle net: Person re-identification with human body region guided feature decomposition and fusion, 2017, pp. 907–915

[54].Z. Zhang, Y. Zou, C. Gan, Textual sentiment analysis via three different atten tion convolutional neural networks and cross-modality consistent regression, Neurocomputing 275 (2018) 1407–1415.

[55].J. Zang, L. Wang, Z. Liu, Q. Zhang, G. Hua, N. Zheng, Attention-based temporal weighted convolutional neural network for action recognition, 2018, pp. 97–108.

A Role of Machine Learning Algorithm for Business Analytics in Industry 4.0 Prediction made for Digital Transformations based on IoT

Mrs.S.Sindhu[1], Dr.N.Vijayalakshmi[2]

[1]Assistant Professor, SRM IST-Ramapuram , Chennai-89, Tamil Nadu, India

[2]Assistant Professor (Sr. G), SRM IST-Ramapuram , Chennai-89, Tamil Nadu, India

ABSTRACT

Machine algorithms will be used extensively in this research to predict future outcomes from previously trained models. Nowadays, traditional businesses have gone digital, necessitating the creation of algorithms for data management and analysis, which have been assigned in Machine Learning. The most important component in the industry 4.0 is that the business has been automatically maintained and predicted. Similarly, the house price prediction was done using the trained dataset that was already attached to the model development. Nonetheless, the recommended study aids in the comprehension of the forecast of an individual business's outcome in Industry 4.0. Machines and other equipment are serviced, and work is done with the assistance of an electrician. Nonetheless, the recommended study aids in the comprehension of the forecast of an individual business's outcome in Industry 4.0. Machines and other equipment are serviced, and work is carried out with the assistance of sensors and other devices. These will assist in determining the outcome. Consider the linear regression and logistic algorithms used to determine the price of a home or the profitability of a company's individual product. The proposed work will discuss the available machine learning algorithms and how they might aid with business analytics in Industry 4.0 for digital transformations.

Keywords: Industry 4.0, Machine learning Algorithms, Business analytics, digital transformation, linear and regression algorithm, K-Means and etc.

I. INTRODUCTION

Machine learning is nothing more than a method for automating a machine without the involvement of the user. Machines are merely physical elements. It is incapable of making a decision. To accomplish this, program the system to make dynamic decisions based on the present situation. The machines are using the prior feed dataset to forecast the outcome. The general dataset may be useful in training the model. Following the training, machines will be able to make decisions regarding the current challenge. There are numerous algorithms to choose from. In general, we employ a number of algorithms in our business analysis.

Artificial Intelligence includes the machine learning model. A computer software that has been trained to recognize specific patterns is known as a machine learning model. We train a model on a collection of data and

provide it with an algorithm to reason about and learn from it.The initial stage in creating the model is to gather the necessary data and divide it into two groups: train dataset and test dataset.

An application for data visualization and activity classification was created. The application enables remote viewing of product movement signals and detection of associated activity. The research's experimental results suggest that the created system can successfully identify many activities of players during their training. For any business analytics in any industry to improve future performance, collected data is increasingly crucial.
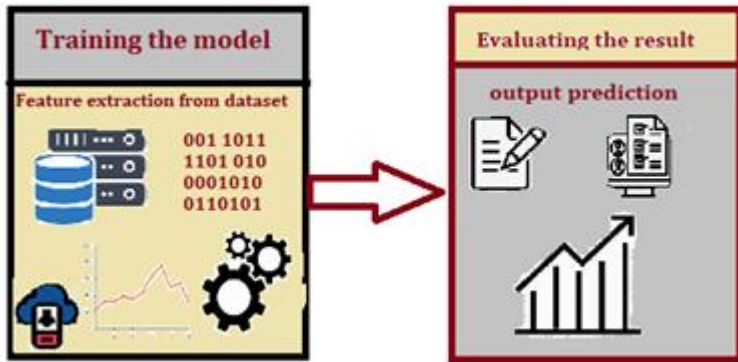
Fig 1.1 Machine learning model prediction

To grasp the pictorial representation of the machine-evaluated learning process, look at the diagram above.

How does Machine Learning differ from Deep Learning and Artificial Intelligence?

Machine Learning	Deep Learning	Artificial Intelligence
It uses statistical methods to train the machine.	It uses neural network to train the machine.	The study/process of using a certain algorithm to enable machines to mimic human behavior.
ML is the subset of AI.	DL is the subset of ML.	AI will analyse from ML and DL datasets.
ML will learn from the data.	DL will analyse the data.	AI is a computer algorithm which exhibits intelligence through decision making.
It cannot able to predict from larger dimensional dataset.	It easily handle the larger dataset.	The efficiency Of AI is basically the efficiency provided by ML and DL respectively.
Examples of ML applications include: Virtual Personal Assistants: Siri, Alexa, Google, etc., Email Spam and Malware Filtering.	Examples of DL applications include: Sentiment based news aggregation, Image analysis and caption generation, etc.	Examples of AI applications include: Google's AI-Powered Predictions, Ridesharing Apps Like Uber and Lyft, Commercial Flights Use an AI Autopilot, etc.

Three different types of machine learning algorithms:

1. Supervised learning
2. Un supervised learning
3. Reinforcement learning

The labeled dataset is used to create supervised learning techniques. In most cases, the data is gathered from the user's previous inputs. However, in order to detect defeats, IoT nodes are connected to the production field. These simply detect the raw input data, such as image and text formats. That which is sensed by the devices will be processed as data and considered as an input. The outcome will be projected based on the input.

Fig 1.2 Supervised Machine learning

Unsupervised learning is used to manage unlabeled datasets such as photos, movies, and other types of media. Binary data is used in this type of data processing. The data preprocessing progressive will generate this. The unlabeled dataset is the subject of the most current efforts. Consider the identification of a face mask, a defective product in a production line, and so on. Because the model was trained using the input dataset. The machine will learn from the dataset and make decisions based on the trained dataset.
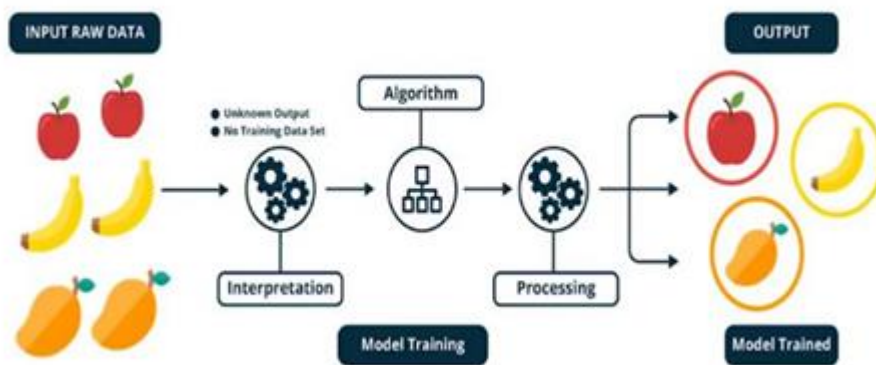
Fig 1.3 Unsupervised machine learning

Structured learning procedures in which a machine learning algorithm is given a set of actions, parameters, and end values to work with are referred to as reinforcement learning. After setting the criteria, monitoring and reviewing each output to determine which is the best, the machine learning algorithm tries to explore numerous options and possibilities. Reinforcement learning tells the system to learn by making mistakes. It

applies what it has learnt in the past to the current environment in order to get the best possible outcome. Reinforcement learning is another type of machine learning algorithm. This method is commonly used to predict the outcome of a current move based on past feedback and rewards.

II. LITERATURE REVIEW

IoT-based quality monitoring systems include a number of capabilities that allow them to monitor the system in the production line. This type of solution is now standard for all firms that use business analytics.[1-8]

a)   IoT based Applications for Industry 4.0

The Internet of Things (IoT) is a well-defined framework of networked computing techniques, digital, and mechanical devices capable of transmitting data across a defined network without the involvement of humans at any level. Without requiring human-to-human or human-to-machine interaction, IoT devices sense the surroundings and transfer the collected data to the Internet cloud. In today's current era of communication, when tens of millions of devices are connected via IoT and the number is rapidly expanding, IoT has become an indispensable aspect[10,12-14]. Health systems, autonomous vehicles, home and industrial automation, intelligent transportation, smart grids, and other areas of life could all benefit from the Internet of Things.In industry Internet of Thing (IIoT) nowadays has a major depth growth[15]. Now many industries are fully automated. Every devices are connected with the internet.
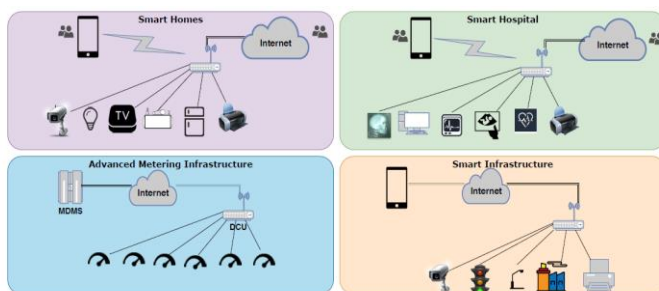
Figure 1: Several IoT applications including: large-scale deployment of home, hospital, utility metering, and infrastructure.

b)   Monitoring process involved in IoTfor Industry 4.0

IoT for Industry 4.0 Monitoring Processes IoT is a new technical platform for fighting pandemics and can meet substantial problems during a lockdown situation [19]. This technology is useful in capturing real-time data and other vital information of the afflicted patient, demonstrating the importance of IoT activities.
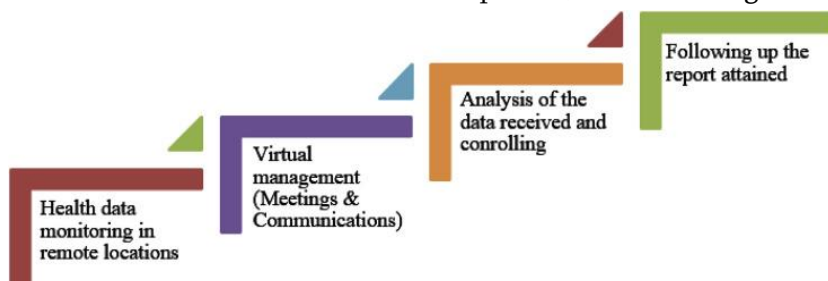
Fig 2 Processes involved in IoT Applications for Industry 4.0

c) **How the machine learning algorithm helps to predict the result**

A machine learning system aids in the prediction of smart device quality.

i) The following three aspects must be considered in order to determine which algorithm is best for processing and making decisions on smart data supplied by IoT devices. First, there's the Internet of Things (IoT) application (Section 3). Second, IoT data characteristics (Section 4.2), and third, machine learning algorithms with a data-driven vision (Section 5). Finally, in Section 6, we explore the difficulties.

ii) A examination of over 70 works in the field of IoT data analysis reveals that there are eight broad types of algorithms that can be used to IoT data. These algorithms are grouped based on structural similarities, data types handled, and the amount of data processed in a reasonable amount of time.

iii) Many noteworthy and insightful conclusions regarding data features have been disclosed after reviewing the real-world perspective of how IoT data is examined by over 20 writers. Section 6 and Table 1 summarise the findings. Patterns must be retrieved and the generated data evaluated to acquire a deeper understanding of IoT smart data. Cognitive algorithms do interpretation and matching in the same way as the human mind does. Prior to this, cognitive IoT systems learned from generated data and improved when performing repetitive tasks. By evaluating huge amounts of data and answering to queries that humans might have when making certain judgments, cognitive computing functions as a prosthetic for human cognition. The ability to extract meaningful patterns from generated IoT is made possible by cognitive IoT.

III. ALGORITHMS USED FOR PREVIOUS RESEARCHES

Paper title	Algorithm and Methodology	Findings	Research Gap
Inline Image Vision Technique for Tires Industry 4.0: Quality and Defect Monitoring in Tires Assembly	3D Reconstruction, DOTS, K-means algorithms, OCR	RGB to Gray Scale, Wheel Alignment	Quality of Tires, Pattern matching
An IoT Application for Industry 4.0: a New and Efficient Public Lighting Management Model	PELL platform MQTT, ENEA Intranet	Points of Delivery, Diagnostics analysis	Quality of Life of Smart services
Low Cost IoT Sensor System for Real-time Remote Monitoring	Fused Deposition Modelling (FDM), Clustering Algorithm,	InfluxDB, TSDB, DHT32, GPS/GSM	Remote modelling
Ensemble of Supervised and Unsupervised Learning Models to Predict a Profitable Business Decision	PCA(Principle component analysis), ANN, RF method, Linear Regression, Multilayer Perceptron, Random Forest, KNN, Locally Weighted	Rate of return	Natural disaster, Faster RCNN

	Learning, SMO, and KStar algorithms, Eager learning method		
Systems for an intelligent application of Automated Processes in industry: a case study from "PMI IoT Industry 4.0"project	SOM(Self organizing map),MQTT,AMQP, Kmeans (as partitioning based algorithms), CURE (as hierarchical based algorithm), DBSCAN (as grid-based algorithms) and SOM (as model-based algorithms).	Decision support system, industrial process monitoring and adopting scientific advances.	Quality monitored using IoT node and sensor but not quality assurance
An Outlook of Narrowband IoT for Industry 4.0	NBIoT	Automation manufacturing, short time sustainability	Long term sustainability

Over past few years most of the applications are implemented with the IoT. To be the core handle the devices in network based nodes. It applies many implementations like emergency handling, environment management, business analytics, production and health care and so on. The sensed data will may used to find the incoming value. These kind of dataset will be processed and treated as a trained dataset which has been saved on a. InfluxDB, as well as any TSDB. Most of the data analytics made by the machine learning algorithms. These analytical tool used to analyze the data even a larger amount of data. Generally the sensor will sense many data with noises. At initial stage unable to detect the noise data from the raw data. Before preprocessing of the data need to keep all the raw data into storage for future preprocessing work.

The eager learning approach is used to determine how the rate of return accurately predicts the outcome. It is used to train the model to generate a higher score. Predictions are created using various machine learning algorithms based on the results of the experimental investigation. These algorithms aid in the prediction of return rates, accuracy, model training, and house price forecast, among other things. KNN, ANN, SMO, MLP, and linear regression techniques are the most commonly utilised algorithms[30]. The findings suggest that eager learning methods' behaviour can have a negative impact on these models' generalization capacity.

IV. ALGORITHM AND METHODOLOGY

The clustering methods can be divided into five categories:

When initial groups are specified and reallocated to a union, partitioning-based algorithms treat the centre of data points as the centre of the appropriate cluster [32].

In a hierarchical fashion termed dendrogram [33], **hierarchical based algorithms** depict the relationship between each pair of clusters based on the medium of similarity or dissimilarity.

Data items are separated using **density-based algorithms** based on their density, connectedness, and boundary areas. Data in the high density region of the data space are regarded as belonging to the same cluster [34].

V. IMPLEMENTATIONS

To collect regional statistical data, **grid-based algorithms** convert the original data space into a grid structure with a set cluster size and then cluster on the grid.

Consider a simple dataset for house price prediction and apply various methods to determine the level of accuracy.The dataset for predicting the price of a house is provided below. There are 21 attributes and 4601 records in the collection. These data will be used to compare the various algorithms' accuracy scores for future rates.

date	price	bedrooms	bathroom	sqft_living	sqft_lot	floors	waterfron	view	condition	sqft_abov	sqft_base	yr_built	yr_renova	street	city	statezip	country
02-05-2014 00:00	313000	3	1.5	1340	7912	1.5	0	0	3	1340	0	1955	2005	18810 Den	Shoreline	WA 98133	USA
02-05-2014 00:00	2384000	5	2.5	3650	9050	2	0	4	5	3370	280	1921	0	709 W Bla	Seattle	WA 98119	USA
02-05-2014 00:00	342000	3	2	1930	11947	1	0	0	4	1930	0	1966	0	26206-262	Kent	WA 98042	USA
02-05-2014 00:00	420000	3	2.25	2000	8030	1	0	0	4	1000	1000	1963	0	857 170th	Bellevue	WA 98008	USA
02-05-2014 00:00	550000	4	2.5	1940	10500	1	0	0	4	1140	800	1976	1992	9105 170th	Redmond	WA 98052	USA
02-05-2014 00:00	490000	2	1	880	6380	1	0	0	3	880	0	1938	1994	522 NE 88	Seattle	WA 98115	USA
02-05-2014 00:00	335000	2	2	1350	2560	1	0	0	3	1350	0	1976	0	2616 174th	Redmond	WA 98052	USA
02-05-2014 00:00	482000	4	2.5	2710	35868	2	0	0	3	2710	0	1989	0	23762 SE 2	Maple Val	WA 98038	USA
02-05-2014 00:00	452500	3	2.5	2430	88426	1	0	0	4	1570	860	1985	0	46611-466	North Ber	WA 98045	USA
02-05-2014 00:00	640000	4	2	1520	6200	1.5	0	0	3	1520	0	1945	2010	6811 55th	Seattle	WA 98115	USA
02-05-2014 00:00	463000	3	1.75	1710	7320	1	0	0	3	1710	0	1948	1994	Burke-Gil	Lake Fore	WA 98155	USA
02-05-2014 00:00	1400000	4	2.5	2920	4000	1.5	0	0	5	1910	1010	1909	1988	3838-4098	Seattle	WA 98105	USA
02-05-2014 00:00	588500	3	1.75	2330	14892	1	0	0	3	1970	360	1980	0	1833 220th	Sammami	WA 98074	USA
02-05-2014 00:00	365000	3	1	1090	6435	1	0	0	4	1090	0	1955	2009	2504 SW P	Seattle	WA 98106	USA
02-05-2014 00:00	1200000	5	2.75	2910	9480	1.5	0	0	3	2910	0	1939	1969	3534 46th	Seattle	WA 98105	USA
02-05-2014 00:00	242500	3	1.5	1200	9720	1	0	0	4	1200	0	1965	0	14034 SE 2	Kent	WA 98042	USA
02-05-2014 00:00	419000	3	1.5	1570	6700	1	0	0	4	1570	0	1956	0	15424 SE 9	Bellevue	WA 98007	USA
02-05-2014 00:00	367500	4	3	3110	7231	2	0	0	3	3110	0	1997	0	11224 SE 3	Auburn	WA 98092	USA
02-05-2014 00:00	257950	3	1.75	1370	5858	1	0	0	3	1370	0	1987	2000	1605 S 245	Des Moin	WA 98198	USA
02-05-2014 00:00	275000	3	1.5	1180	10277	1	0	0	3	1180	0	1983	2009	12425 415	North Ber	WA 98045	USA
02-05-2014 00:00	750000	3	1.75	2240	10578	2	0	0	5	1550	690	1923	0	3225 NE 9	Seattle	WA 98115	USA
02-05-2014 00:00	435000	4	1	1450	8800	1	0	0	4	1450	0	1954	1979	3922 154th	Bellevue	WA 98006	USA
02-05-2014 00:00	626000	3	2.25	1750	1572	2.5	0	0	3	1470	280	2005	0	3140 Franl	Seattle	WA 98102	USA
02-05-2014 00:00	612500	4	2.5	2730	12261	2	0	0	3	2730	0	1991	0	10212 NE	Bothell	WA 98011	USA
02-05-2014 00:00	495000	4	1.75	1600	6380	1	0	0	3	1130	470	1959	1989	2021 NE 1	Seattle	WA 98125	USA
02-05-2014 00:00	285000	3	2.5	2090	10834	1	0	0	4	1360	730	1987	0	27736 23r	Federal W	WA 98003	USA
02-05-2014 00:00	615000	3	1.75	2360	7291	1	0	0	4	1360	1000	1948	0	8436-8438	Seattle	WA 98136	USA
02-05-2014 00:00	698000	4	2.25	2200	11250	1.5	0	0	5	1300	900	1920	0	1036 4th S	Kirkland	WA 98033	USA
02-05-2014 00:00	675000	5	2.5	2820	67518	2	0	0	3	2820	0	1979	2014	23525 SE 3	Issaquah	WA 98029	USA
02-05-2014 00:00	790000	3	2.5	2600	4750	1	0	0	4	1700	900	1951	1999	3314 NW	Seattle	WA 98117	USA
02-05-2014 00:00	382500	4	1.75	1560	8700	1	0	0	4	1560	0	1967	0	14104 119	Kirkland	WA 98034	USA

Fig 1.7 House price Dataset

The graphical representation is used to identify a graphical representation for a particular attribute from the dataset. To understand the pricing ratio for a room's availability, look at the diagram.
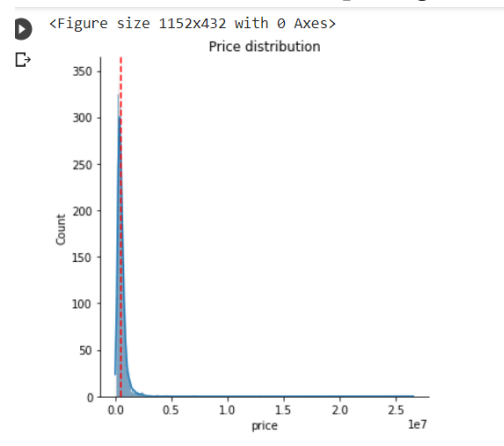

Fig 1.8 diagrammatic representation of the price and count

To understand the pricing ratio for a room's availability, look at the diagram.
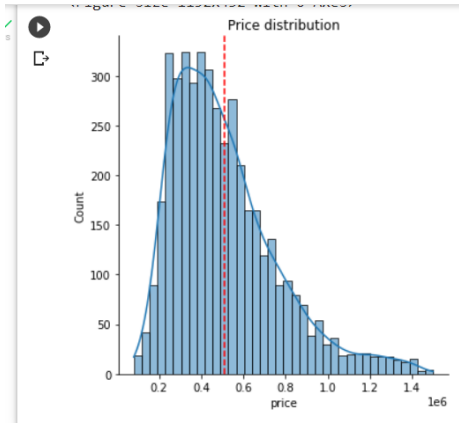

Fig 1.9 Bar diagram represents the price between above than the 2500000.

The figure above is used to comprehend the price ratio if it is expected to be more than 250000. It simply assists us in determining the value of a technological issue.
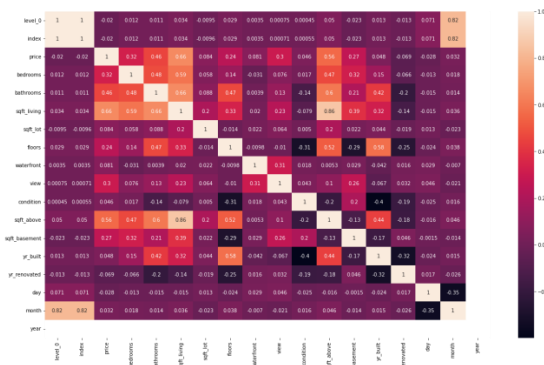

Fig 1.10 To understand the correlation value for the dataset

The correlation and coefficient values for the given dataset table will be handled by the table described above. The white colour box will usually show the high ratio of a correlation. This could indicate that a housing price has been defeated.

```
[09:29:08] WARNING: /workspace/src/objective/regression_obj.cu:152: reg:linear is now deprecated in favor of reg:squarederror.
Results
[0] Logistic Regression Test Error: 175722.69267720784
[1] K neighbors Regression Test Error: 187413.1178600679
[2] SVR linear Regression Test Error: 175094.804958079
[3] Decision Tree Regression Test Error: 240619.38280147134
[4] Random Forest Regression Test Error: 167230.60185910817
[5] Gradient Boosting Regression Test Error: 162038.2194183569
[6] XGBoost Regression Test Error: 162137.00183533775
[7] LightGBM Regression Test Error: 165750.77643469602
```

Fig 1.11 accuracy score for the different algorithm applied to the same dataset.

The different supervised learning algorithms for the idea of rate of return based on the above described outcome. The prior dataset is used to calculate the majority of the algorithms. These could be issues with the findings. Because a natural calamity may strike that location in the future, the price will be drastically reduced. Similarly, the price of an area will skyrocket in any well-known corporation or government. As a result, natural challenges must be considered in the business analytical process. In industry 4.0, the business analytical process deals with difficulties like these.

VI. CONCLUSION

In this study, machine algorithms will be employed extensively to forecast future outcomes using previously trained models. Traditional organisations have gone digital in recent years, necessitating the development of data management and analysis algorithms, which have been allocated to Machine Learning. The most significant aspect of industry 4.0 is that the business is maintained and predicted automatically. Similarly, the training dataset that was already tied to the model development was used to estimate housing prices. Nonetheless, the recommended research aids in the understanding of the predicted consequence of a specific firm in Industry 4.0.

VII.   REFERENCES

[1]. R. C. Parpala, and R. Iacob, "Application of IoT Concept on Predictive Maintenance of Industrial Equipment," MATEC Web of Conference, Vol. 121, No. 02008, 2017, pp. 1-8.

[2]. A. Massaro, A. Galiano, G. Meuli, S. F. Massari, "Overview and Application of Enabling Technologies Oriented on Energy Routing Monitoring, on Network Installation and on Predictive Maintenance," Int. J. Art. Intell. Appl., Vol. 9, No. 2, pp. 1-20, 2018.

[3]. A. Massaro, V. Maritati, A. Galiano, V. Birardi, L. Pellicani, "ESB Platform Integrating KNIME Data Mining Tool oriented on Industry 4.0 Based on Artificial Neural Network Predictive Maintenance," Int.

[4]. J. Art. Intell. Appl., Vol. 9, No. 3, 2018, pp. 1-17. [4] L. Sánchez, J. Lanza, et al "Federation of Internet of Things testbeds for the realization of a semantically-enabled multi-domain data marketplace," Sensors, Vol. 18, No. 10, 2018, pp. 3375.

[5]. V. Kothu, and B. Deshpande, "Predictive Analytics and Data Mining Concept and Pratice with RapidMiner", 1st Edition, Elsevier book, 2014.

[6]. B. Bajic, I. Cosic, M. Lazarevic, N. Sremcev, and A. Rikalovic, "Machine Learning Techniques for Smart anufacturing: Applications and Challenges in Industry 4.0," Department of Industrial Engineering and Management Novi Sad, Serbia, Vol. 29, 2018.

[7]. D. Morent, W.-C. Lin, K. Stathatos, M. R. Berthold "Comprehensive PMML Preprocessing in KNIME," Proceedings of the 2011 Workshop on Predictive markup language modeling, pp. 28-31.

[8]. A. J. Jara, D. Genoud and Y. Bocchi, "Big Data for Smart Cities with KNIME a Real Experience in the SmartSantander Testbed," Softw. Pract. Exper., 2014, pp. 1-16.

[9]. J. G. R. F. Bernardo, "A Contribution for Data Processing and Interoperability in Industry 4.0," Doctoral dissertation, 2019.

[10]. U. Asan and S. Ercan, "An Introduction to Self-Organaizing Maps," Atlantis Press Book, ch. 4, 2012

[11]. A. Vellido, K. Gibert, C. Angulo, and J. D. M. Guerrero, (Eds.). "Advances in Self-Organizing Maps, Learning Vector Quantization, Clustering and Data Visualization," Proceedings of the 13th International Workshop, WSOM+ 2019, Barcelona, Spain, June 26-28, 2019 (Vol. 976). Springer.

[12]. R. Ponmalai, and Kamath, C."Self-Organizing Maps and Their Applications to Data Analysis," Report No. LLNL-TR-791165, Lawrence Livermore National Lab.(LLNL), Livermore, CA (United States), 2019.

[13].A. A. Fuqaha, M. Guizani, M. Mohammadi, M. Aledhari and M. Ayyash, "Internet of Things: a survey on enabling technologies, protocols, and applications" IEEE Communications Surveys & Tutorials, Vol. 17, No. 4, 2015,pp. 2347-237

[14].J. Um, K. Fischer, T. Spieldenner, and D. Kolberg, "Development a Modular Factory with Modular Software Components," Proc. Manufact., Vol. 11, 2017, pp. 922-930.

[15].R. Rákay, A. Galajdová, (2019). Comparison of communication protocols for smart devices. Technical sciences and technologies, 3 (17), 146–154.

[16].Likas, A., Vlassis, N., & Verbeek, J. J. (2003). The global k-means clustering algorithm. Pattern recognition, 36(2), 451-461.

[17].Reddy, C. K., & Vinzamuri, B. (2018). A survey of partitional and hierarchical clustering algorithms. In Data Clustering (pp. 87-110). Chapman and Hall/CRC.

[18].H. P. Kriegel, P. Kröger, J. Sander, and A. Zimek, A., "DensityBased Clustering," Wiley Interd. Rev.: Data Min. Knowl. Discov., Vol. 1, No. 3, 2011, pp. 231-240.

[19].M. Parikh, and T. Varma, "Survey on Different Grid Based Clustering Algorithms," Int. J. Adv. Res. Comp. Sci. Manag. Stud., Vol. 2, No. 2, 2014.

[20].C. Fraley, and A. E. Raftery, (2002). "Model Based Clustering, Discriminant Analysis, and Density Estimation," J. Amer. Stat. Assoc, Vol. 97, No. 458, pp. 611-631.

[21].S. S. Cheng, H. C. Fu, and H. M. Wang, "Model-Based Clustering byProbabilistic Self-Organizing Maps," IEEE Trans. Neur. Net., Vol. 20, No. 5,, 2009, pp. 805-826.

[22].C. Legány, S. Juhász, and A. Babos, (2006, February). "Cluster Validity Measurement Techniques," in Proceedings of the 5th WSEAS, Wisconsin, USA, Feb. 2006, pp. 388-393.

[23].E. Rendón, et al.."Internal Versus External Cluster Validation Indexes," Int. J. Comp. Comm., Vol. 5, No. 1, 2011, pp. 27-34.

[24].I. Gurrutxaga, J. Muguerza, O. Arbelaitz, J. M. Pérez, and J. I. Martín, "Towards a Standard Methodology to Evaluate Internal Cluster Validity Indices," Patt. Recogn. Lett., Vol. 32, No. 3, 2011, pp.505-515.

[25].S. Zhou, and Z. Xu, "A Novel Internal Validity Index Based on the Cluster Centre and the Nearest Neighbour Cluster," Appl. Soft Comput., Vol. 71, 2018, pp.78-88.

[26].Lambda Architecture, http://lambda-architecture.net

[27].Alessandro Massaro, Ivano Manfredonia, Angelo Galiano, Nicola Contuzzi 's "Inline Image Vision Technique for Tires Industry 4.0: Quality and Defect Monitoring in Tires Assembly", 978-1-7281-0429-4/19/$31.00 ©2019 IEEE

[28].Mariagrazia Leccisi, Fabio Leccese, Fabio Moretti, Laura Blaso, Arianna Brutti, Nicoletta Gozo's "An IoT Application for Industry 4.0: a New and Efficient Public Lighting Management Model", 978-1-7281-4892-2/20/$31.00 ©2020 IEEE

[29].Matteo D'Aloia, Annalisa Longo, Gianluca Guadagno, Mariano Pulpito, Paolo Fornarelli, Pietro Nicola Laera, Dario Manni's " Low Cost IoT Sensor System for Real-time Remote Monitoring" 978-1-7281-4892-2/20/$31.00 ©2020 IEEE

[30].Maryam Heidari, Samira Zad, Setareh Rafatirad, "Ensemble of Supervised and Unsupervised Learning Models to Predict a Profitable Business Decision", Authorized licensed use limited to: Carleton University. Downloaded on May 26,2021 at 12:35:20 UTC from IEEE Xplore

[31].Alessandro Massaro, Giuseppe Mastandrea's " Systems for an intelligent application of AutomatedProcesses in industry: a case study from "PMI IoTIndustry 4.0"project", 978-1-7281-4892-2/20,@2020 IEEE.

[32].Reddy, C. K., & Vinzamuri, B. (2018). A survey of partitional and hierarchical clustering algorithms. In Data Clustering (pp. 87-110). Chapman and Hall/CRC.

[33].H. P. Kriegel, P. Kröger, J. Sander, and A. Zimek, A., "Density Based Clustering," Wiley Interd. Rev.: Data Min. Knowl. Discov., Vol. 1, No. 3, 2011, pp. 231-240.

[34].M. Parikh, and T. Varma, "Survey on Different Grid Based Clustering Algorithms," Int. J. Adv. Res. Comp. Sci. Manag. Stud., Vol. 2, No. 2, 2014.

[35].C. Fraley, and A. E. Raftery, (2002). "Model Based Clustering, Discriminant Analysis, and Density Estimation," J. Amer. Stat. Assoc, Vol. 97, No. 458, pp. 611-631.

[36].S. S. Cheng, H. C. Fu, and H. M. Wang, "Model-Based Clustering by Probabilistic Self-Organizing Maps," IEEE Trans. Neur. Net., Vol.20, No. 5,, 2009, pp. 805-826.

[37].E. Rendón, et al.."Internal Versus External Cluster Validation Indexes," Int. J. Comp. Comm., Vol. 5, No. 1, 2011, pp. 27-34.

[38].Sudhir K. Routray, Sharmila K. P, Abhishek Javali, " An Outlook of Narrowband IoT for Industry 4.0", Proceedings of the Second International Conference on Inventive Research in Computing Applications (ICIRCA-2020)

Automated Infusion Drug Warmer System

Boopathi Raaj R¹*, Devaroshini A¹, Prem M¹, Sneha P¹

¹*Student, III Year, Department of Biomedical Engineering, Bannari Amman Institute of Technology,
Sathyamangalam -638401, Erode, Tamil Nadu, India

ABSTRACT

During the process of infusing a drug to a patient, it may be found that the patient who is under the infusion support, feels uncomfortable at some stage and it may also lead to hypothermia, febrile seizure etc. These infusions may be caused by the type of drug, amount of drug, flow speed of the drug and also the crucial part of the temperature infused into the blood flow of the patient. To control the temperature of the drug it is hard to keep the drug at a high temperature as it may react with the drug and causes some glitches in the properties and it may be harmful for the patients. Hence a system has to be developed which just warm up the drug before it is delivered to the patient as it makes the patient feel comfortable since the blood adapts to the temperature of the drug easily. A system is proposed that the temperature of the infused drug is maintained continuously and delivered to the patient. This may avoid the chances of the seizures, hypothermia is several cases and also alleviate the condition of the patient to a considerable limit.

Keywords: Infusion, Hypothermia, Febrile seizure, Drug, Temperature

I. INTRODUCTION

The practice of injecting the drugs has been increasing day by day in the recent years. This is due to the evolution of the diseases and it depends on various factors such as climatic change, hereditary diseases and physical habit changes. The traditional way of oral medicines has been decreasing day by day and made a rise in the use of latest way of medication. This is due to the way for curing the disease quickly when compared to the traditional way of medication. This type of medication also ensures the right amount of drug to be delivered to the patient with accuracy and also ensures in terms of speedy recovery. It is also considered as one of the basic treating procedure in treatment. The injection of blood or drug is carried out to the blood stream through a hypodermic needle. It is mainly injected via the intravenous, a muscle which is intramuscularly or under the skin that is subcutaneously. The drug injection procedure increased due to the discovery of reusable syringes in olden days. The method is used for various reasons especially when patients are in a state of unconsciousness and also in prolonged cases. This procedure works as an essential part for the hospital treatment.

II. PROBLEM STATEMENT

Even though it is considered as an essential part in the hospital treatment procedure, few drawbacks arise for this system. One of the issues caused when administering the drug is that, the temperature of the drug at which it is administered. The temperature plays a vital role in the components of the drug as it may react according to it. The drug which is delivered to the patients will be maintained at a low temperature less than 25oC (77o F) before the administration process. Few drugs require very low temperature at which it needed to be stored. This arise a problem while administering the drug to the patient. When the low temperature drug is delivered to the bloodstream, it may cause hypothermia to the patient having chances of paralyzing the parts. Adding to this, the temperature of the surrounding i.e. the room temperature also assists to worsen the condition. Since the hospitals are assisted by the centralized air conditioning system at low temperature ranging from 19oC to 23oC (70oF-75oF) compared to the normal room temperature of 25oC (78oF), it is considered as one of the sensitive issues that need to be handled with care as the treatment should not end up in a negative way. The reason for which the hospital is maintained at a low temperature rather than the normal room temperature is that to avoid the chances of infection because the micro organisms may die at low temperature and provides a clean environment which is essential for a hospital.

III. OBJECTIVE

It is clear from the problem statement that the temperature of the drug which is to delivered need to be in a certain range so that it may not worsen or affect the condition of the patient. The main objective of this work is to ensure the temperature of the drug that is administered to the patient must not be in low temperature as it may cause hypothermia. Since the medication to be injected should not be kept in high temperature, the only possible way is to just heat up the drug to a certain range before the process of injecting. This allows to achieve the condition that the temperature should not be in low values and also it should not be heated physically as it may get reacted which in turn changes the physical and chemical properties of the drug.

IV. SOLUTION PROPOSED

The objective can be achieved by developing a system which can work on the principle of heating the drug or the blood to be transfused without physical contact. The drug is always passed through the infusion pump or syringe pump which can be attached with this system of the drug warmer so that the transfused drug is maintained at a certain temperature. The temperature of the system is dissipated at the solenoid shaped coil in which the tube passes through without the physical contact. The temperature of the coil can be adjusted by varying the voltage that is given to the system manually. This can be done with the consideration of the room temperature and the temperature at which the patient feels comfortable.

V. SYSTEM WORKING

The liquids were warmed with the help of external heating temperature by the coil which can be controlled by the voltage variation by manual methods. The normal room temperature is monitored by the system and the voltage variation can be also changed according to it. This input value is then carried over by the system which in turn vary the voltage of the system. This process allows the coil to get heated and thus provides the sufficient heat that is to be applied to the liquid. This allows the drug to get heated in a warm condition allowing the patient to feel comfortable during the process of infusion.

VI. BLOCK DIAGRAM
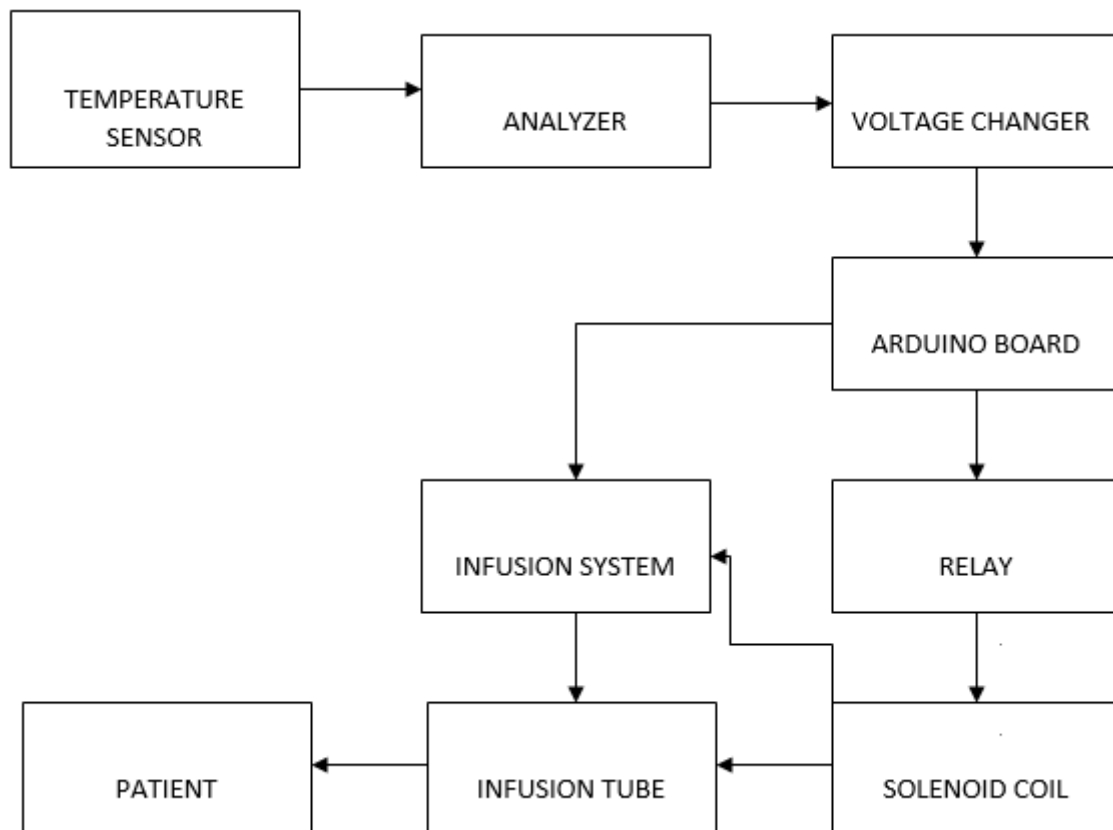
VII.   FEATURES

It is licensed auto-line technology. It yields desired temperature. There is no common expense of disposables. The Silicon warming sleeve to embody IV trickle line. It has the exact temperature of the board. It is safe for blood bonding. The liquid or blood warming happens till the place of bonding. The vital highlights of the IV liquid warmers are particular setup, divider mounted, ledge, or shaft mounted choices, lightweight, clinical grade plastic lodging. It holds 0.5-, 1-, 2- or 3-liter clinical arrangement sacks. It has anodized aluminum heat plate. Double temperature sensors are used. It warms to 40°C in a short time or less. Precise to +0°/ - 2°C.

VIII.   APPLICATIONS

It is very well may be applied in neonatal consideration, pediatric consideration, acute consideration, postoperative consideration and home-care. A fluid warmer is a clinical gadget utilized in medical service offices. It is utilized for warming liquids, crystalloid, colloid, or blood item. It is before being regulated (intravenously or by other parenteral courses) to internal heat level levels. It prevent hypothermia in actually damaged or careful patients. The imbuement hotter assists with warming up the temperature of clinical arrangements, supplement arrangements, dialyses also as flush fluid which can forestall the occurrence of hypothermia in enormous degree. A blood warmer is utilized to warm blood or different liquids, limiting the gamble of hypothermia. Blood is kept refrigerated for safeguarding of the cells. It is vital for warm it to a suitable temperature not exclusively to prevent hypothermia yet additionally to forestall hemolysis, or breakdown of the platelets.

IX. CONCLUSIONS

All things considered, imbuement of warm intravenous fluids to parturition going through cesarean fragment under neighborhood sedation reduces the degree of hypothermia and is connected with a 0.25°C temperature advantage differentiated and intravenous fluids blended at incorporating temperature of the functioning room. Regardless, it was not fruitful to prevent shivering and to lessen time to set free from recovery room. Warming IV fluids to inward intensity level before implantation was connected with additional created comfort for grown-up emergency department patients appeared differently in relation to standard, room temperature IV fluids in this pilot study. Future investigation is legitimate to furthermore analyze the effect of warmed IV fluids on constant centered results and the credibility of warming IV fluids in the emergency department setting.

X. REFERENCES

[1]. Goyal P, Kundra S, Sharma S, et al. Efficacy of intravenous fluid warming for maintenance of core temperature during lower segment cesarean section under spinal anesthesia. J Obstet Anaesth and Crit Care. 2011;1:73–77. [Google Scholar]

[2]. Stewart M, Brown JB, Weston WW, et al. Patient-Centered Medicine: Transforming the Clinical Method. 2nd edition. Abingdon, United Kingdom: Radcliffe Medical Press; 2003. [Google Scholar]

[3]. Brogden RN, Sorkin EM. Ketanserin. a review of its pharmacodynamic and pharmacokinetic properties, and therapeutic potential in hypertension and peripheral vascular disease. Drugs 1990; 40:903-49; PMID:2079001; http://dx.doi.org/ 10.2165/00003495-199040060-00010. [PubMed] [CrossRef] [Google Scholar]

[4]. Dafters RI. Hyperthermia following MDMA administration in rats: effects of ambient temperature, water consumption, and chronic dosing. Physiol Behav 1995; 58:877-82; PMID:8577883; http://dx.doi.org/ 10.1016/0031-9384(95)00136-7. [PubMed] [CrossRef] [Google Scholar]

[5]. Smith CE, Gerdes E, Sweda S, et al. Warming intravenous fluids reduces perioperative hypothermia in women undergoing ambulatory gynecological surgery. Anesth Analg. 1998;87:37–41. [PubMed] [Google Scholar]

Design and Development of Automatic Water Dispenser using Arduino

Dr. T. Lakshmibai[1], Borlaa. Sivakalyani[2]

[1]Assistant Professor, Department of EIE, Sri Chandrasekarendra Saraswathi Viswa MahaVidyalaya, (SCSVMV),
Kanchipuram, Tamil Nadu, India

[2]Student, Department of EIE, Sri Chandrasekarendra Saraswathi Viswa MahaVidyalaya, (SCSVMV),
Kanchipuram, Tamil Nadu, India

ABSTRACT

Water pumps are very useful for the water supply. In 1700s wooden pumps are used for the water supply, and then metal piston type pumps came into existence in mid 1800s. The first submersible pumps are used in 1920s, whereas in 2020s the automated pumps changed the people's life easier. This proposed Automatic Water Dispenser system performs a series of functions like controlling the water level, displaying the level of the water in the tank, indicating the value of water temperature, and automatic ejection of water.

Automatic Water Dispenser contains a temperature sensor, Arduino and 2 Ultrasonic sensors one for water level measurement and other to sense the presence of the water container. This proposal is built to assists the users in day-to-day activity.

The sensor senses the Container (object) which is placed in front of it. The sensed signal is applied to the Arduino to execute a program that operates a motor which runs the water dispenser machine accordingly. The sensed temperature of water and its level will be displayed simultaneously in the LCD panel also. The proposed system is more efficient and reliable. If all the manual taps are replaced with a smart one that opens and closes automatically, will not only save the water but also provides a healthier lifestyle, since the tap won't be touched by human hands. So, the AutomaticWater Dispenser using Arduino can automatically supply water when a glass is placed below the tap.

Keywords: Arduino Nano Micro controller, Temperature sensor LM35 &Ultrasonic sensor, float sensor,Relay, DC motor.

I. INTRODUCTION

In day to day life intelligent systems are used in a wide range and these are embedded in design. There are some physical elements which are needed to be controlled in day to day life in order for them to perform their expected task. The Automatic water dispenser has a series of functions to maintain each parameter of water such as water level, showing thevalue of temperature & level of water and automatic water ejection. A control system therefore can be defined as a device or set of devices that manages, commands, directs or regulates the

behaviour of other devices. How the room temperature can be measured? The answer to the simple question is with the help of a Temperature Sensor.

In this system, microcontroller is most important and plays a vital role in the smart system development. It has become an essential part in the current day to day technologies. This system is responsible for controlling the water level and flow of the water automatically based on the time limits that has been coded in the programming part. The system requires an ARDUINO board to implement a control to this system.

Many inventions were made to control the water dispurities in order to make the whole system automatic. The research result was flexible, proposed a web and cellular based monitoring service protocol to determine and sense water level globally. At first there was a need to store the water. Big tanks were made to collect the water when the pump fetched the water from the ground level to the tank. A water level sensor was used so that it can automatically cut off the supply from the pump to tank in order to avoid the wastage of water.

This system which is "Automatic Water Dispenser Using Arduino" has an ultrasonic sensor which senses the object and passes the signals to the arduino which is coded with certain time limit to fillthe container. If the ultrasonic sensor gets some back-and-forth signals to echo pin, then subsequently the arduino would passes the signals to the relay and that initiates the submerged DC motor to pump the water out. The programming part has done with certain litigations as distance, time limit and echo pin pulses.

II. PROPOSED SYSTEM

The proposed system is that the ultrasonic sensor which is placed on the card board which senses the object and passes the signals to the Arduino. In Arduino program coding is written which is coded with certain time limit to fillthe container with required amount of water. If the ultrasonic sensor gets some received echo signals that passes to the Arduino and it activates the relay so that the submerged DC motor starts to pump the water out. The coding part has done with certain processeslike distance, time limit and received echo pin pulses.
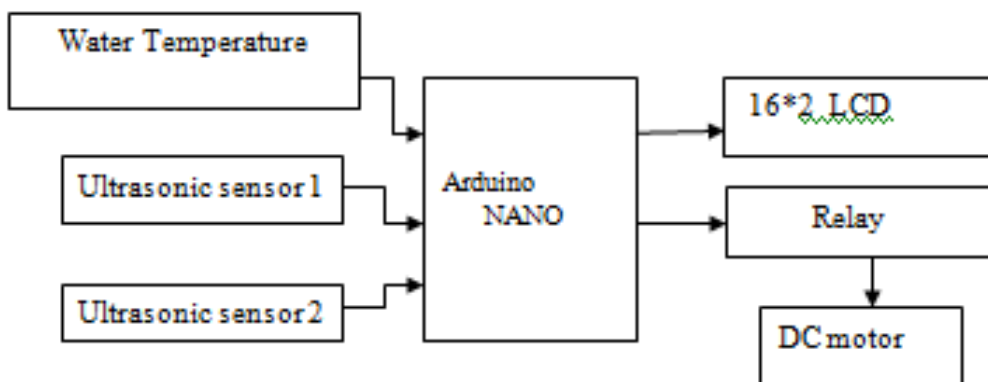
III. DIAGRAMS OF THE WORKING MODEL

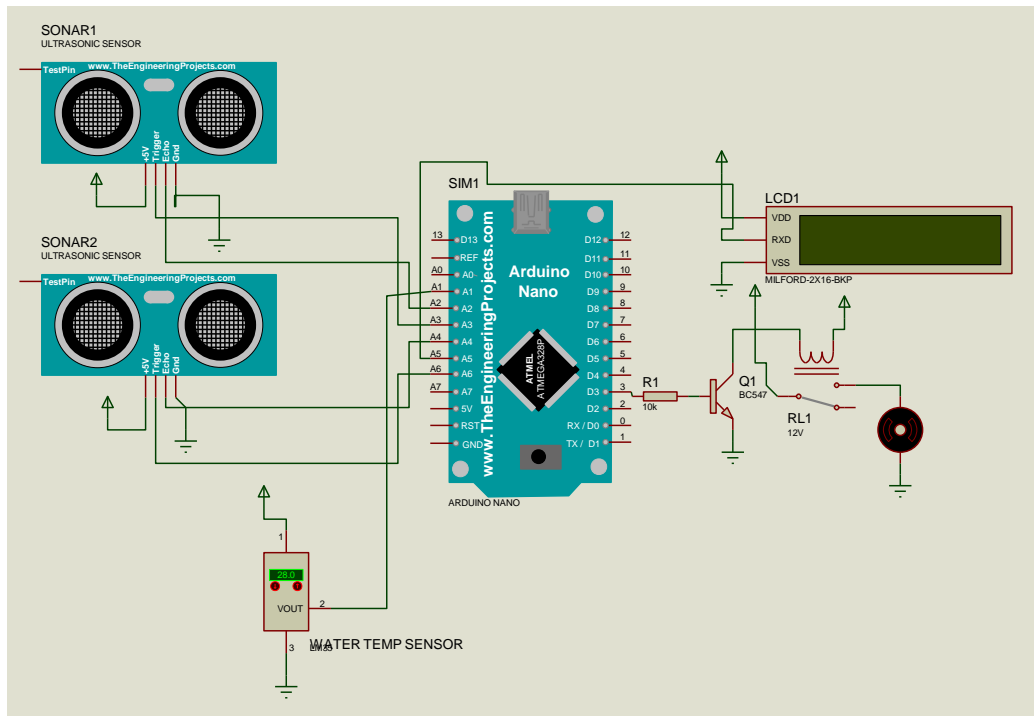**BLOCK DIAGRAM**

Fig.1 Block Diagram

CIRCUIT DIAGRAM

Fig. 2. Circuit Diagram

IV. TOOLS REQUIRED

Hardware Requirements

1. Arduino Nano
2. Temperature Sensor
3. Ultrasonic Sensor
4. Float Sensor
5. LCD Display
6. Relay
7. Resistor
8. DC motor
9. Bread board
10. Jumper wires

Software Requirements

Arduino is a single-board microcontroller. The Arduino provides an integrated development environment (IDE) based on Processing language.

Arduino Nano

Programming in Arduino

Arduino programs are written in the Arduino Integrated Development Environment (IDE). The Arduino programming language is based on a very simple hardware programming language called processing, which is similar to the C language. After the sketch is written in the Arduino IDE, it should be uploaded on the Arduino board for execution.
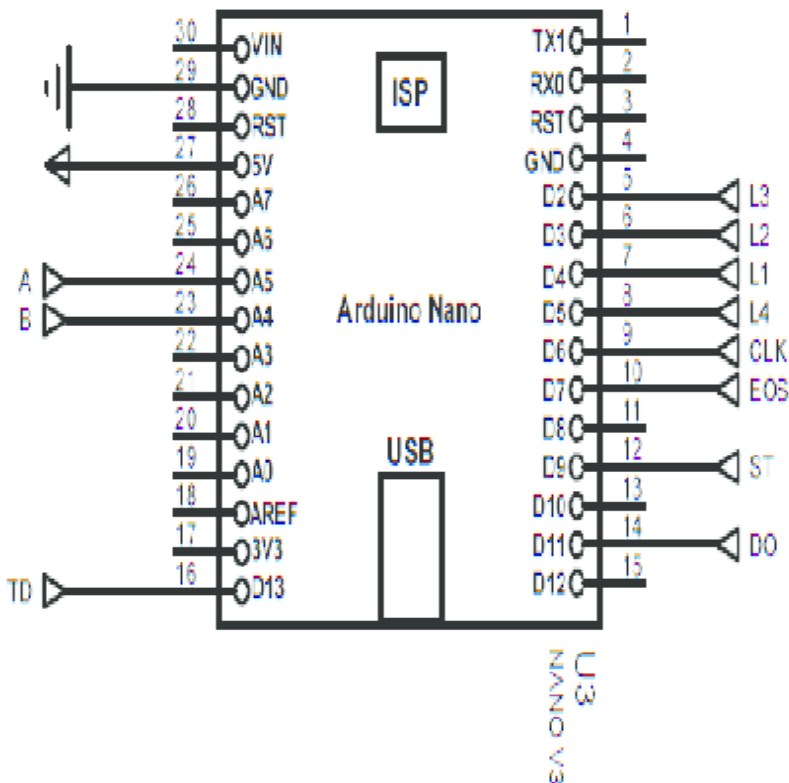
Fig. 3. Arduino Nano

Every Arduino sketch has two main parts to the program:

void setup () – Sets things up that have to be done once and then don't happen again.

void loop () – Contains the instructions that get repeated over and over until the board is turned off.

1) POWER SUPPLY

The Arduino board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

2) Temperature Sensor

TheDS18B20 sensor is usedas temperature sensor in this system. The DS18B20 digital thermometer provides 9-bit to 12-bit Celsius temperature measurements and has an alarm function with non-volatile user-

programmable upper and lower trigger points. The DS18B20 communicates over a 1-Wire bus that by definition requires only one data line (and ground) for communication with a central microprocessor. In addition, the DS18B20 can derive power directly from the data line ("parasite power"), eliminating the need for an external power supply.

Fig. 4. DS18B20

Each DS18B20 has a unique 64-bit serial code, which allows multiple DS18B20s to function on the same 1-Wire bus. Thus, it is simple to use one microprocessor to control many DS18B20s distributed over a large area. HVAC environmental controls, temperature monitoring systems inside buildings, equipment, or machinery, and process monitoring and control systems are some of the applications that can be benefited from this feature.

3) Ultrasonic sensor

Ultrasonic Sensors are also knownas**transceivers** when they do both send and receive and work on a principle similar to radar or sonar **which** evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object.

Fig. 5. Ultrasonic Sensor

Vcc → Arduino +5V pin

Gnd → Arduino Gnd pin

Trig → Arduino Digital Pin 3

Echo → Arduino Digital Pin 2

The sensor is composed of two ultrasonic transducers. One is transmitter which outputs ultrasonic sound pulses and the other is receiver which listens for reflected waves.It emits an ultrasound at 40 000 Hz which travels

through the air and if there is an object or obstacle on its path. It will bounce back to the module. Considering the travel time and the speed of the sound the distancecan be calculated.

In order to generate the ultrasound, we need to set the Trig pin on a High State for 10 μs. That will send out an 8-cycle ultrasonic burst which will travel at the speed of sound. The Echo pins goes high right away after that 8-cycle ultrasonic burst is sent, and it starts listening or waiting for that wave to be reflected from an object.If there is no object or reflected pulse, the Echo pin will time-out after 38ms and get back to low state.

If a reflected pulse is received, the Echo pin will go down sooner than those 38ms. According to the amount of time the Echo pin was HIGH, the distance the sound wave traveledcan be determined, thus the distance from the sensor to the object.For that purpose, the distance can be calculated by,Distance = (Speed x Time)/2

This technology can be used for measuringthe amount of liquid in a tank, the sensor measures the distance to the surface of the fluid.

Operating Voltage	5V DC
Operating Current	15mA
Operating Frequency	40KHz
Min Range	2cm / 1 inch
Max Range	400cm / 13 feet
Accuracy	3mm
Measuring Angle	<15°
Dimension	45 x 20 x 15mm

4)   LCD [Liquid crystal Display]

The LCD is a dot matrix liquid crystal display that displays alphanumeric characters and symbols. 16X2 LCD digital display has been used in the system to show the room temperature
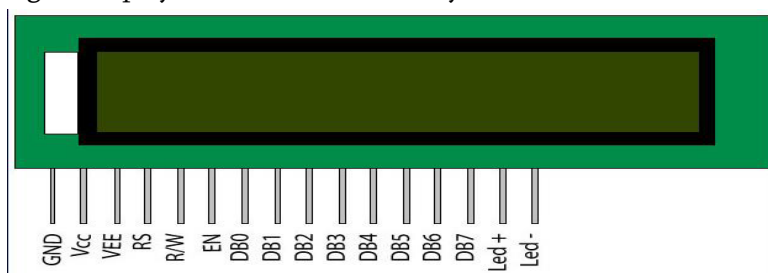
 Fig. 6. LCD

Liquid Crystal Display screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits.

5)   RELAY

The electric relay is one of the most frequently used devices in modern technologicalsystems. It can be found in cars, washing machines, microwave ovens, and medical equipment as well as in tanks, aircraft, and ships. Practically no industry would functionwithout relays.

Fig. 7. Relay

In some complex automatic control systems in industry, the number of Relays is estimated in hundreds and even thousands. In the power-generation industry, no power device is allowed to operate without special protection relays. Certain electrical equipment, such as power transformers, may be protected by several different kinds of relays, each controlling different functions.

6)   DC motor

Fig. 8. DC motor

A **DC motor** is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronicto periodically change the direction of current in part of the motor.

V. METHODOLOGY
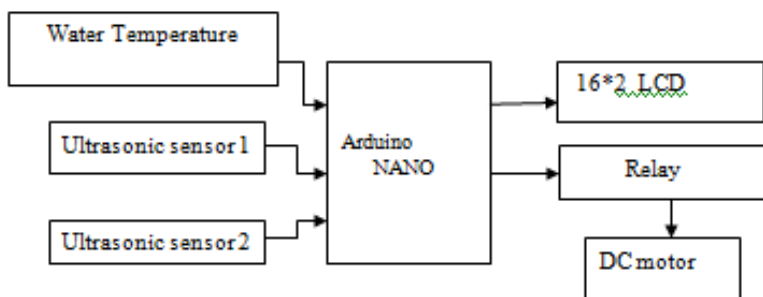
Fig 9. Block Diagram

The fig 9. represents the block diagram of the proposed concept. The temperature sensor and the two ultrasonic sensors are interfaced with Arduino to fetch the data of temperature and level of the water in the tank. The data is processed if the ultrasonic sensor1 detects the pulses and senses the signals and passes to the furtherzones.Moreover, if the temperature and the level cannot be managed but it would just show the accurate values of it. The data will then quickly displays on LCD for user interaction. Here the ultrasonic sensor2 is kept for the level detection of water. If everything processed then arduino fetches the data from outside and compares it to the data given then passes the signals to the relay and then to DC motor apparently.

VI. DESCRIPTION OF THE WORKING MODEL

- The connections from ultrasonic sensors 1&2 are connected to the Arduino NANO as shown in the fig 9. The pins VCC, Echo, Trigger, GND of ultrasonic sensors 1&2 are connected to the A2, A3 and A5, A6 of Arduino pins.
- The DS18b20 sensor is also connected to the NANO board to the pin A1. Subsequently from the Arduino NANO board the connections are dragged to the LCD and a relay module
- Additionally, a power supply cable and a battery areneeded to make this dispenser run and to fill the container.
- The Arduino is coded with 15 seconds of time to fill the container, and it stops and holds for a delay of 2 seconds.

VII.   HARDWARE IMPLEMENTATION

Fig. 10. Proposed Hardware model

VIII.   CONCLUSION

- Automatic water Dispenser system employs the use of different technologies in the whole design of its development and implementation.
- The system is used by the microcontroller to automatic process of the water which is used by human beings and it has the ability to detect the level of the water, the temperature of the water, and the use of the LCD in this system provides the output which is very useful for human beings.
- This project has successfully provided the improvement on existing water condition by which human beings get the good quality of water, and with this there will be no wastage of water.

IX.REFERENCES

[1]. Chandra AfriadeSiregar; DudungMulyadi; AgungWahyudiBiantoro; HeriSismoro, YantiIrawati, "Automation and Control System on Water Level of Reservoir based on Microcontroller and Blynk", 2020 14th International Conference on Telecommunication Systems, Services, and Applications IEEE Xplore, 2021, pp. 1-4.

[2]. Arif-Ul Islam; Shamim H Ripon , "Smart Water System at House Using Arduino Uno and C# Desktop Application to Reduce Water Wastage and Energy Loss", International Conference on Advances in Science, Engineering and Robotics Technology (ICASERT), IEEE Xplore, 2019, pp. 1-6.

[3]. Ayob Johari et al., "Tank Water Level Monitoring System Using GSM Network", International Journal of Computer Science and Information Technologies, vol. 2, no. 3, pp. 1114-1120, 2011.

[4]. J Priya and SailushaChekuri, "Water Level Monitoring System Using Iot", International Research Journal of Engineering and Technology (IRJET), vol. 04, no. 12, Dec 2017.

[5]. Ahmed C. Ihedioha and Ifeanyichukwu I. Eneh, "Water Level Monitoring and Control Using Fuzzy Logic System", International Research Journal of Engineering and Technology (IRJET), vol. 02, no. 08, Nov 2015.

[6]. Ejiofor Virginia Ebere and Oladipo Onaolapo Francisca, "Microcontroller Based Automatic Water Levelcontrol System", International Journal of Innovative Research in Computer and Communication Engineering, vol. 1, no. 6, August 2013.

[7]. Pooja. Narkhede, AjayBholane, Riyaz Mirza and Parag Jawale, "Water Level Monitoring by Using PLC", International Journal of Research in Advent Technology (IJRAT) National Conference CONVERGENCE 2016, 06th-07th April 2016.

[8]. A. Shome and D. Ashok, "Fuzzy Logic Approach for Boiler Temperature and Water Level Control'", International Journal ofScientific and Engineering Research, vol. 3, pp. 1-6, 2012.

[9]. D. Wu, F. Karray and I. Song, "Water Level Control by Fuzzy Logic and Neural Networks", IEEE Conference on Control Applications, pp. 3134-39, 2005.

[10].Khaled Reza, M. S, Shah Ahsanuzzaman Md. Tariq and S. M. Mohsin Reza, "Microcontroller Based Automated Water Level Sensing and Controlling": Design and Implementation Issue", Proceedings of The World Congress on Engineering and Computer Science, pp. 220-224, 2010.

[11].S. M. Khaled Reza, Shah Ahsanuzzaman Md. Tariq, S.M. Mohsin Reza,"Microcontroller Based Automated Water Level Sensing and Controlling: Proceedings of the World Congress on Engineering and Computer Science 2010 Vol I 2010, San Francisco, USA, 2010, ISBN: 978-988-17012-0-6

[12].EJIOFOR VIRGINIA EBERE, Francisca Onaolapo Oladipo VODAN Africa,"Microcontroller based Automatic Water level Control System"International Journal of Innovative Research in Computer and Communication Engineering 1(6):pp. 1390-1396, 2007.

Sun Tracking Solar System

Karthick TS[1], Karthiga Sree T G[1], Kumaran KJ[1], Jalal Deen K[2]

[1]U.G. Third Year Students, Department of ECE, Solamalai College of Engineering, Madurai, Tamil Nadu, India
[2]Assistant Professor (SG), Department of ECE, Solamalai College of Engineering, Madurai, Tamil Nadu, India

ABSTRACT

This project employs a solar panel mounted to a time-programmed stepper motor to track the sun so that maximum sun light is made incident upon the panel at any given time of the day. This is better compared to the light- sensing method that may not be accurate always – for example, during cloudy days. With the impending scarcity of non-renewable resources, people are considering to use alternate sources of energy. Barring all the other available resources, the solar energy is the most abundant and it is comparatively easy to convert into electrical energy. The usage of solar panel to convert Sun energy into electrical energy is very popular, but due to the transition of sun from easttowest,thefixedsolarpanelmaynotbeabletogenerate optimumenergy.Theproposedsystemsolvesthisproblemby an arrangement for the solar panel to track the Sun. The position of the Sun with respect to the solar panel is not fixed due to the rotation of the Earth. For an efficient usage of the solar energy, the Solar panels should absorb energy to a maximum extent. This can be done only if the panels are continuously placed towards the direction of the Sun. So, solar panel should continuously rotate in the direction of Sun. When the intensity of the light falling on right LDR is more, panel slowly moves towards right and if intensity on the left LDR is more, panel slowly moves towards left. In the noon time, Sun is ahead and intensity of light on both the panels is same. In such cases, panel is constant and there is no rotation.

TheArduinocontrollerusedinthisprojectisfromtheArduinofamily.TheSteppermotorisdrivenbyaninterfacingICast he controllerisnotcapableofhandlingthepowerrequirements of the stepper motor. Furthermore, this project can be enhancedbyusinganRTC(RealTimeClock)tofollowthesun. This helps in maintaining the required position of the panel even if the power is interrupted for sometime.

Key Words: Solar Panel, Stepper motor, Real Time clock, 89C51, Programmed Microcontroller.

I.   INTRODUCTION

This project deals with the research and development of a Sun tracking system. Now a day's Renewable energy solutions are becoming increasingly popular. Maximizing power output from a solar system is desirable to increase efficiency.Inordertomaximizepoweroutputfromthesolar panels, one need is to keep the panels aligned with the sun, means that the tracking of the sun is required. This is a far morecost-

effectivesolutionthanpurchasingadditionalsolar panels. This system is designed with specific methodology, thissystemusing89C51Microcontroller,DummySolarPanel, Stepper Motor, Voltage Regulator, Diodes, Relay driver IC, Transformer.Solarpanelscollectsolarradiationfromthesun and actively convert that energy to electricity. Solar panels are comprised of several individual solar cells. Thesesolar cellsfunctionsimilarlytolargesemiconductorsandutilizea large area p-n junction diode. When the solar cells are exposed to sunlight, the p-n junction diodes convert the energy from sunlight into usable electrical energy. The energy generated from photons striking the surface of the solarpanelallowselectronstobeknockedoutoftheirorbits and released, and electric fields in the solar cells pull these free electrons in a directional current, from which metal contacts in the solar cell can generate electricity. The more solar cells in a solar panel and the higher the quality of the solarcells,themoretotalelectricaloutputthe solar panel can produce. The conversion of sunlight to usable electrical energy has been dubbed the Photovoltaic Effect. A solar trackerisadevicethatorientsapayloadtowardthesun.The use of solar trackers can increase electricity production by around a third, and some claim by as much as 40% insome regions,comparedwithmodulesatafixedangle.Inany solar application,theconversionefficiencyisimprovedwhenthe modulesarecontinuallyadjustedto the optimum angle as the sun traverses the sky. As improved efficiency means improvedyield,useoftrackerscanmakequitea difference to the income from a largeplant.

Commercial purpose of solar tracking system:

- Increase Solar PanelOutput.
- Maximum efficiency of thepanel.
- Maximize Power per unitarea.
- Abletograbtheenergythroughouttheday.

Figure 1 Solar tracking system

II. METHODOLOGY

The Sun tracking solar panel consists of two LDRs, solar panel and a DC motor and L293D Micro controller. Two light dependent resistors are arranged on the edges of the solar panel. Light dependent resistors produce low resistance when light falls on them. The servo motor connected to the panel rotates the panel in the direction of Sun. Panel is arranged in such a way that light on two LDRs is compared and panel is rotated towards LDR which have high intensity i.e. low resistance compared to other. Servo motor rotates the panel at certain angle. When the intensity of the light falling on right LDR is more, panel slowly moves towards right

and if intensity on the left LDR is more, panel slowly moves towards left. In the noon time, Sun is ahead and intensity of light on both the panels is same. In such cases, panel is constant and there is no rotation.
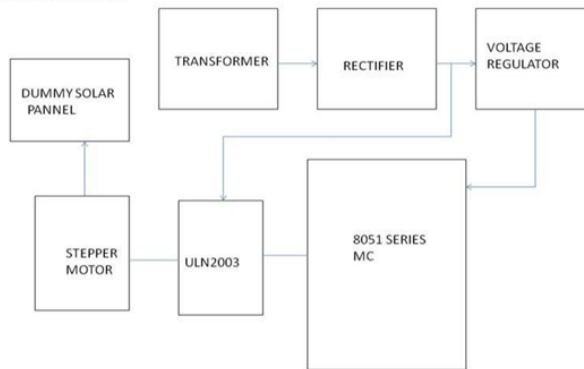
BLOCK DIAGRAM

Figure 2 Block Diagram

HARDWARE REQUIREMENTS:

89C51 Microcontroller, Dummy Solar Panel, Stepper Motor, Voltage Regulator, Diodes, Relay driver IC, Transformer.

SOFTWARE REQUIREMENTS:

Keil compiler, Languages: Embedded C or Assembly

There are many different components and also the methods used to track the sun. This system has a simple combination of electronic circuit. This project contains the basic component which deals with the Solar panel, Stepper motor, Microcontroller (89C51), Relay, keil software.

Transformer

In this project we used step down transformer the main function of step-down transformer is to make higher voltage to lower voltage. The output of transformer is connected to bridge rectifier.

Bridge rectifier

Output of transformer is given to input of bridge rectifier we used full wave bridge rectifier. Main function of rectifier is to convert ac to dc voltage. Output of bridge rectifier is given to regulator.

Regulator

ICLM7805 is used as a voltage regulator which regulates the voltage. output of regulator is connected to input of IC 89C51.

Microcontroller (89C51)

The microcontroller 89C51 has a basic role in this project; it takes action according to its program.

Stepper motor

The stepper motor plays an important role in this project; it directed the panel towards the sun.

Solar Panel

All the system works to keep the solar panel directed towards the sun, the solar panel generate the DC voltage

Input power

This system is using +5V DC power, as the input, for the all the three units and also +12V DC for the stepper motor of unit

SOFTWARE

In manual tracking we used software named "Keil Compiler";thissoftwareiscreatedon.cassemblylanguage, withthehelpofthissoftwarewecanmovethesolarpanelin our desired direction on one axis, this software uses the parallel port to communicate, when the system using practically.
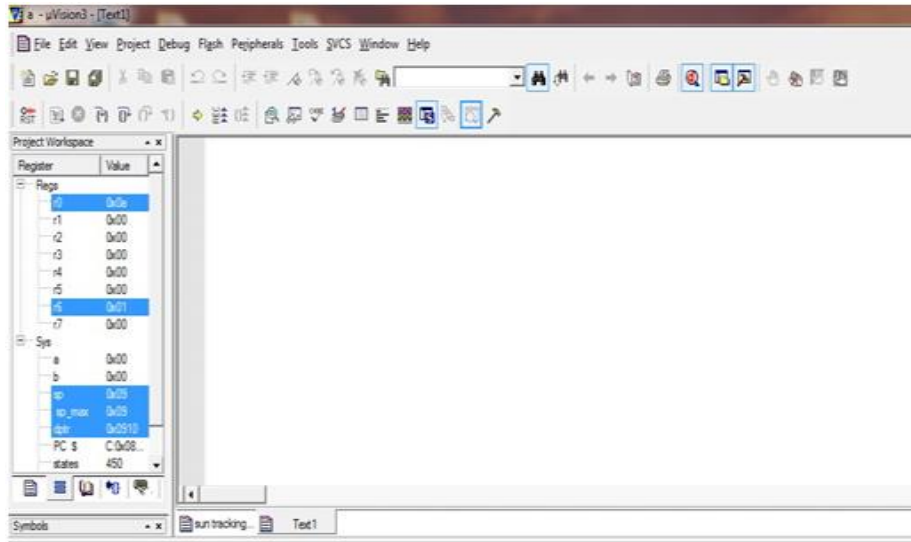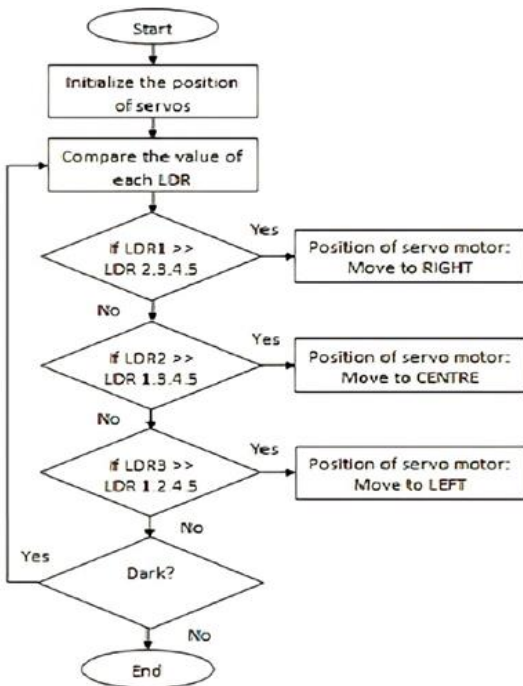

Figure 3 Keil Software window

Flowchart

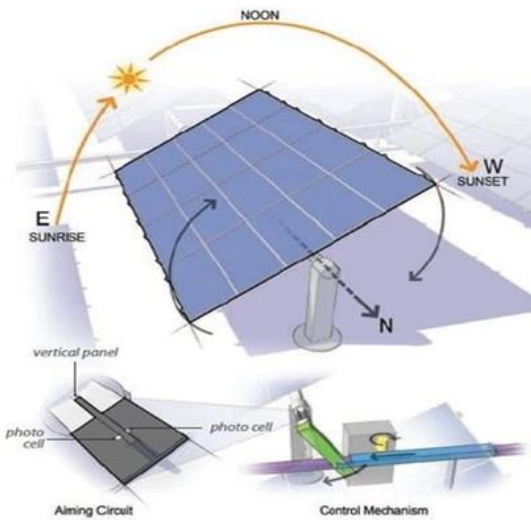Figure 4 Flow chart

---

III. IMPLIMENTATION AND RESULT

Figure 5 Program for stepper motor on keil

WORKING PRINCIPAL

The Sun tracking solar panel consists of two LDRs, solar panel and a DC motor and L293D Micro controller.Two light dependent resistors are arranged on the edges of the solar panel. Light dependent resistors produce low resistance when light falls on them. The servo motor connected to the panel rotates the panel in the direction of Sun. Panel is arranged in such a way that light on two LDRs is compared and panel is rotated towards LDR which have high intensity i.e. low resistance compared to other. Servo motor rotates the panel at certain angle.When the intensity of the light falling on right LDR is more, panel slowly moves towards right and if intensity on the left LDR is more, panel slowly moves towards left. In the noon time, Sun is ahead and intensity of light on both the panels is same. In such cases, panel is constant and there is no rotation.

REPRESENTATION OF CIRCUIT
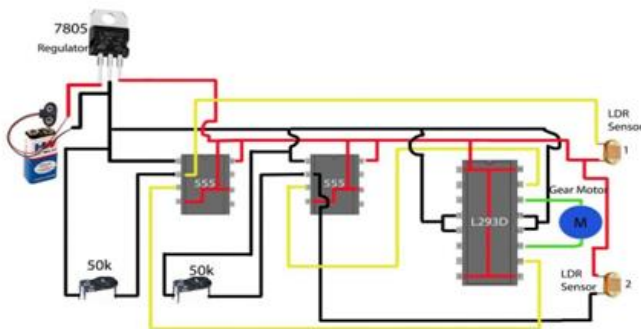
Figure 6.Basic Circuit

IV. CONCLUSION

In this project, the sun tracking system is developed based on 89C51 microcontroller. The microcontroller 89C51 based circuit is used in this system with a minimum number of components and the use of stepper motors enables accurate tracking of the sun. It has been shown that the sun tracking systems can collect maximum energy than a fixed panel system collects and high efficiency is achieved through this tracker, it can be said that the proposed sun tracking system is a feasible method of maximizing the light energy received from sun. This is an efficient tracking system for solar energy collection.

V. REFERENCES

[1]. Mayank Kumar Lokhande - Automatic Solar Tracking System

[2]. Bipin Krishna &Kaustavsinha - Tracking of Sun for Solar Panels and Real Time Monitoring Using LabVIEW

[3]. Reshmi Banerjee - Solar Tracking System

[4]. Syed Arsalan - Sun Tracking System with Microcontroller 8051

[5]. Tiberiu Tudorache&Liviu Kreindler - Design of a Solar Tracker System for PV Power Plants

[6]. Nam Nguyen - Solar Tracking System

Bluetooth Low Energy and Cloud based Building Automation System

Siddharthan A[1], Saiprasath R[1], Pavan Kumar Reddy N[1], Parithi R[1], Balaji M[2]

[1]UG Student, Department of Electrical and Electronics Engineering, SSN College of Engineering, Tamil Nadu,
India

[2]Associate Professor, Department of Electrical and Electronics Engineering, SSN College of Engineering, Tamil
Nadu, India

ABSTRACT

Data sharing for automation and intelligent control has created the demand for robust wireless technologies that can offer a high data rate, greater range and secure transfer of data. Bluetooth low energy is a paradigm for transferring data between two points. Bluetooth has short range, but is highly efficient for devices involved in energy critical and standalone applications. Cloud connectivity is another widely used technology for data monitoring and storage. This work first proposes a building automation system using bluetooth low energy consisting of three separate modules which control certain aspects of a building. To overcome the limitations posed by bluetooth, the system is then connected to a cloud platform for publishing and subscription of real-time variables and for data visualization. Demonstration of a smartphone application is then provided for manual control. The work is demonstrated in real-time with a focus on commercial building automation application.

Keywords—Bluetooth low energy, cloud, automation, smartphone application

I. INTRODUCTION

In the recent years, there has been an increasing necessity for data sharing between devices, both for automation and intelligent control. This in turn has created the demand for robust wireless technologies that can offer high data rate, greater range and secure transfer of data. The interconnection of devices using these technologies has created the Internet of Things (IoT). Current products in themarket largely employ this using WiFi[8].

Bluetooth Low Energy (BLE) becomes an optimal choice for small to medium scale automation solutions [11]. In addition to consuming low power, the technology is already integrated in many smart devices like phones and tablets. Wi-Fi on the other hand, while unreliable for fast and low power standalone applications, is robust in its virtually unlimited range and excellent for devices that are not power critical. This includes lighting and cooling systems which control lights and fans.

This work proposes the use of bluetooth low energy and cloud to automate a commercial building using models that depict the building's requirements. Three modules that depict the control of fan speed, lighting control and motion capture have been fabricated and integrated as a bluetooth point-to-point network. The work then proposes the use of cloud to increase range and robustness and automate lighting and cooling systems. A smartphone application for manual control has also been proposed.

The rest of the paper is organized as follows: Section II covers the building automation application using bluetooth low energy. Section III discusses the prototype results for the same. Section IV and V elucidates the design of cloud-based building automation system and its real-time implementation.Section VI covers the conclusion.

II. BUILDING AUTOMATION USING BLUETOOTH LOW ENERGY

This work uses ESP32 controllers that are interconnected to each other using bluetooth, forming a point-to-point connection. The data to be transmitted is provided by sensors that are interfaced with the controllers(server). Controllers(client) which receive this data process it and use it to control actuators. Hence, each controller is a node. Figure 1 illustrates this connection in a block diagram.
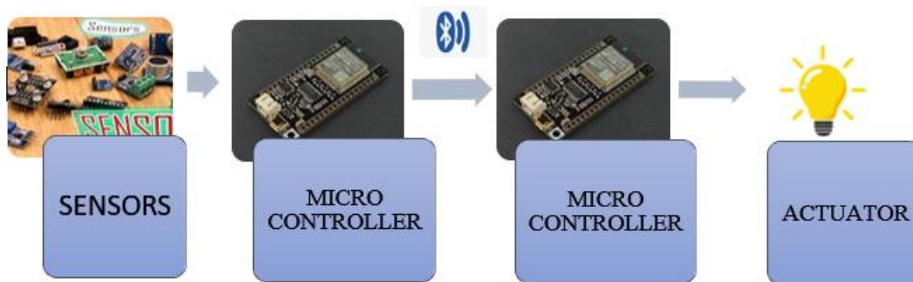

Figure 1. Block diagram of P2P BLE

This work compromises of three individual modules namely,

- Fan (Motor) control using temperature data
- Light control depending on environment light conditions.
- Photo capture using motion sensor

III. PROTOTYPE RESULTS OF BUILDING AUTOMATION USING BLE

When the light intensity was low i.e., the environment was dark, the LED glowed with full brightness as seen in Figure 3. As the light intensity was increased, the LED started dimming. When the light intensity was at the brightest, the LED turned off. A slight delay was observed in dimming or brightening of the LED. Possible cause could be the latency in BLE communication.

Figure 3. Photosensor in dark environment

Since a temperature variation from 30 ⁰C to 40 ⁰C was available, motor was made to vary its speed from 0 rpm to maximum speed (6000 rpm) within this range. When temperature was at 30 ⁰C, the fan didn't run. As the temperature increased above 32 ⁰C, the fan started run with increasing speed. As the temperature neared 40 ⁰C, the fan reached its maximum speed.

When there was no movement in the range of the PIR sensor, the camera was idle i.e., no photo was taken (Figure 4). When movement was introduced in the PIR sensor's range, the camera flashed indicating that a photo was taken (Figure 5). The photos were viewed (for verification) using SD card in which the ESP cam stored the captured photos. This can be used for security purposes.

Figure 4. PIR-No movement detected
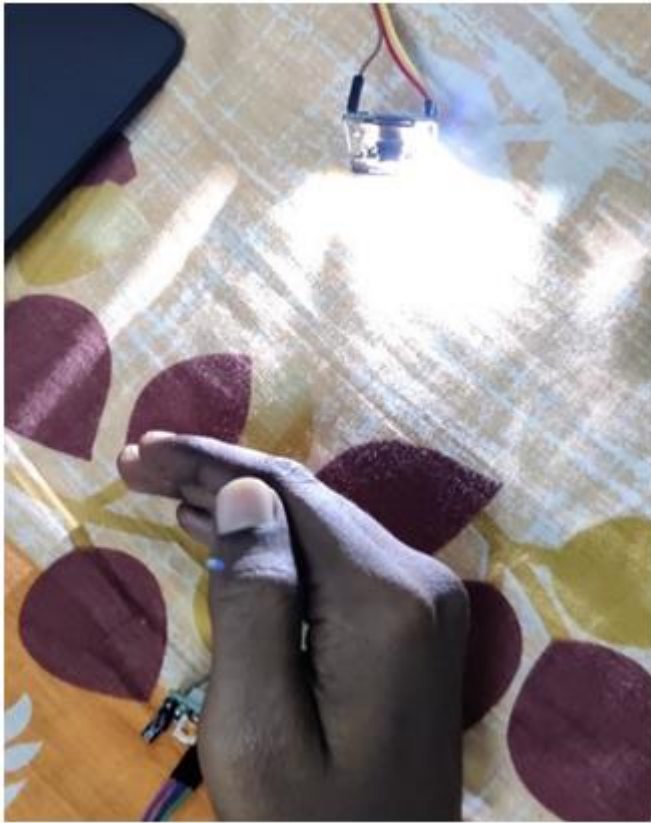
Figure 5. PIR-Movement detected

IV. CLOUD-BASED BUILDING AUTOMATION SYSTEM

This work proposes a building automation model for controlling the lighting and cooling systems by implementing cloud technology.Figure 6 shows the connectivity between sensors and actuators. The sensors publish the sensed values through controllers to the cloud. The actuators subscribe to these variables and process them as required.
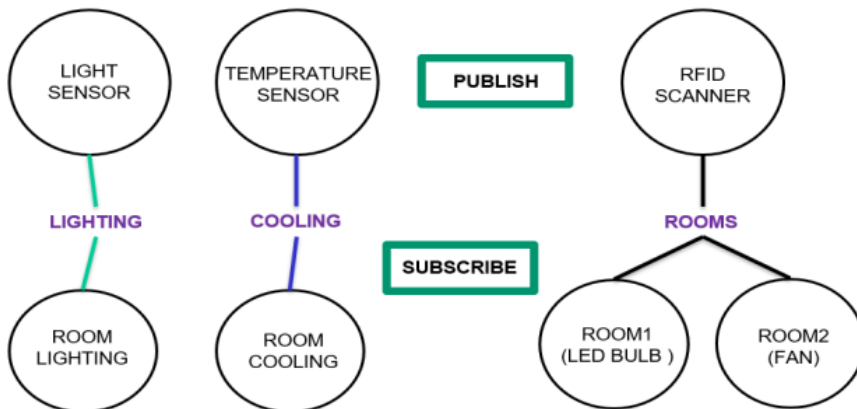

Figure 6. Block diagram of cloud-based automation system

Brightness of the environment is determined using LDR sensor and classified as dark or light. This data is then published to the cloud. The light state, ON or OFF, is set by the controller which subscribes to this data.

A temperature sensor captures the temperature of the surroundings and publishes this value to the cloud. The fan speed, 0 through 4, is set by the controller which subscribes to the temperature value.

A preference-based mechanism is created using a RFID scanner. Depending on a RFID tag scanned, light state or fan speed is set according to the user's preference. This preference is set by the user beforehand.

Smart phone application which was designed acts as a means for manual control according to the user's needs.

Figure 7 illustrates a typical commercial building automation system. The sensors are placed on the periphery of the building to sense real-time environmental conditions. RFID reader is situated at the entrance like in most offices. A centralized fan control room would control fans present in the corridors.
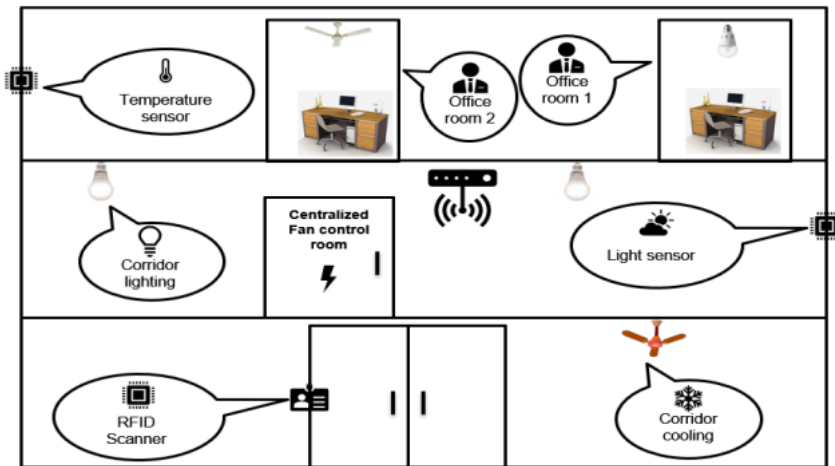
Figure 7. Typical commercial building automation system

V. REAL-TIME IMPLEMENTATION OF SYSTEM

The LDR circuit in Figure 8 was tuned to the ambient environment light conditions after which the circuit correctly detected if the environment was dark or bright and the LED bulb circuit turned ON and OFF correctly.

Figure 8. LDR sensor circuit

The fan speed control circuit, illustrated in Figure 9, was connected to an actual ceiling fan and was observed to run at the set speeds, when controlled by the temperature sensor as well as by the smartphone application.
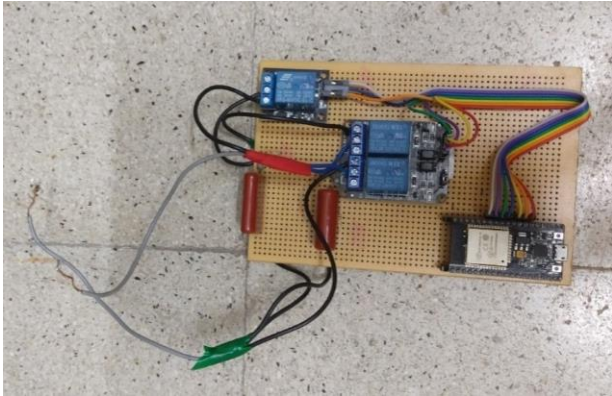

Figure 9. Fan speed control circuit

RFID reader and tags were used to set the light and fan to a particular state depending on which tag was scanned. When tag 1 was scanned, the light bulb turned ON and when tag 2 was scanned, the fan ran at speed 2. Figure 10 shows the RFID reader scanning a tag.
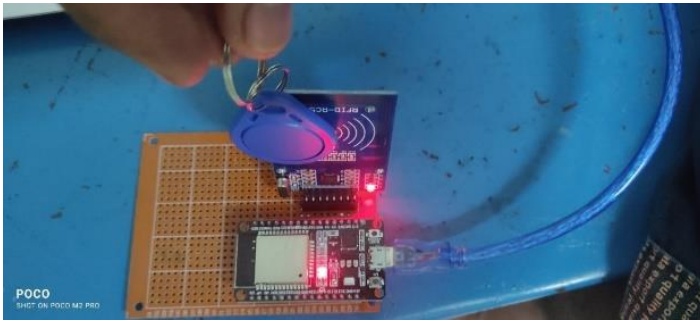

Figure 10. RFID reader and tag circuit

The smartphone application designed provided a manual override function by which the user could set the light state and fan speed based on their preference. Figure 11 illustrates the control of light state screen.

Figure 11. Light control screen

The UBIDOTS cloud provided a visual representation of all the variables used in the system by means of a dashboard. Appropriate widgets were used to graphically represent the variables like temperature and the state of light.

VI. CONCLUSION

Bluetooth low energy (BLE) is a technology that enables us to interconnect and establish communication between two devices. This work first implemented a BLE point to point (P2P) communication in three modules. The prototype was tested and all three modules successfully established a BLE P2P communication.

The limitations of the range imposed by BLE has been overcome by using cloud connectivity. This virtually gives unlimited range provided the devices have an internet connection. The sensors published the sensed values to the cloud which could also be seen by the user through the dashboard provided by the cloud platform. The actuator devices subscribed to these variables and accordingly controlled the state of the light and fan. The designed smartphone application also has been successfully tested when it overrode the values published by the sensors.

The system has been tested in a real-time scenario and has been found to be a viable option for commercial automation applications.

VII.   REFERENCES

[1]. D. G. Lokhande and S. A. Mohsin (2017), "Internet of things for ubiquitous smart home system," 1st International Conference on Intelligent Systems and Information Management (ICISIM), pp. 314-320.

[2]. Jacopo Tosi; Fabrizio Taffoni; Marco Santacatterina; Roberto Sannino; Domenico Formica (2019), "Throughput Analysis of BLE Sensor Network for Motion Tracking of Human Movements", IEEE Sensors Journal, vol. 19, pp. 370-377.

[3]. Jorge Elizalde; Cristina Cruces; Michael Stiven Sandoval; Xabier Eguiluz; Iñaki Val (2021), "Self-Powered Photovoltaic Bluetooth® Low Energy Temperature Sensor Node", IEEE Access, vol. 9, pp. 111305-111314.

[4]. K. L. Raju, V. Chandrani, S. S. Begum and M. P. Devi (2019), "Home Automation and Security System with Node MCU using Internet of Things," International Conference on Vision Towards Emerging Trends in Communication and Networking (ViTECoN), pp. 1-5.

[5]. S. Dey, A. Roy and S. Das (2016,), "Home automation using Internet of Thing," IEEE 7th Annual Ubiquitous Computing, Electronics & Mobile Communication Conference (UEMCON), pp. 1-6.

Design of DC-DC Converter for Hybrid Energy Storage Systems

Dhivyadharshini S[1], Harini C[1], Mythili M[1], Nithishri B[1], Dr. Balaji M[2]

[1]UG Student, Department of Electrical and Electronics Engineering, SSN College of Engineering, Rajiv Gandhi Salai, Kalavakkam-603110, Chennai, Tamil Nadu, India

[2]Associate Professor, Department of Electrical and Electronics Engineering, SSN College of Engineering, Rajiv Gandhi Salai, Kalavakkam-603110, Chennai, Tamil Nadu, India

ABSTRACT

In Electric Vehicle (EV), the energy storage system plays a vital role as it controls and regulates the flow of energy. The desirable features of energy storage systems include high energy density, power density and good life cycle. In this context hybrid energy storage system combining the features of Lithium-ion battery and ultracapacitor for electric two-wheeler is considered in this work. The battery ultracapacitor system results in efficient energy storage with reduced cost, increase in lifetime of the battery and vehicle range extension. This work deals with the design of the power electronic interface to regulate the power flow from the hybrid energy storage system to the motor load. The modelling and simulation of the electric vehicle drive and the energy management system is carried out in MATLAB/Simulink and the performance is evaluated. The results reveal the effectiveness of the proposed approach.

Keywords— Battery, ultracapacitor, BLDC motor, energy management, State of Charge

I. INTRODUCTION

Electric vehicles are gaining popularity around the world due to their improved performance and lack of carbon emissions. The effectiveness of electric vehicles depends on proper interfacing between energy storage systems and power electronics converters [1]. On the other hand, the power delivered by energy storage devices exhibits unstable and uncontrolled voltage drops. Hence, electric vehicle converters, controllers, and modulation techniques are required to ensure a secure and reliable power transmission from energy storage systems to the electric motor. Modern Electric Vehicles (EV) are powered by Li-ion batteries. The attractive traits of these batteries include higher energy-density, better cycle-life, lower self-discharge and absence of memory effect. However, the limited power-density is a major hindrance in achieving high-current discharge or charge demanded during rapid acceleration and deceleration respectively [2]. Ultracapacitors (UC) are also known as super capacitors. They supply large amounts of power and can be recharged in a short period of time. Batteries work on the principle of conversion of electrical energy from chemical energy but due to the Electric Double Layer (EDL)effect UC can directly accumulate the electrical energy. UC can be charged and discharged

at a very high specific current value (A/kg), 100 times more 2 than that of battery, without damaging the unit. Hence hybrid energy storage systems consisting of battery and UC are utilised in modern electric vehicles [3]. The design presented in this project attempts to replace a battery-alone system with Li-ion battery and Ultracapacitor based hybrid energy storage system for a two-wheeled electric vehicle and design a converter for the same. Introduction of UCs increases the specific power of the system and enables improved response during acceleration and regeneration. The limited cycle-life of the Li-ion battery can be extended by utilizing the energy from UC during high current requirements and dynamic load changes. These complementary electrical characteristics make them an ideal pair to realize a hybrid energy storage system (HESS). By combining battery bank and capacitor tank, it is possible to use a smaller battery with less peak-output power capability. Therefore, the cost would decrease significantly and the efficiency of the energy sources would increase.

II. VEHICLE DYNAMICS OF ELECTRIC TWO-WHEELER

A. Two wheeler specifications

As the proposed approach is to re-engineer the conventional battery-operated two-wheeler into an electric vehicle with Li-ion battery and UC, the specifications of the Hero electric Photon HX have been considered for analysis. The specifications of the Photon HX is given in Table 1.

TABLE 1: TWO WHEELER SPECIFICATIONS

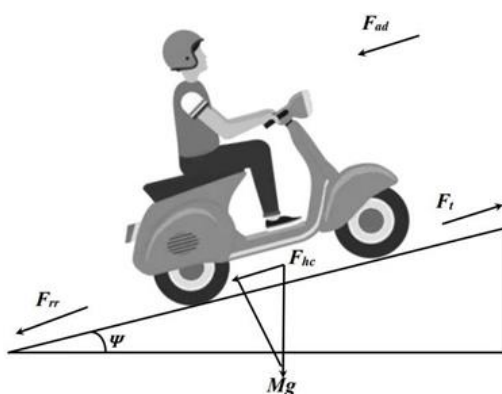| S.No	Specification	Value
1	Mass of the vehicle (Curb weight +payload weight)	240 kg (90+150 kg)
2	Maximum Speed	45 km/h
3	Tyre (wheel) diameter	10 inches
4	Rolling resistance coefficient, C_{rr}	0.015
5	Drag coefficient, C_d	0.6
6	Frontal area, A_d	0.8
7	Dimensions	1970/745/1145 mm

Fig.1. Modelling of vehicle load

The extended form of the above equation is given by

$$F_t = C_{rr} m g \cos \Psi + \frac{1}{2} \rho A_d C_d v$$
$$0.1 F_{la}$$

$$+ m g \sin \Psi + m \frac{dv}{dt} +$$

where Crr is the rolling resistance coefficient, M is the mass of the vehicle (kg),
g is the gravitational constant (9.81 m/s2), C is the grade angle (degree),
ρ is the density of air (1.22 kg/m3), Ad is the frontal area (m2),
Cd is the drag coefficient and y is the speed of vehicle (m/s).

The gradient of road (Ψ) contributes a major role in the responses of the vehicle model. For simplicity, the maximum gradient of the road is assumed as Ψ= 6 with a maximum speed of 15 km/h. The tractive power required at the wheels of the vehicle is calculated using the tractive force and velocity(v) of the vehicle, which is given by

$Tractive\ power, P_t = F_t \times v$

By using the tractive power and transmission efficiency, the motor power is obtained as,

$$Motor\ power, P_m = \frac{P_t}{\eta_t}$$

$$;\qquad P_t \geq 0$$

B. Vehicle dynamics

By using Newton's law of motion, the vehicle is modelled as a load by considering various longitudinal forces acting on it which is depicted in Figure 2.1. The tractive force (Ft) required to drive the wheels by overcoming resistive force is given by

$F_t = F_{rr} + F_{ad} + F_{hc}$

Where, Frr is the rolling resistance force, Fad is the aerodynamic drag,
Fhc is the hill climbing force.

$$= P_t \times \eta_t; \qquad P_t < 0$$

C. Power requirement for constant speed operation

Constant speed operations in drive cycle represent the continuous operation of the vehicle. The energy storage system with high energy density has the tendency to power the vehicle continuously during this mode. Hence, the maximum power demand during constant speed operation of the drive cycle must be provided by the main

battery energy source. It is inferred from the IDC profile that the maximum constant speed occurs at the speed of 38km/h. For flat road(Ψ=0), the maximum cruising power required at wheels can be calculated from

$Pcruising = [(Crr\ mgcos\Psi\ ) + (0.5\ \rho\ AdCd\ v2)]vmax$

$Pcruising = 1013W$

where ρ is density of air (1.22kg/m3) and g is the gravitational constant (9.81 m/s2). The maximum cruising power the motor is obtained as 1.19 KW by considering the transmission efficiency(ηT=85%). Therefore, the maximum power required from the battery is calculated as 1.40KW by assuming motor and controller efficiency as 85%.

D. Power requirement for acceleration mode

The highest acceleration request occurs at the standstill condition of 0 km/h to 20 km/h in 6 sec of IDC. The maximum mechanical power required during acceleration request is obtained from

TABLE 3: SPECIFICATION OF LI-ION BATTERY CELL

S.No	Parameter	Value
1.	Voltage Range	2.5V to 3.7V
2.	Nominal Voltage	3.2V
3.	Weight and Cost	0.54kg and 20US $

P = $[(C\ mgcos\Psi\ ) + (0.5\ \rho A\ C\ vt2\ ) + (m\ dvt\ )]\ v$

acceleration

rr

d d

$Pacceleration = 1481\ W.$

dt   t

The electrical motor power required during this interval is 1.74 KW. Hence, the maximum power required from the HESS during acceleration is 2.05 KW. Since the battery can provide a maximum power of 1.401 KW, the remaining power required to be provided by UC. Therefore, the UC must provide the remaining power of 0.648 KW during acceleration by assuming converter efficiency as 0.85%.

TABLE 2: OPERATING MODES

S.No	Operating Mode	Motor power	Battery/UC power
1	Constant Speed	1191 W	1401W/0W
2	Acceleration	1742 W	1401 W/648 W

The required battery bank capacity is calculated as

Energy required

Battery bank capacity = Nominal Voltage

1400 *Wh*

= 200 *V*

= 7*Ah*

The number of series connected battery cells is obtained as,

Nominal voltage of DC bus

Nbs = Nominal voltage of battery cell 200

= 3.2 = 62.5 *Nos*

Nbs = 63 *Nos*

The number of parallel-connected battery cells corresponding to battery capacity is obtained as,

III. DESIGN OF POWER ELECTRONIC INTERFACE FOR THE ENERGY STORAGE SYSTEM

Nbp

Battery bank capacity

=

Battery capacity

Nbp

7

=   = 0

20

A. Proposed EV with hybrid energy storage system

In order to enhance the performance of the battery and to increase its lifetime, UC is interfaced along with the battery. The battery along with the UC constitutes the hybrid energy storage system. The block diagram of the proposed system is shown in Figure 2.
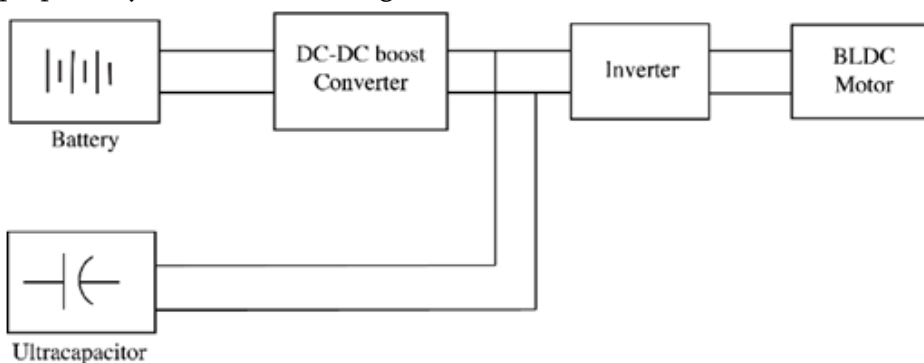
Fig.2 Block Diagram of the proposed system

B.   Sizing of Hybrid Energy Storage System

The energy stored in one stack of battery =200V x 7Ah

=1400Wh

The maximum continuous current of battery

=1200W/200V=6A

Hence for a 1400W of energy storage,63 units of Li-ion battery cells (stacks with 63 cells in series and 0 in parallel) are needed.

C.   UC specifications

The maximum and minimum voltage of the UC cell is 2.7 V and 1.5 V. Therefore,74 numbers of 2.7V UC cells are connected in series to achieve a maximum voltage of 200 V on the LV side. The nominal voltage of the UC bank is 27 V. The minimum capacitance requirement of UC cell for the maximum velocity of electric vehicle can be calculated from

1

$u \qquad 2\ UC$

$[V2$

$UCmax$

$- V2UCmax]$

$1\ C$

$[V2$

$- V2$

$] * No\ of\ series\ cells =$

This section presents a design methodology adopted for sizing the Li-ion battery and UC energy sources for a two-

wheeled EV using IDC. This methodology determines the

$2\ \ UC$

$UCmax$

$UCmax$

$$\frac{1}{2}mv^2_{max}$$

number of battery and UC cells needed in series or parallel stacking to achieve the demanded energy of the vehicle.

A. Battery Specifications

LiFePO4 prismatic battery cell with a nominal voltage of 3.2V, 20Ah is considered in this study. The battery pack with the terminal voltage of 200V is directly connected to the motor drive.

C_{UC} = 100F

Where, C_{UC}- Capacitance of UC;

V_{UCmax} - maximum UC voltage of a cell= 2.7V. V_{UCmin} - minimum UC voltage of a cell = 1.5V

Hence, a UC with 100F capacitance should be chosen. The commercially available UC is 100F.The specification of the chosen UC is given in Table 4.

TABLE 4: SPECIFICATION OF UC CELL

S.no	Parameter	Value
1	Internal resistance	15mΩ
2	Stored energy	0.101Wh
3	Continuous and maximum current	11A and 36A
4	Weight	0.021kg
5	No. of cells in series (NUS)	200/2.7≅74 No.
6	Allowable voltage range	1.5V to 2.7V

The current supplied to the output RC circuit is discontinuous. Thus, a larger filter capacitor is required to limit the output voltage ripple. The minimum value of filter capacitor that provides the DC current to the load when the diode D is off is given by

$$C_{min} = \frac{DV_o}{VRF}$$

TABLE 5: COMPONENT VALUES OF DC-DC BOOST CONVERTER

Description	Rating
Inductor	120 μH
Capacitor	330 μF
Switching frequency	20 kHz

The UC bank must provide 648 W power during the initial acceleration request in a time period of 6 sec. Hence, the average current of UC is calculated as

$$648 + 648$$

IV. SELECTION OF MOTOR

$$iUC(acc) =$$

$$\frac{200 \quad 110}{2}$$

$$= 4.56 A$$

The electric motor and its power rating are chosen based

By assuming number of parallel UC (NUP=1), the total capacitance of the UC bank can be obtained as on the requirements of the propulsion system and the driving road conditions. The electric motor employed in EV should

$$Ctotal = Ccell * \frac{NUP}{US}$$

$$= 100 * \frac{1}{74} = 1.35 \ F$$

fulfill the following requirements:
- Wide speed range
- Frequent start/stop operations

 Then, the total resistance of the UC bank is given by
- More torque and less speed for acceleration mode

$$Rtotal$$

$$= Rcell$$

$$\frac{NUP}{* \atop NUS}$$

= 15 ∗ 10–3 ∗ 1

74

= 0.2027mΩ

- Less torque and high speed for constant speed mode
- Acceleration/deceleration in high rate

Therefore, the weight of the UC bank is 1.554kg.

V.   DESIGN OF DC-DC BOOST CONVERTER
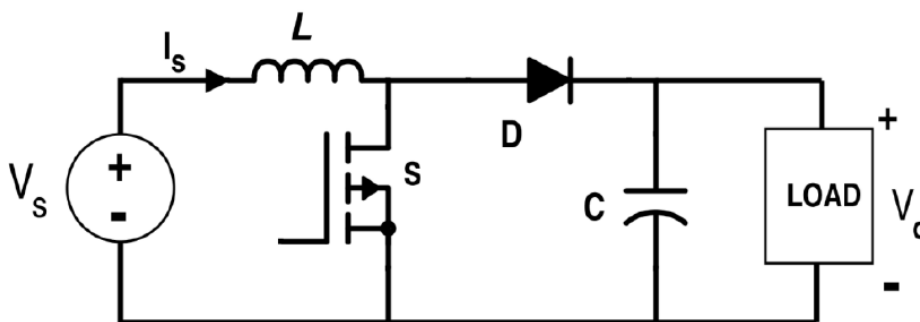
Fig.3. DC-DC Boost Converter

A DC-DC converter consists of a DC input voltage source VS, boost inductor L, controlled switch S, diode D, filter capacitor C and load resistance R. If the switch operates with a duty ratio D, the DC voltage gain of the boost converter is given by

By considering the propulsion system requirements, efficiency, fast response, easy maintenance, simple structure and expenses, a Brushless Direct Current (BLDC) motor is preferred.

A.   BLDC motor

A BLDC motor with the trapezoidal back-EMF produces larger torque compared to a PMSM with the sinusoidal back-EMF.BLDC motors are a novel type of the conventional DC motors where commutation is done electronically, not by brushes. Therefore, a BLDC motor needs less maintenance, has lower noise susceptibility and lesser power dissipation in the air gap compared to a brushed DC motor due to absence of the brushes.

$$Mv = \frac{Vo}{V} = \frac{1}{1 - d}$$

where Vs is input voltage, Vo is output voltage, and d is the duty cycle of the pulse width modulation (PWM) signal used to control the IGBT ON and OFF states.

The boost converter operates in the continuous conduction mode for the value of inductance L > Lb where,

$(1–D2)DR$

Lb =

,

$2f$

where Lb is the minimum value of inductance for continuous conduction.

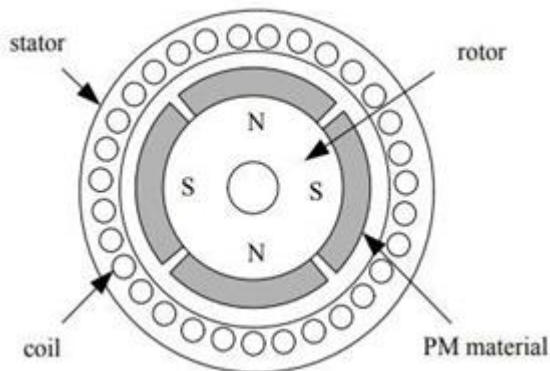Fig .4.BLDC Configuration

B.   BLDC drive system

The drive system of the motor is one of the most important components of electric vehicle that has influence over the performance of the system. Several topologies of DC/AC converters are available such as H-bridge, diode-clamped, cascaded, multi-level, matrix and flying capacitor. H-bridge converter is found to be the simple and cost-effective converter for AC drive applications. The BLDC motor drive system is shown in Figure 5.
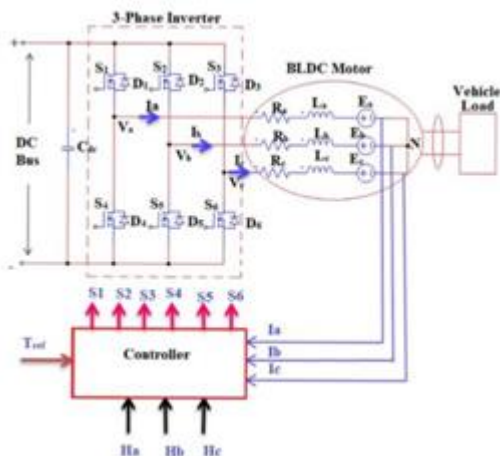
Fig 5: BLDC Motor drive system

VI. ENERGY MANAGEMENT OF THE HYBRID ENERGY STORAGE SYSTEM

In this chapter, an energy management strategy is proposed for the battery-supercapacitor hybrid energy storage system. A battery and supercapacitor have different characteristics in their operation. A battery has a relatively high energy density, but a low power density compared to an SC. In contrast, an SC has a relatively high-power density but a low energy density compared to battery. To overcome the shortcomings of the battery and supercapacitor, an energy management strategy is implemented with the help of DC-DC converter. The flowchart of the energy management strategy is presented in Figure 6.

First, the power demand of the motor and the SOC of the battery and ultracapacitor is obtained as input. The maximum power demand from the battery is 1400 W. When the power demand exceeds the maximum power of the battery (>1400 W), the demand is supplied by both the battery and the ultracapacitor. The voltage from the battery is increased accordingly to meet the power demand by the DC-DC boost converter. When the power demand is lesser than the maximum power of the battery (<1400 W), the State of Charge of the battery is checked. When the SOC of the battery is greater than the minimum SOC of the battery, the power demand is supplied by the boosted output from the battery alone. When the SOC of the battery is lesser than the minimum SOC, then the SOC of the UC is checked. If the SOC of the UC is greater than the minimum SOC, the power demand is supplied by both battery and ultracapacitor.

VII.   SIMULATION RESULTS

The proposed energy management strategy is simulated in MATLAB and the following results are obtained. Figure 7 shows the motor power requirement. The system has been simulated for a period of 2 seconds. For the first 0.8 seconds, the motor power requirement is more than 1400W. For the next 0.4 seconds, the demand is less than 1400W and the demand decreases further for the next 0.4 seconds.
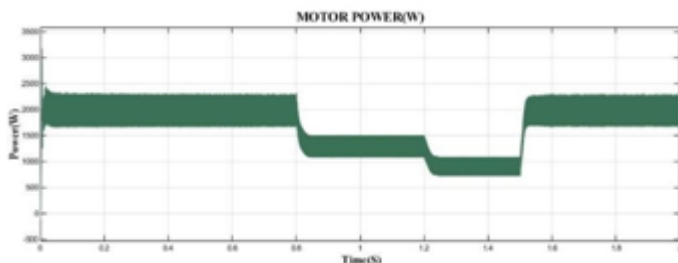

Fig 7: Motor power

The state of charge of the battery is shown in figure 8. From the graph the state of charge of the battery decreases steadily as the battery supplies the power demand continuously.
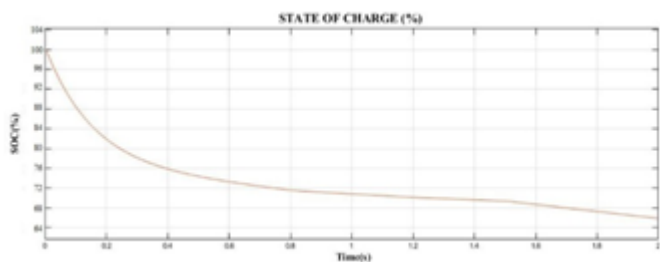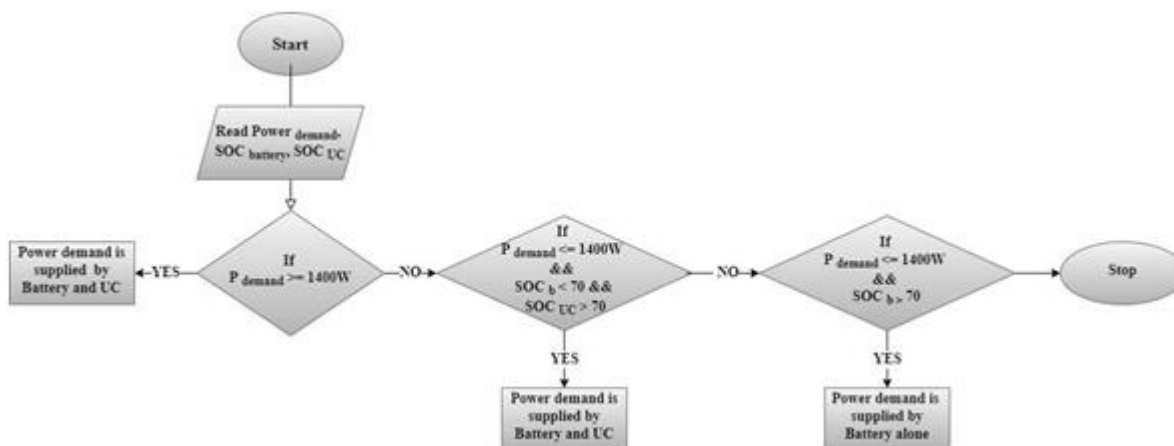
Fig 8: SOC of battery

Fig 6: Flowchart of the energy management strategy

Figure 9 shows the electromagnetic torque of the motor. The initial torque of the motor is 5 Nm and it decreases to 2 Nm after 0.8 seconds. The torque then increases to 5 Nm after 1.5 seconds.
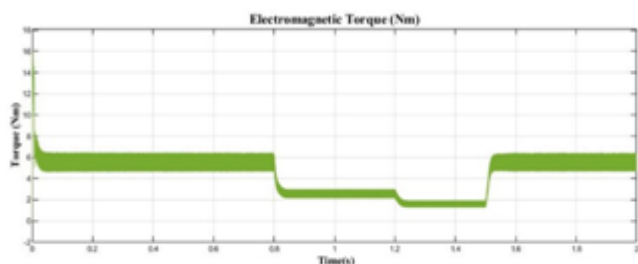

Fig 9: Motor torque

Figure 10 shows the current supplied by the battery. The battery current varies according to the torque of the motor. From figure 4.5 and 4.6, it can be inferred that when the motor torque decreases the current supplied by the battery also decreases.
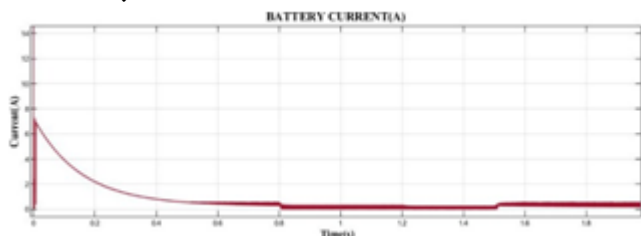

Fig 10: Battery current

Figure 11 shows the current supplied by the ultracapacitor. From the graph it is seen that the ultracapacitor supplies the demand for the initial 0.8 seconds when the power demand is greater than 1400 W and also from 0.8 to 1.2 seconds when the power demand is less than 1400 W and the SOC of the battery is less than the minimum SOC.
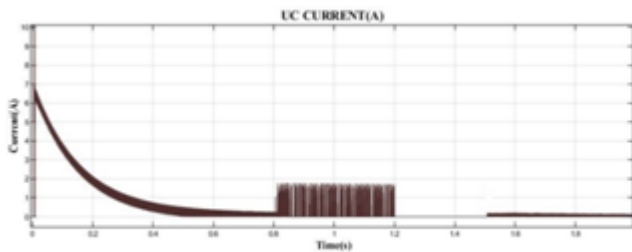

Fig 11: Ultracapacitor current

VIII.   CONCLUSION

This project presents a battery/ultra-capacitor based hybrid energy storage system for electric two-wheeler. The design aspects and the power requirement of the components involved in EV has been presented by considering Hero Photon HX two-wheeler. The design of the power electronic interface is detailed in this work. The simulation studies are carried out in MATLAB/Simulink environment. The power electronic interface ensures that the battery and ultracapacitor provides the required power during acceleration. This aids in enhancing the performance of the battery. The energy management strategy is implemented and the control strategy ensures the UC supplies the power demand during transient peak power demand. This reduces the strain on the battery and enhances the battery life. The simulation is performed to supply the power demand based on the torque requirement and the SOC of the battery. The simulation results provide clear insights into the characteristics of EV with hybrid energy storage.

IX. REFERENCES

[1]. Elsayad N., Moradisizkoohi H. and Mohammed O. A. (2020), 'A new hybrid structure of a bidirectional dc-dc converter with high conversion ratios for electric vehicles', IEEE Transactions on Vehicular Technology, vol.69, no.1, pp.194-206.

[2]. Khaligh A., Cao J. and Lee Y. (2009),'A multiple-input DC-DC converter topology', IEEE Transactions on Power Electronics, vol. 24, pp. 862-868.

[3]. Lai, C., Cheng, Y., Hsieh, M., & Lin, Y. (2018), 'Development of a Bidirectional DC/DC Converter with Dual-Battery Energy Storage for Hybrid Electric Vehicle System', IEEE Transactions on Vehicular Technology, 67, 1036-1052.

[4]. Lee, Young J., Khaligh A., and Emadi A. (2019), 'Advanced integrated bidirectional AC/DC and DC/DC converter for plug-in hybrid electric vehicles', IEEE Transactions on vehicular technology 58, no. 8, pp. 3970-3980.

[5]. Napoli A., Crescimbini F., Solero L., F. Caricchi F. and Capponi F. (2012), 'Multiple-Input DC-DC Power Converter for Power-Flow Management in Hybrid Vehicles', Proceedings of the IEEE, pp.1578-1585.

[6]. Ortuzar M., Moreno J. and Dixon J. (2017), 'Ultracapacitor-Based Auxiliary Energy System for an Electric Vehicle: Implementation and Evaluation', IEEE Transactions on Industrial Electronics, vol. 54, no. 4, pp. 2147–2156.

[7]. Shen J., Dusmez S., and Khaligh A. (2019) 'Optimization of Sizing and Battery Cycle Life in Battery/Ultracapacitor Hybrid Energy Storage Systems for Electric Vehicle Applications', IEEE Transactions on Industrial Informatics, vol. 10, no. 4, pp. 2112–2121.

[8]. Vidhya S. D. and Balaji M. (2019), 'Modelling, design and control of a light electric vehicle with hybrid energy storage system for Indian driving cycle', Measurement and Control, pp. 1420–1433.

[9]. Wai R. J., Lin C. and Chen B.H. (2012), 'High-efficiency DC e DC converter with two input power sources', IEEE Transactions on Power Electronics, vol. 27, pp. 1862-1875.

[10].Zhang Y., Gao Y., Zhou L. and Sumner M. (2018), 'A switched-capacitor bidirectional DC–DC converter with wide voltage gain range for electric vehicles with hybrid energy sources', in IEEE Transactions on Power Electronics, vol. 33, no. 11, pp. 9459-9469.

Sarcastic and Non Sarcastic Word Detection in Social Media

Alagu Sundari N, Prof. S. Suresh Thangakrishnan

Department of EEE, Einstein College of Engineering, Tirunelveli, Tamil Nadu, India

ABSTRACT

Sarcasm is a type of sentimental analysis where people express their feeling either in sarcastic or non- sarcastic text through social media. Classification of sarcastic sentence into positive and negative sentiments has been identified as a difficult problem. In this paper, the main objective of this is to find out the data in sarcastic or non-sarcastic word. The amount of data retrieved from the public social media like YouTube, Facebook, and Twitter etc..,. Sarcasm is a special kind of sentiment that comprises of words that what you really want to say (e.g., Insult someone, funny, and to shoe irritation).People often express it through the use of heavy tonal stress or certain gestural clues like rolling of eyes.

Key word: Sarcastic, Non-Sarcastic, Social Media, Sentiments, Social Media

I. INTRODUCTION

The process of evaluating data using analytical and logical reasoning to examine each component of the data provided. Data from various sources is gathered, reviewed, and then analyzed to form some sort of finding or conclusion. There are various specific data analysis method, some of which include data mining, text analysis and data visualization. R is perhaps one of the most powerful and most popular platforms for statistical programming and applied machine learning. Sarcasm detection is the task of correctly labeling the text as "Sarcastic" or "Non Sarcastic" word. It is challenging task due to the lack of intonation and facial expression in text. The use of sarcasm is prevalent across the all social media. Sarcasm analysis, being one of the toughest challenges in Natural Language Processing (NLP) has become a hot topic of research these days. NLP is one of the important domains in artificial intelligence. It acts as a platform between the computer and human languages. It helps in making the machine understand, analyze and interpret the data. It helps in querying the datasets and provide an answer. It helps in not only understand the text or speech but also the context behind it. It work for structure and unstructured data. Sarcasm is one of the leading challenges faced in Sentimental Analysis. Sarcasm is an indirect manner of conveying a message. It is basically a bitter expression which is conveyed. Sarcasm can be expressed in many ways. It can be expressed in speech and text. Sarcasm can be conveyed through various ways like a direct conversion, speech, text, etc. In direct conversation, facial expression and body gestures provide the hint of sarcasm. In the speech, sarcasm can be inferred if there is any changes in tone.

MACHINE LEARNING:

Machine learning is a subset of artificial intelligence that provides computers with the ability to learn without being explicitly programmed. Machine learning focuses on the development of computer programs, those can teach themselves to grow and change when exposed to new data. It considers the prediction problem as a problem of supervised learning problem, where I have to infer from historical data the possibly nonlinear dependence between the input (past embedding svector) and the output (future value).The area of Machine Learning deals with the design of programs that can learn rules from data, adapt to changes, and improve performance with experience. In addition to being one of the initial dreams of Computer Science, Machine Learning has become crucial as computers are expected to solve increasingly complex problems and become more integrated into our daily lives. Writing a computer program is a bit like writing down instructions for an extremely literal child who just happens to be millions of times faster than you. Yet many of the problems we now want computers to solve are no longer tasks we know how to explicitly tell a computer how to do. These include identifying faces in images, autonomous driving in the desert, finding relevant documents in a database (or throwing out irrelevant ones, such as spam email), finding patterns in large volumes of scientific data, and adjusting internal parameters of systems to optimize performance. That is, we may ourselves be good at identifying people in photographs, but we do not know how to directly tell a computer how to do it. Instead, methods that take labeled training data (images labeled by who is in them, or email messages labeled by whether or not they are spam) and then learn appropriate rules from the data, seem to be the best approaches to solving these problems.

NLP is a branch of data science that consists of systematic processes for analyzing, understanding, and deriving information from the text data in a smart and efficient manner. Here used package of R studio to apply NPL in order to do the following tasks. Removal of new lines and tabs, removal of punctuations, separating hash tagged words, tokenizing the inputs, removal of stop wards

II. RELATED WORK

R is a system for statistical analyses and graphics created by Ross Ihaka and Robert Gentleman1. R is both a software and a language considered as a dialect of the S language created by the AT&T Bell Laboratories. S is available as the software S-PLUS commercialized by Insightful2. There are important differences in the designs of R and of S: those who want to know more on this point can read the paper by Ihaka & Gentleman (1996) or the R-FAQ3, a copy of which is also distributed with R. R is freely distributed under the terms of the GNU General Public License 4; its development and distribution are carried out by several statisticians known as the R Development Core Team. R is available in several forms: the sources (written mainly in C and some routines in FORTRAN), essentially for UNIX and Linux machines, or some pre-compiled binaries for Windows, Linux, and Macintosh. The files needed to install R, either from the sources or from the pre-compiled binaries, are distributed from the internet site of the Comprehensive R Archive Network (CRAN) 5 where the instructions for the installation are also available. Regarding the distributions of Linux (Debian . . .), the binaries are generally available for the most recent versions; look at the CRAN site if necessary. R has many functions for statistical analyses and graphics; the latter are visualized immediately in their own window and can be saved in

various formats (jpg, png, bmp, PS, pdf, emf, pictex, xfig; the available formats may depend on the operating system). The results from a statistical analysis are displayed on the screen, some intermediate results (P-values, regression coefficients, residuals . . .) can be saved, written in a file, or used in subsequent analyses. The R language allows the user, for instance, to program loops to successively analyze several data sets. It is also possible to combine in a single program different statistical functions to perform more complex analyses. The R users may benefit from a large number of programs written for S and available on the internet6, most of these programs can be used directly with R. At first, R could seem too complex for a non-specialist. This may not be true actually. In fact, a prominent feature of R is its flexibility. Whereas a classical software displays immediately the results of an analysis, R stores these results in an "object", so that an analysis can be done with no result displayed. The user may be surprised by this, but such a feature is very useful. Indeed, the user can extract only the part of the results which is of interest. For example, if one runs a series of 20 regressions and wants to compare the different regression coefficients, R can display only the estimated coefficients: thus the results may take a single line, whereas a classical software could well open 20 results windows. We will see other examples illustrating the flexibility of a system such as R compared to traditional software's.The term "environment" is intended to characterize it as a fully planned and coherent system, rather than an incremental accretion of very specific and inflexible tools, as is frequently the case with other data analysis software. R is very much a vehicle for newly developing methods of interactive data analysis. It has developed rapidly, and has been extended by a large collection of packages. However, most programs written in R are essentially ephemeral, written for a single piece of data analysis. The fact that R is a language may deter some users who think "I can't program". This should not be the case for two reasons. First, R is an interpreted language, not a compiled one, meaning that all commands typed on the keyboard are directly executed without requiring to build a complete program like in most computer languages (C, Fortran, Pascal . . .). Second, R's syntax is very simple and intuitive. For instance, a linear regression can be done with the command lm(y ~ x) which means "fitting a linear model with y as response and x as predictor". In R, in order to be executed, a function always needs to be written with parentheses, even if there is nothing within them (e.g., ls ()). If one just types the name of a function without parentheses, R will display the content of the function. In this document, the names of the functions are generally written with parentheses in order to distinguish them from other objects, unless the text indicates clearly so. When R is running, variables, data, functions, results, etc., are stored in the active memory of the computer in the form of objects which have a name. The user can do actions on these objects with operators (arithmetic, logical, comparison . . .) and functions (which are themselves objects).

III. METHODOLOGY & DESIGN

Existing System:

For a set of data, the intention is to classify each data depending on whether it is sarcastic or not. Hence for each comment, the extraction of a set of feature, referred as a training set and uses machine learning algorithms to perform the classification was used. To collect sarcastic tweets, it queries the incorporate the hashtag „„#sarcasm"". In total, collection of 3000 comments with the hashtag „„#sarcasm"", which was cleaned up by removing the noisy and irrelevant ones alone. As for non-sarcastic tweets, they collected tweets dealing with

different topics and made sure they have some emotional content. The whole study revolved around 3 data sets. First set contains 3000 data, half of them are sarcastic, and the other half are not. The tweets on this data set are manually checked and segregated depending on their level of sarcasm from 0 (highly non-sarcastic) to 1(highly sarcastic).For the second one no manual check is done, which makes it a very noisy data set. The third one, all comments are manually monitored and classified as sarcastic and non-sarcastic. This set will serve as a test set, and will be used to evaluate.

Proposed System:

A randomly collected set of data is taken, each one of them depending on whether it is sarcastic or not. Therefore, from each data, extract a set of features, refer to a training set and use machine learning algorithms to perform the classification. The features are extracted in a way that makes use of different components of the data, and used the sarcasm. The set of data on which run experiments is checked and annotated manually. The proposed system can detect sarcasm based on the text.

System Design:
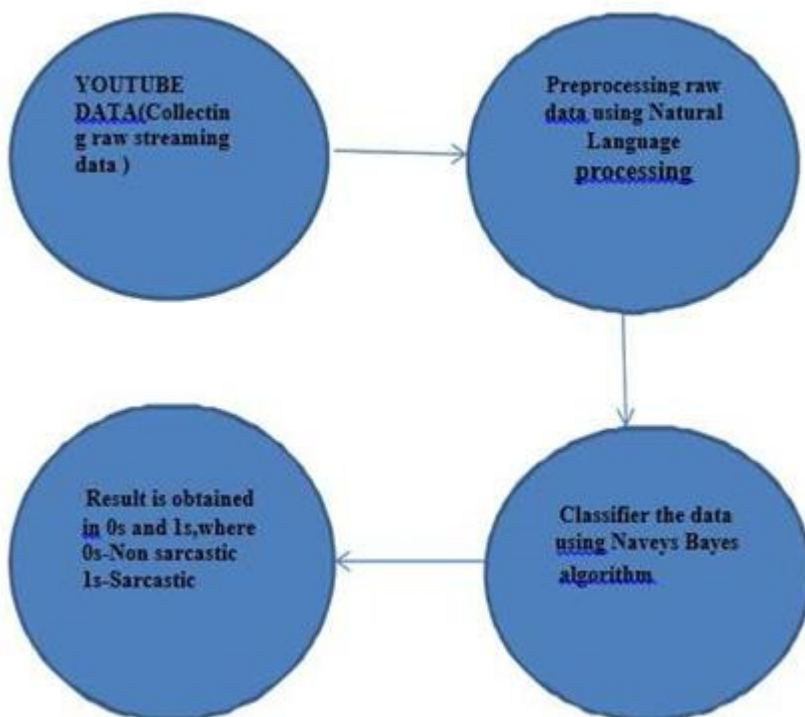
Figure 2: Proposed system design

Dataset:

The data will gather to do the project with, will likely to be live streaming data that I gather for a period of a few days or weeks until I have a sufficiently large amount to train our system with. However YouTube data is problematic, while the data is readily available there is little to no context due to the short messages. In order to gain context with data we need to look at replies, past tweets, and the user's profile. While these may be

possible it is a more advanced option that I hope to be able to get to by the end of the project, but using and gathering the context for each data is more of a stretch goal. Ideally I will be able to attain a data set that has more context in the surrounding text and does not require specific background of the actors. To narrow the scope, using data initially, I will select #sarcasm, #sarcastic, etc. as well as other hashtags that allow us to tailor our system to a specific niche area to focus upon. This focus will make our system less generalizable but, in theory, be more accurate with that particular data set. If I am able to attain a sufficiently high accuracy with a niche focus then testing the system on a more general data selection would be the next goal. My data will be tagged as sarcasm or not sarcasm so I will be using primarily supervised learning techniques.

Corpus:

Corpus is a large collection of texts. It is a body of written or spoken material upon which a linguistic analysis is based. The plural form of corpus is corpora. Some popular corpora are British National Corpus (BNC), COBUILD/Birmingham Corpus, IBM/Lancaster Spoken English Corpus. Monolingual corpora represent only one language while bilingual corpora represent two languages. European Corpus Initiative (ECI) corpus is multilingual having 98 million words in Turkish, Japanese, Russian, Chinese, and other languages. The corpus may be composed of written language, spoken language or both. Spoken corpus is usually in the form of audio recordings. A corpus may be opened or closed. An opened corpus is one which does not claim to contain all data from a specific area while a closed corpus does claim to contain all or nearly all data from a particular field. Historical corpora, for example, are closed as there can be no further input to an area.The main structure for managing documents in tm is a so- called Corpus, representing a collection of text documents. ... The default implementation is the so- called VCorpus (short for Volatile Corpus) which realizes a semantics as known from most R objects: corpora are R objects held fully in memory

Bag of Words:

The Bag of words is a way of representing text data when modeling text with machine learning algorithm. The Bag of words model is simple to understand and implement and is seen great success in problem such as language modeling and documentation classification.

Document Term Matrix:

A document-term matrix or term-document matrix is a mathematical matrix that describes the frequency of terms that occur in a collection of documents. In a document-term matrix, rows correspond to documents in the collection and columns correspond to terms. There are various schemes for determining the value that each entry in the matrix should take.. They are useful in the field of natural language processing.

IV. RESULT AND DISCUSSION

My primary goal is to analyze the data whether it is in sarcastic or non-sarcastic. Computational detection of sarcasm is seen attention from the sentiment analysis community in the past few years. Sarcasm is an interesting problem for sentiment analysis because surface sentiment of words in sarcastic text may be different

from the implied sentiment. For Example, "Being stranded in traffic is the best way to start a week" is a sarcastic sentence because the surface sentiment of the word "best" (positive) is different from the implied sentiment of the sentence (negative), considering remaining portion of the text. Proposed an algorithm to understand a sentence or data is sarcastic or not. From the dataset I have acquired the data, I try to train our model so that test live streaming data from social media to detect whether they are sarcastic or not. This will result in obtaining accurate sentiment analysis and opinion mining. It could contribute to enhanced automated feedback systems in the context of customer based sites.

V. CONCLUSION

Social media is an informal means of communication so with the absence of complete background knowledge it is very hard to predict the exact nature of tweets. Further short forms, abbreviated words, short-form words, emoji's can add a degree of vagueness, inconsistency in the results. Sarcasm detection and analysis in social media provides invaluable insight into the current public opinion on trends and events in real time. Various classification and NLP are implemented to find out the best model. Navie Baye's Classification algorithm are used. Sarcasm can be found in variety of topics, it need to sample a large data. Finding new features relevant to sarcasm is a critical step for improving sarcasm detection and expect to see that some sort of contextual clues (feature types such as sentiment contrast, order of words, etc.) to play a big role in the sarcastic nature of a sentence.

VI.REFERENCES

[1]. D. Bamman, N. Smith Copyright © 2015, Association for the Advancement of Artificial Intelligence.

[2]. A Closer Look R. González-Ibáñez S. Muresan N. Wacholder HLT '11 Proceedings of the 49th Annual Meeting of the Association for Computational Linguistics: Human Language Technologies: Volume 2 581-586 Association for Computational Linguistics Stroudsburg, PA, USA ©2011

[3]. Lexical influences on the perception of sarcasm, R. J. Kreuz and G. M. Caucci, in Proceedings of the Workshop on computational approaches to Figurative Language, ACL, pp. 1--4, 2007.

[4]. Parsing-based Sarcasm Sentiment Recognition in Twitter Data S.Kumar Bharti K. Sathya S. Kumar Jena ASONAM '15 Proceedings of the 2015 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining 2015 Pages 1373-1380 ACM New York, NY, USA ©2015

[5]. Recognition of Sarcasm in Tweets Based on Concept Level Sentiment Analysis and Supervised Learning Approaches P. Tungthamthiti K. Shirai M. Mohd

[6]. Sarcasm as Contrast between a Positive Sentiment and Negative Situation E.Riloff, A. Qadir, P. Surve, L.De Silva, N.Gilbert, R. Huang EMNLP 2013 - 2013 Conference on Empirical Methods in Natural Language Processing, Proceedings of the Conference Association for Computational

Design of DC-DC Boost Converter for Solar Powered Electric Vehicle

Reshmika Janani M[1], Sowmya G[1], Srividhya S[1], Vishwa Raj V[1], Balaji M[2]

[1]UG Student, Department of Electrical and Electronics Engineering, SSN College of Engineering, Tamil Nadu,
India

[2]Associate Professor, Department of Electrical and Electronics Engineering, SSN College of Engineering, Tamil
Nadu, India

ABSTRACT

With ever increasing energy consumption, global warming and consequent climate change concerns, there has
been increased attention towards the design and implementation of electric and hybrid electric vehicles. This
project discusses the design and implementation of a DC-DC converter for solar powered electric vehicle. P &
O MPPT algorithm is employed to extract optimum power under varying atmospheric conditions. The
simulation is carried out in MATLAB environment and the results validate the design of the converter for solar
powered electric vehicle. The hardware implementation of the prototype has also been carried out and the
results are validated.

Keywords: Solar arrays, MPPT, BLDC motor, Boost converter, Inverter, Pulse width modulation

I. INTRODUCTION

Solar energy is a renewable energy which is available abundant in nature. With ever increasing energy
consumption,global warming and consequent climate change concerns, both Government as well as Industries
globally are heavily pitching for the implementation of electric and hybrid electric vehicles[1-2]. Electric
vehicles are preferred because of their cleanliness. Since they operate free of fossil fuels, the environment is free
from pollution. The EV also has fewer moving parts, compared to the conventional vehicles, thus making them
more efficient and easier to maintain. The cost for charging an EV is also comparatively less.

The main objective of this work is to develop a DC-DC converterfor a solar powered electric vehicle. The
project aims towork on a hybrid energy management system which consists of both PV and battery. Lithium-
ion battery is used as an auxiliary source. The inputfrom the PV Array is fed to the DC-DC Boost converter.
MPPT algorithmis used to track the maximum power from the panel. The output of theconverter is fed to the
load which is driven by a BLDC Motor Drive.. Thehardware implementation of the prototype is carried out by
connecting thePV Array, Boost Converter, Inverter and the motor load.

II. PROPOSED SYSTEM

The figure1 describes the block diagram of the proposed system. The system consists of two sources PV Array and Li Ion battery as auxiliary source. The PV Array output is connected to the DC-DC Boost Converter through MPPT algorithm in order to obtain maximum power from the panel. By means of a switch, the panel and battery is operated accordingly. The boosted output is given to the inverter, which is connected with the electronically commutated BLDC Motor load.
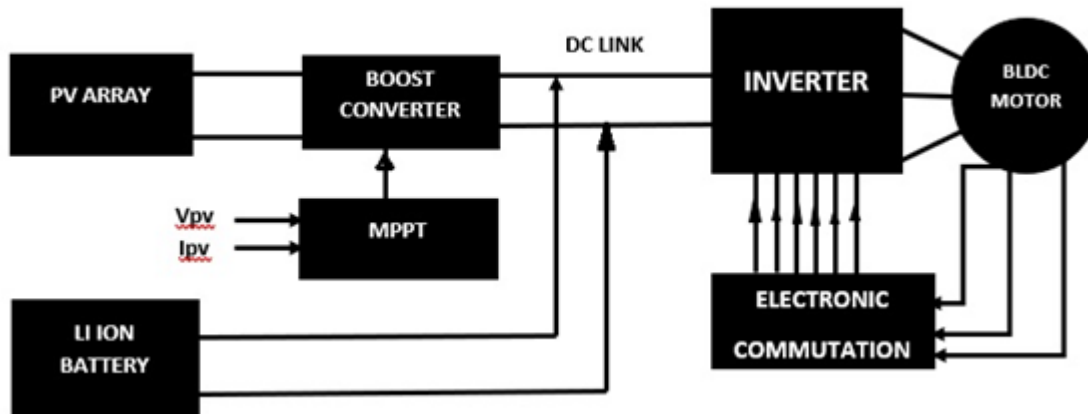

FIGURE 1. Block diagram of the proposed system

2.1 DC- DC Boost Converter
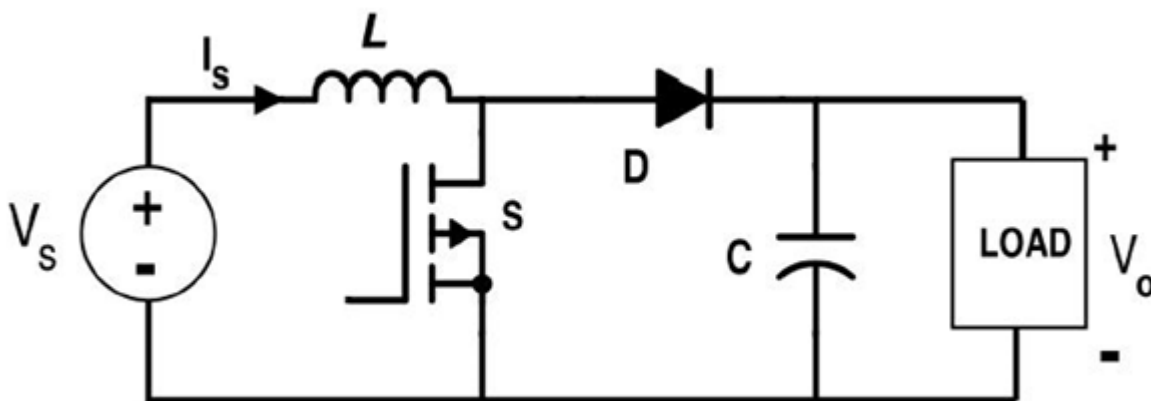
FIGURE 2. Boost Converter Circuit diagram

DC-DC Boost Converter is a power converter circuit that steps up the input voltage. MOSFET is used as a switch as it has very high switching speed and it is capable of handling high currents. The values of inductor and capacitor is obtained using the design equations as discussed below. The value of duty cycle for our application is assumed to be 50%.

- $D = 1 - \frac{Vi}{Vo}$

. $L = \frac{Vi \times D}{\Delta I_l \times f_s}$, where $\Delta I_l = \frac{(0.2\ to\ 0.4)I_o\ V_o}{V_i}$

. $C = \frac{I_o \times D}{f_s \times \Delta V_o}$

Using these formulae, the values are calculated for both best and worst case as the power from the solar is varying. After the calculations, the simulation is done in MATLAB.
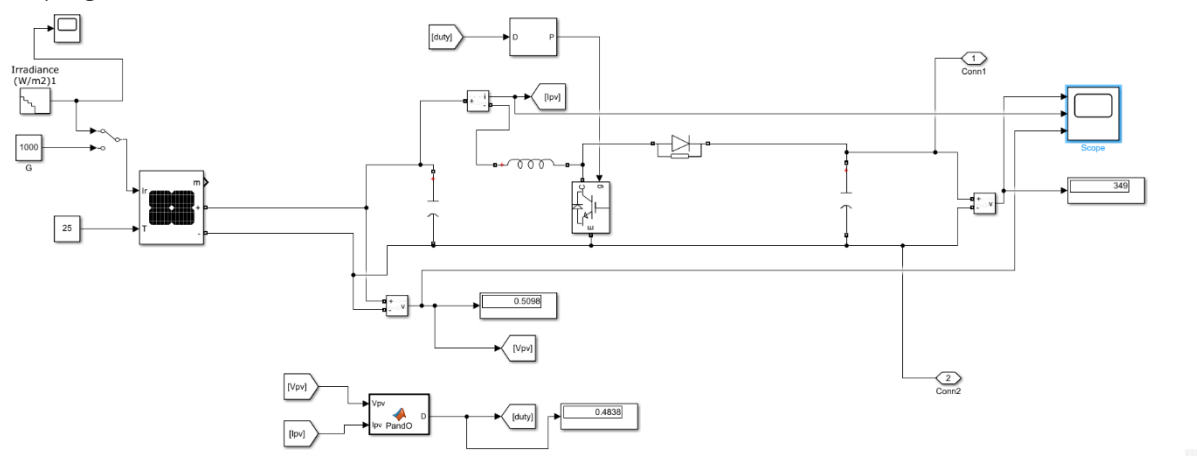

FIGURE 3. Simulation of Boost Converter with variable irradiance and MPPT Control

The boost converter is simulated for the calculated values of inductor and capacitor. Variable irradiance is provided as input and the converter output is improved using the MPPT Algorithm. The below figure 4 describes the simulation results, which is proven to have reduced ripples and hence better power supplied.
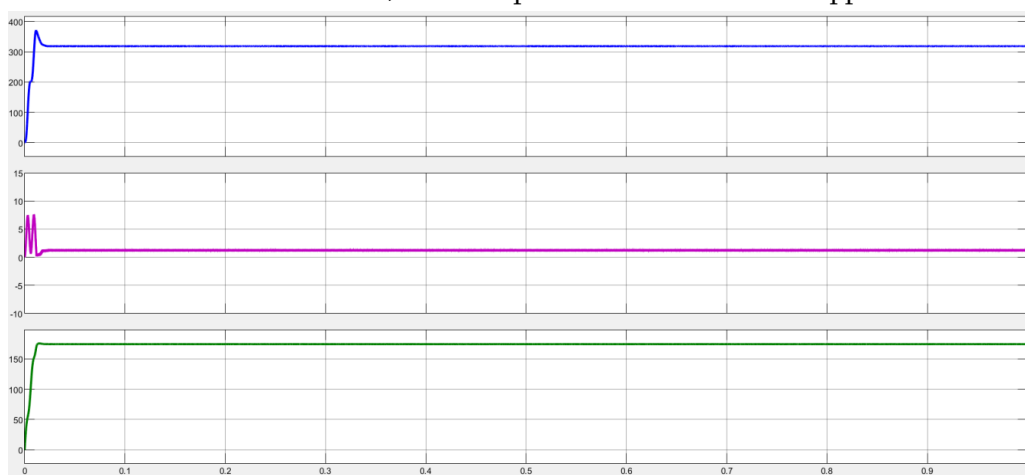
FIGURE 4. Simulation results with MPPT implemented

The plot shows the PV Input Voltage, Current and the Output Voltage after MPPT (P&O) algorithm is implemented.

III. RESULTS AND DISCUSSION

The overall simulation results are obtained by integrating battery source with the solar powered Boost Converter. The hybrid system can offer some definite advantages for electric vehicles, namely the higher fuel economy due to the increase of on-board renewable energy, the better energy security due to the use of multiple resources, and the higher control flexibility.
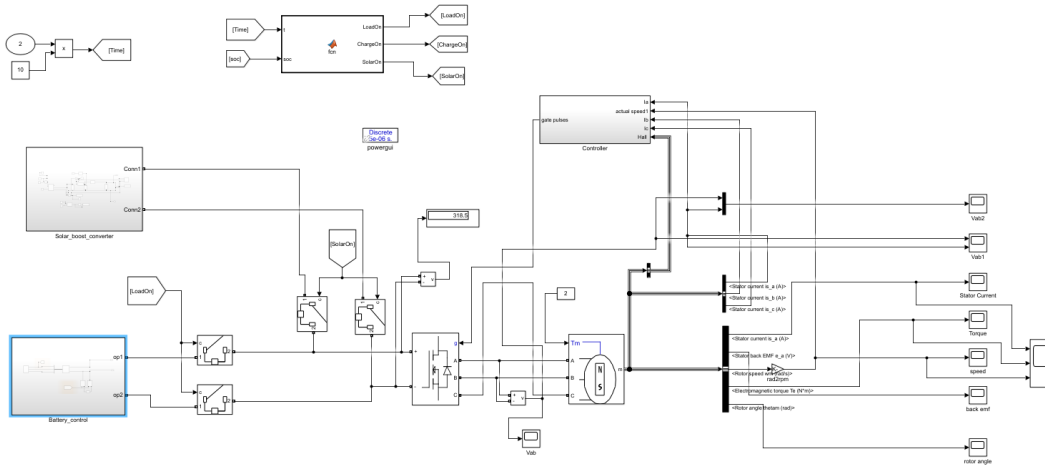

FIGURE 5. Overall Simulation Results

Battery control block is provided with switches to ensure correct usage of battery.
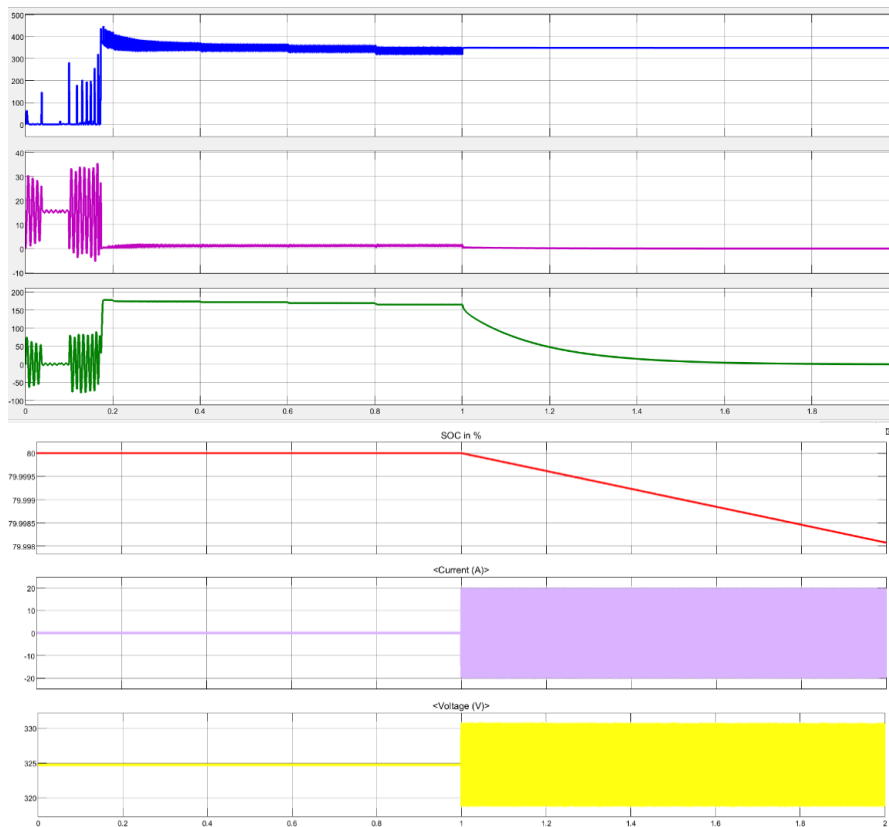
FIGURE 6. Energy Management

The diagram describes two conditions in which the first state is assumed to be day and hence powered by solar energy. The next state is assumed to be night, hence battery supplies energy.
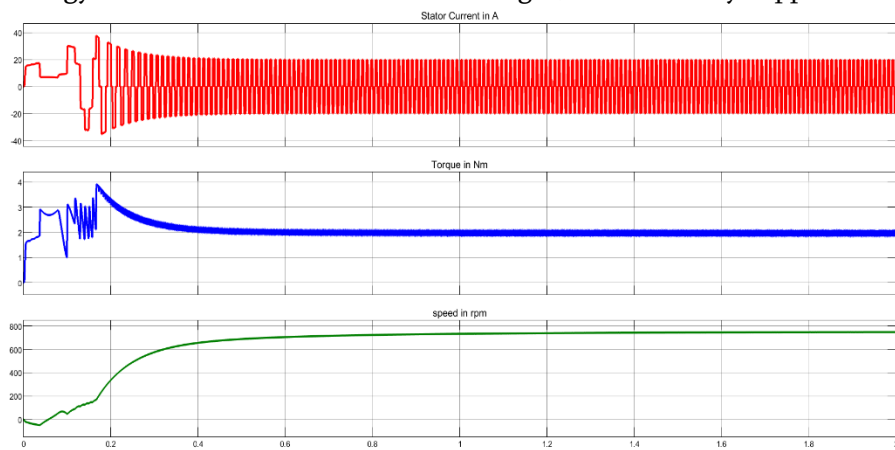
FIGURE 7. Motor Characteristics

After successful simulation, the stator current, torque and speed of the motor is obtained, thus experimentally verifying the simulation.

IV. HARDWARE IMPLEMENTATION

A prototype of the above proposed system is implemented through hardware. The circuit consists of a 20W PV panel which is connected with the boost converter. The output from the converter is given to the inverter fed BLDC Motor, which is an electronically commutated load. The panel supplies 12V and it is boosted to a value of approximately 24V. A multimeter is used at the inverter terminal to verify the output voltage and then the motor is connected.
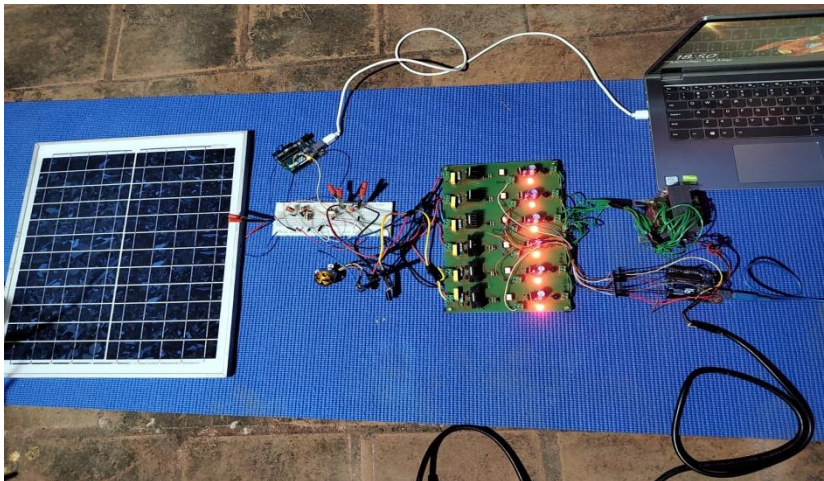

FIGURE 8. Prototype Implementation

The BLDC Motor has a maximum speed of 1000 rpm and it is observed to operate at a high speed, thus experimentally verifying the working of the above prototype model.

V. CONCLUSION

A PV-powered EV with BLDC motor drive for a three-wheel EV is designed and simulated in this work. The inclusion of PV source helps to increase the range that the vehicle can travel. The P&O MPPT algorithm ensures maximum power is extracted from PV array. The DC-DC boost converter acts as a suitable interface to the drive. Simulations were carried out in MATLAB/Simulink environment to verify the effectiveness of the proposed model with modelled system components of three wheeled light electric vehicle. The hardware implementation of the prototype was also carried out and the results were obtained. The results indicate the effectiveness of the proposed design for EV with hybrid energy sources.

VI.REFERENCES

[1]. Devi Vidhya S. and Balaji M. (2019), 'Modelling, Design and Control of a Light Electric Vehicle with Hybrid Energy Storage System for Indian Driving Cycle.' Measurement and Control, vol. 52, no. 9–10, pp. 1420–1433.

[2]. IndrashisHaldar, Dipanakar Debnath, and Tanmoy Roy Choudhury (2021), 'Design of a Battery Charger Fed from Two Solar Panels Arranged at Different Inclination for E-rickshaw and DC Microgrid Applications', International Conference on Power Electronics and Energy, pp. 1-6.

[3]. Khan F.H., Tolbert L.M. and Webb W.E. (2009), 'Bi-directional power management and fault tolerant feature in a 5-kW multilevel dc-dc converter with modular architecture', IET Power Electron., Vol. 2, No. 5, pp. 595– 604

[4]. Raghavan S.S, Onar O.C. and Khaligh A. (2010), 'Power electronic interfaces for future plug-in transportation systems', IEEE Power Electron. Soc. Newsletter., Vol. 24, No. 3, pp. 23–26. Waffler S. and Kolar J.W. (2009), 'A Novel low-loss modulation strategy for high power bidirectional buck - boost converters', IEEE Trans. Power Electron., Vol. 24, No. 6, pp. 1589–1599.

[5]. Williams B.W. (2008), 'Basic DC-to-DC converters', IEEE Trans. Power Electron., Vol. 23, No. 1, pp. 387– 401.

Design of Inverted U and E Shaped Slot Multiband Microstrip Patch Antenna for Wireless Applications

J. Abisha Bala[1], Mrs. J.Vanitha[2]

[1]Student, Department of Applied Electronics, VV College of Engineering, Tamil Nadu, India

[2]Assistant Professor, Department of Electronics and Communication Engineering, VV College of Engineering,
Tamil Nadu, India

ABSTRACT

This work presents the design of a multi band microstrip patch antenna for wireless applications. The proposed antenna has a compact size of 42mm x 32mm and is printed on FR4 material with height h=1.6mm, loss tangent of 0.02 and dielectric constant Er=4.4. The designed multiband antenna operates at three different frequencies of 5.6 GHz, 7.9 GHz and 11.9 GHz with return loss of -26.35 dB, -40.88 dB and -34.31 dB respectively. Multiband phenomenon in the designed antenna is reached by inserting a inverted U and E shaped slots inside a rectangular patch antenna in the ground plane. The influence of various design parameters on the resonance frequency has been investigated using CST and also presented here. The simulated results show good antenna performance for multiple applications in wireless communication.

Keywords— Multi Band Antenna, Slot on Patch, Return Loss, VSWR and Directivity.

I. INTRODUCTION

With the development of various wirelesscommunication systems, the concept of using an antenna for multiple applications is increasing day by day. Because the multipurpose applications of a single antenna play an important role for device miniaturizations and low power consumptions. In designing such multiband antennas, the microstrip patch become more attractive for many applications because of their low manufacturing cost as well as simple design [1] [2]. A number of works have been found in literature devoted in designing antennas for multiband operations, especially for wireless applications [3–7]. Among them, slot antenna in which a hole or slot of different shape and size is cut out on the metal surface of patch is a promising technique due to its very low profile, low fabrication cost, can be easily integrated with microwave integrated circuits and capable of dual and triple frequency operations [4] [6].

For dual and triple band operations, various slots of microstrip have been introduced which includes inverted cone slot [4], butterfly shape [5], inverted L-strip slot [6], multilayer structure using LTCC technology [7], inverted U shape slot [8], tapered slot with tuning patch [9], double U shape slot [10], defected structure shape with length and width variation on slot [11] and many other shapes [12]. The unnecessary band can be

effectively filtrated by multiband antenna compared with the broadband antenna [13, 14], that can reduce system interference and complexity for multimode operations. However, the designing of slots for particular application (specific operating frequency) requires a very specific conditions in its geometry. This is very difficult to simulate, measure and achieve particularly for triple band operations, where the change in one dimension of the slot will affect the performance of all the three bands.

In this paper a triple band microstrip patch antenna has been proposed for wireless applications. The antenna is designed by making a UE slot on the rectangular patch. The resonance frequency of this antenna is 5.6 GHz for Wi-Fi and Wi-Max (5.25-5.85GHz), 7.9GHz for Satellite communication (7.24-7.57) GHz) and 11.9 GHz for radar applications (11.5–12.9 GHz). This antenna can also work for WLAN (2.4–2.48 GHz) application [12]. The antenna is simple and comparatively small in size with good radiation patterns and return loss. The designed antenna is simulated first by using CST Microwave Studio.

The next section (Section II) describe the methodology of designing the proposed antenna and its dimensions in detail. Section III presents the obtained simulated results due to the variation of different design parameters as well as the measured results. The performances of the proposed antenna are also compared in this section with several similar works form literature. Finally, section IV concludes all the discussion previously presented.

II. ANTENNA DESIGN

The schematic configuration of proposed antenna is shown in Fig.1 with different views of (a) Designed Multiband Patch antenna (b) Front view with inverted U and E shaped slots on the patch. The antenna consists of substrate, ground, patch, feed line, waveguide port and a slot on the patch. It is designed on FR4 substrate with dielectric constant Er of 4.4 and a thickness of 1.6 mm. The triple bands are achieved by making a UE slot on the patch. Without this slot, the antenna operates at a single band with a resonance frequency of 2.4 GHz. However, introducing this slot and properly choosing the dimensions, it resonates at three different frequencies. The proposed antenna is fed by 50 Ω microstrip line with loss tangent of 0.02. The size of the patch is 36×20 mm2 on which the UE slot is made. The inverted U and E shaped slot on the rectangular patch is designed with numerous cuts in order to improve the antenna performance. Here, in this design, seven cuts are sloted in the shape of inverted U and E with the changes in the dimensions of length and width respectively.The full ground plane is located on the backside of the dielectric substrate. Table I listed all the dimensions of the proposed antenna.
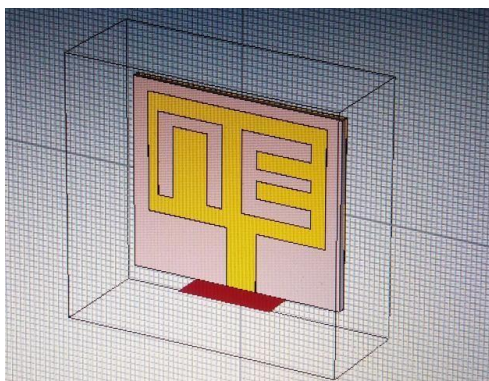

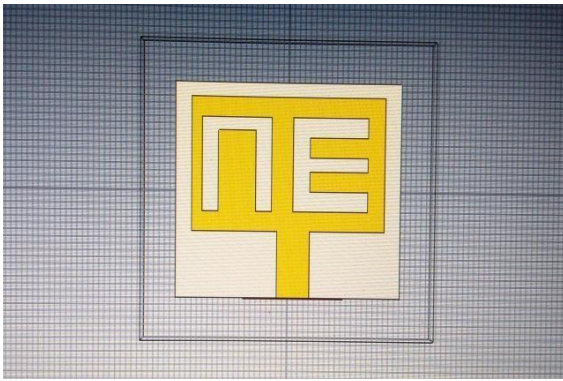Fig1.(a) The designed Multiband Microstrip patch antenna

Fig 1.(b) Front View with inverted U and E shaped slots on the patch

TABLE I. DIMENSION OF THE PROPOSED ANTENNA

Parameters	Values (mm)	Parameters	Values (mm)
Wsub	32	Wg	32
Lsub	42	Lg	42
Tsub	1.6	Ws	24
Wp	36	Ls	30
Lp	20	Wf	6
Tp	0.05	Lf	22

III. RESULT AND DISCUSSION

Fig.2 shows the simulated return loss for various frequency bands at 5.6 GHz, 7.9 GHz and 11.9 GHz respectively. S parameters is the measure of how small the return or reflection is reflected. The value of return loss is found to be -26.35 dB at 5.6 GHz, -40.88 dB at 7.9 GHz and -34.31 dB at 11.99 GHz respectively. Fig.3 shows the simulated VSWR at three frequency bands.VSWR is an element of the reflection coefficient which portrays the force reflected from the antenna. The VSWR ratio of proposed antenna is found to be 1.11 at 5.6 GHz, 1.01 at 7.9 GHz and 1.04 at 11.9 GHz respectively.
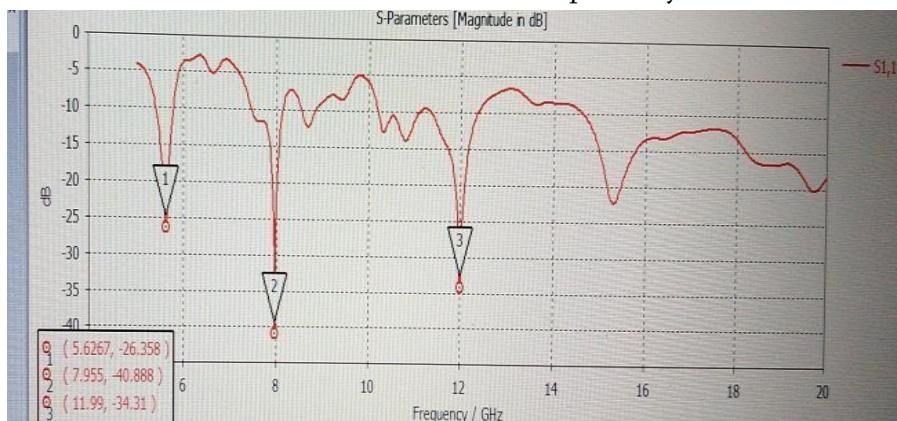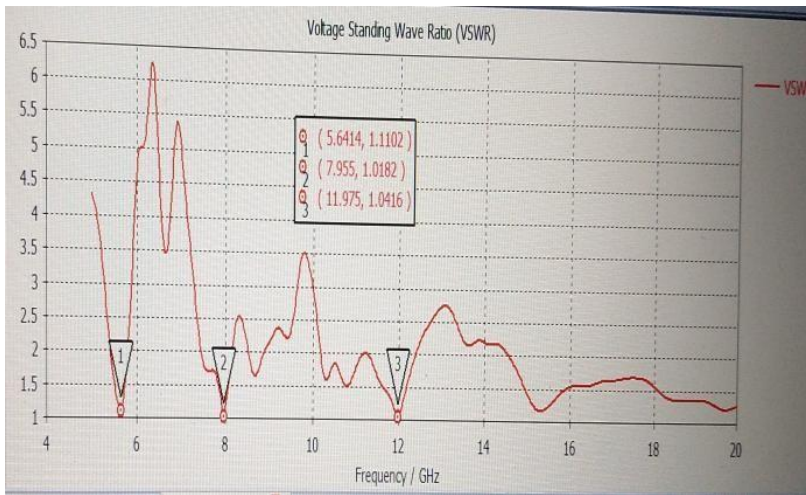

Fig 2. Return loss at three frequency bands

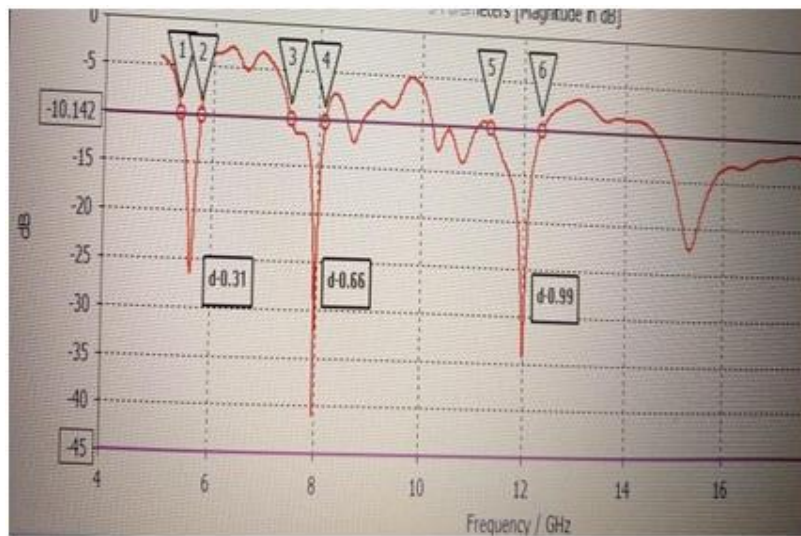Fig 3. VSWR at threee frequency bands

Fig 4. Bandwidth at three frequency bands

Bandwidth is the range of frequencies over which the antenna can operate correctly. For an antenna, bandwidth is calculated from the S parameters graph by drawing a line at -10 dB. As per the design, the bandwidth is 318 MHz at 5.6GHz, 661 MHz at 7.9GHz and 992 MHz at 11.9GHz respectively.
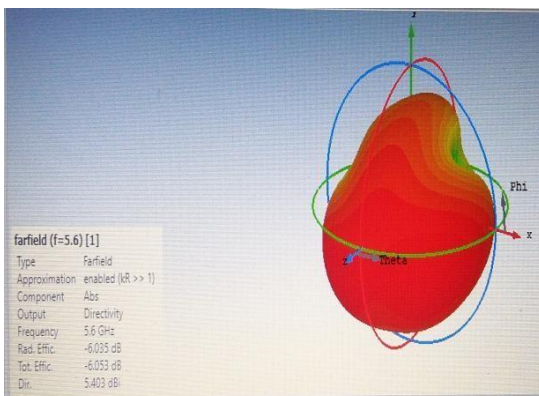

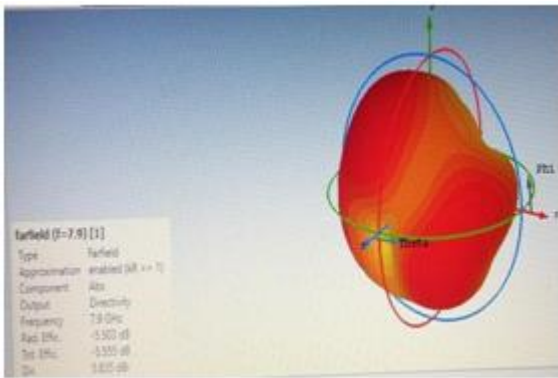Fig 5.(a) Directivity at 5.6 GHz
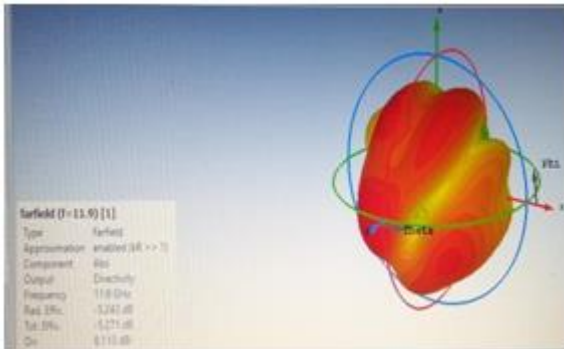
Fig 5.(b) Directivity at 7.9 GHz

Fig 5.(c) Directivity at 11.9 GHz

Directivity is desirable to maximize the radiation pattern of the antenna response in a fixed direction in order to transmit or receive power. Likewise the directivity is dependent only on the shape of the radiation pattern. The achieved directivity of designed antenna is 5.403 dBi at 5.6 GHz, 5.835 dBi at 7.9 GHz and 8.110 dBi at 11.9 GHz respectively.

Since a multiband microstrip patch antenna radiates normal to its patch surface, the radiation pattern for phi= 900 would be important for antenna design. Fig 6 (a,b,c) shows the gain, radiated power and effective area of the simulated antenna for the frequency bands 5.6 GHz, 7.9 GHz and 11.9 GHz.
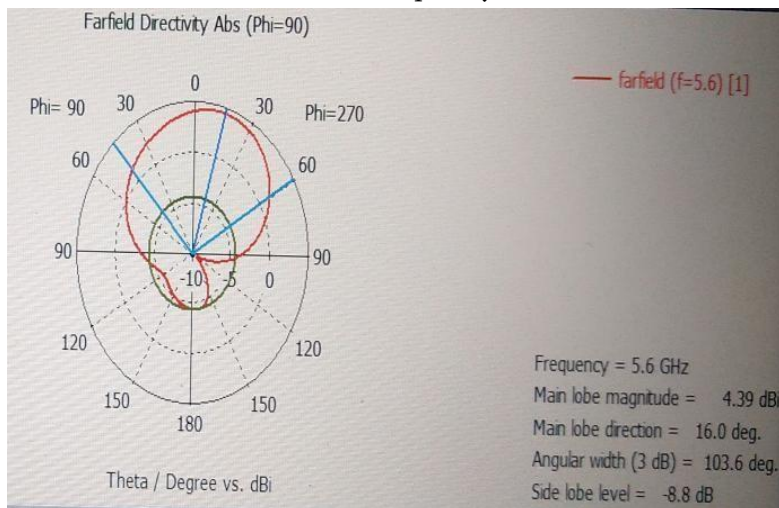

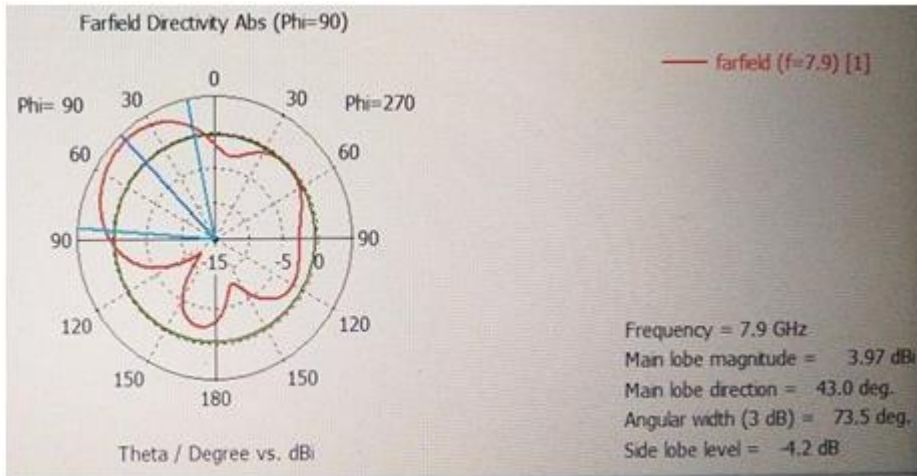Fig 6.(a) Radiation pattern plots at 5.6 GHz
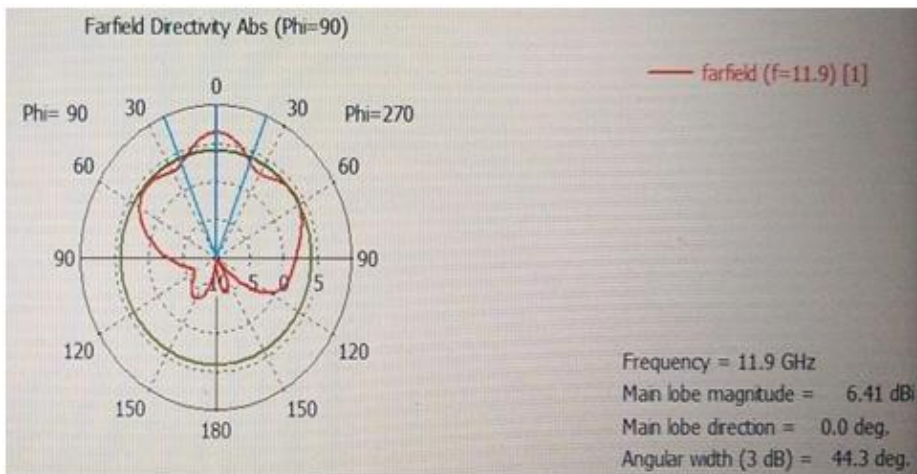
Fig 6.(b) Radiation pattern plots at 7.9 GHz

Fig 6.(c) Radiation pattern plots at 11.9 GHz

IV. CONCLUSION

A simple Multiband microstrip patch antenna has been proposed in this work for triple band wireless applications. The inverted U and E shaped slot with appropriate length and width has been introduced on the patch to generate the desired three operating bands at 5.6 GHz, 7.9 GHz and 11.9 GHz respectively. The proposed antenna is designed on FR4 substrate with its overall dimension of $42 \times 32 \times 1.6$ mm3, which is relatively compact and its performance has been investigated both numerically and experimentally. The peak return loss of the proposed antenna is -40.88 dB and peak directivity is 8.11 dBi. The antenna exhibits stable radiation patterns in the entire frequency range. The proposed antenna is suitable for triple band applications of Wi-Fi and Wi-Max (5.25-5.85 GHz), satellite communications (7.24-7.57 GHz) and radar systems (11.5-12.9 GHz), which are verified by CST simulated results.

TABLE II. Multiband Microstrip Patch Antenna's Performance

Title	Overall dimension (mm³)	Reference frequency (GHz)	Return Loss (dB)	VSWR	Bandwidth (MHz)	Gain (dB)	Directivity (dBi)
Design of inverted U and E shaped slot multiband microstrip patch antenna for wireless applications	42x32x1.6	5.6,7.9,11.9	-26.35,-40.88,-34.31	1.11,1.01,1.04	318,661,992	0.12,1.11,2.97	5.43,5.83,8.11

V. REFERENCES

[1]. V. Asnani and S. Baudha, "Triple band microstrip patch antenna useful for Wi-Fi and WiMAX," IETE Journal of Research, March 2019. DOI: 10.1080/03772063.2019.1582365

[2]. P. Khanna, A. Sharma, K. Shinghal and A. Kumar, "A defected structure shaped CPW-fed wideband microstrip antenna for wireless applications," Journal of Engineering, vol. 2019, Article ID 2863508, pp. 1-7, Feb. 2019.

[3]. H. Zhai, L. Liu, Z. Ma and C. Liang, "A printed monopole antenna for triple-band WLAN/WiMAX applications," International Journal of Antennas and Propagation, vol. 2019, Article ID 254268, pp. 1-7, 2015.

[4]. S. Cheng, P. Hallbjorner and A. Rydberg, "Printed slot planar inverted cone antenna for ultrawideband applications," IEEE Antennas and Wireless Propagation Letters, vol. 7, pp. 18–21, 2019.

[5]. L. Sun, M. He, J. Hu, Y. Zhu and H. Chen, "A butterfly-shaped wideband microstrip patch antenna for wireless communication," International Journal of Antennas and Propagation, vol. 2020, Article ID 328208, pp. 1-7, 2020.

[6]. A. K. Gautam, S. Yadav and B. K. Kanaujia, "A CPW-Fed compact UWB microstrip antenna," IEEE Antennas and Wireless Propagation Letters, vol. 12, pp. 151–154, 2020.

[7]. X. Qing and Z. N. Chen, "Monopole-like slot UWB antenna on LTCC," in Proc. of IEEE International Conference on Ultra-Wideband (ICUWB), pp. 121–124, Hannover, Germany, Sept. 2020.

[8]. L.-N. Zhang, S.-S. Zhong, X.-L. Liang and C.-Z. Du, "Compact omnidirectional band-notch ultra-wideband antenna," Electronics Letters, vol. 45, no. 13, pp. 659–660, 2020.

[9]. R. Azim, M. T. Islam and N. Misran, "Compact taperedshape slot antenna for UWB applications," IEEE Antennas and Wireless Propagation Letters, vol. 10, pp. 1190–1193, 2020.

[10].N. K. Darimireddy, R. R. Reddy and A. M. Prasad, "Design of triple-layer double U-slot patch antenna for wireless applications," Journal of Applied Research and Technology, vol. 13, no. 5, pp. 526–534, 2020.

[11].P. Khanna, K. Shinghal and A. Kumar, "A survey of defected wideband and multiband microstrip patch antennas," International Journal for Scientific Research & Development, vol. 3, no. 4, pp. 2043–2047, 2021.

[12].Y. Li and W. Yu, "A miniaturized triple band monopole antenna for WLAN and WiMAX applications," International Journal of Antennas and Propagation, vol. 2021, Article ID 146780, 1-5, Oct. 2021.

[13].D. Ahirwar, A. Shrivastava and S. Baudha, "A decagon shaped universal compact broadband printed monopole antenna, " Microwave Optical Technology Letters., vol. 58, no. 11, pp. 2760–2764, March 2021.

[14].S. Baudha and D.K. Vishwakarma, "A compact broadband printed antenna with tilted patch," Microwave Optical Technology Letters, vol. 58, no. 7, pp. 1231–1235, Jul. 2021.

[15].C. C. Lin , E. Z. Yu and C. Y. Huang, "Dual-band rhombus slot antenna fed by CPW for WLAN applications," IEEE Antennas and Wireless Propagation Letters , vol. 11, pp. 362-364, 2022.

[16].H. Werfelli, K. Tayari, M. Chaoui, M. Lahiani and H. Ghariani, "Design of rectangular multiband microstrip patch antenna," in Proc. of 2nd International Conference on Advanced Technologies for Signal and Image Processing (ATSIP), IEEE, Monastir, Tunisia, March , 2022.

[17].J. Tak, S. Woo, J. Kwon and J. Choi, "Dual band dual-mode patch antenna for on-/off-body WBAN communications," IEEE Antennas and Wireless Propogation Letters, vol. 15, pp. 348-351, 2022.

[18].C. Y. Huang and E. Z. Yu, "A slot-patch antenna for dual-band WLAN applications," IEEE Antennas and Wireless Propagation Letters, vol. 10, pp. 500-502, 2022.

[19].H. Kaschel and C. Ahumada, "Design of Rectangular Multiband Microstrip Patch Antenna for 2.4 GHz applied a WBAN," in Proc. of IEEE International Conference on Automation/XXIII Congress of the Chilean Association of Automatic Control (ICA-ACCA), pp. 1-6, Concepcion, Chile, Oct. 2022.

Wave Driven Turbine

U. Arumugaperumal, Mr. C. Suren, Mrs.W. Jenefer

Department of Energy Engineering, Cape Institute of Technology, Levengipuram, Tamil Nadu, India

ABSTRACT

This project harvests energy from wind and floating mechanism, tomaking mechanical arrangement and usingelectronicgadgetstoproduce thelarge amountsamount of electricitycan be generatedsavinglot of money.And if implementeditwillbeverybeneficialforpublic.When boator ashipisin motionit producesvariousforms ofenergy. The motion of the ship and the waves producedcan be used to generate electrical energy. The principle involved in the project is conversion of potentialenergy into electricalenergy. There is a system to generatepower byconverting thepotential energy generatedbyafloatgoing upon wavesandback bygravitation. When the shipmoves over along wayit createsa lotof waves whichincreasespotentialenergy,whichiswasted ina conventionalrumblestrip.Whenthe floatmovesupanddown, they reciprocate a leverfitted tothe crankand slotted mechanismarrangement which inturn rotatesa shaft.The output of this shaft is coupled to a dynamo to convert kinetic energy into electricity and stored in a battery.

Keywords—wave energy, renewable energy, wind, battery.

I. INTRODUCTION

Thismoduleprovidesan Outlineand Brief Description,Includingfundamentals,Ofthedifferent Renewableenergytechnologieslikewind, Solar, Bioenergy, Hydro, Tidalandgeothermalenergy.It Providesa Generaloverviewofthe Technologiesand Theirapplications.Electricitygenerationfromwave Andtidalenergyisdiscussed. Theuseofthis Technologyislessrelevantfordevelopingcountries Asmostly These Technologiesare Still Atthe Prototypestage. Whilethesetechnologiesarenot Fullyprovenyet, Promisingresearchand Development Isbeing Conducted.The Modulealso Reviews Thecostsof Thedifferenttechnologiesand Discusses Commontechnicalandnon-Technical Barriersand Issueslimiting Thewide Spread Use/Dissemination Ofrenewableenergy In Developing Countries. Theinformationinthismoduleisof Generalinterestto Explainthebasicsofrenewable Energytechnologies, Tounderstandtheirstrengths Andweaknesses Andhencetohaveabettergraspof Thebenefitsavailablefrom, Andthebarriersfaced By,Thesetechnologies.

II. CONSTRUCTION

INTHISPROJECTWEUSEBOTHANAIR TURBINEANDA FLOATINGCRANKAND SLOTTEDMECHANISM TOGENERATE   POWER.THECONSTRUCTIONOFTHESYSTEMCONSISTSOFTHE   ABOVE MENTIONEDCOMPONENTS.THE CONSTRUCTION   OF THESYSTEMISAS FOLLOWS THESYSTEM CONSISTSOFAHOUSINGINWHICHTHEAIR   TURBINEBLADEAND   THEFLOATINGBALL ARECOUPLEDAND CONNECTEDTOAGENERATOR.THEFLOATINGBALLMOVESIN A RECIPROCATING MOTION AND THERECIPROCATINGMOTION ISCONVERTED INTO ROTARY MOTION BY MEANSOFCRANK AND   SLOTTEDMECHANISM.THE HOUSINGIS PLACED IN A POSITIONWHERETHEFLOATINGBALLSINKSINWATER. THE MOVEMENTOFTHESHAFTISCOUPLED TO A GENERATOR.THE GENERATORISCONNECTEDTOABATTERY.THECHARGINGOF THEBATTERY ISDONEBY MEANSOFTHEGENERATOR.

CRANKAND SLOTTED MECHANISM

Oneof themostimportantmechanismsinour lives istheslider-crank mechanism. Itisused inreciprocating enginesfor automobiles,reciprocatingcompressors,and pistonpumps.Inthisassignment youwill useExcel to calculatetheforceintheconnectingrodthatcausesthepiston   toaccelerateoveritscycle.Forcesdueto   combustion pressuresarenotincludedinthisanalysis.Aschematicofthe   mechanismisshownbelow.   ThelinklabeledListhe connecting rod. Rrepresentsthe crankarm. Wrepresentsthe weightof thepiston.Thedistanceof thepistonfromthe crankshaft bearingsisgivenbyr.Thecrank angleisθ.The angleof theconnectingrodasmeasuredfromthehorizontal isdenoted by φ.

Youwillneedtousesevenequationsinyour spreadsheet. These areprovidedbelow.Remember thatExcelneedsto haveargumentsof trigonometricfunctions(sin,cos,etc.) in radians

φ=arcsin(R sinθ)

1.   /L

2.r=Rcosθ+Lcosφ

3.   Angular velocity=R/L ×

4.   Velocity=−R sinθ(1−LVel)

5.

to convertdegreestoradians.For thePhicolumn,use Equation (1). You willhavetousetheinputvaluesforRand L andtheASINfunctioninMath andTrigto computethe arcsine.The rcolumnusesthesecond andthirdcolumns and theinputvaluesofR and Lin Equation (2).

TheL-Velcolumn   comesfromEquation(3)which   usescosinefunctionsofthesecondandthirdcolumnsandthe inputvaluefor .VelusesEquation(4)whichusesR   and   valuesyouhavealreadycomputedinother   columns.L-AcccomesfromEquation(5) andusesinputvaluesR,L,and , and valuesyou have already computed. Acccomesfrom

Equation(6) andForcecomesfromEquation(7).Ineach column, copy the formulasdown to 360degreescrankangle. ShadetheDegrees, r, Vel, Acc, andForcecolumnsbecause we aregoing to graph themnext.

Whenyour spreadsheetisfinished,formatthe numbersinthecolumnslikeI havetheminmyspreadsheet (twoplacesafterthedecimalpoint,etc.).Nowforfun,try

enteringsomedifferent numbersforR,L,, andWjust to seewhatwillhappen to theForce.

III. WORKING PRINCIPEL

INTHISPROJECTTHEREISABEDOVERWHICHTHEHOUSINGIS

2   2   PLACED.AFLOATINGARRANGEMENTISPLACEDWITHTHE

LAcc($R$$sin$)$(L$$LVel$$sinH$$O$)USING. THE FLOATINGARRANGEMENT CONSISTS OF A

Lcos

6.

CRANKANDSLOTTEDMECHANISMWHICHISCONNECTEDTOA

GENERATORTHROUGH A SHAFT.THESHAFTISALSO COUPLED WITH A WIND TURBINEWHICH

ISUSED TOMAKETHEMOTION OFTHECRANKANDSLOTTEDMECHANISMTOBECARRIEDOUT

A$R$$cos$$(LVel)$$R$$sin$$WLITAHOccUT FAIL.THE FLOATIS KEPT INSIDE WATER, WHEN

Force$W$$Acc$

7.   386.4cos

Whereyou willprovideinputvaluesforR,   L,(in   rad/s),andW.Velisthevelocityof   thepiston,LVelisthe angularvelocityoftheconnectingrod(inrad/s),Accis   the   accelerationof   thepiston,andLAccistheangular acceleration ofthe connection rod (inrad/S2).

Yourassignmentistousethe equations aboveto generateaspreadsheet,liketheoneattached,thatcalculates

the connecting rod force.

Provideatitleatthetopof your worksheet, "Force inConnectingRod."Makethetitlestandouta littleby increasingitssizeandusingotherenhancements. Provide cellsforinputtingthevalues for R,L,,andW.Putvalues of 4,12,3000and4respectivelyinthemfor now.Youcan changethem later.Placecomments(right click and choose insertcomment)inthesecellsthatsaytoenterthelengths R andLininches,thespeedofthemachineinrpm,and the weightWinpounds.It'sagoodideatocalculatethemachine   speedin   rad/stoobecausethat'sthewayweuseitin calculations.Placetheradian/svaluein ahandy cell.Shade or color theinput areatosetitoff fromtherestof the spreadsheet wherekeyboardinputswill not beallowed. Selectthefourinputcells(forR, L,, and W).

Set upheadingsfrom left to right in theorderthat I havethem in myspreadsheet. Increment crank anglefrom zeroto360degreesinincrementsof5 degrees.Inthe Radianscolumn,useaMathandTrigFunction(RADIANS)

THEREISAMOTION   ORWAVEPRODUCEDTHEFLOATWILL

MOVEUPANDDOWNINSIDETHEHOUSINGAND   THEUPAND

DOWNMOTIONOFTHEFLOATISCONVERTED INTOROTARY MOTIONBYMEANSOFTHECRANKANDSLOTTEDMECHANISM.

THEAIR TURBINEALSOROTATESTHECRANKANDTHE MOTIONOFTHECRANKIS TRANSMITTEDTO THEGENERATOR BYMEANSOFASHAFT. THEKINETICENERGYPRODUCEDBY THESHAFTISCONVERTED INTO ELECTRICAL ENERGYBY MEANSOFTHEGENERATOR. THEELECTRICALENERGY PRODUCEDBYTHEGENERATORISSTORED INABATTERYFOR FURTHERPURPOSE.

IV. CONCLUSION

Thusthemoduleprovidesanoutlineandbriefdescription, ofthedifferent renewableenergytechnologieslikeWind, Solar,Bioenergy,Hydro,Tidalandgeothermal energy.It providesageneraloverviewof thetechnologiesandtheir applications.Electricitygenerationfrom waveandtidal energyisdiscussed.Theuseofthistechnologyislessrelevant fordeveloping countriesasmostly thesetechnologiesarestill attheprototypestage. While thesetechnologiesarenotfully provenyet, promisingresearch anddevelopment isbeing conducted. Themodulealso reviewsthe costsofthedifferent technologiesanddiscussescommontechnical andnon-technicalbarriersandissueslimitingthewide spread use/disseminationof renewableenergyindeveloping countries.Theinformationinthismoduleisofgeneralinterest toexplainthebasicsofrenewable energytechnologies,to understand theirstrengthsand weaknessesandhencetohave abettergraspofthebenefitsavailablefrom,andthebarriers facedby thesetechnologies..

V. REFERENCES

[1]. InternationalEnergyAgency,ImplementingAgreementforCo-operationintheResearchandDevelopmentofWind Turbine Systems, Annual Report 2000, May 2001.

[2]. American WindEnergy Association, Global Wind Energy Market Report: Wind Energy GrowthWasSteady in 2000, Outlook for2001 Is Bright.AWEAwebsite: http://www.awea.org/faq/Global05-2001.PDF.

[3]. American Wind Energy Association. 2001. Wind Project Database:WindEnergyProjectsThroughout theUnitedStates. AWEA web site: http://www.awea.org/projects/index.html.

[4]. DepartmentofEnergy,WindPowerToday,DOE/GO-102001-1325,May2001.5)ElectricPowerResearchInstituteand DOE, Renewable EnergyTechnology Characterizations, EPRI TR-109496, December1997.

[5]. LegertonML,AdamantiadesAG,AnconaDF,WindPower Plants, World Energy Council Conference, Houston, TX, Working Group Paper3.3, 15 September1998.

[6]. Current status of Renewable energy across the globe &Bangladesh,EBIOZONE,TheGrowing BiologicalSectorsin World.Available atError!Hyperlinkreference notvalid.Error! Hyperlinkreference notvalid.Error!Hyperlinkreference not valid.Error!Hyperlink referencenot valid.

[7]. Bangladesh joined thegeothermal energy, reve, wind energy and electric vehicle review. Available at http://www.evwind.es/2011/04/04/bangladeshjoined-the-geothermal-energy

[8]. Md.   AlimIftekharRasel,   SaihamSiraj,   KaziMoshiurRahman, "ProspectofRenewableEnergyastheSolutionofthe Existing Energy CrisisofBangladesh,"International Journal ofScientific &Engineering Research Volume3, Issue3,March-2012.

[9]. Md.BodruddozaMia,"Geothermalenergyandit"sprospectin   Bangladesh".   URL:http://benjapan.org/-wea_files/23bodruddoza.pdf

[10].Joint Rivers Commission Bangladesh Ministry of Water Resources. Available at http://www.jrcb.-gov.bd/

[11].Biomassinterventions,RenewableEnergyInformation(REIN).   URL:http://www.lged-rein.org/-database.php?-pageid=68 10. M. RofiqulIslam, M. RabiulIslam, M. RafiqulAlam, "Renewableenergy resources andtechnologies Practicein Bangladesh,"ELSEVIER, July 2006.

[12].Improvement ofBiomass Energy Utilization in Bangladeshi Homes.URL:http://www.asiabiomass.-jp/english/topics/- 0909_05.html

[13].Ahmed Zubair,Aman AbdullaTanvir, Md.MehediHasan, "Optimal PlanningofStandalone SolarWind-DieselHybrid   Energy   Systemfora   CoastalArea   ofBangladesh,"   International JournalofElectricalandComputerEngineering (IJECE),Vol.2, No.6, December2012, pp. 731~738.

[14].Windinterventions,RenewableEnergyInformation   Network   (REIN).Available   at http://www.lgedrein.org/database.php?pageid=67

[15].TheAsia   PacificJournal,RenewableEnergyCost Trends 2002   http://www.japanfocus.org/-Andrew-De Wit/3249

[16].TheEnergyandEnvironmentCouncil,BasicPrinciples:Towards   aproposaldefiningOptionsforan StrategyforEnergyandthe   Environment,   2011 http://www.npu.go.jp/en/policy/policy06/pdf/20120403/201204 02_basicprinciples%20_en.pdf

Fabrication and Experimental Analysis of a Novel Micro Heat Exchanger Circuit Printed Using Wooden Charcoal

David Bright C[1], Bala Dinesh P. M.E[2], Milan S. M.E[2]

[1]Department of Mechanical Engineering, Cape Institute of Technology, Anna University of Chennai, Tamil Nadu, India

[2]Assistant Professor, Department of Mechanical Engineering, Cape Institute of Technology, Anna University of Chennai, Tamil Nadu, India

ABSTRACT

Modern cooling and heating systems rely heavily on the efficiency of heat exchangers to achieve their desired cooling and heating results. Researchers have a growing obligation to reduce energy loss and improve heat exchanger performance. It's a goal of heat exchanger designers and researchers alike to find ways to speed up the heat transfer from the heat exchanger surface to the heat transfer fluid. The most common way to improve heat transmission is to add longer external surfaces/fins to the airside. Although this strategy increases the system's weight and pressure drop, it also blocks airflow and reduces the pump's ability to move water through the system. Heat transfer enhancement methods now in use are quite complicated in terms of their design, size, long-term performance and economics. Nanofluids, on the other hand, may be used to improve heat transmission. Nanofluid heat transfer techniques, however, are still limited by the wide range and complexity of nanofluids organization. Recent advances in coating technology may help reduce this problem by improving heat transmission via the use of high thermal conductivity coatings on the heat exchanger's outer surface. Two types of carbon will be extracted for our work, one is to etch on the shell outer layer for heat rejection and the second adhesive is to etch on the outer surface of the tube for heat absorption by adding nano copper sulphate in the activated carbon. The chemical like sodium poly acrylate, sulphuric acid, nano copper sulphate, chloroform, xylene will be used to make the activated carbon adhesive in my project. Eventually the performance of the heat exchanger will be analyzed by taking temperature reading of the inlet and outlet of both shell and tube fluids. The rate of heat transfer will evaluate using these results.

I. INTRODUCTION

Heat exchangers are extensively used in industries, and improvement of their performances will improve energy utilization. Commonly, to enhance the thermal performance of heat exchangers, increasing the heat transfer coefficient is largely based on simple geometry configurations, and is referred to as technologies for improving heat transfer. The technology of improved heat transfer attained rapid development and the figure of published papers in this field increases every year. In the 1990s, though the progress in enhanced heat

transfer technology has been reduced because a number of people assumed that the technology had been called "repetitive", and the energy price was constant. Then the next generation of enhanced heat transfer technology is claimed, such as 3 D (three dimensions) rib and compound improvement technology.

As far as construction design is concerned, it is classified into two types, (i) the tubular or shell & tube type and (ii) the finned type or extended surface heat exchangers are universally in use. Normally, fluid flows inside the tube whereas the air is directed crosswise between the fins. Since the air has poor thermal conductivity and heat transfer coefficient, it is compulsory to enhance the heat transfer without losing the heat exchanger compactness, hence extended surfaces are added. A cross-sectional view of circular finned– tube cross–flow geometry as exposed in Figure 1.
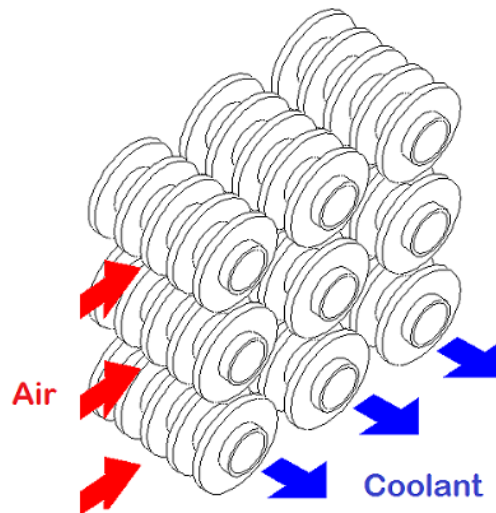
Fig 1 Cross-sectional view of circular finned–tube cross–flow

II. MATERIALS AND METHODS

2.1 Micro/Nano-coating

In general, coating procedures can be broadly classified into three groups; Vapor, fluid and strong phase coatings. The various coating approaches are glow discharge, gas phase chemical processes, evaporation methods and chemical techniques on liquid phase. Environmental conditions strongly affect the chemical composition, residual stress, and microstructure of the coating. A significant number of novel techniques that make use of combining different processes have been established to enhance the coatings in a controlled manner depending on the required applications. Coatings are applied to protect components in a system against corrosion and improve surface properties. These advantages favor coating of thermally sensitive substrates like plastic, large complex shapes and small components to a significant volume that draws the attention of semiconductor, optical, electronics, and several other high–technology fields. Moreover, the environmentally friendly processes guarantee high–quality coatings over other conventional surface treatment methods. Extensive use of the coating is greatly helpful in reducing production cost and improving productivity. The future of these particular coating markets will further expand in various industries such as marine, building, and defense. Revolutionary advancements in nanotechnology promise to unleash a vast potential in the field of

coatings and is expected to play a significant role in the shield of the infrastructure and human health. The coating can be done via Physical Vapor Deposition (PVD), Chemical Vapor Deposition (CVD), Electroless and electroplating deposition, Sol-gel coating method, dip coating method. The solvent-based coating can be applied to metals by a spin coating technique, spray coating method, and electrospinning technique.

2.2 Physical Vapor Deposition

Physical vapor deposition (PVD) is used to bond thin layers of material, normally in the range of few nanometers to micrometers. It is the preferred method to deposit metals and alloys because no chemical reaction will take place. PVD procedures are environment-friendly. Vacuum deposition methods comprise three fundamental steps as shown in Figure 2.
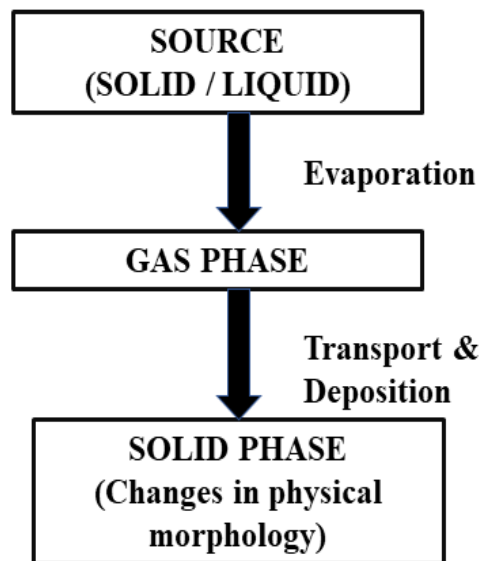

Fig 2Illustration of a PVD process

2.3 Chemical Vapor Deposition

Chemical vapor deposition (CVD) is a technique used to deposit thin films on wafers or other substrates and this method is frequently used in the semiconductor industry to produce films (Creighton & Ho 2001). Figure 3 shows the process of CVD.
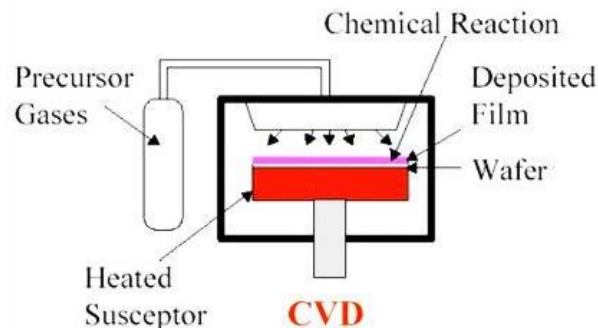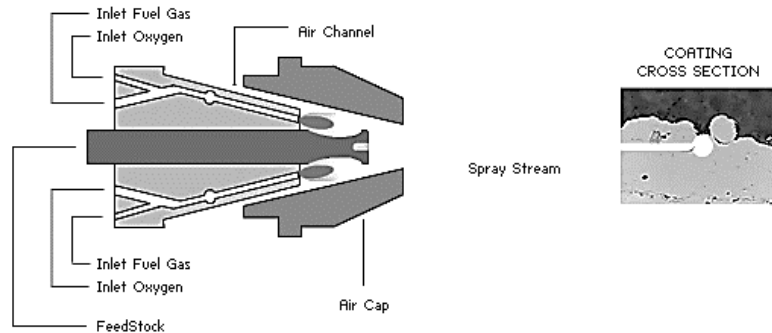

Fig 3 Illustration of a CVD process (Dow Corning Corporation)

2.4 Spray Coating

Spray coating is a simple yet extremely scalable method for thin film coating sprayed onto a surface. Thermal spraying can deliver coating in levels of nano/micro thickness. Figure 4 displays spray coating technique.

Fig 4 Illustration of a spray coating technique

2.5 Evolution of the carbon etched heat exchanger

A heat exchanger is a device in which heat energy is transferred from one fluidto another across a solid surface. Two important problems in heat exchanger analysis are(1):Ratingexistingheatexchangersand(2):Sizingheatexchangersforaparticular application. Rating involves determination of the rate of heat transfer, the change intemperature ofthe two fluids and the pressure drop across the heat exchanger. Sizinginvolvesselectionofaspecificheatexchangerfromthosecurrentlyavailableordetermining the design of a new heat exchanger forthe industrial application. A Primaryobjective in the Heat exchanger design is the estimation of the minimum heat transfer arearequired for a given heat duty, as it governs the overall cost of heat exchanger. So, thedesign of a heat exchanger usually involves a trial-and-error procedure where for a certaincombination of the design variables the heat transfer area is calculated and then anothercombinationistriedtocheckifthereisanypossibilityofreducingtheheattransferareaand also by withstanding the heat transfer rate/coefficient and temperature change in hotand cold fluid. Conventionally shell and tube heat exchanger is used in all chemical andallied industries for carrying out the heat transfer operations. Increase in the contact timebetweenhotandcoldfluidwillenhancetheheattransfer.Finally,thisaboveconcept (increasing the residence time distribution of fluids) is incorporated in thedesign ofheat exchanger to achieve the minimum heat transfer area and better heattransfer rate. Thisattempt has been made with the help of Pro-E software and the final design from Pro-E isnamedas MeshTypeHeatExchanger.Due to their design, carbon etched heat exchangers offer a less heat transfer area andhighcontacttimebetweenthefluidsandprovidethehighheattransferefficiency incomparisonwith others.

Fig 5 Model of heat exchanger

Steps involved in carbon nano material etching process.

1. **First coating (high thermal bonding material)**

High thermal bonding material is a silica-based material that gives better coupling of carbon nano material with the heat exchanger surface.

2. **Second coating (nano carbon material)**

Carbon nano materials are having high thermal insulating property. The carbon nano materials where coated the surface of the heat exchanger which is already coated with silica-based coating material.

3. **Third coating (curing process)**

This is process for protect the carbon layer and gives long lasting life.in this process hydro carbon solvents where used.

Fig 6 Model of carbon etched heat exchanger

III. RESULT AND DISCUSSION

In the current energy sectors, the performance expected from the heat exchangers plays a vital role in the development of cooling/heating systems for various applications. There is a tremendous need to decrease the energy loss and to increase the efficiency of heat exchangers have created a progressively significant responsibility for the researchers. The researchers, as well as the designers of heat transfer, are devoting their interest towards increasing the heat transfer rate between the heat exchanger surface and the heat transfer fluid (HTF) through several methods. Conventionally adopted enhancement for heat transfer technique is incorporation of prolonged exterior surface/fins to airside. However, this approach increases the overall weight of the system and pressure drop, obstructs airflow and the pumping power. In addition, the challenges in the existing enhancement method of heat transfer are very complex in design, size, long-term performance and economic considerations. On the other hand, heat transfer can be augmented using nanofluids. Nevertheless, due to the extensive range and the difficulty of the nanofluids arrangement, heat transfer mechanisms using nanofluids are still quite restricted. This could be minimized with the support of recent advancements in the arena of coating technology, which provides an opportunity to enhance the heat transfer when the heat exchanger exterior surface is coated with high thermal conductivity materials.

The present research work is aimed to investigate the heat transfer performance of the heat exchanger through recent advancement in coating technologies. Spray coating technique are used in this study to deposit the coatings on copper (Cu) substrate for cooling/heating applications. In addition, the same procedure was adopted to coat the heat exchanger to account for the subsequent enhancement achieved in the heat transfer rate.

In the present work, spray coating technique is used to coat the extracted charcoal from the wooden powder or coconut shell. The extracted charcoal from the material contain carbon and it will modify as activated carbon by using various chemicals. This activated carbon then converted as adhesive and used to paste in the outer layer of the shell and the outer layer of the tubes. Two types of carbon will be extracted for our work, one is to etch on the shell outer layer for heat rejection and the second adhesive is to etch on the outer surface of the tube for heat absorption by adding nano copper sulphate in the activated carbon. The chemical like sodium poly acrylate, sulphuric acid, nano copper sulphate, chloroform, xylene will be used to make the activated carbon adhesive in my project. Eventually the performance of the heat exchanger will be analyzed by taking temperature reading of the inlet and outlet of both shell and tube fluids. The rate of heat transfer will evaluate using these results.

IV. CONCLUSION

- The heat transfer rate is important in the heat–exchange device, as it has become a tough task for engineers in industry. The global demand for efficient, reliable and inexpensive heat exchange apparatus is accelerating rapidly, especially in large–scale industries, air conditioning and refrigeration systems. For improved airside heat transfer enactments, great developments in energy management and the defense of the surroundings are feasible. In recent years, coating technology has evolved globally into a most significant investigation area. The significance of coatings and fabrication of novel materials for manufacturing industry have led to in an amazing improvement of revolutionary coating and thin film technologies. At present, this advancement drives hand–in–hand by the rapid upsurge of technical and technological advances in optics, microelectronics, and nanotechnology.

- Another main field comprises process equipment for coatings with thinness fluctuating from one of few micron levels. These coatings are essentials for a group of manufacturing areas, for instance, thermal barrier and wear protection coatings, improving the service life of tools and protect materials against full of atmosphere and thermal impacts. Presently, rapidly changing requirements for coating material and procedures are generating new barriers for the progress of novel procedures, materials, and technologies. Hence, intense research actions will be essential in the upcoming, progressive predictive abilities for connecting the fundamental chemical and physical properties to the microstructure than the performance of coatings in many applications.

- In the present work, the heat exchanger is coated with a high thermal conductivity activated carbon material to increase the heat transfer performance of the heat exchanger for cooling/heating applications.

- The investigation will successfully evaluate the performance of the micro-coated heat exchanger.

V. REFERENCES

[1]. Albano Cavaleiro & Jeff Th. M. De Hosson 2016, 'Nanostructured Coatings' springer.

[2]. Anton Surtaev, Denis Kuznetsov, Vladimir Serdyukov, Aleksandr Pavlenko, Vasiliy Kalita, Dmitriy Komlev, Aleksandr Ivannikov, Aleksey Radyuk, 2018 'Structured capillary-porous coatings for enhancement of heat transfer at pool boiling', Applied Thermal Engineering, vol 133, pp 532-542.

[3]. Arsenyeva, O, Tovazhnyansky, L, Kapustenko, P, Perevertaylenko, O & Khavin G 2011, 'Investigation of the new corrugation pattern for low-pressure plate condensers', Applied Thermal Engineering, vol. 31, no. 13, pp. 2146–2152.

[4]. Bayon, R, Igartua, A, Fernandez, X, Martınez, R, Rodrıguez, RJ, Garcı, JA, Frutos A de, Arenas MA &DamboreneaJ.De 2019, 'Corrosion–wear behavior of PVDCr/CrN multilayer coatings for gear applications', Tribology International, vol. 42, pp. 591–599.

[5]. Behfard, Sohankar, 2016, 'Numerical investigation for finding the appropriate design parameters of a fin-and-tube heat exchanger with delta-winglet vortex generators' Heat Mass Transf., vol 52 (1), pp. 21- 37.

[6]. Berger, SA, Talbot, L & Yao, LS 1983. 'Flow in curved pipes', Annual Review Fluid Mechanics, vol. 15, pp. 461–512

[7]. Bergles, AE2017, 'Advanced enhancement—third generation heat transfer technology or the final frontier', Transaction of the Institute of Chemistry Engineering, Part A, vol. 79, pp. 437–444.

[8]. Bergles, AE, Jensen, MK & Shome, B 1996, 'Bibliography on the enhancement of convective heat and mass transfer', Journal of Enhanced Heat Transfer, vol. 4, pp. 1–6.

[9]. Bhatti, M.M.; Zeeshan, A.; Ellahi, R. 2017, 'Electromagnetohydrodynamic (EMHD) peristaltic flow of solid particles in a third-grade fluid with heat transfer'. Mech. Ind. Vol, 18, pp- 314.

[10].Biltoft, Benapfl& Swain 2012, 'Thin Film Deposition Processes Vacuum Technology 60A & 60B', Las Positas College, Fall.

Solar Powered Seed Sowing Machine

B. Ponkavin[1], Dr. S. Milan[2], Mr. S. Suse Raja Prabaharan[2]

[1]PG Students, Department of Mechanical, Cape Institute of Technology, Levengipuram, Tamil Nadu, India
[2]Assistant Professor, Department of Mechanical, Cape Institute of Technology, Levengipuram, Tamil Nadu,
India

ABSTRACT

In India, the majority of the population is dependent on agriculture for their livelihood. The use of fossil fuels in the agricultural activities leads to various environmental issues such as noise pollution and water pollution. Due to the increasing cost of energy, farmers are forced to spend more time on seed sowing. This is why a project has been developed that uses solar power. The machine is controlled by a microcontroller unit. It uses a solar panel to harvest the solar power and then recharges the battery. The DC motor is also used to provide power to the machine. It is connected to the rear wheel using a transmission system. The machine's path is monitored by an infrared sensor, which is controlled by the MCU. The seeds are sown according to the revolutions of the wheel. The machine then uses its solar power to dig the soil and cover it with fertilizer. It is designed to reduce the amount of pollution that comes from the agricultural activities.

I. INTRODUCTION

Now days in agricultural sector face many problems such as there is no skilled person is available to carry out agricultural process and time consuming for the process are high. The world population is rapidly grows so the agricultural products are highly focused and industrial requirements are also increased. In India the 70% of population is depends on the agricultural related activities and agricultural is the backbone of the India. The pollution level in all over the world is raised to hazardous level and many city is in India also reaches hazardous level in air condition and this pollution are mostly caused by the vehicles and some industrial activities. So we need to study all these issues. Innovative idea of our project is to overcome this problem faced by farmers and entire world due to pollution. Our project will use solar panel to reduce the pollution level and it is fully automated so it can save time and money for farmers and reduces the man labors and skilled person requirement for agricultural needs can also be reduced. This project consume much less power than tractor consumption and this project use the solar energy which is a renewable energy and enormously available in nature. In recent times the seed sowing machine are solar powered but partially operated is only available not fully automated is available in this project we can overcome all the disadvantage in the current market by it is fully automated and solar powered and cost efficient for the farmers.

II. LITERATURE SURVEY

Mahesh R. Pundkar. et.al High precision pneumatic planters have been developed for many verities of crops, for a wide range of seed sizes, resulting to uniform seeds distribution along the travel path, in seed spacing. The basic function of sowing operation is to sow the seed and fertilizer in rows at required depth and to maintain the distance between the seeds and provide proper compaction over the seed [1]

Swetha S. et.al In this machine solar panel is used to capture solar energy and then it is converted into electrical energy which in turn is used to charge 12V battery, which then gives the necessary power to a shunt wound DC motor. This power is then transmitted to the DC motor to drive the wheels. And to further reduction of labor dependency, IR sensors are used to maneuver robot in the field. Here 4 post sensors are used to define the territory and robot senses the track length and pitch for movement from line to line. [6]

Kunal A. Dhande. et.al In this work we replace complicated gear system by hall effect sensor for easier and costlier seed sowing and also reduce a need of labour. The Hall Effect sensor convert rotation into distance for which seed sowing at particular distance. Also, there is adjustable system for sowing at different distance. By using this machine, the sowing can be done row by row and distance will maintain. [7]

TruptiA.Shinde. et.al In seed sowing machine system, they are used battery powered wheels and dc motor inbuilt in these wheels. When the seeds are empty it detects the level of storage seed and indicates the alarm. When any obstacle comes in the in-front of machine or divert path the seed sowing machine can detect this obstacle very easily. In each complete rotation of rotating wheel there is seeds falls from this seed drum and the seed plantation process can take place smoothly as well as without wastage of seeds. The end of system machine reached and it create alarm. [10]

III. PROPOSED SYSTEM

We propose a machine which can carry out various farming activities like digging, sowing and irrigation etc. Figure 1 shows the block diagram of our experimental setup. This is a manually operated machine which is equipped with a four-wheel drive. The seed sowing machine is developed at a very low cost. It is cheap and easily affordable by rural farmers. It is maintenance free and various adjustments can be made with ease for continuous operation.In this project many components are used they are MCU(micro controller unit), IR sensors, Solar panel, Battery, Charge Controller,DC Shunt Motor, Seed Storage tank, Soil plough, Soil cover, Seed Disc.

3.1. MCU (micro controller unit)
The Micro Controller Unit is a compact integrated circuit design to give specific operation in embedded system. Micro controller unit is key component in this project the IR sensor gives the output signal to the micro

controller unit based on the IR sensor output the Dc Motor is controlled by the Micro Controller unit. The Micro Controller used in this project is Arduino Nano V3 micro controller
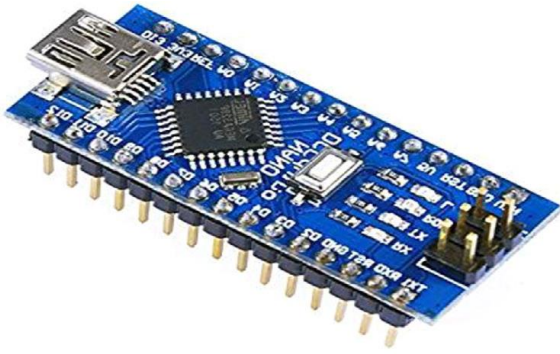

Fig. 1. Micro controller unit.

3.2. IR sensor

IR sensor is used in this project to control the motion of the machine and path of the machine and sense the obstacles in the path. Which gives its output to the MCU which controls the machine (see Fig. 2).
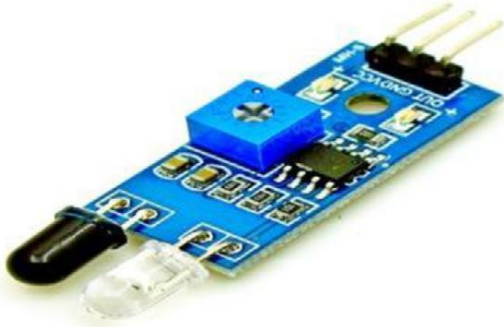

Figure 2: IR Sensor

3.3. Solar panel

The main concept solar panel is used to convert solar energy to electrical energy. The solar panel used is 12 V solar panel. The solar panel is made of material of semiconductor and it consist of pv cell.
Which supplies the energy to the Dc Shunt Motor (see Fig. 3).

Fig. 3. Solar panel.

3.4. Battery

The battery is a electrochemical cell which is used to save the electrical energy and in this project we use 12 V Lead acid battery.

3.5. Charge controller

The charge from the solar panel is stored in the charge controller where the solar power is converted into the electric power.This power during conversion **process can be stored and used.**

### 3.6. Seed storage tank, soil plough, soil cover

The Seed storage tank is used to store the seed and we can add the seed according to requirements. The soil plough is used to dig the soil in the field. The Soil cover is used to cover the soil after the sowing of the seeds. The Seed sowing disc which used to drop the seed to the field from the seed storage tank and it is controlled by the revolution of the wheels.

IV. WORKING METHODOLOGY

In this project first solar energy is absorbed on the solar panel by pv cell and then it is transferred to the charge controller which used to transfer the solar energy into electrical energy and save the charge [1]. The electrical energy from the charge controller than transferred to the battery of 12 V (lead acid battery). The battery is used to save the electrical energy when the solar power is insufficient we can use the electrical energy from the battery. The electrical energy is given to the Dc motor. The Micro controller in this machine will control the motor motion and it will stop and on the Dc motor. The IR sensor will sense the obstacles and path should be covered by the machine. According to the output of the IR sensor the MCU will control the Dc motor. The seed are sowing is carried based on revolution of the wheel (one seed for one revolution). Dc Motor which converts electrical energy into the mechanical energy and the mechanical energy is transmitted to the rear wheel using the transmission system. The seed plough will dig the soil in correct required manner and seed from the seed storage tank will fall to the seed disc which will drop the seed into the soil based on the revolution of the wheel we can control the seed feed to the soil. The sand cover is a used to cover the soil after sowing the seed and fertilizer can also be sprayed

4.1 Material used

In this project we use three types of materials such as Low carbon steel, Medium carbon steel and High carbon steel. Low carbon steel is used to construct the farm machinery and medium carbon steel used to construct the shafts connecting rod etc. The high carbon steel is used to construct the transmission system.
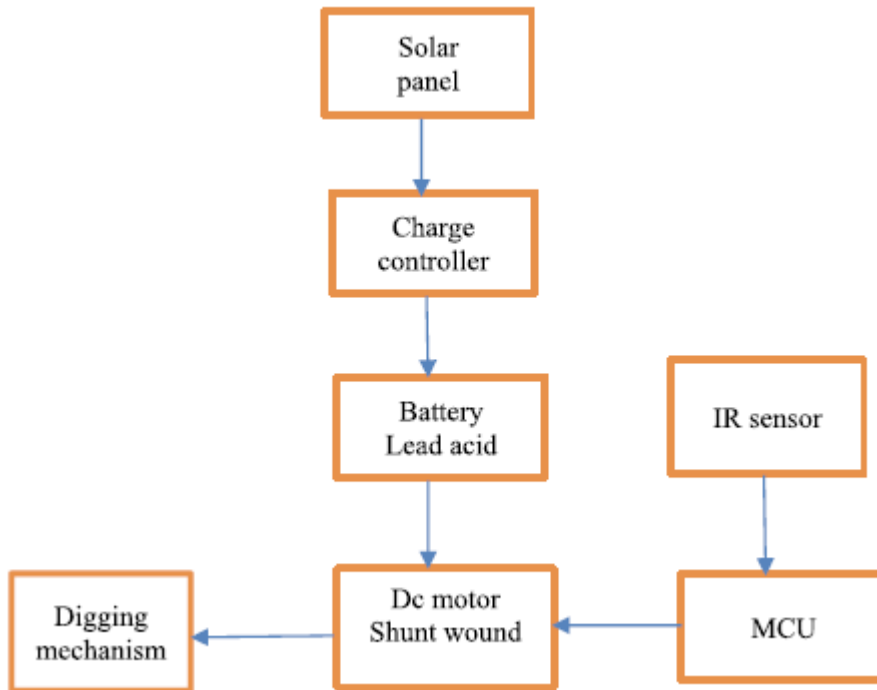
Fig. 5. Experimental setup.

4.2. Future Scope

1) Introduction of drill in place of cutter can be used as soil erosion equipment.
2) Machine can be operated automatically with the help of remote control or navigation sensors.
3) Multi-hopper can be attached instead of single hopper for sowing of a large farm.
4) Seed Spacing sensors can be used for accurate spacing.

V. CONCLUSION

In India about 70% of the population lives in rural areas and their main source of income is dependent on agriculture sector. So, it is important to have special focus on agriculture sector and to apply latest technologies and methods which are more advance and efficient. This will lead to better growth rate of the country. Our machine which operate on solar power when compared to different traditional seed sowing methods, it can be concluded that:

1) Sowing rate can be controlled
2) Seed spacing can be achieved
3) Less manual power is required
4) No pollution is caused
5) Economical
6) Variety of seeds can be sowed

VI.REFERENCES

[1]. Mahesh R. Pundkar, "A seed sowing machine: A review" IJESS volume 3, Issue 3. ISSN: 2249-9482, International journal of engineering and social science.

[2]. P.P. Shelke, "frontline demonstration on bullock-drawn planter enhances yield of soya bean crop. International journal of farm science 1(2):123-128, 2011.

[3]. Sahay (1990), Principals of Agricultural Engineering (2005), Volume 1, Text book published by Jain brothers, New Delhi, India.

[4]. N.Iqbal, N.Akbar, M.Ali, M.Sattar, L.Ali."Effect of seed rate and Row spacing on yield and yield components of Wheat "Journal of Agricultural Research, 48(2).

[5]. R. Joshua, V. Vasu and P. Vincent "Solar Sprayer - An Agriculture Implement", "International Journal of Sustainable Agriculture" 2 (1): 16-19, 2010 ISSN 2079-2107.

[6]. Swetha S. and Shreeharsha G.H., "Solar Operated Automatic Seed Sowing Machine", Cloud Publications International Journal of Advanced Agricultural Sciences and Technology 2015, Volume 4, Issue 1, pp. 67-71, Article ID Sci-223, 26 February 2015.

Fabrication of Dual-Axis Solar Tracking Controller Project

ManikandanJ[1], Mr.E.Rajesh[1], Mr.E.Prakash[1]

[1]Department of Mechanical Engineering, Cape Institute of Technology, Anna University of Chennai, Tamil Nadu, India

ABSTRACT

The recentdecadeshave seentheincreaseindemandforreliable andcleanformofelectricityderivedfrom renewableenergysources.One suchexampleissolarpower.The challenge remainstomaximizethe capture oftheraysfrom thesunforconversionintoelectricity.Thispaperpresentsfabricationandinstallationofa solarpanelmountwithadual-axissolartrackingcontroller.Thisisdonesothatraysfrom thesunfallper-pendicularlyuntothesolarpanelstomaximizethecaptureoftheraysbypointingthesolarpanelstowards thesunand followingitspathacrossthesky.Thuselectricityandefficiencyincreased.

Keywords: Controller,Tracker, Sensor,Battery,Inverter,Timer,Switches,Program,Installation

I. INTRODUCTION

Electricalenergyfromsolarpanelsisderivedby con- vertingenergyfromthe raysofthesunintoelectrical currentinthesolarcells.Themainchallengeisto maxi- mizethecaptureofthe raysofthesunuponthesolar panels,whichinturn maximizestheoutputof electricity. Apracticalwayofachievingthisisby positioningthe panelssuchthattheraysofthesunfallperpendicularly onthesolarpanelsby trackingthemovementofthesun [1].Thiscanbe achievedbymeansofusingasolarpanel mountwhichtracksthe movementofthesunthroughout theday.Energyconversionismostefficientwhenthe raysfallperpendicularly ontothesolarpanels.Thus,the workisdividedintothreemainpartsnamelythe mount- ingsystem,thetrackingcontrollersystemand theelec-tricalpowersystem.

Insolartrackingsystems,solarpanelsaremountedon astructurewhichmovestotrackthemovementofthe sunthroughoutthe day.There are three methodsof tracking: active, passive and chronological tracking. Thesemethodscanthenbeconfiguredeitherassin- gle- axis ordual-axissolartrackers.Inactivetracking,the positionofthesuninthesky duringtheday iscontinu- ouslydeterminedbysensors.Thesensorswilltriggerthe motororactuatortomovethemountingsystemsothat thesolarpanelswillalwaysfacethesunthroughout the day.This methodofsun-trackingis reasonably accurate exceptonverycloudydayswhenitishardforthesensor todeterminethepositionofthesunintheskythusmak-

ingithardtoreorientthestructure[2].

PassiveTrackingunlike activetrackingwhichdeter- mines thepositionofthesuninthesky,apassivetracker movesin responseto animbalanceinpressurebetween twopoints atbothendsofthetracker.The imbalanceis causedby solarheatcreatinggaspressureona"lowboil- ingpointcompressedgasfluidthatisdriventooneside orthe other"[2]whichthenmovesthe structure.How- ever,this methodof sun-trackingis notaccurate.A chronological tracker isatimer-based trackingsystem whereby thestructureismovedatafixedratethroughout theday.Thetheory behindthisisthatthesunmoves acrosstheskyatafixedrate.Thusthemotororactuator isprogrammedtocontinuously rotateata"slowaverage rateofone revolutionperday(15degreesperhour)"[2]. This methodofsun-trackingisveryaccurate.However, thecontinuousrotationofthe motororactuatormeans morepowerconsumptionand trackingthesunonavery cloudydayisunnecessary.

Asingle-axissolartrackerfollowsthemovementof thesunfromeasttowestby rotatingthestructurealong theverticalaxis.Thesolarpanelsareusually tiltedata fixedanglecorrespondingtothelatitudeof thelocation. Accordingto[3],the useofsingle-axistrackingcanin- creasetheelectricityyieldby asmuchas27to32per- cent.Onthe otherhand,adual-axissolartrackerfollows theangularheightpositionofthesuninthesky inaddi- tiontofollowingthesun'seast-westmovement[3] re- ports that dual-axis tracking increases the electricity outputasmuchas35to40percent.

II. DESCRIPTION

Theprimarytaskofthispilotprojectistobuildanactual solarpanelmountwithasun-trackingsystemto bein- stalledoutdoorsin Miri(location:4˚23′ 35″ N113˚58′ 49″ E) inSarawak,Malaysia.Basedonthebackground infor- mationofthevarioustypesofsolartrackers,it hasbeen decidedthatactivetrackingwithadual-axisset-upwill beused.The reasonforthischoiceisactivetrackingisa fairly effectivemethodtotrackthesunandadual-axis trackingsystem hasthe capabilityofincreasingthe yield ofelectricalenergy outputfromthesolarpanels.

Forthe purposeofclarity,theeast-westofthetracker willbe calledthe"horizontaltracking"whiletheangular height trackerwillbereferred toas"verticaltracking".

Anactive,dual-axistrackingsystemprototype has al- readybeendesignedandbuiltby[4],whichconsistsof thesensorsystemtodeterminethepositionofthesun andacontrolsystemwhichreadsdatafromthesensors tocommand themovementofthetracker.A programto controlthetrackingsystemhasbeenalsodeveloped[4]. Thesensorsystemconsistsoftwosensors:onetodeter- minethepositionofthesunintheskyandanotherto determinethepositionofthesun'smovementfromeast towest.EachsensorconsistsoftwoCadmiumSulphate (CdS)lightdependantresistors(LDRs).

The LDRs were placed as shown in Figure 1, a shadowwillfallononeoftheLDRswhenthesensoris notpointingdirectly towardthesunresultingindiffer- enceofthelevelofresistancebetweenthetwoLDRs. Thisdifferencewillbedetectedby themicrochipinthe controlsystemandwillmovethetrackeraccordingly so thatbothLDRs arepointingtowardsthesun.

Todecidehow thetrackerwouldmove,itisimportant toconsiderthemovementofthesuninthesky through- outtheyear.ThesunpathdiagramofFigure2shows theannualvariationofthepathofthesuninMiri. Fromthesunpathdiagram,themovement ofthesun
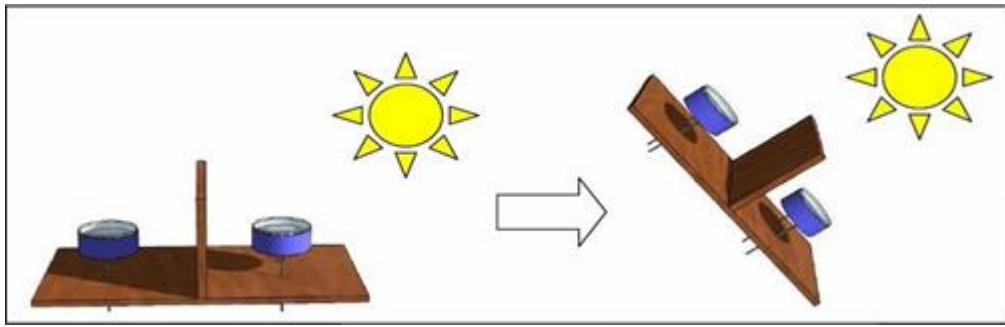
Figure1.Sensorresponseonceashadowis castononeLDR.

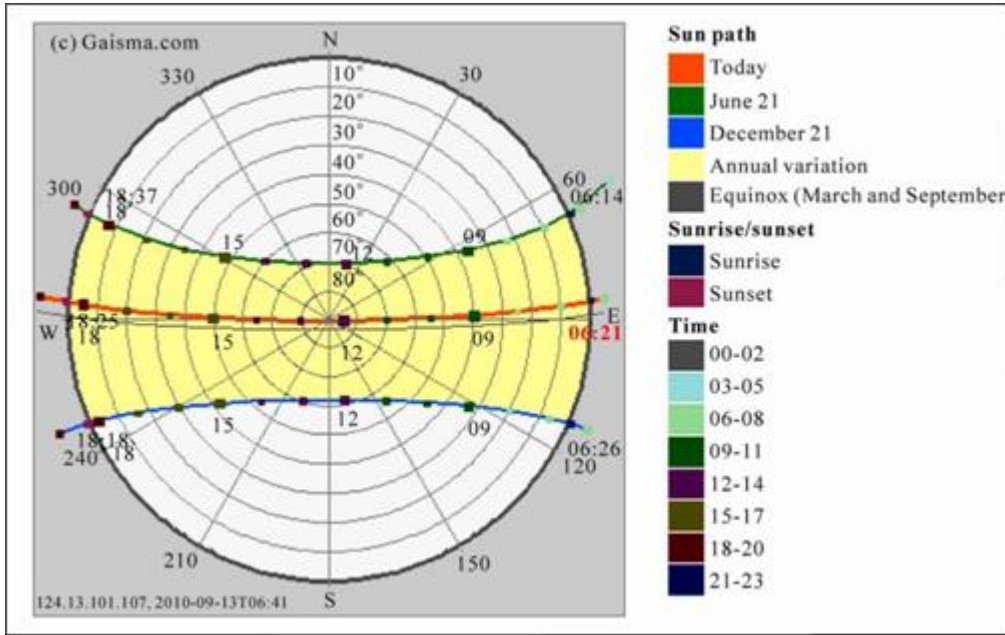

Figure2.Sun pathdiagramforMiri,Sarawak,Malaysia.

intheskythroughout theyearinMiricanbedividedinto threedifferentscenarios.AsthesunrisesfromtheEast tosetstotheWest,thesunpathmay moveintheSouth- ernorNorthern region,oritmay movealmostdirectly overhead. If thepathof thesunisintheNorthern region,the structuremustbe ableto trackthesunfromEastto West inanti-clockwisedirection.Ifthe pathofthesunis inthe Southernregion,thestructuremustbeabletotrackthe sunfromEasttoWestinclockwisedirection.Ifthesun ismovingoverhead,only theaxiswhichtracksthean-gularheightofthe sunwillmove.Inallthreesituations, theremustbeaway toturnbackthetrackertoitsorigi-nalpositionafterithasfollowedthemovementofthe sun from morning to dusk. To achieve this, limit switchesareaddedtothesystem.Whenthelimitswitch istriggered attheendof theday,thetrackerwillmove backtoitsoriginalposition.

Whiletheprototypehasbeendoneandtestedinthe lab,thispaperfocusesonthedesign,fabricationand in-stallationofasolarpanelmountingsystemwithdual- axissolartrackingcontrollerto betestedand in- stalled outdoors.Thesystemisthen connected toabat-tery bankviaachargecontrollerandDCvoltagefromthe solarpanelsis convertedtoACvoltagethroughan inverter.Improvementsweremade tothedesignofthe sensor,the controllerprogramandlimitswitcheswere addedtothesystem.

III. MOUNTINGSYSTEM

Themountingsystemrefersto thestructurewhichholds thesolarpanels;thestructure consistsofmovableand fixedpartsbasedonaset ofcriteria.

Firstly, the structure must be able to support the

weightofthesolarpanelswhicharemountedonit.In thiswork,twosolarpanelsareused.Thetotalweightis 31kg,15.5kgeach.Besidesthat,thecolumnandthe baseofthestructureshould alsobeabletosupportthe weightoftheframe,whichisestimatedtobe about70kg [5].Thatgivesatotalweightofslightlymorethan100 kg.

Secondly,sincethe structurewillbeerectedoutdoors, thestructuremustbeabletowithstand theelementsof nature,mostnotably theeffectsfromthesun(heat),rain (water)andthewind(air).Ofutmostconcernwillbe effectofwindloadonthestructure whenwindloadis actinguponthesolarpanels.Basedonthe recorded maximumwindspeeddataofMiriwhichis 78 km/h[6], andassumingthewindflowisacting perpendicularly uponthemaximumareaofthesolarpanels,thewind loadiscalculatedusingthe genericformula[7]asfol- lows:

Windload:Force,$F = A \times P \times Cd$

A =projectedareaofthe item=$(1.58m \times 0.808m \times 2)$

$=2.553m^2$

P =Windpressure(Psf), $=0.00256 \times V^2$(V=windspeed

74.5652Mph)$=0.00256 \times 74.5652 = 14.233$ Psf=

0.0988 Psi $= 69.492$ Kg/m2

Cd=Dragcoefficient,=2.0forflatplates.

⸫Windloadforce=$A \times P \times Cd = 2.553m^2 \times 69.492$ kg/m2$\times 2.0 = 354.826$kg≈ 3548.26N

The calculation shows that the   material chosen to make thestructurewouldneedtobeabletowithstanda perpendicularactingforceof3548.26N.

Thirdly,themovablepartsofthestructuremustbe

ableto rotatetofollowthemovementofthesun throughouttheday.Adouble-axissolartrackermeans thetrackermustbeabletorotatealongtheverticalaxis tofollowthemovementofthesunfromEasttoWest, andalso rotatealongthehorizontalaxistofollowthe positionofthesun's angularheightinthesky.Inthat manner,thestructurewouldbeableto pointthesolar panelstowardsthepositionofthesuninthesky.

Themotorusedforthispilotprojectisa12VDC

motorwhichhasatorqueofabout13.5pound-feet(18.3

Nm)to17.5pound-feet(23.73Nm)[8].Tojustifythe useofthis motor,thefollowingcalculationwasdone to ensurethatithasenoughpowertorotatethemassof100 kg;the radiusofthesprocketr=0.1m,andtakingval- uesofcoefficientoffrictionofthebearing=0.001[9] and thecoefficientoffrictionbetweenthechainand the sprocket(steelandsteel)=0.42[9],the torque neededis calculatedas:

Torque=$F \times r$, whereF=mgcf(Serway2000, 132)

$=(mgcf) \times r = (100kg \times 10m \cdot s^{-2} \times 0.001$

$\times 0.42) \times 0.1m = 0.042$ Nm

Theultimatetensilestrengthis about50,000psiwhile theyieldstrengthis about30,000psi.[10].Basedonthe strengthof steel,thestructurewouldbeabletowithstand theeffectofwindloadas wellas the otherweightloads placedonit.Thus,theoptimum designisasshownin Figure3.Itisimportantthatthereare noshadowscast uponthesolarpanel.Any shadowscangreatlyaffectthe outputofelectriccurrent[11].Itis thereforeimportantto ensure thatduringday-time at thesiteforthe installation ofthesystem, noshadowsfromtrees,buildings orother tallobjectssuchaspolesarecastonto thesolarpanels. Thus,thesiteselection for thispilotprojecttookinto considerationthisparticularissue.

IV. FABRICATION AND INSTALLATION

Thefirstpart tobefabricatedwastheframe ofthestruc- ture.Ateachendoftheframe,apillowblockbearing is usedtoenabletheframetorotatealongthehorizontal
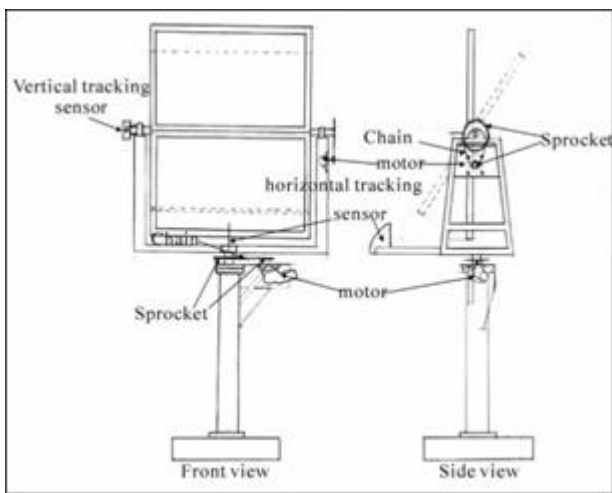
Pillow block bearing
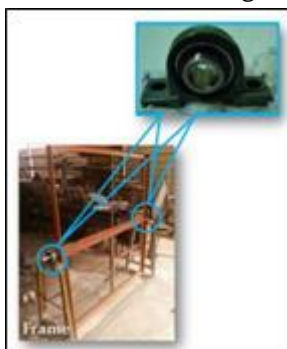
Steel frame

DC motorplacedatthe sideoftheframe

Figure3.Finaliseddesignof thestructure.

Flangebearing

axis.A metalshaftwhichgoesthroughthecentreofthe frameconnectsthetwobearings.Also,theDC motor controllingtheverticalmovementisplacedononeside oftheframe.Figure4illustratethefabricationparts.

Oncetheframewascompleted,thecolumnof the structurewasmade.The upperpartofthecolumnisde- signedto holdtheotherDCmotorwhichcontrolsthe horizontalmovementthelower partoftheframewas thenattachedtothe upperpartofthecolumnusingtwo flangebearingswhichareconnectedby ashaft.The bearingsare usedtoenablethe structure toturnaboutthe verticalaxis.

Asprocketis affixeduntotheshaftofthe motor,unto oneendoftheshaft,besidesthe pillowblockbearingand attheendoftheshaftontoptheflangebearing.Achain isthenput inplacesothatwhenthe motorsarepowered, thestructurecan rotate.Thegearratiousedis10:40(1:4),

10onthe motorand40onthe shaft.Afterinstallingthe solarpanelsuntotheframe,itwasfoundthat therotation

ThecolumnDCmotoraffixedatthetop

Frameandcolumn attached

wasnotstabledue to imbalanceinweight.Therefore,a counter-weightwasaddedtothebackof theframeto balancethe torque actionontheshaft,asgiveninFigure 5.

Fromleft to right:Sprocketattachedto motor,sprocketattachedto frame,chainconnectingthetwosprockets

Figure4.Fabricationparts.

Thebaseofthecolumnwasconcretedwitha   tubepipe   andweldedunto   thegalvanisedpipebeforeboltingthe columnuntothebase.Then,theframe   wassecuredunto   thecolumnalsousing   nutsandbolts.Anextralayerof concretewasthenaddedtocoverthelowerpartofthe baseofthecolumn.Figures6illustratethe installation process.

V. TRACKING CONTROLLER SYSTEM

Theprogramforthe   trackingcontrollerwaswrittenby   PICBasicwhichisthenconvertedtobinary   ormachine languagebeforebeingloadedintothemicrocontroller.

Figure5.Thesolarpanelaffixedtotheframe(left).The counter-weight(circled,right).

Baseofthecolumnisweldedandthecolumnbeingsetup

Theframebeingattachedtothecolumn

Applyinganextralayer of concreteto thebase

Figure6. Installationprocess.

Themicrocontrollertogetherwiththecontrollercircuit andthesensorwillcontrolthe movementofthestructure to trackthesun.[4]Haschosento useMicrochip's PIC16F84Amicrocontroller,giveninFigures7and8.
Theprogramandcircuithasbeendevelopedby[4].   Eachtrackingaxishasitsowncontrolcircuit.Tocontrol   the rotational direction of the motor, [4] used an H- Bridge. The works and writings of [2,12] have been referredtowhenmakingthefollowing modificationsto [4]program:
Renamingsymbols
Reassigningports
Including limitswitches
Changingvaluesof scalesandtime
Thealgorithmisbasedontheclassicalbasic   language   todetectthevoltagesignalfromthelightsensors   and comparebetween2 signals andcalculatethedifferent.

Thisdifferentisconvertedto   setacertainpositionangle   andsendthesignaltothemotortorotateprecisely   toan accuratepositionsothat facing thesun.
Theprogramistoolongandisnottypedinthispaper,
butsmallpartoftheprogram isgivenbelow:
Include "bs1defs.bas" Start:
Symbol CDS1 = B0
Symbol CDS2 = B1
Symbol Diff = B6

TRISB.0=1'setpinRB0asinput(sensor1)

TRISB.1=1'setpinRB1asinput(sensor2) TRISB.2 = 0 'set pin RB2 as output TRISB.3 = 0 'set pin RB3 as output

Low PORTB.2 'pin RB2 set to low

Low PORTB.3 'pin RB3 set to low

Low PORTB.4 'pin RB4 set to low

(limit-switch1)

Low PORTB.5 'pin RB5 set to low

(limit-switch2)

Theabovedescriptionis:Symbolsaredeclaredand

theinput/outputandvariablesareinitialised.Thecode   waswritteninPICBasic   (savedas   a.bas   file)usingMi-croCodeStudio.Withinthissoftware,theprogramcode   isthencompiledandthe   .hexfileisobtained.Figure9   shows theMicroCode Studio.

Toloadtheprogramintothe microcontroller,Micro- chip'sMPLAB IDEwasusedtogetherwithPICSTART Plus.

Followingthestepstaken toset-upthePICSTART Plusprogrammer,Figures10and11:

•Ensurethat PICSTARTPlusispoweredandcon-

nectedtotheRS232portofthecomputer.

•OpenMPLABIDE.

•Go to "configure >select device" and the corre- sponding microcontroller model was chosen. Click
 "ok".

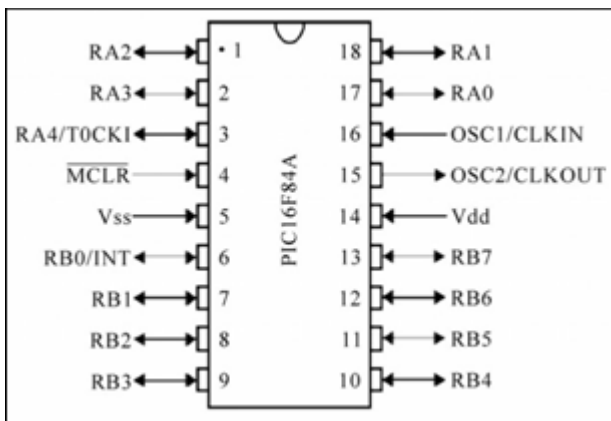•Goto"programmer>selectprogrammer"and"PIC-

STARTPlus"waschosen.

Figure7.Pin setup for thePIC16F84Amicrocontroller.

PinNo.	Name	Function
1	RA2–PORTAbit2	Secondpinon portA.Hasnoadditionalfunction.
2	RA3–PORTAbit3	Thirdpinon portA.Hasnoadditionalfunction.
3	RA4/T0CK1	FourthpinonportA.T0CK1whichfunctionsasatimesisalsofoundonthispin.
4	MCLR–masterclear	Resetinputand Vssprogrammingvoltageof PIC.
5	Vss–Gnd	Groundofpowersupply.
6	RB0/INT– PORTBbit 0	Zeropinonport B.Interruptinputisanextrafunction.
7	RB1–PORTBbit 1	Firstpinon portB.Noadditionalfunction.
8	RB2–PORTBbit 2	Secondpinon portB.Noadditionalfunction.
9	RB3–PORTBbit 3	Thirdpinon portB.Noadditionalfunction.
10	RB4–PORTBbit 4	FourthpinonportB. Noadditionalfunction.
11	RB5–PORTBbit 5	Fifthpinonport B. Noadditionalfunction.
12	RB6–PORTBbit 6	SixthpinonportB.'Clock'lineinprogrammode.
13	RB7– PORTB bit 7	SeventhpinonportB.'Data' linein programmode.
14	Vdd+Vsupply	Positivepowersupplyof+2.0Vto+5.5V
15	OSC2	Pinassignedforconnectingwithanoscillator.
16	OSC1	Pinassignedforconnectingwithanoscillator.
17	RA0–PORTAbit0	SecondpinonportA. Noadditionalfunction.
18	RA1–PORTAbit1	FirstpinonportA. Noadditionalfunction.

Figure8.Pinfunctionfor thePIC16F84Amicrocontroller.
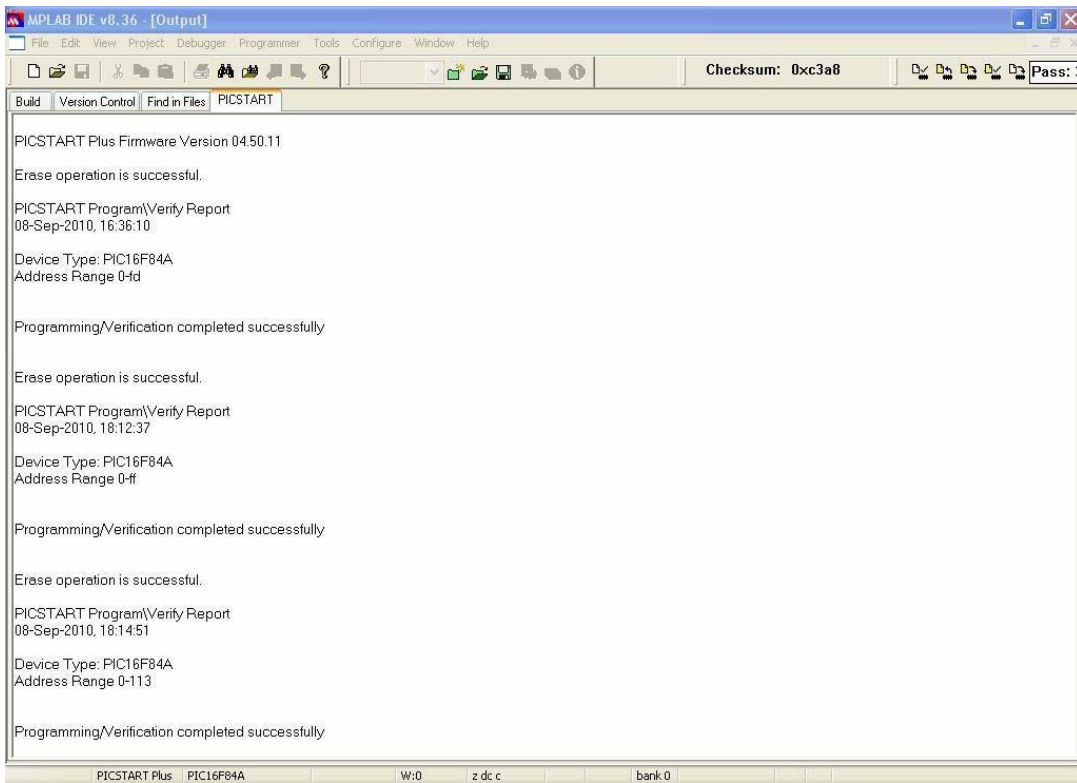
Figure9.ScreenshotofMicrocodestudio.
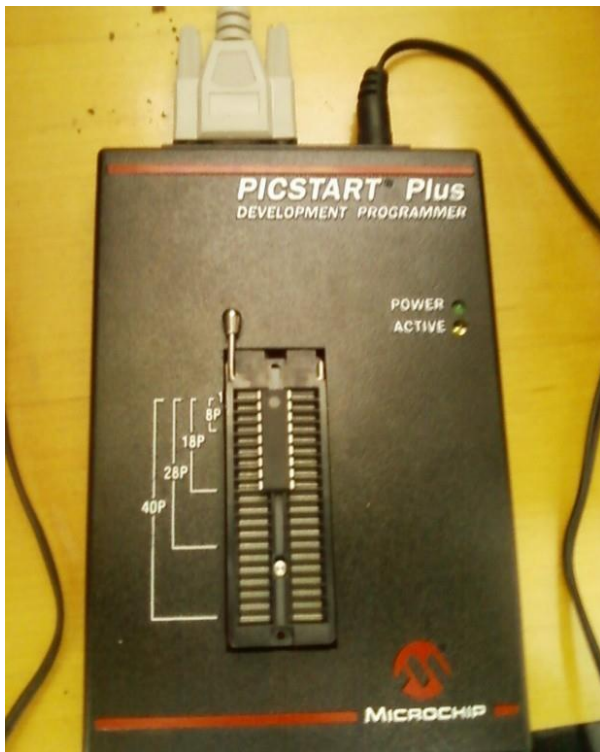
Figure10.ScreenshotofMPLABIDE.

Figure11.PICSTARTPlusprogrammer.

• Goto "programmer > enable programmer".

• Goto "programmer > settings" and choose the "communications" tab. The port which the PICSTART Plus programmer is connected to was selected. Click "ok".

Once the programmer has been properly set-up, following were the steps taken to program the microcontroller using PICSTART Plus:

• The microcontroller was inserted into the corre- sponding pin holes of the programmer.

• Goto "file > import" and from the targeted directory, the ".hex" file which is to be programmed into the microcontroller was selected.

• Goto "programmer > erase flash device" to erase any data stored in the microcontroller.

• Goto "programmer > program" to program the mi- crocontroller.

• If the programming was unsuccessful, the settings of the programmer were re-checked. If the settings are correct, the microcontroller might be spoilt. Another way to check if the microcontroller is spoilt is by verifying the microcontroller. Goto "programmer > verify" and if the verification is unsuccessful, it is possible that the microcontroller is faulty.

Printed Circuit Board (PCB)

The PCBs in this pilot project were made by means of chemical etching, it was noted that the PCB making pro- cedure can be divided into six main processes. These are:

• Design the PCB by EAGLE software, the schematic circuit was drawn in the program, by wiring up the corresponding electronic components

• Develop the image of the board by placing the trans- parency face down unto the UV exposure unit, and then place the board into the solution

• Etching by 250g of Ferric Chloride Hexahydrate granules was mixed with 500ml boiling water and in another plastic container

• Spray the board with a photoresist strip solution

• For tin-plating, Fourteaspoons of tin crystals were dissolved in 300ml boiling water and the board was immersed into the solution to coat the copper part of the circuit with thin layer of tin to prevent oxidation and acts as solder flux. Once coated, the board is given a rinse

• Drilling holes and soldering the electronic compo- nents and testing the circuit board

Figure 12 shows the completed PCB.

Sensor

The sensors will trigger the motor to move the mounting system so that the solar panels will always face the sun. Some Improvements were made to the design of the sensor holder to make the sensor more sensitive. This

wasdonebyincreasingthelengthofthesensorholder.   Forthefrontsensor,thesensorholderwas   redesignedto   suit theangularmovementofthesunsothatshadowcan
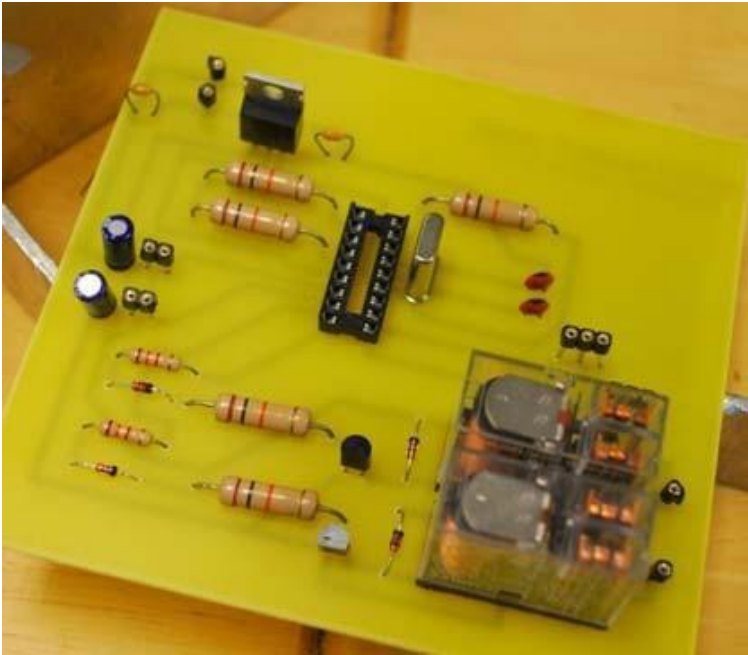
Figure12.AcompletedPCB withelectroniccomponents solderedon.

becastontotheLDRfromanyangular heightofthesun inthesky.Figure13shows thenewdesignofthehold- ers Thesensorholderwasthenpainted.Afterthepaint   wasdry,theLDRswereinsertedintothe   holderanda plasticcoverwasplacedontopof   thesensorandsilicone   appliedaroundthecoverof   thesensorholdertoprevent wateringressintotheLDRs.ThisisshowninFigure14.

VI. SYSTEM CONNECTION

The overallelectricalconnectionforthesystemisgiven byFigure15. Asseen,thesolarpanelsare connectedto

Verticaltracking   Horizontaltracking

Figure13.Sensorholders.

Figure14.Placementof the sensorson thestructure.

fromthesolarpanelsis higherthanthevoltageofthe batterybank,whichis48Vto enablechargingthebat- teries.

ChargeController

Thewirefromthesolarpanelisconnectedto   thecharge   controller.Thechargecontroller,Figure20,is   usedto maintainpropercharging   voltageonthebatteries.Itpre-   ventsoverchargingofthebatteriesshouldthe   input voltagefromthesolarpanelsrises.
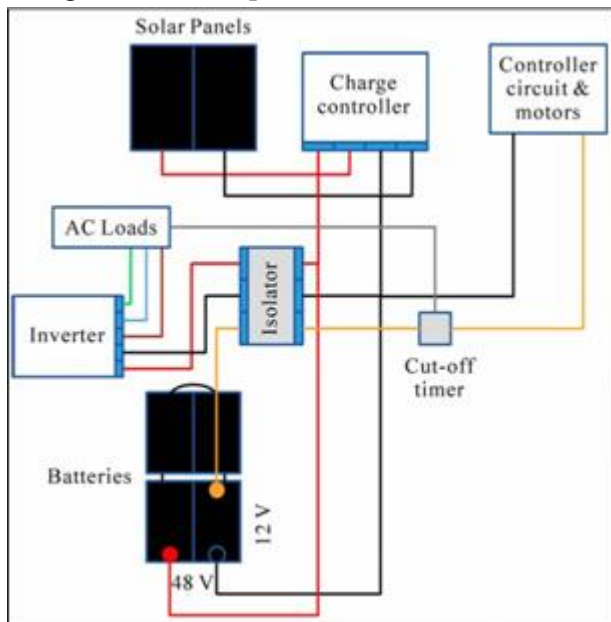
Figure15.System connection.

thechargecontroller,whichisthenconnectedtothe   bat-   tery   bank.Thebatterybankisthenconnectedtothein-verterandalsoanotherwireisconnectedfromthebat-   tery   topowerthecontrollercircuitandthemotors(rep-resentedby theorangecolouredwireintheFigure15). The controller box houses the controller circuits   and servesasa junctionboxforthevariouselectricalcon- nectionsisasshowninFigure16.

Figure17explains thevariouswireconnectionsin the   junctionbox.Forthe   wiringofthesensor,   thewiring configurationof Figure18wasused:

Twosolarpanels,Figure19, areconnectedinseriesto giveatotaloutputvoltageof72V.Thereasontheyare connectedinseriesistoensure that theoutputvoltage

Figure16.Insidethecontrollerbox.
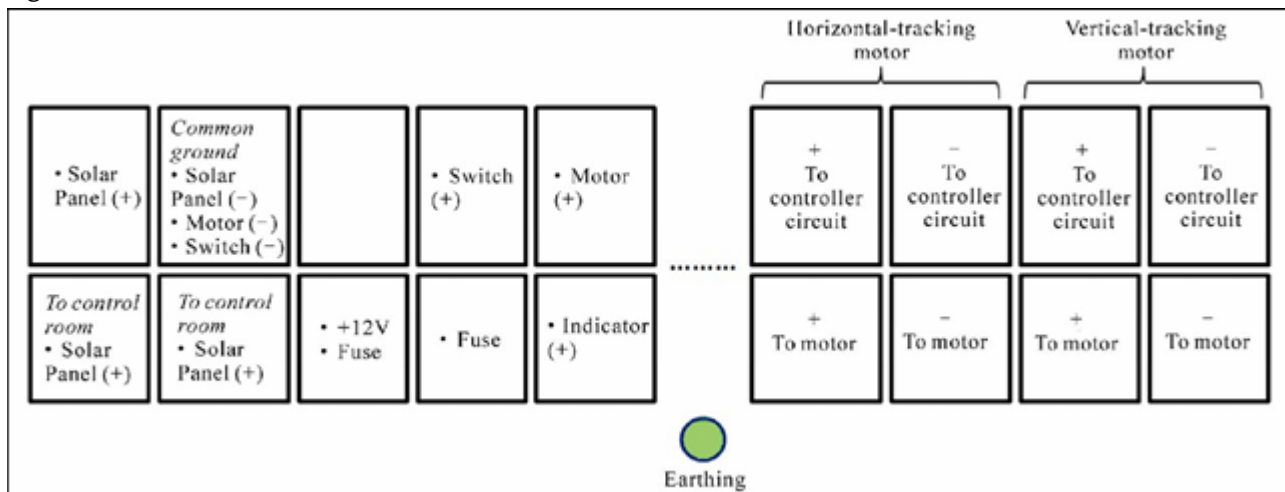
Figure17.Explanationof thewiringconnectioninsidethe junctionbox.

Horizontal-tracking sensor   Vertical-tracking sensor

L	R	T	B
• Black	• White	• Black	• White
• Green	• Orange	• Green	• Orange
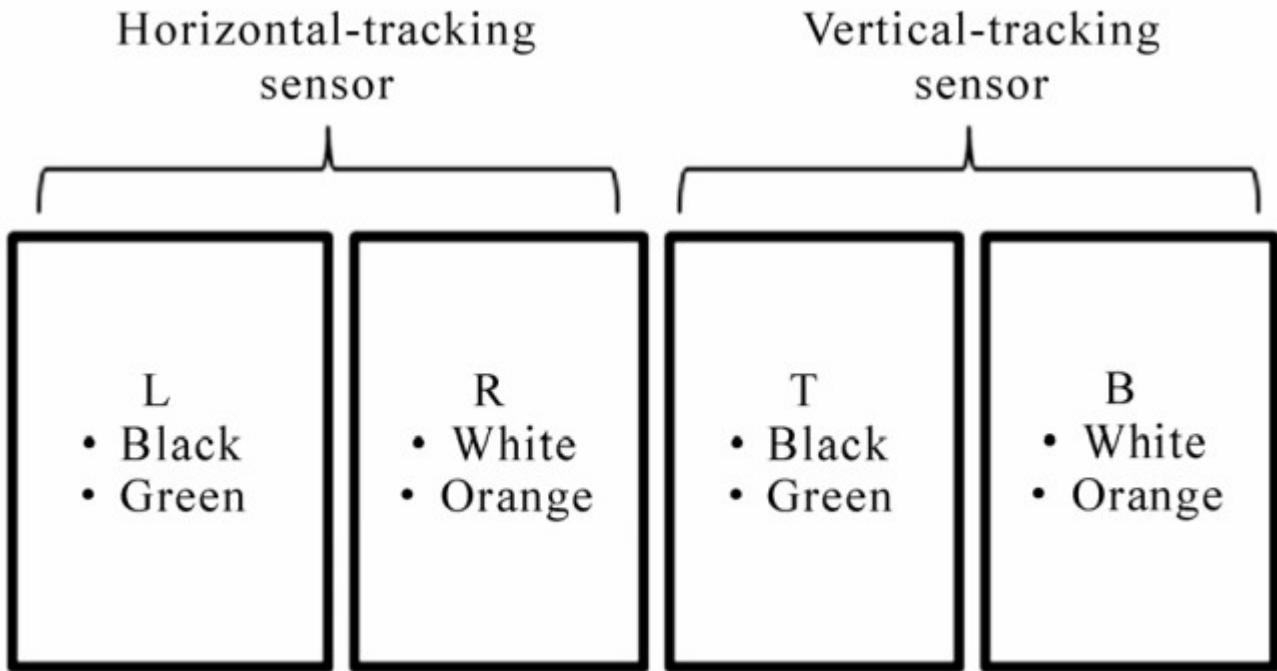
Figure18.Connectionofthecolouredwiresfor the sensor.

Figure19.Thesolarpanels.

Figure20.Thechargecontroller.
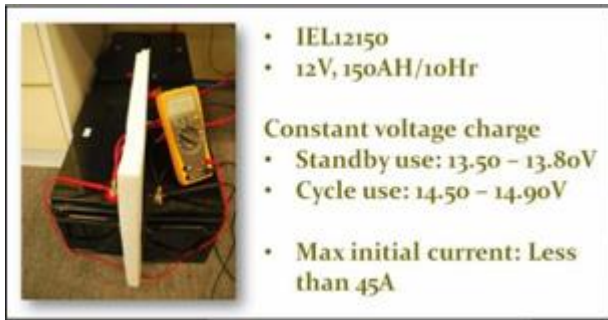
Figure21.Thebatterybank.
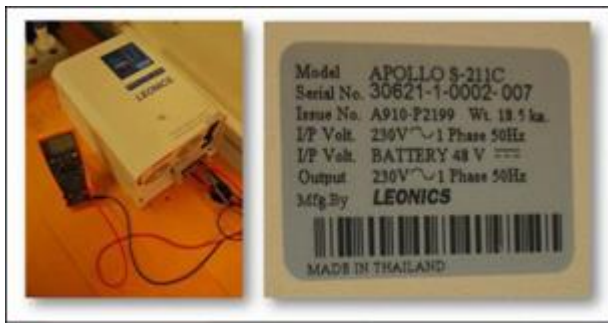
Figure22.Theinverter.

BatteryBank

Four12Vbatteriesareconnectedinseriestocreatea totaloutputvoltageof48V,showninFigure21.The wirefromthechargecontrolleristhenconnectedto the battery bankwhichenablesthebatteriestobecharged. Fromthebatterybank,awire isconnectedtotheinverter. Thenanotherwireis placeononeof the12Vbatteriesto powerthe12VDCloadssuchasthemotorsaswellas thecontrollercircuit.

Inverter,Isolator and Cut-offTimer

Theinverter,Figure22,convertsthe48DCvoltageof thebattery to230ACsinglephasevoltage topowerAC loads.Anisolatorisput inplaceto makemaintenance workonthesystemeasier.

Thecut-offtimer,Figure23,isa24-hourbasedtimer whichallowselectriccurrenttopassthroughatpre-set times.ThetimerispoweredusingACvoltagefromthe inverter.Thepurposeofthetimerisbecausetheframe holdingthesolarpanel has made morethanonefull rota- tiontothepointthatthecableswerealltwisted.Upon inspection,itwasdiscoveredthatthesensorrespondedto thestreetlightingsalonglakesidewhichwerelitafter sunset.Toovercometheproblem,acut-offtimerwas placedtocut-offtheelectricitysupplytothecontroller circuitbetweenjustbeforesunset(around6p.m.)until8 a.m.thenext morning. Thistimerisadjustable.

Itwasdiscoveredthatthestructuredid notrotateback to itsoriginalpositionjustbeforesunsetbecausethe magnet never triggered the limit switch because they nevercameincontact.Thepositionofthelimitswitch andthemagnetwasdeterminedby notingthetimeand position when thehorizontal tracking has reached its maximumfortheday.However,due to thevaryingde- greeofmovementofthesuninthesky throughoutthe

year,thepositionofthelimitswitchand magnetforto- dayisnotthesameasthepositioninthreeweekstime. To deal with this problem, the position of the limit switch was manuallyadjusted to correspond with the pathofthesetting sun.

Another problem which occurred was rain water startedtosipintotheLDRsalthoughthesensorholder has beencoveredwithsilicone.This was mostprobably due toinadequatesiliconeapplication.Hence,thesensor

Figure23.24-hourbasedtimerswitch.

wastakenapartandthe LDRs replaced.This time,sili- conewasagainappliedto thesensor holderand anextra plasticsheetwasputoverthesensor.

Outputand Loads

Theelectricityoutputfromthe inverterisasingle-phase sinusoidal230 VAC voltageat50 Hz.This wascon- firmedandverifiedby connectingtheoutputofthein- verterto anoscilloscope.Figure24showstheACvolt- agewaveform.

Whilethe aimofthisworkwastocreateadual-axis solar-trackingsolarpanelmount, neverthelesstheelec- tricityoutputderivedwastestedonafewACloadssuch aslightbulbs,computer monitorand CPU,and aspot- light.Meanwhile,theACvoltageisalsousedtopower   thecut-offtimer.TheDCvoltagederivedfromoneof the12Vbatteriesisusedtopowerthecontrollercircuit aswellas themotors.

VII.   SUGGESTIONS

Itissuggestedto:
• Applygreasetothegears andchains.
• Paintstructure.
• Inspectforwateringressintocontrollerboxandsen- sor.
• Change plasticsheetoverthesensorfromtimeto time.
• Positionoflimitswitchesandmagnetneedstobe adjustedfromtimetotime

Itisrecommendedtomakethismaintenanceevery2
monthsoraftereverysession ofheavyrain,tocheck
lightsensors,timersensors,alljunctions,ironandcable

connections   2009/06/solar-trackers-facing-the-sun

VIII.   CONCLUSIONS

Theobjectiveofthispilotprojecttodesign,fabricate and
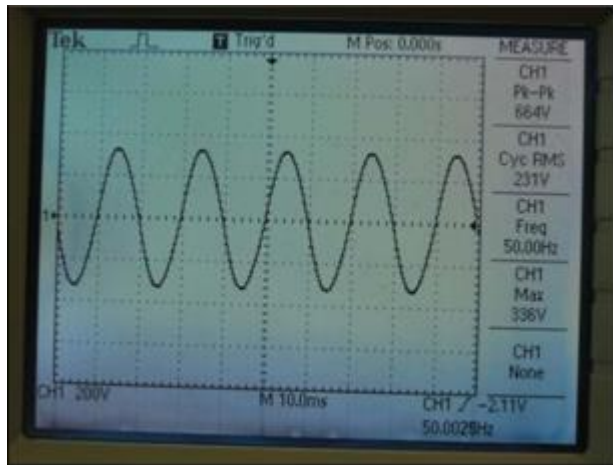
Figure24.Thevoltagewaveformof theoutputACvoltage formtheinverter.

installasolarpanel mount withdual-axissuntracking capabilityhasbeenachieved.Theworkwasmadepossi- ble throughthecooperationandinvolvementofmany   differentparties.Planningandcommunicationskills wereessentialtoensurethat theprojectwentsmoothly. Thereisstillroomforimprovementforthissystemandit   ishopedthat   furtherstudycanbecarriedouttofurther developthesystem.Improvementscanbedone tothe designofthestructure,forexamplebyaddingcoversfor the motors andalsoimprovingthedesignofthesensor holderbymakingitwaterproof.Besidesthat,improve- mentscanbe madetothecurrentmethodofturningback   theframetoitsoriginalposition,removingtheneedto manuallyadjustthelimitswitches.Also,a   detailedstudy   shouldbecarriedouttoascertainthepercentageincrease ofelectricityyieldbyusingthissystemtoestablish whetherornot thesystemisviable.

IX.REFERENCES

[1]. M.R.Patel,"WindandSolar Power Systems Design, AnalysisandOperations,"2ndEdition,CRC PressTaylor &Francis   Group   Producing   aPCB.   n.d.,   Boca   Raton,   2006. http://uk.farnell.com/images/en_UK/design_findings8pt2. pdf

[2]. SolarTracker,"SunPathDiagramImage,"2010.   http://www.gaisma.com/en/location/miri.html, http://en.wikipedia.org/wiki/Solar_tracker

[3]. D.Appleyard,"SolarTrackers:FacingtheSun,"Renew- able Energy World, Vol. 12, No. 3, 2009. http://www.renewableenergyworld.com/rea/news/article?2009/06/solar-trackers-facing-the-sun

[4]. N.Barsoumand P.Vasant,"SimplifiedSolarTracking Prototype,"GlobalJournalof TechnologyandOptimiza-tionGJTO,Vol.1,2010,pp.38-45.

[5]. J.Mak,"PersonalCommunicationMessenger,"In:R.A.Messenger and J. Ventre, Photovoltaic Systems Engi-neering,2ndEdition,CRC Press,BocaRaton,2004.

[6]. Yearly   Trends:WeatherAveragesandExtremes,2010.   http://www.myweather2.com/City-Town/Malaysia/Miri/climate-profile.aspx?month=4

[7]. K. Andreas, "Wind Load,"2002.http://k7nv.com/notebook/=topics/windload.html

[8]. S.Terry,"Using   aWiper   Motorin   YourHalloweenPro-   jects,"   2010.http://www.scary-terry.com/wipmtr/wipmtr. htm

[9]. R.Beardmore,"Rolling,Bearing,Friction,"2010a;"Co-efficientofFriction,"2010b.http://www.roymech.co.uk/Useful_Tables/Tribology/Bea ring%20Friction.html http://www.roymech.co.uk/Useful_Tables/Tribology/co_of_frict.htm#coefficients

[10].E.A.AvalloneandT.Baumeister,Eds.,"StandardHand- book for Mechanical Engineers," 10th Edition, Mc-Graw-Hill,NewYork,1996.

[11].R.A.Messenger andJ.Ventre,"Photovoltaic Systems Engineering," 2nd Edition, CRC Press, Boca Raton, 2004.

[12].J.Iovine,"PICMicrocontrollerProjectBook,"McGraw Hill,NewYork,2000

Finite Element Method Using Ansys Thermoelectric To Convert the Thermal Energy into Electrical Energy in Industries

Ramesh Kumar R[1], Suren M.E[2], Suse Raja Prabaharan M.E[2]

[1]Department of Mechanical Engineering, Cape Institute of Technology, Anna University of Chennai, Tamil Nadu, India

[2]Assistant Professor, Department of Mechanical Engineering, Cape Institute of Technology, Anna University of Chennai, Tamil Nadu, India

ABSTRACT

Current scenario concerns include increasing world power consumptions and raising greenhouse heat emission posing serious considerations. Thermoelectric energy conversion incorporates direct energy conversion from heat sources to electric energy conservation. It incorporates direct energy conversion from heat sources to electric energy conservation and the underlying physical into rapid effect has been well recovered in this past century. The thermoelectric effect is that the use of temperature differences to electric voltage creation and vice versa. A considerable number of primary fuels could be stored if some of the waste heat generated from Ovens, Kilns, Boilers, Furnaces, IC engines etc. are recovered through waste heat generating system. In a diesel engine, substantial energy (10 to 30%) is lost through the engine exhaust gas as waste heat. It means a large fraction of the fuel energy remains untapped and gain of energy from waste heat is appreciable. This waste heat can be used for generating the thermoelectric power by using thermoelectric materials. Recently, the "nanoparticle-in nanocomposite" is formulated to enhance thermoelectric characteristics which augment the interface scattering of photons for reducing the lattice as well as bipolar thermal conductivities. The high-energy ball-milling is an effective methodology to produce thermoelectric nanocomposites in large scale. Thedesirable characteristics of the thermoelectric materials are high Seebeck coefficient, high conductivity and low thermal conductivity. In this work the thermoelectric generator is designed and numerically analyzed using Ansys 2021R2 software by using the copper alloy and p and n type semiconductors. The heat is utilized from the automobile exhaust. The current generation, current density and the flow direction of the current will be determined numerically using ANSYS software.

I. INTRODUCTION

In recent decades, human activities such as deforestation and construction have its significant impact on the atmosphere and the energy absorbed by the distribution market is increasing each year, because of the growth in the industrial disciplines. Although highly environmental user friendly, efficient and cleaner battery such as artificial recovered systems are used to alter the number of ways to provide latent heat, the consumption and

reliance on electricity generated from coal have still increased to synchronize with the vehicle expansion year by year. It is allowed to pass through the environment without being reused for its usefulness or economic values. The value of the heat generated is to be considered rather than its amount. The mechanism to recover the unused heat depends on the temperature of the waste heat gases. Large quantities of hot flue gases are generated from diesel engine, boilers, kilns, ovens and furnaces. This chapter briefly describes various methods to extract and utilize the waste heat from automobile spares. While some waste heat losses from industrial processes are inevitable, facilities can reduce these losses by improving equipment efficiency or installing waste heat recovery technologies year .

The "Law Concerning the Rational Use-Of Energy" (Energy Conservation Law), as amended in 2008 where the obligated business and Indian representatives participated and published reports about the energy consumption of the Automobile sectors. The Indian authorities promised a 7.1% reduction in greenhouse gasses from 2017 in keeping with the "Prathama green yochana system" succeeding in Gujarat. Preparations are made in order to reach the aforementioned reduction target in the legal arena, through such efforts as an amendment to the Energy Conservation Law. This legislation demands action, such as the entry of energy consumption reports on the part of individual industries, with the duties executed on company operators and franchise operators participated in convenience shopand dining businesses on a scale that surpasses a certain level, to manage energy consumption.

The typical energy balance flow chart of the diesel Engine is given in Figure 1.1 in which considerable portion of the heat is lost (about 36 %) as Exhaust
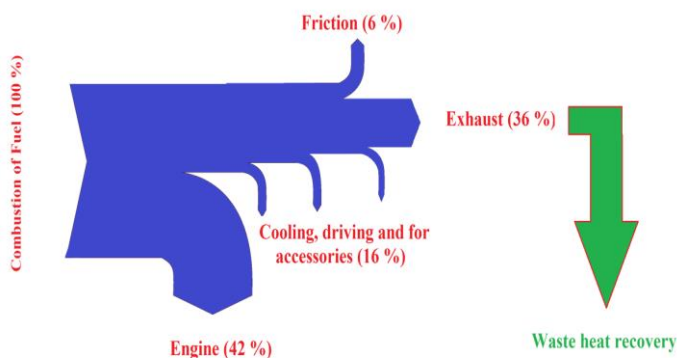
Figure 1 Typical heat balance of diesel engine systems

Recovering a part of this waste heat would result in saving of considerable amount of the primary fuel. Although the energy lost in waste gases cannot be fully recovered, a considerable amount of the heat could be recovered. The loss can also be minimized if the measure outlined in this chapter is adopted.

The uses of waste heat include generating electricity, preheating combustion air, preheating furnace loads, absorption cooling and space heating. The direct and indirect benefits of the waste heat recovery are given below,

a)   Reduction in pollution
b)   No moving parts
c)   Reduction in Equipment size
d)   Less maintenance requirements

e)   Reduction in auxiliary energy consumption

f)   Reduced harmful emissions

g)   Silent Operation

h)   Durable

i)   No chemical reactions

j)   No corrosion and wear

It is also necessary to evaluate the selected waste heat recovery system on the basis of financial analysis such as investment, depreciation, payback period, the rate of return etc.

Table 1 Maximum temperature range sources

Type of Device	Temperature (°C)
Nickel refining furnace	1370-1650
Aluminium refining furnace	650-760
Zinc refining furnace	760-1100
Copper refining furnace	760-815
Steel heating furnaces	925-1050
Copper reverberatory furnace	900-1100
Open heart furnace	650-700
Cement kiln (Dry process)	620-730
Glass melting furnace	1000-1550
Hydrogen plants	650-1000
Solid waste incinerators	650-1000
Fume incinerators	650-1450

II. MATERIALS AND METHODS
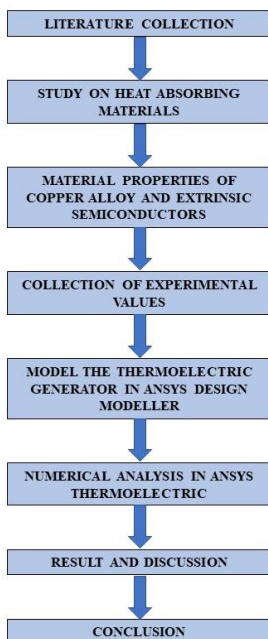
2.1 Thermoelectric Generators

Generally, it consists of many N-type and P-type semiconductors which are connected thermally in parallel and electrically in series (Figure 2). A voltage is generated when one side of the TEG is cooled and the other side is heated.
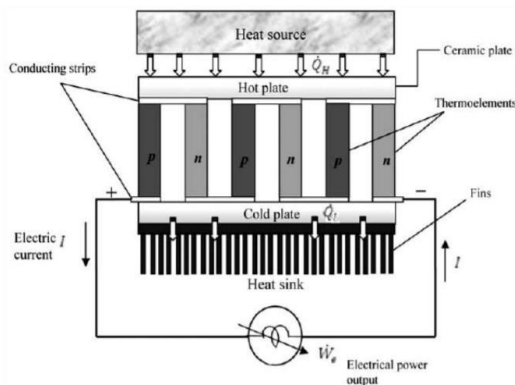
Fig 2 Typical Single-Stage Thermoelectric Power Generator

It generates electrical energy from any temperature difference and their efficiency depends on the temperature difference. Generally, the efficiency of TEG system is less than 3%. Another factor which can be used to compare the efficiencies of different TEGs which are operating at same temperatures is their electric figure of merit (ZT).

2.2 Thermoelectricity

The electric energy is generated due to the temperature difference between the junctions and its proportionality constant is known as the Seebeck coefficient or thermoelectric power or thermoelectricity. The first commercial Thermo Electric generator has been launched in 1925 in the name "Thermattaix" and it is shown in Figure 3
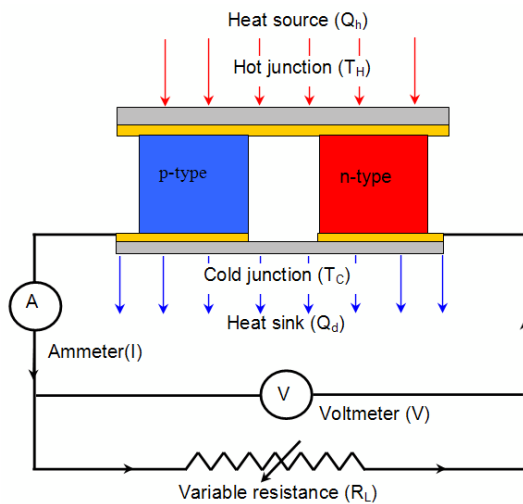
Fig 3 Thermoelectric Generator

The thermoelectric generator comprises p-type semi-conductors combined metal plate. If the junctions of b and a are maintained at different temperatures T1 and T2 at which T1> T2, an open-circuit electromotive force (emf)

is induced in the circuit. The figure of merit is proportional to the efficacy of the device. Values of ZT=1 are deemed great, and worth of ZT is about 3-4 which would be considered for further applications.

III. RESULT AND DISCUSSION

3.1 Design of thermoelectric generator

The thermoelectric generator is designed using Ansys 2021R2 design modeler. The orthographic and the isometric view of the designed TER is shown in the below figure.
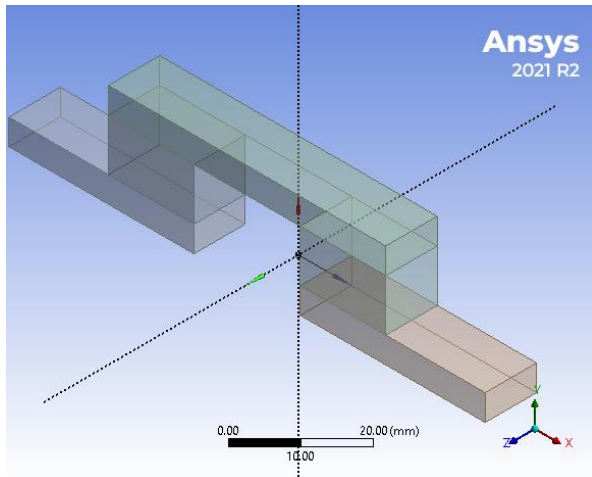
Fig 3 Orthographic view of the TEG designed

3.2 Materials used

Table 2 Materials and suitable part name

Sl. No	Name of the part	Material used
1	P-Base	Copper alloy
2	P-Leg	P-Type semiconductor
3	Top face	Copper alloy
4	N-base	Copper alloy
5	N-Leg	N-Type semiconductor

3.3 P-type semiconductor

A p-type semiconductor is an extrinsic type of semiconductor. When a trivalent impurity (like Boron, Aluminum etc.) is added to an intrinsic or pure semiconductor (silicon or germanium), it is said to be a p-type semiconductor. Trivalent impurities such as boron (B), gallium (Ga), indium (In), aluminum (Al) etc. are called acceptor impurity. Ordinary semiconductors are made of materials that do not conduct (or carry) an electric current very well but are not highly resistant to doing so. They fall half way between conductors and insulators. An electric current occurs when electrons move through a material. In order to move, there must be an electron 'hole' in the material for the electron to move into. A p-type semiconductor has more holes than electrons. This allows the current to flow along the material from hole to hole but only in one direction.

Semiconductors are most often made from silicon. Silicon is an element with four electrons in its outer shell. To make a p-type semiconductor extra materials like <u>boron</u> or <u>aluminum</u> are added to the silicon. These materials have only three electrons in their outer shell. When the extra material replaces some of the silicon it leaves a 'hole' where the fourth electron would have been if the semiconductor was pure silicon.

3.4 N-type semiconductor

An N-type semiconductor is a impurity mixed semiconductor material used in <u>electronics</u>.

The pentavalent impure atoms like <u>phosphorus</u>, <u>arsenic</u>, <u>antimony</u>, <u>bismuth</u> or some other <u>chemical element</u> are used to produce n-type semiconductors. These impure atoms are called donor impurities because they give free <u>electrons</u> to a semiconductor. The doping increases the number of charge carriers in the material for <u>conduction</u>. A n-type semiconductor is a lot more conductive than the pure silicon or germanium.

Semiconductor materials like <u>silicon</u> and <u>germanium</u> have four electrons in their outer shell. The outer shell of electrons is called the valence shell. The four electrons are used by the semiconductor atom in forming bonds with its neighboring atoms. This leaves a low number of electrons available for conduction.
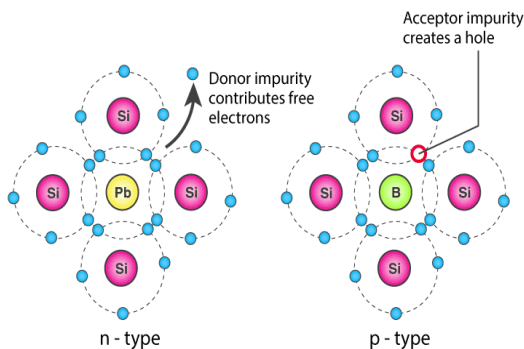
Fig 4 Extrinsic semiconductors

3.5 Result

- The problem created to find the current generated and heat absorbed by a thermo electric generator.
- The boundary conditions as per the literature is 452^0C as hot side temperature and 22^0C as cold side temperature.
- The material selected for this analysis is copper alloy and p-type and n-type semiconductors.
- The hard mesh is used to mesh the designed object, the size of the element is 0.0015m.

IV.REFERENCES

[1]. Ahmad, K, Pan, W & Wu, H. 2015, 'High performance alumina based graphene nanocomposites with novel electrical and dielectric properties'. RSC Advances, vol. 5, pp. 33607-33614.

[2]. Ahmad, K, Wan, C, Al-Eshaikh, MA &Kadachi, AN. 2019, 'Enhanced thermoelectric performance of Bi2Te3 based graphene nanocomposites'. Applied Surface Science, vol. 474, pp. 2-8.

[3]. Ahmad, S, Singh, A, Bohra, A, Basu, R, Bhattacharya, S, Bhatt, R, Meshram, KN, Roy, M, Sarkar, SK & Hayakawa, Y. 2016, 'Boosting Thermoelectric Performance of p-Type SiGe Alloys through in-situ Metallic YSi2 Nanoinclusions'. Nano Energy, vol. 27, pp. 282–297.

[4]. Ali, E, Firdaus B, Thamir, KI, Khairul, H, Hassan, I &Daing, MNDI. 2017, 'A review on heat sink for thermo-electric power generation: Classifications and parameters affecting performance'. Energy Conversion and Management, vol. 134, pp. 260–277.

[5]. Arash, MD, Mona, Z, Jian, H & Terry, MT. 2015, 'Thermoelectric power factor: Enhancement mechanisms and strategies for higher performance thermoelectric materials'. Materials Science and Engineering R, vol. 97, pp. 1–22.

[6]. Bathula, S, Jayasimhadri, M, Gahtori, Kumar, A, Srivastava, AK & Dhar, A. 2017, 'Enhancement in Thermoelectric Performance of SiGe Nanoalloys Dispersed with SiC Nanoparticles'. Physical Chemistry Chemical Physics, vol. 19, pp. 25180–25185.

[7]. Beibei, L, Zijun, S, Minghui, W, Lianjun, W & Wan, J. 2013, 'Fabrication and Thermoelectric Properties of Graphene/Bi2Te3, Composite Materials'. Journal of Nanomaterials, vol. 2013, No. 210767.

[8]. Bittner, M, Kanas, N, Hinterding, R, Steinbach, F, Groeneveld, D, Wemhoff, P, Wiik, K, Einarsrud, MA &Feldhoff, A. 2019, 'Triple-phase Ceramic 2D Nanocomposite with Enhanced Thermoelectric Properties'. Journal of the European Ceramic Society, vol. 39, pp. 1237–1244.

Performance Analysis on Inclined Solar Still with Different New Wick Materials and Wire Mesh

H. Sanilkumar, Dr. K. Rajkumar, Mr. G. Ariharasuthan

Department of Energy Engineering, Cape Institute of Technology, Levengipuram, Tamil Nadu, India

ABSTRACT

Inthispapertheperformanceofaninclined typesolarstillwasexperimentally investigatedusing differentwickmaterialson differentabsorber plate configurations.Inthiswork,the newmaterials are characterised for absorption, capillary rise, porosity, waterrepellence andheat transferco-efficienttoselecta suitable materialfor the solar desalination application. Different wick materials are chosen for this analysis. Based onthisanalysis,

watercoralfleecematerial with porosity(69.67%), absorbency (2 s), capillary rise (10 mm/h) and heat transfercoefficient(34.21W/m2°C)isthemostsuitable

wicking materialforhigher productivesolarstill. Performancesofthestillwerecomparedwithdifferent

wick materials (wood pulp paper wick, wicking water coralfleecefabric andpolystyrenesponge)onthevarious absorberplateconfigurations(flat absorber,stepped absorber and stepped absorber with wire mesh). Maximum distillate achievedinthestillwas 4.28l/dayby usingwatercoralfleecewithweirmesh–stepped absorber plate.

I. INTRODUCTION

Waterisessentialtosustainhumanlife andfor socio-economic development. Nevertheless, there is limitedaccess towater that meetsstandardlimitsof waterquality. Thequality ofwatercanbeimproved throughdesalination.Conventionaltechniques for desalination areavailable buttheyrequirealargeinput ofenergy,mostlyfromfossilfuelsthatcontribute to environmental degradation. Consequently, thereisa need to use sustainable energy sources, with solar energybeingoneofthemostpromising alternatives. Desalinationtechnology isgainingworldwide acceptanceasa proventechnologyforfresh waterproduction.Thereviewofdesalinationhistory can be found in literature [1]. Desalination is the processof removinghigh salt content,mineralsand organisms fromawatersource.Desalination systems require energy for the separation of salt and water. Solardesalination systemsaresystemsthatutilizethe sunenergy(solarradiation) fortheseparationofwater andsalt.Classificationofsolardesalination varies depending ontechniquesandenergysupply.Themost commontypeofsolardesalination systemisthesolar still.Asolarstillisasimpledevicewhichcanbeused toconvertsaline,brackishwaterintodrinkingwater.

Solar still can be broadly divided into passive and active types. Passive stills are further divided into basin and inclined types. Extensive research was made to improve the productivity of these stills. In an inclined still, water flows from the top to the bottom of the absorber surface. To maintain the uniform thickness of water, a wick, which draws water through capillary effect, is used. Stills with inclined absorber surfaces are reported to have significantly higher productivity than basin type stills[2]. There are several works presented in literature, to improve the performance of an inclined wick type solar still. Ho-Ming Ye het al.[3] studied the effects of climatic, design, and operational parameters on the productivity of the wick-type solar distillers. Minasian et al.[4] studied the performance of a new type of still formed by connecting a small conventional basin-type (installed in shadow and having an opaque cover) with a wick-type solar still. Badran et al.[5] studied the performance of an inverted trickle solar still. Radhwan et al.[6] studied the performance of stepped solar still with built-in latent heat thermal energy storage. Sadineni et al.[7] studied the theoretical and experimental performance of a weir-type inclined solar still. Mahdi et al.[8] studied the performance of a wick type solar still, where charcoal cloth is used as an absorber/evaporator material and for saline water transport. Sodha et al.[9] studied the performance of multiple wick solar still, where blackened jute cloth formed the liquid surface. Janarthan et al. [10] studied the effect of floating cum tilted wick type solar still with the effect of water flowing over glass cover. Anburaj et al. [11] studied the experimental performance of a new type inclined solar still with rectangular grooves and ridges in absorber plate. Tanaka et al.[12] studied the improvement of the tilted wick solar still by using a flat plate reflector. Based on the literature review there is no work available related to the characters of wick materials used in an inclined solar still. In this context, new testing procedures are developed for analysing the important wicking characters of wick materials. Here few important wicking characters such as absorption, capillary rise, porosity, water repellence and heat transfer coefficient, are taken into account to select a suitable material for the solar desalination application [13–16]. Based on this analysis, the best wick material is chosen and used with wire mesh & stepped absorber plate to enhance the productivity of the inclined solar still.

II. CHARACTERIZATION OF WICKING MATERIALS

Efficient wick material. Wicking properties of the material may be determined by the following procedures.
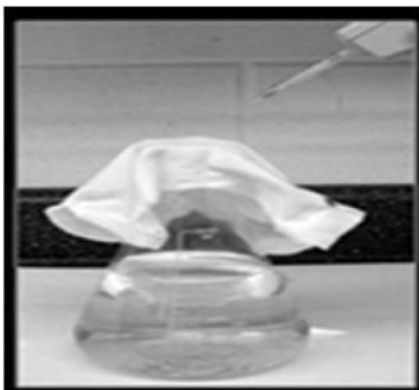
 Fig.1. Test method for water absorbency.
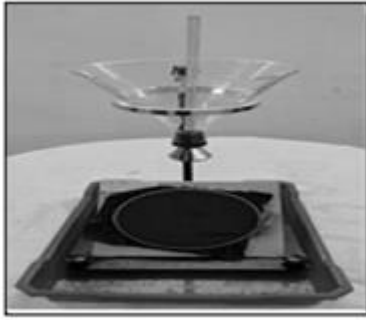
Fig.2. Waterrepellenttester.

2.1.Porosity

Porosityisameasure   ofthevoid(i.e.,"empty")spaces   inamaterial,   andisafractionofthevolume   ofvoids overthetotalvolume,asapercentagebetween0and
100%.Theporosityfollowsstraightforwardlybyits properdefinition[17].
K¼Vp=Vbx 100

2.1.1.Bulkvolume(Vb)

Bulkvolumemaybedeterminedbylinearmeasurement value
(dimensionofmaterials) Vb¼lxb x t

2.1.2.Porevolume(Vp)

Porevolumemaybedeterminedbythefluidsaturation method
(materialimmersedinwater) Wwtr= Wsat–Wdry
Vp= Wwtr/ρwtr

2.2.Heattransferco-efficient

Theevaporationofwaterwithinthestillisdependent ontheevaporativeheattransfercoefficient,whichisa function ofheattransfercoefficient betweenthewet wickabsorber surface andtheglasscover.Theheat transfer coefficient   depends   upon   the   difference betweentheabsorbertemperature andglasscover temperature andthedifferenceinpartialpressureof water vapour between thewickabsorber andtheglass cover.Theheattransfer betweenthewetwick absorber andtheglasscovercanbegivenas,
h =q/ΔT(W/m2oC)
ΔT= Tg–Ta:

Table1
Wicking characteristicsofdifferentwickmaterials.
WickmaterialsWickingcharacters

Wick materials Wicking characters.

	Porosity %	Absorbency (seconds)	Repellent	Capillary rise (mm/h)	Heat transfer coefficient (W/m2°C)
Cotton	28.5	1	0	120	36.0
Wool	27	150	0	110	45.8
Nylon	14.5	1	0	160	28.0
Waste cotton	28.23	10	0	90	41.04
Jute cloth	16.7	128	0	10	15.4
Coir mate	34.26	2	0	60	18.2
Charcoal cloth	16.2	2	0	180	58.4
Wood pulp paper	17	2	0	65	37.3
Polystyrene sponge	52.06	300	0	0	29.05
Waterproof fabric	65.6	2	0	10	34.21

2.3. Water absorbency

Water absorbency is the rate at which water is taken into, and morphed into another object or phase. Water can be absorbed into the atmosphere, and change into another state, such as gas, or it can be absorbed into an object, like a sponge. 2.3.1. Procedure for absorbency

Measure the water absorbency of textiles by measuring the time it takes a drop of water placed on the fabric surface to be completely absorbed into the fabric (Fig. 1). a. Sample is placed over the top of a beaker so that the centre is unsupported. b. A measured drop of water is placed on the fabric 1cm from the surface. c. Time is recorded until the water drop is absorbed completely.

2.4. Water repellence

Water repellence is the character of wick/fabric material to resist the entire penetration or absorption of water.

2.4.1. Water repellent tester

Water repellent tester measures the resistance of fabrics to wetting by water. It is used to check the water repellent of the fabric by spray test in textile testing laboratory. It is suitable for testing tablecloth, flooring material, fabric manufacture or processors.

Test procedure

a. First of all fasten the test specimens securely on the metal hoop of the water repellence tester so that it represents as moothwrinkle free surface and place it face up on the tester as shown in Fig. 2. b. Adjust the metal hoop so that the centre of the spray coincides with the centre of the metal hoop. Later pour 250ml of distilled water at normal temperature into the funnel and spray the whole quantity on the test specimen for a period of 25–30s. c. Now detach the metal hoop from the stand. Confirm whether water had penetrated to the back of the test specimen. With the face side of the test specimen down, hold the metal hoop by one edge and tap the opposite edge lightly once against the table. d. Then rotate it 180°C and similarly tap once again on the point previously held to remove any excess water drop. e. The final step is to compare the wetting of the test specimen with a photographic rating standard and grade it accordingly.

2.5.Capillaryrise

Capillary riseistheriseinaliquidabovethelevelof zeropressuredue toa netupward forceproducedbythe attractionofthewatermolecules toasolidsurface,e.g. glass,fabric,andsoil.Thecapillarity ofwickmaterials maybedetermined bystandardverticalwickingtest method.Herecharcoal cloth(180mm/h)hashigh capillaryrisebutsponge haszerocapillarity.Table1 showsthewickingcharacteristics ofdifferentwick materials obtained fromtheanalysis.Among allwick materials,watercoralfleecematerial (69.67%)hashigh porosity.
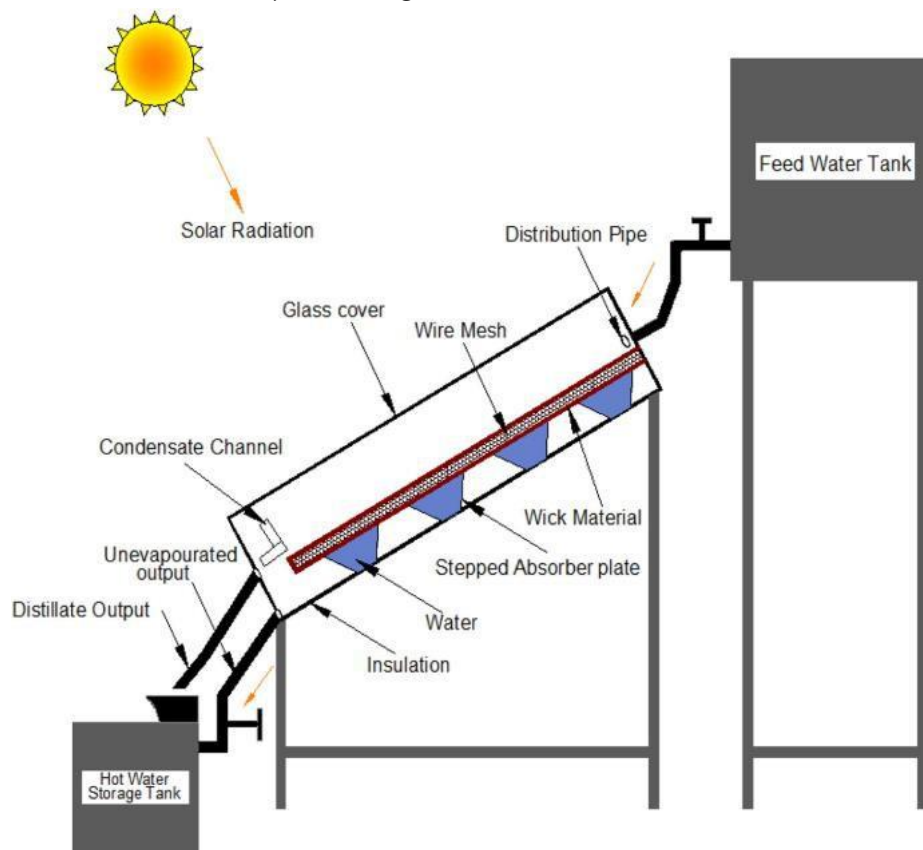
Fig.3. Schematicdrawingofinclinedtypesolarstill.

III.REFERENCES

[1]. E.Delyannis,Historicbackgroundofdesalination andrenewableenergies,Sol.Energy75(2003)357–366.

[2]. S. Aybar, Egelioglu Fuat, U. Atikol, An experimental study on an inclined solar water distillationsystem,Desalination180 (2005)285–289. [3] Yeh Ho-Ming, Chen Lie-Chaing, Effects of climatic, design and operational parameters on the performance of wick-type solar distillers, Energy Convers.Manag.26(1986)175–180.

[3]. A.N.Minasian,A.A.Al-Karaghouli, Animproved solar still: the wick-basin type, Energy Convers. Manag.36(1994)213–217.

[4]. A.Badran, L.Assaf,S.Kayed,A.Ghaith, I. Hammash,Simulationandexperimental studyforan invertedtricklesolarstill,Desalination164(2004)77–85.

[5]. M.Radhwan,Transientperformance ofastepped solarstillwithbuilt-inlatentheatthermal energy storage,Desalination171(2004)61–76.

[6]. S.B.Sadineni, R.Hurt,C.K.Halford,R.F.Boehm, Theoryandexperimental investigation ofaweir-type inclinedsolarstill,Energy33(2008)71–80.

[7]. J.T.Mahdi,B.E.Smith, A.O.Sharif,Experimental wicktypesolarstillsystem: designandconstruction, Desalination267 (2011)233–238.

[8]. M.S.Sodha,KumarAshvini,A.Tiwari,G.Tyagi,Progresses insimplemultiplewicksolarstill:analysis andperformance,Sol. Energy26(1986)127–131.

[9]. B.Janarthan,J.Chandrasekaran, S.Kumar, Performanceoffloatingcumtilted-wick typesolarstillwiththeeffectofwaterflowingoverthe glasscover,Desalination190(2006)51–62.

[10].P.Anburaj, R.Samuel Hansen, K.Kalidasa Murugavel,Performance ofaninclinedsolarstillwith rectangular groovesandridges,Appl.Sol.Energy49 (2013)22–26.

[11].H.Tanaka,Y.Nakatake,Improvement ofthe tiltedwick solarstillbyusingaflatplatereflector, Desalination216 (2007)139–146.

[12].Chao-Nan Wang, Jiunn-Hwan Torng, Experimentalstudyoftheabsorptioncharacteristicsof some porousfibrousmaterials,Appl. Acoust. 62(2001) 447–459.

[13].Lokendra Pal, Margaret K. Joyce, Paul D. Fleming,Asimplemethodforcalculation ofthe permeability coefficientofporousmedia,TAPPIJ.9 (2006)10–14.

Experimental Exploration on The Utilisation of Low Viscous Cooked Waste Palm Oil into Biofuel Influenced by Additives in A Diesel Engine

Nadar Selvamani Mudisoodum Perumal, Mrs. S. Shenbagavalli, Mr. K. Kathiravan

Department of Mechanical Engineering, Cape Institute of Technology, Levengipuram, Tamil Nadu, India

I. INTRODUCTION

IMPORTANCE OF ENERGY

Energy drives all the living and non-living things in the world. The energy needs and demands are not balanced and so, we are using up the future energy reserves. This will lead to the depletion of fossil fuels in the near future. As a consequence of population growth, change in life style, industrialization and urbanization, there has been an exponential increase in the energy requirements. Petroleum reserves are depleting day by day whereas energy consumption is increasing at 6.5 percent per year. India's crude oil consumption amount increased to 3.1% whereas the production is 1% of the total global crude oil production. A number of Government organizations and private companies are involved in the production and distribution of biofuel in India. The leaders in biofuel processing in India are Reliance Industries Ltd, D1 Oil Plc, Emmi Group, Godrej Agrovet, Atiya Biofuels Pvt Ltd., Gujarat Oleo Chem Limited (GOCL), Jatropha Oil Extractions Private Limited etc., Nova Biofuels Pvt.Ltd., Jain Irrigation System Ltd., Sagar (Swain 2014). According to a survey made by the International Energy Agency (IEA), oil demand at global level will rise about 1.6% for the year 2000 by 75 mb/d and it will increase in the year 2030 by 120 mb/d. Energy sources are broadly classified into two categories renewable energy sources and nonrenewable energy sources.

Non-renewable energy source cannot be replaced by natural processes once it is consumed, it will take longer time to get accumulate e.g., Natural gas, coal, crude oil and nuclear energy. Renewable energy fuels are generated from natural materials or renewable energy materials which are inexhaustible e.g., geo-thermal energy, solar energy, biofuels, hydro-power, wind energy, and biomass etc.
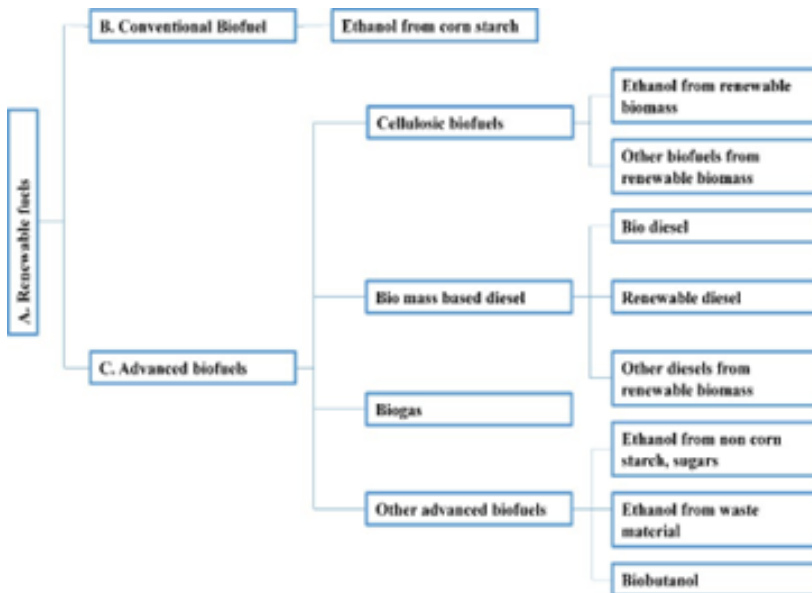
Fig 1.1 Sources and types of Renewable biofuels

Due to the rising greenhouse gas levels and depletion of oil supply, there is an increase in the energy demand which resulted in the search for an alternative clean and sustainable fuel in order to balance the energy demand supply chain. Currently, fossil fuels such as coal, crude oil and natural gas contribute majorly towards the power generation in the nonrenewable sector. Figure 1.1 shows that biofuels such as bioethanol, bio- butanol biodiesel, biohydrogen and biomethane are the major renewable bioenergy's which are reducing the usage of petroleum-based fuels. Bioenergy is the largest source of renewable energy today derived from biomass as it supplies energy in the form of fuel, heat and electricity for transport, industry and domestic usage. Bioenergy is compensating 10% for electricity production and 3% for transportation. The lack of large-scale production to meet the requirements and supply chain, which is dependent on number of economic sectors is the obstacle today. Moreover, these projects require relatively more sustainable and reliable technology to overcome the economic issues in the usage of biofuels impractical application. private cars and busses are the major consumersof diesel fuel.
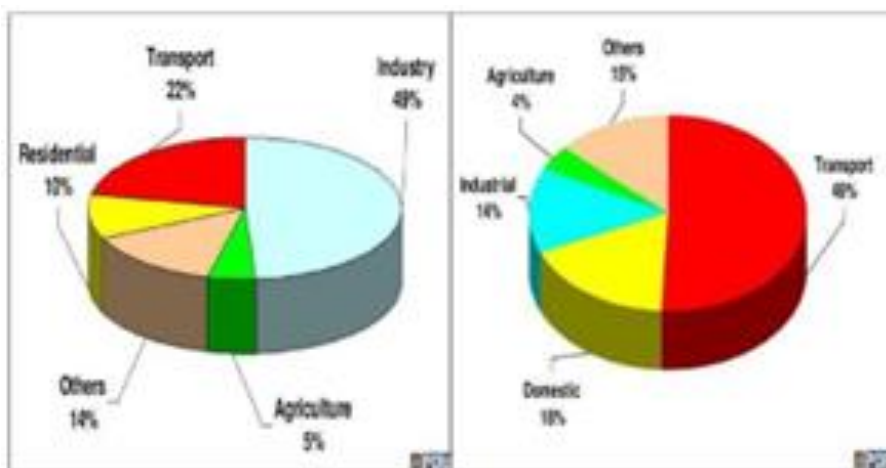
Fig 1.2 Petroleum fuel consumption by various sectors in India
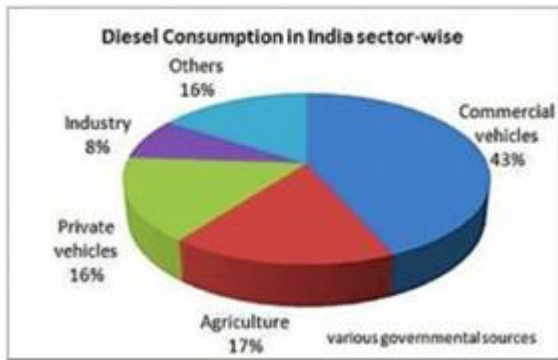
Fig 1.3 Consumption of diesel in various sectors

INDIA ENERGY SUPPLY BY VARIOUS ENERGY SOURCES
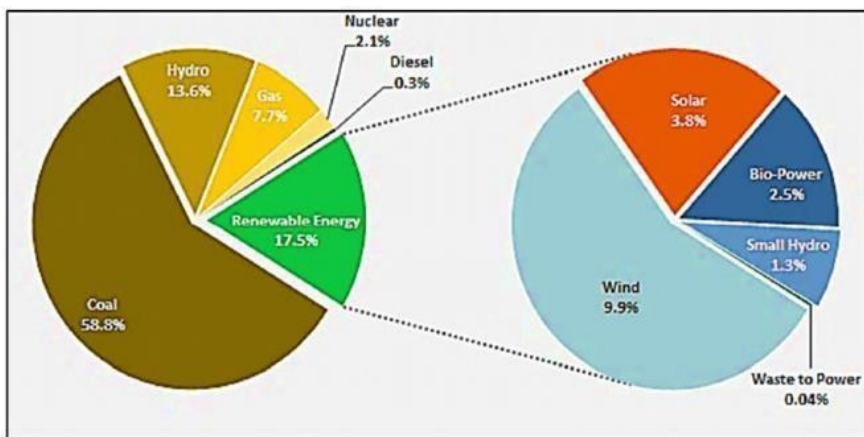
Fig 1.4 Energy supply from various sources of renewable and nonrenewable Resources

Figure 1.4 shows that the worlds energy requirement was mainly depending on coal, in which diesel stands for 0.3% and renewable energy sources accounts for 16.1%. In the renewable energy generation sector, biopower contributes about 2.6%. However, waste to energy accounts only about 0.04%, which is a very minimal contribution in the nation of large amount of waste production. It is due to the lack of waste to energy conversion technologies.

BIOFUEL TYPES

There are no strict guidelines for the classification. Generation of biofuel is mainly classified based on the feedstock and conversion method used for raw material to biofuel production. Biofuels are derived from biomass feedstock such as plant materials, algae, microorganism and animal waste materials, which could completely replace or blended with petroleum fuels to power the engines.

EXISTING FAT AND OIL EXTRACTION METHODS

In the oil refining process, extraction is the first step. Fats and oils are extracted from their source such as seeds, fruits or other oil-bearing raw materials using a variety of extraction methods. For example, virgin olive oil is

extracted directly from seeds and fruits by means of a mechanical press and used for commercial applications without any further processing. This process is called as cold pressing. For most of oil extraction methods the cold pressing method is more complex. In the conventional oil extraction mills combination of cooking, pressing and solvent extraction has been following to extract the oil from samples. This process is followed from the origin of country.

Dried biomass sample was grinded well to make smaller particle size. As shown in figure 1.6, Extraction process was carried out for 6 h at 70°C with suitable solvent mostly mixture of solvents (n- hexane: methanol, n-hexane: chloroform) were used to get the complete extraction of fat oil. After the extraction, the residual solvents were distilled and removed from the oil.

ULTRASOUND-ASSISTED EXTRACTION

The beaker containing seed was mixed with n- hexane. The setup and its contents were immersed into the ice-bath. The probe was immersed into the beaker and treated with ultrasound for 30   mi.   During   extraction, the   system temperature was maintained at 30°C.. After extraction, the   mixture   was   filtered   and residual solvent in the oil was evaporated.

PHYSICAL METHOD

Expeller pressed oils are mechanically pressed from the raw material at high pressure to obtain maximum oil yield. In expeller pressed oils high- pressure extraction can raise the temperatures above 120 degrees. In cold pressed the temperature is monitored and kept under 120degrees, otherwise it is called expeller pressed. By this method 85-90% of oil can be extracted from the biomass.
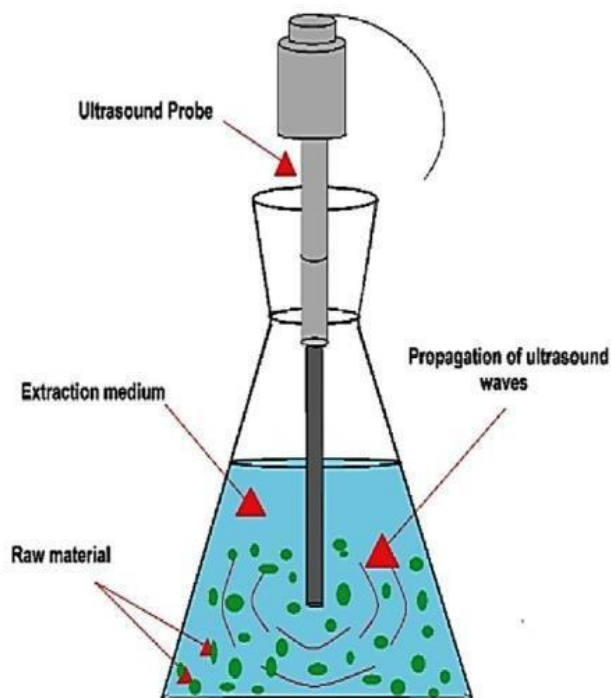
Fig 1.7 Ultrasound assisted oil extraction
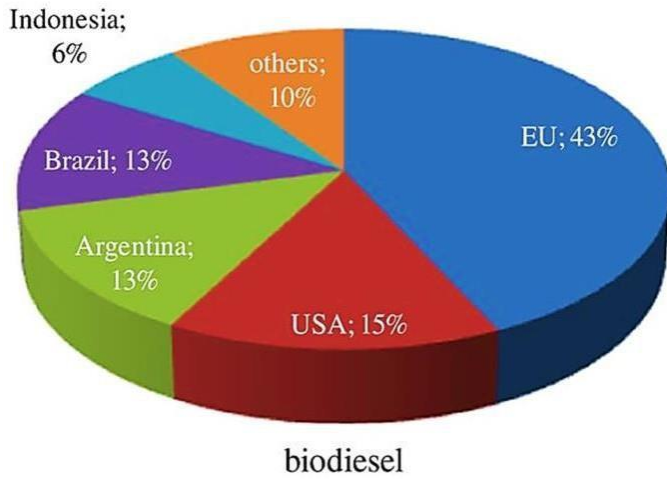
Fig 1.8 Regional production of biodiesel

High FFA in fat necessitates a two-step transesterification process. Due to the cleanemission profile of biodiesel, its usage is increasing faster. Low grade glycerol is produced at the end of transesterification process. Converting this glycerol into bioethanol by solventogenesis process will give valuable end product. Ethanol produced by this process is used for biodiesel production and it will reduce thebiodiesel production cost. Also, Ethanol is mixed with petroleum fuel and used to power the engines.

NEED OF BIODIESEL PRODUCTIONFROM WASTEMATERIALS

In India, Biodiesel production from jatropha seeds were   well-established,   but   the   raw   material production has not been consistent. Farmers were encouraged to   produce   jatropha seeds,   but   the production was not in the expected levels. This will increase the raw material cost and biodiesel

CONCENTRATED   SULPHURY   ACID

Sulfuric   acid   (American   spelling   and   the preferred IUPAC   name)   or   sulphury   acid (Commonwealthspelling), known in antiquity as oil of vitriol, isa mineral acid   composed of   the elements sulfur, oxygen and hydrogen, with the molecular formula H_2SO_4. It is a colorless, odorless and viscous liquid that is miscible withwater.

Fig 1.10 96% sulfuric acid

Disposal of WCO and fats has become a serious environmental problem around the world. Proper utilization and management office can effectively solve this problem. Physical and chemical properties and fatty acid composition of WCO are given in Tables. Besides, use office significantly reduces total biodiesel processing cost as the cost of WCO is 2 to 3 times less than that of vegetable oil. Comparison of average price of WCO with another   biofuel   is   showed.

Fig3.1 Different waste cooking oil

Though source of cooking oil differs across the globe, plant-based lipids such as sunflower oil, corn oil, coconut oil, palm oil, olive oil, soybean oil, canola oil, rapeseed oil margarine etc. are the main feedstock. Animal based lipids such as fish oil, ghee, buttered. used for cooking and frying
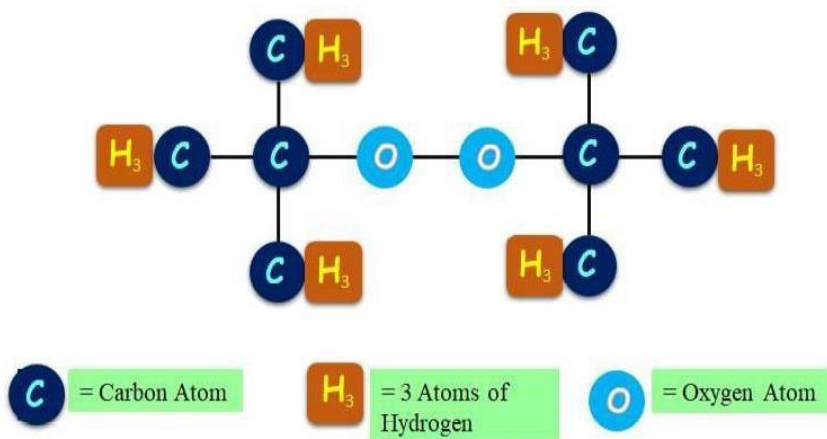
Fig 3.3 Molecular Structure of Di tertiary butyl peroxide

Table 3.3 Properties of Di tertiary butylperoxide

PREPARATION OF CATALYST FOR TRANSESTERIFICATION PROCESS

In the correct quantity, combine sodium hydroxide and methanol. Keep the combined particle on the magnetic stirrer at room temperature for 3 to 4 hours. Finish the operation until the two chemicals are transparently dissolved. In the transesterification process, this end chemical is used as a catalyst.

Fig 4.1 Preparation of catalyst

ESTERIFICATION PROCESS

Filter the one-liter waste cooking oil purchased at home or at motels. To begin the procedure, add a small amount of con.H2SO4 to the oil and let it sit for 30 minutes. Add the con.H2SO4 to the oil and heat it for 2 hours at 600 degrees Celsius. Theoil and sulfuric acid are heated in the heating mantle. Existing triglycerides are transformed to petroleum esters in this method.

TRANSESTERIFICATION PROCESS

In a beaker, slowly pour the catalyst into the petroleum esters. We acquire glycerol, water, sodium sulphate, and biofuel methyl ester as a byproduct.

Fig 4.3 Transesterification process

BLENDING THE SOLVENT

DMF has chosen the solvent DMF as an additive to combine with the biofuel. It's a first in biofuel research. Low carbon emissions, low fuel usage, and a high volatile temperature are the reasons for using a solvent to mix. At the blending procedure, the bio fuel and solvent were blended in a 100:1 ratio.

II. REFERENCES

[1]. Jump up to:a b c d e f g Omidvarborna; et al. (December 2020). "Characterization of particulate matter emitted from transit buses fueled with B20 in idle modes". Journal of Environmental Chemical Engineering. 2 (4): 2335–2342. doi:10.1016/j.jece.2020.09.020.

[2]. "Nylund.N-O & Koponen.K. 2020. Fuel and Technology Alternatives for Buses. Overall Energy Efficiency and Emission Performance. IEA Bioenergy Task 46" (PDF). Archived (PDF) from the original on 2020-02-16. Retrieved 2021-04-18.

[3]. "Biodiesel Basics" (?). National Biodiesel Board. Archived from the original on 2020-08-04. Retrieved 2020-01-29.

[4]. Jump up to:a b c "Biodiesel Basics - Biodiesel.org". biodiesel.org. 2019. Archived from the original on August 4, 2020. Retrieved May 5, 2020.

[5]. "Biodiesel Handling and Use Guide, Fourth Edition" (PDF). National Renewable Energy Laboratory. Archived from the original (PDF) on 2020-11-10. Retrieved 2020-02-13.

[6]. "American Society for Testing and Materials". ASTM International. Archived from the original on 2019-12-08. Retrieved 2020-02-13.

[7]. Guide" (PDF). nrel.gov. 2019. Archived (PDF) from the original on April 28, 2020. Retrieved December 21, 2020.

[8]. Duffy, Patrick (1853). "On the constitution of stearine".

Performance Analysis of Hybridizing Solar and Wind Energy

V Thirusuthan, T Abinesh, C Suren

Department of Mechanical Engineering, Cape Institute of Technology, Levengipuram, Tamil Nadu, India

I. INTRODUCTION

Hybrid energy systems have received worldwide attention for remote locations where grid supply is not feasible [1]. In remote areas, various renewable energy technologies such as standalone solar systems and minigrids have been intro- duced to achieve an efficient energy supply [2]. However, many of them do not offer real versatility to the end user or are not practical when they are launched, usually due to the lack of sales to offset product replacement and operating and repair costs. Furthermore, in the light of global grid growth, the concern that grid arrival at a particular location will render off-grid systems useless has recently spread among energy system investors [2, 3]. Climate change has become a major environmental concern in recent years as Green House Gas (GHG) emissions have increased [4]. As a result, it has been urged to look for alternative energy sources that can produce electricity [4], and wind and solar energy have been proven to be effective in producing cost-effective electricity [4]. In older times, only solar energy was used for generating electricity. Using only solar energy systems is having some challenges. These systems are not capable of generating maximum power during cloudy or rainy days [5]. People who use this system will be without power until the battery has been discharged [5]. Maximum power can be produced by combining solar and wind energy production techniques [5]. For electric power generation systems, these kinds of integrated systems guarantee a pollution-free and accident-free inventory [5]. Various off-grid methodologies, such as hydroenergy and geothermal energy, have been tried in the past few years to improve power supply reliability, but they have failed [6, 7]. The key cause for such strategies' inability is their high energy prices, which are unaffordable on a broader scale [6, 7]. The system presented in this paper is based on various optimization techniques for enhancing the efficiency of the system, which can provide continuous power at lower costs, thus reducing the financial pressure on people living in rural areas. Integrating solar and wind energy into hybrid power generation systems will minimize induced power volatility relative to single Variable Re-newable Energy (VRE) systems, increasing overall system efficiency and reliability [7]. As a result, the amount of capacity used in the device can be decreased significantly, resulting in significant cost savings [7]. The major contri- butions of the paper are as follows:

(i)   In this paper, a hybrid and effective system for harnessing power is suggested based on IoT and a combination of solar and wind energy

(ii)   The aim of this paper is to find the solution to the challenges in resolving carbon emission and en- hancing power efficiency, along with the focus on predicting the cost of energy from the system

The remainder of the paper is organized as follows. The associated work is covered in Section 2. The importance of the research is explained in Section 3. The proposed ar- chitecture and optimization methods are explained in Section 4. Section 5 summarizes the research findings, and Section 6 concludes the paper. Section 7 explains the lim- itation of the current study and future scope of work.

II. RELATED WORK

Due to increased awareness regarding climate change and other environmental issues, the expectations for generating power from renewable sources of energy have increased [8]. Various studies have been conducted to suggest cost-ef- fective and efficient systems for generating electricity. In [8], the authors have suggested a novel analysis technique for pumped storage and thermal power generator with a de- tailed introduction of renewable energy sources (RESs). For addressing operational planning for thermal power gener- ators and output decisions for pumped storage, this paper uses Tabu search and interior point methods [9, 10]. The authors of [11] gave a high-level overview of the functional integration of hybrid renewable energy systems (HRES) in multienergy buildings. The paper discussed the most commonly used HRES solutions in the residential sector, as well as an investigation of HRES integration with thermal and electrical loads in residential apartments, which were then connected to external energy grids. The authors of [12] demonstrated the advantages of expanding the integration of renewable energy sources in the insular system. The main focus of this paper is on profit maximization, cost efficiency, GHG reduction, and time consumption in power genera- tion. The authors of [13] submitted a review of different control strategies used by battery storage systems for smoothing the output power of wind turbines in order to improve future energy applications. The authors of [14] applied model predictive control to a three-phase inverter and used another model to estimate future system voltage forecasts for a given set of voltages. The method presented in this paper avoids the use of linear and nonlinear controllers by avoiding the use of a modulator, and it was found to be effective and simple to implement. The authors used an integrated approach in [15], combining spatially explicit resource potential analysis with high spatial resolution modeling of the US electricity system. Various wind supply curves, reflecting variations in siting regimes such as reg- ulatory, physical, and social land-use factors, are analyzed in this study to determine the impact of potential wind growth. In [16], the authors have optimized a hybrid energy system for catamaran ship. The authors have discussed PV per- formance, generator performance, dual-input buck boost, and simulation. In [17], the authors have suggested an economic day-ahead scheduling technique for a sustainable cogeneration system. A dynamic programming model was developed for which the goal is to minimize fuel con- sumption. In [18], the authors have focused on the design and performance analysis of dual-axis tracking solar sys- tems. The authors have also conducted a detailed review of various types of solar tracking systems and types of solar PV cells. The performance analysis for various solar PV systems suggested by other authors as per the literature reviewed is compared in Table 1. Recent development also focuses on developing efficient battery technology for energy storage in smart grid systems. In [26], the authors have developed a power management system, which is capable of controlling the power flow for an integrated system. However, using this technology as a storage system will make the overall system more expensive, which might not be affordable for low- income countries. We want to keep the system as simple as

possible through which we can cover both high-income and low-income countries. The authors of [27] have discussed finding an effective solution to replace natural gas for power generation with wind and solar energy. This study has also discussed the different cases of carbon-dioxide emission and the total cost of energy. However, the scope of the study is limited as in countries like Yemen and Saudi Arabia, natural gas is the most widely used for power generation, and it is not possible to extract the full potential of the integrated grid systems in these regions. So we have to develop a low-cost system to avoid wastage of investments in installing inte- grated systems under these conditions.

In [28], the authors have suggested a model for calcu- lating tariffs at charging stations for electric vehicles. This paper also suggests the use of solar energy for charging electric vehicles (EVs). The approach suggested in this paper is unique, but various factors that affect the efficiency of the system such as tilt angle of the PV array have not been discussed. In [29], the authors have suggested a trigeneration system that produces ammonia, hydrogen, and electricity through the integrated solar system. This system can be fully implemented in high-income and middle-income countries, but in low-income countries, implementing this technique would be challenging as ammonia is a harmful substance and might cause respiratory diseases to the person who is operating the energy system or living nearby the system.

Upon analysis of the literature, we found that most of the works focus on developing complex systems which might affect the efficiency of the system and are not feasible for low- income or poor nations. Through this paper, we have tried to improve the system through various optimization tech- niques so that the system would be feasible for all.

III. SIGNIFICANCE OF WORK

In contrast to conventional fossil fuel-based resources, re- newable energy sources play a critical role in maintaining the country's economy and quality of life [30]. Due to the in- crease in severe problems as a result of climate change, this research may be useful in addressing the issues to some extent. Using an integration of solar energy and wind energy will cause zero pollution, low greenhouse emissions, and fewer challenges related to waste management [31]. The system suggested in this paper is a better alternative for nuclear energy for fulfillment of 100% of electricity needs of the world [31]. The solution suggested in this paper will help in achieving a continuous power supply without the risk of harming nature or humans. Various studies have shown only a single renewable energy source for producing elec- tricity, either solar energy or wind energy. Single renewable sources, on the other hand, become problematic in terms of operational costs and energy yield due to the intermittent nature of renewable sources [32]. Two or more renewable sources are combined to form a hybrid energy system (HES) based on these drawbacks [32]. The main aim of imple- menting such a system is to maximize power production, lower operating costs, and increase system productivity [32]. The hybrid system proposed in this paper can be quickly introduced to provide end users with highly efficient and reliable power. An HES may be used as a standalone system or as part of a grid [32]. Standalone systems, on the other hand, need a lot of storage to handle the load [32]. In grid-connected systems, the storage can be small, which can decrease the efficiency of the system. So, it is advised to use HES in standalone modes for generating high power. The energy produced from the suggested system is stable without causing any type of pollution.

With the current challenge of not having enough space to construct power plants as the world's population grows, it is critical to make efficient use of land used to produce electricity and to think carefully when constructing a power plant. The power plant must be located near the power availability area to avoid power transmission losses and low power transit costs [31]. Thus to increase the reliability of power generation, integrated systems are used. Furthermore, to increase the dependency of the overall system only on one technique, either solar/wind energy, the size of the storage battery is needed to be reduced and using integrated systems would help in achieving this.
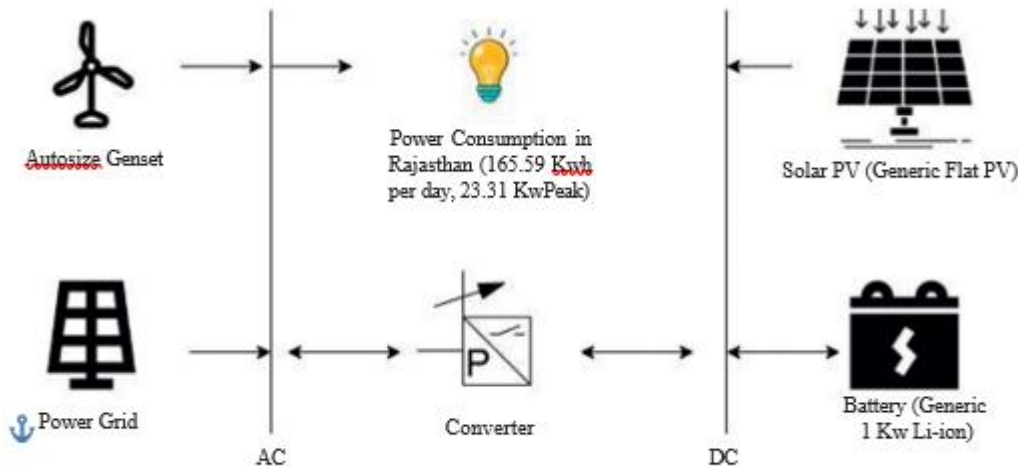
FIGURE 2: Grid system internal structure.

The software Hybrid Optimization of Multiple Energy Re- sources (HOMER) [46] was chosen for simulations and system design. We chose this software because it can per- form essential tasks like optimization, simulation, and sensitivity analysis. After the users' data have been simu- lated, HOMER determines the best setup based on the lowest net present cost (NPC) [46]. Sensitivity analysis is carried out to ensure that only the best components are used in the system design. We chose the rural areas of Rajasthan, India, for system testing because the state is covered in desert, allowing ample solar energy to be harnessed. The com- munity consumes 165.59 kWh per day, with a peak demandof 23.31 KW. The load profiles were created using public databases [47, 48] and a poll conducted by the Government of Rajasthan in India. The random variability from one day to the next is 10%, and the variability from one-time step to the next is 20%. Summer demand (May–July) was found to be moderate, and winter demand was found to be low (November–January). Electrical service can need a distri- bution system, whether the system is self-contained or connected to the grid [46]. A grid connection system would need an 11 KV/220V step-down transformer as well as an automatic transfer switch to resolve any power distribution anomalies. The seasonal load profile generated is shown in Figure 3.
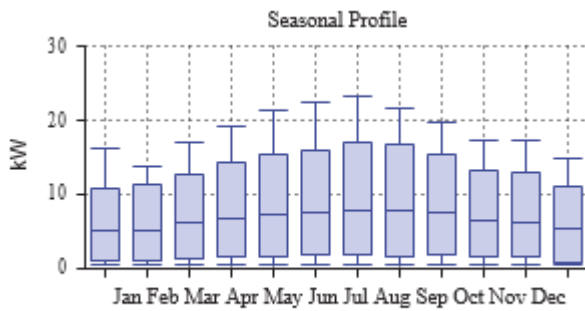
FIGURE 3: Season-based load profile obtained for the suggested installation location.

The components used for designing the system are explained in Tables 2–5, respectively.

The purpose of using the Autosize Genset generator is that this generator automatically adjusts itself according to the load. The capacity of the generator is small so that it cannot produce capacity shortages in cases of sensitivity and in the future if the multiyear analysis is used. This generator is also capable of adjusting its fuel curve to match its size (source: http://www.homerenergy.com).

Generic 10 kW wind turbine is used for our study. Ta- ble 3 lists the wind turbines' various parameters, while Figure 4 depicts the power curve. The turbine's predicted lifespan was discovered to be 20 years. Although the initial investment is low, replacement costs are high. However, when compared to high-quality wind turbines during the project's lifetime, the HOMER simulation findings show that the turbine contributes to a less net present cost (NPC) due to its low capital cost [46]. The surface area criteria are based on National Renewable Energy Lab (NREL) standards [46]. According to NREL, the capacity per unit area is

3.0 ± 1.7 MW/km2. Therefore, the area required for 10 kW wind turbine is 2500 m2. The capacity of the wind turbines can be optimized by a genetic algorithm [49] given as Al- gorithms 1 and2, respectively. Upon analysis of HOMER, we found that the lifetime of the overall system would be in the range of 20–30 years, which is a good sign.

TABLE 2: Generator specifications.

Type	Autosize Genset
Size (kW)	1.2 kW
Capital cost (INR)	500 INR
Restoration cost (INR)	500 INR
O&M cost (per operational hour)	0.030 INR

TABLE 3: Wind turbine specifications.

Type	Generic 10 kW
Hub height	24 meters
Capital cost (INR)	50000 INR
Restoration cost (INR)	50000 INR
O&M cost (per operational hour) lifetime 500 INR/year 20 years	

Due to the seasonal nature of renewable energy sources, energy storage devices are necessary to ensure a constant supply of energy from renewable sources. We have con- sidered the load following strategy [46] in developing our model. Due to the sudden increase or decrease in power supply, hybrid systems require additional reserves to tackle the challenges related to sudden increase or decrease. The operating reserve was considered as 10% of the hourly load as recommended by [46] for maximizing efficiency. The specifications for the solar PV and storage devices are given in Tables 4 and 5, respectively.

Simulations and Analysis. For the evaluation of the proposed system, various configurations such as grid-only systems, renewable energy sources (RES) systems, and Grid-RES hybrid systems are analyzed. The optimization results are recorded in Table 6.

TABLE 4: Storage battery specifications.

Type	Generic 1 kWh Li-ion
Lifetime	15 years
Capital cost	550 USD
Restoration cost	550 USD
O&M cost (per operational	10
hour) Throughput	USD/year
	3000 kWh

TABLE 5: Solar PV specifications.

Type PV	Generic flat
Derating factor	80%
Capital cost	2500 USD
Restoration cost	2500 USD
O&M cost (per operational hour)	10 USD/year
Lifetime	25 years
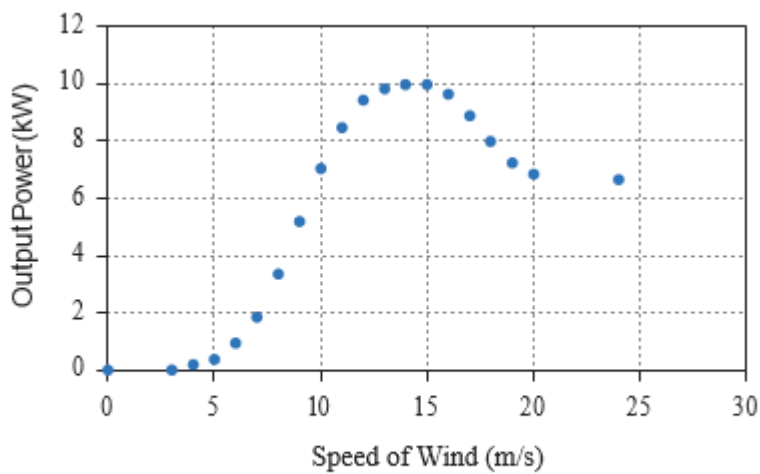
FIGURE 4: Scatter plot of the wind turbine in terms of power.

(1) Initialize GA ∈ [0,1], POS ∈ f(V)//*Particle swarm optimization, f(V)* � *Functional Decision*
(2) If - -
(3) POS optimizes w(f(n)) ∈ NIS//*NIS* � *noninferior solutions, w(f(n))* � *weighted single objective function*
(4) Then
(5) Use Crowding Distance Method for the solutions Obtained in step 3
(6) If
(7) User submitted � true, terminate the algorithm and Solutions � accepted
(8) Else
(9) Values recorded
(10) Evaluate Fitness for each individual, do Genetic Operations
(11) Return Values recorded
(12) Evaluate Fitness for each individual, do Genetic Operations
(13) Return to Step 2

A$_{\text{LGORITHM}}$ 1: Optimization of the capacity of wind turbines.

(1) Initialize u � 0 m/s^2 ∈ POS in decision making variables//u� initial velocity
(2) Evaluate Fitness Values, Extreme Points
(3) New$_u$ and position updated
(4) If

(5) Steps 1,2,3 � True, conditions satisfied
(6) Algorithm terminated
(7) Else
(8) Go to step 2 again

A$_{\text{LGORITHM}}$ 2: For noninferior solutions.

TABLE 6: RES configuration optimization result.

PV (kW)	Wind turbine	Battery	Conv (kW)	Initial capital	Operating cost (USD/year)	Net NPC	Coe ($/kWh)	Renewable factor	Capacity shortage
26	10	100	25	$63,531	$16,405	$84,413	0.118	0.028	0.10
------	11	120	25	$77,762	$21,375	$83,201	0.156	0.028	0.10
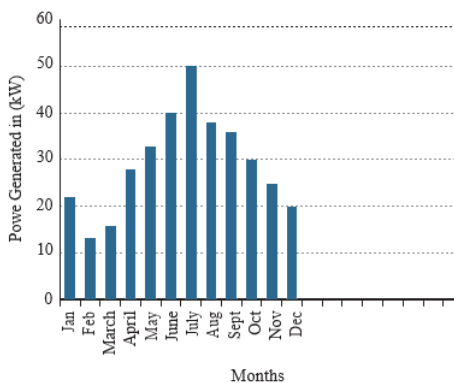
FIGURE 5: Monthly power production at 10% shortage.
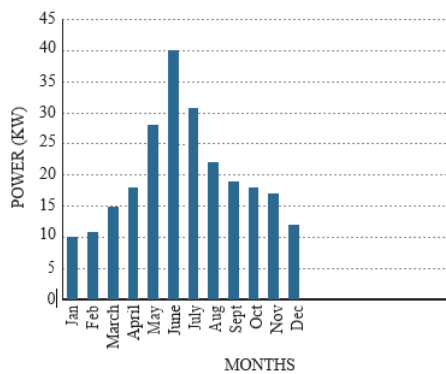
FIGURE 6: Monthly power production of Grid-RES system.

The HOMER findings show that the RES only setup is achievable with the available resources. This result was achieved after numerous trials, mistakes, and the removal of inefficient data in order to reduce simulation time.

This system is economically feasible at 10% shortage. The monthly production of power is shown in Figure 5. In Grid-RES systems, it has been found from HOMER simulations that these systems are feasible with currently available re- newable resources. This type of system is also economically efficient. Upon optimization, it has been found that the system gives a net present cost (NPC) of $3,45,198. The renewable factor for this type of configuration is 77.6%. In this type of configuration, battery and inverter are not necessary as the grid network acts as a backup for the system. The monthly power production is given in Figure 6.

Sensitivity Analysis. The control parameters of a system can be varied in sensitivity analysis to examine the effect of these parameters on the system's effectiveness [46]. This aids the designer in creating a system that is effective. A sensi- tivity analysis is often performed to ensure that the system is reliable. Because the aim is to protect 100 percent of the load, the energy system would be expensive. A sensitivity analysis of the capacity constraints for the system will provide the details about how much amount is to be paid by the cus- tomers for more effective system in terms of hours of re- liability. Values from 0 to 15% with a phase of 2% were given as capacity constraints inputs. In addition, a sensitivity analysis was carried out to research the conditions under which the available findings are true for PV modules and battery prices and how much the cost of the device would differ with the variance of these prices. A sensitivity analysis was performed to evaluate all possible scenarios between these rates, where capital cost multipliers of 1.5 to 3.5 were given for the solar PV capital cost, and multipliers of 1 to 2 were given for the battery capital cost. For running the simulations, the time step was set to 40 minutes (instead of the default 60 minutes in HOMER) to effectively adjust the load and output of electricity. The maximum number of simulations per optimization was set to 25,000. This implies that simulations would be discarded if they have not been completed until the value has been achieved. Increasing this value therefore dramatically increases the simulation time. The device design accuracy and the NPC accuracy were
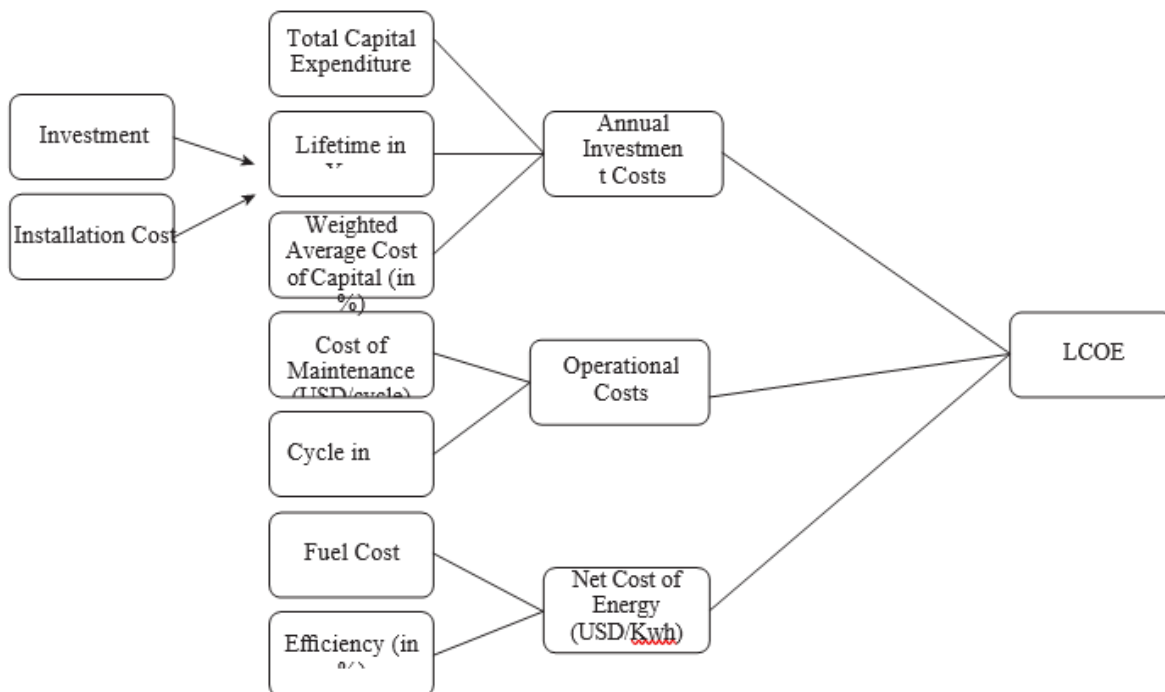
FIGURE 7: Flowchart for calculation of LCOE.
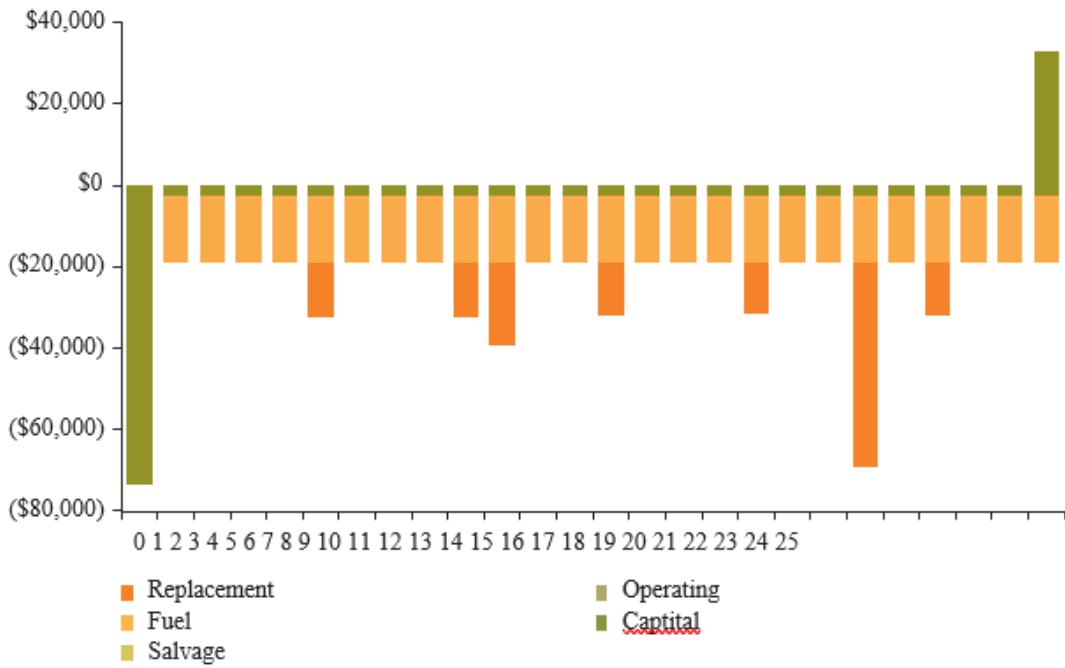
FIGURE 8: Cash flow diagram showing the cost efficiency of the suggested system.

TABLE 7: Cost analysis between various systems.

System configuration	PV array number	Number of wind generators		Battery quantity	PV converter	Cost (in USD)
Single PV	50	0	10	15		$66,000
Single wind	0	10	5	0		$56,650
Nonoptimized	20	5	6	8		$56,300
Suggested system	15	6	6	6		$49,500
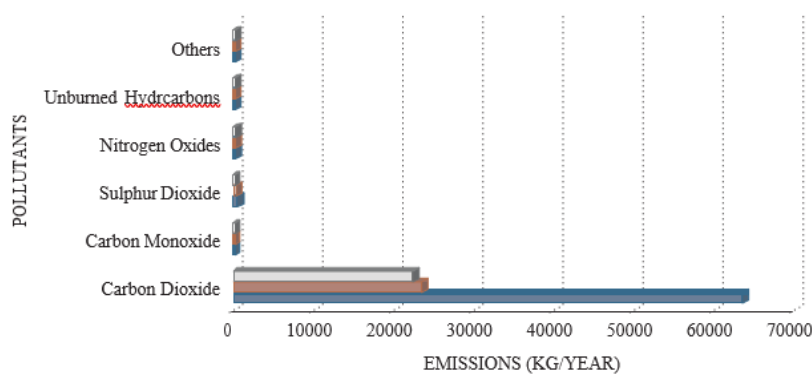
FIGURE 9: Comparison between greenhouse emissions of various systems. Blue bar indicates a grid-only system, orange bar indicates grid- wind system, and grey bar indicates grid-wind-PV system, which is suggested. defined by maximum simulation errors set at 1% and 2%, respectively.

The efficiency of the system is shown in Figure 7, Fig- ure 8, Table 7, and Figure 9, respectively, with a comparison between various systems in terms of cost analysis and greenhouse emissions. The flowchart for the calculation of LCOE (levelized cost of heat) [50] is given in Figure 7.

Clearly, we can see from Figure 8 that the system sug- gested in this paper is efficient. It can also be seen that the optimized PV system is more cost-effective than other systems. It can also be inferred from the results that most of the energy is supplied by wind.

IV. CONCLUSION

Due to the growth of population and environmental pollution, the demand for efficient production of electricity has increased. Utilizing solar and wind energy for electricity production will help in resolving the challenges such as climate change and greenhouse emissions and can emerge as the best solution for resolving the energy crisis. The hybrid energy system suggested in this paper has advantages such as continuity in power supply, high efficiency, low maintenance cost, optimized uti- lization of the resources, and load management. The results given in this paper show that the use of hybrid PV-wind power generation units could save up to 10%–20% of the cost of current systems. This study encourages the use of hybrid systems in India and abroad in order to improve electricity production sustainability. Hybrid systems will provide a viable, secure power supply to rural areas while also providing a pool of funding for community grid maintenance and economic development. Ultimately, these systems will help to increase the usage of renewable energy for generating electricity globally and thereby contribute to resolving the environmental prob- lems currently facing the world.

V. LIMITATIONS AND FUTURE SCOPE OF THE WORK

Solar energy and wind energy undoubtedly come to people's mind when we talk about renewable energy. In an hour, the sun emits enough energy, which can cover human needs for a year.

This property makes solar energy the best form of energy to be integrated with other energy forms. However, with the current technology, we are unable to extract the full potential of the integrated systems. Some amount of energy gets wasted due to inefficient operation. According to recent reports [51], it has been shown that the PV panels have a median degradation rate of 0.5% per year. It may be high in hot climate areas and rooftop systems. The degradation rate of 0.5% shows that the energy production from solar PV will decrease at the rate of 0.5% per year. This will make the system inefficient over time. Furthermore, the unpredictability and intermittency of solar energy make the solar PV panel less reliable. Solar panels require additional inverters to convert DC to AC energy in order to be used on the power network, which makes the system complex and increases the installation time and circuit development costs. For a continuous supply of electricity on grid connections, PV panels also require storage batteries along with inverters, which also increases the investment costs. Moreover, the installation of solar PV panels usually requires a large area of land for a period of more than 20 years. Also, solar PV is fragile and can be damaged easily, so insurance costs also increase the overall costs of the systems. Our future work will be based on resolving these challenges and the development of microenergy grids with micro-PV cells, which would require less complexity and installation area. This system will be further integrated with blockchain technology to increase the efficiency of the system.

VI. REFERENCES

[1]. S. Sanajaoba, "Optimal sizing of off-grid hybrid energy system based on minimum cost of energy and reliability criteria using firefly algorithm," Solar Energy, vol. 188, pp. 655–666, 2019.

[2]. F. Husni, Y. Tan, and J. Yan, "Power and Methanol Pro- duction from Biomass Combined with Solar and Wind Energy : Analysis and Comparison," Energy Procedia, vol. 145, pp. 576–581, 2018.

[3]. C. Mata Yandiola, Feasibility Analysis of the Use of Hybrid Solar PV-Wind Power Systems for Grid Integrated Mini-Grids in India, Dissertation, KTH, School of Industrial Engineering and Management (ITM). Selco Foundation, Stockholm, Sweden, 2017.

[4]. Y. Kassem, H. Çamur, and R. A. F. Aateg, "Exploring solar and wind energy as a power generation source for solving the electricity crisis in Libya," Energies, vol. 13, no. 14, p. 370, 2020.

[5]. S. Al-Mimar, Integration of Solar and Wind Power at Lill- grundwind farm Wind Turbine Shadow Effect on Solar Farm atLillgrund Wind Farm, Halmstad University, Halmstad, Sweden, 2015, http://www.diva-portal.org/smash/record.jsf? pid=diva2%3A817812&dswid=9794.

[6]. F. Ueckerdt, Integrating Variable Electricity Supply from Wind and Solar PV into Power Systems, Technische Universität Berlin, Berlin, Germany, Berlin, 2014.

[7]. G. Notton, "Hybrid wind-photovoltaic energy systems," in Stand-Alone and Hybrid Wind Energy SystemsWoodhead Publishing, Sawston, UK, 2010.

[8]. T. Mitani, M. Aziz, T. Oda, A. Uetsuji, Y. Watanabe, andT. Kashiwagi, "Annual assessment of large-scale introduction of renewable energy: modeling of unit commitment schedule for thermal power generators and pumped storages," Energies, vol. 10, p. 738, 2017.

[9]. F. Tang, H. Zhou, Q. Wu, H. Qin, J. Jia, and K. Guo, "A Tabu search algorithm for the power system islanding problem," Energies, vol. 8, no. 10, pp. 11315–11341, 2015.

[10]. F. Capitanescu and L. Wehenkel, "Experiments with the in- terior-point method for solving large scale Optimal Power Flow problems," Electric Power Systems Research, vol. 95, pp. 276–283, 2013.

[11]. L. Canale, A. R. Di Fazio, M. Russo, A. Frattolillo, and M. Dell'Isola, "An overview on functional integration of hybrid renewable energy systems in multi-energy buildings," Energies, vol. 14, no. 4, p. 1078, 2021.

[12]. G. J. Oso´rio, M. Shafie-khah, J. M. Lujano-Rojas, and J. P. S. Catalão, "Scheduling model for renewable energy sources integration in an insular power system," Energies, vol. 11, p. 144, 2018.

[13].L. M. S. de Siqueira and W. Peng, "Control strategy to smooth wind power output using battery energy storage system: a review," Journal of Energy Storage, vol. 35, Article ID 102252, 2021.

[14].I. Akhtar and S. kirmani, "Design and implementation of model predictive control for microgrid energy system with power quality improvement features," International Journal of Electronics, vol. 108, no. 12, pp. 1977–1998, 2021.

[15].T. Mai, A. Lopez, M. Mowers, and E. Lantz, "Interactions of wind energy project siting, wind resource potential, and the evolution of the U.S. power system," Energy, vol. 223, Article ID 119998, 2021.

[16].B. Setiawan, E. S. Putra, I. Siradjuddin, and M. Junus, "Op- timisation solar and wind hybrid energy for model catamaran ship," IOP Conference Series: materials Science and Engi- neering, vol. 1073, no. 1, Article ID 012044, 2021.

[17].L. Sun, Y. Jin, J. Shen, and F. You, "Sustainable residential micro-cogeneration system based on a fuel cell using dynamic programming-based economic day- ahead scheduling," ACS Sustainable Chemistry & Engineering, vol. 9, no. 8, pp. 3258–3266, 2021.

[18].A. Awasthi, A. K. Shukla, M. M. S.R. et al., "Review on sun tracking technology in solar PV system," Energy Reports, vol. 6, pp. 392–405, 2020.

[19].A. Ghafoor and A. Munir, "Design and economics analysis of an off-grid PV system for household electrification," Re- newable and Sustainable Energy Reviews, vol. 42, pp. 496–502, 2015.

[20].M. Al-Addous, Z. Dalala, C. B. Class, F. Alawneh, and H. Al-Taani, "Performance analysis of off-grid PV systems in the Jordan Valley," Renewable Energy, vol. 113, pp. 930–941, 2017.

[21].Ghenai, Chouki, and M. Bettayeb, "Grid-tied solar PV/fuel cell hybrid power system for university building," Energy Procedia, vol. 159, pp. 96–103, 2019.

[22].M. A. V. Rad, R. Ghasempour, P. Rahdan, S. Mousavi, and M. Arastounia, "Techno-economic analysis of a hybrid power system based on the cost-effective hydrogen production method for rural electrification, a case study in Iran," Energy, vol. 190, Article ID 116421, 2020.

[23].L. Qi, P. Zheng, X. Wu, W. Duan, L. Li, and Z. Zhang, "A hybrid wind-photovoltaic power generation system based on the foldable umbrella mechanism for applications on high- ways," Solar Energy, vol. 208, pp. 368–378, 2020.

[24].N. Bizon and P. Thounthong, "Energy efficiency and fuel economy of a fuel cell/renewable energy sources hybrid power system with the load-following control of the fueling regu- lators," Mathematics, vol. 8, no. 2, p. 151, 2020.

[25].T. Salameh, M. A. Abdelkareem, A. G. Olabi, E. T. Sayed, M. Al-Chaderchi, and H. Rezk, "Integrated standalone hybrid solar PV, fuel cell and diesel generator power system for battery or supercapacitor storage systems in Khorfakkan, United Arab Emirates," International Journal of Hydrogen Energy, vol. 46, no. 8, pp. 6014–6027, 2021.

[26].V. A. Ani, "Development of an intelligent power management system for solar PV-Wind-Battery-Fuel-Cell integrated sys- tem," Frontiers in Energy Research, vol. 9, p. 31, 2021.

[27].Y. Noorollahi, A. Khatibi, and S. Eslami, "Replacing natural gas with solar and wind energy to supply the thermal demand of buildings in Iran: a simulation approach," Sustainable Energy Technologies and Assessments, vol. 44, Article ID 101047, 2021.

[28].P. D. Santos, A. C. Zambroni de Souza, B. D. Bonatto, T. P. Mendes, J. A. S. Neto, and A. C. B. Botan, "Analysis of solar and wind energy installations at electric vehicle charging stations in a region in Brazil and their impact on pricing using an optimized sale price model," International Journal of Energy Research, vol. 45, no. 5, pp. 6745–6764, 2021.

[29].O. Siddiqui and I. Dincer, "Optimization of a new renewable energy system for producing electricity, hydrogen and am- monia," Sustainable Energy Technologies and Assessments, vol. 44, Article ID 101023, 2021.

[30].Z. Qadir, S. I. Khan, E. Khalaji, H. S. Munawar, F. Al-Turjman, and M. P. Mahmud, K. Le, Predicting the energy output of hybrid PV–wind renewable energy system using feature se- lection technique for smart grids," Energy Reports, vol. 7, pp. 8465–8475,

Land Perforate Rescue by Animatronic Projection

Dr. B.C. Preethi[1], A. Abisha[2], D.A. Ashly[2], D. Danika[2], D. Dasmini[2]

[1]Assistant Professor, Department of Electronics and Communication Engineering, St. Xavier's Catholic College of Engineering, Chunkankadai, Tamil Nadu, India

[2]Final Year, Department of Electronics and Communication Engineering, St. Xavier's Catholic College of Engineering, Chunkankadai, Tamil Nadu, India

ABSTRACT

The National Disaster Response Force, have reported that more than 40 children have fallen into borewells, and on an average, 70 percent of the rescue operations fail, since 2009. These borewells are dug due to the increased scarcity of water, but the borewells which are left uncovered become dangerous for the innocent children [1, 5]. Most of the victims are under the age of 10 [8]. The government has adopted various methods to rescue those children but in those rescue operations some children were saved but some, unfortunately, lost their lives. Usually these rescue operations are very lengthy, complicated and very time taking processes [13]. So, we came up with a project to rescue the child from the borewell. This animatronic hand moves according to the movement of a human wearable glove. It works from the information that is received from the glove. The animatronic hand is controlled by an arduino. The movement of the glove is sensed with the help of five flex sensors, and the output of the flex sensors is sent to the servo motors in the animatronic hand by the arduinos. RF module is used for communication between the transmitting side and the receiving side. Using this system, the child can be rescued quickly and also without any major injuries.

Keywords - Borewell rescue, Child rescue, animatronic arm, wireless system , flex sensor, servo motor , Arduino Uno, Embedded System.

I. INTRODUCTION

Due to drought and depletion of underground water, more bore wells are drilled on the surface of the earth [19]. But due to the carelessness of people the borewells are left open and these borewells will become a death pit for the small children. They unknowingly fall into the borewell, and due to the delay and complexity in the rescue operation, it leads to the death of the child. The government has taken several measures to rescue the children. The children are usually rescued by digging a narrow pit parallel to the borewell and then from there digging sideways to reach the child [18,19]. But this process is risky and it takes a lot of time to reach and rescue the child. Also, if the distance is long the process becomes even more risky. So, as a solution to this problem we have designed an animatronic hand to rescue the child [7]. This animatronic hand moves according to the

movement of a human wearable glove. It works from the information that is received from the glove. The animatronic hand is controlled by an arduino. The movement of the glove is sensed with the help of five flex sensors. The output of the flex sensors is sent to the servo motors in the animatronic hand by the arduinos. The hand is controlled by servo motors [15]. For wireless communication between the transmitter and receiver RF module is used [6]. The child is held by the animatronic hand and is then lifted up. This method will be a good alternative for most of the existing methods.

II. EXISTING METHODS

There are many techniques used to rescue children from borewells. Parallel pit rescue method is the most common method adapted to rescue children from borewells [1,16]. This will cause very high vibration inside the bore well [18], so it may be unsafe sometimes. Another method is using a robotic arm whose diameter can be adjusted, to rescue the child from the borewell [2]. The distance to the child is also found using infrared sensors [2,3]. A robotic system which will attach a harness to the child using pneumatic arms is another method. Then the child is picked up . Teleconferencing is also used to communicate with the child [4]. Another system uses a clipper to pick the child [14], and video surveillance monitors the status of the child [14,15].

III. SYSTEM DESIGN

The proposed methodology can be used to rescue children who fell into the borewell. This prototype is capable of lifting upto to a weight of 75kg and the rescue can be done in a short period of time. The topics discussed below include block diagram and its system design.

A. Block diagram
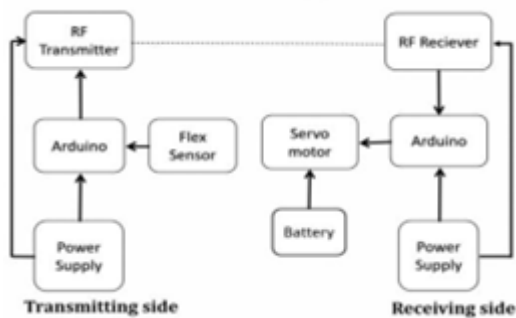
Fig.1. Block Diagram

As shown in Fig.1, the system consists of two units. They are the transmitting unit and the receiving unit. The transmitting unit contains an arduino board to control the transmitting side, five flex sensors and a RF transmitter to transmit the information to the receiving unit. On the receiving side the RF receiver receives the information. Again, the receiving side is controlled by an arduino UNO microcontroller. Five servo motors are connected to an animatronic arm on the receiving side. The servo motors are powered by batteries.

Arduino UNO is a microcontroller board based on the ATmega328P [20]. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a

power jack, an ICSP header and a reset button [5]. The versatility of the pinout provides many different options such as driving motors, LEDs, reading sensors and more. The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

Arduino can be powered either from the pc through a USB or through external source like adaptor or a battery. The external power supplies mainly include AC to DC adapter otherwise a battery. The adapter can be connected to the Arduino Uno by plugging into the power jack of the Arduino board. Similarly, the battery leads can be connected to the Vin pin and the GND pin of the POWER connector. The suggested voltage range will be 7 volts to 12 volts.

A transceiver is a blend of a transmitter and a receiver in a single package. An RF module is a small size electronic device that is used to transmit or receive radio signals between two devices. The main application of the RF module in an embedded system is to communicate with another device wirelessly. This communication may be accomplished through radio frequency communication and it does not need a line of sight. The nRF24L01+ transceiver module transmits and receives data on a certain frequency called Channel. Also in order for two or more transceiver modules to communicate with each other, they need to be on the same channel. This channel could be any frequency in the 2.4 GHz ISM [16] band or to be more precise, it could be between 2.400 to 2.525 GHz. Each channel occupies a bandwidth of less than 1MHz. This gives us 125 possible channels with 1MHz spacing. So, the module can use 125 different channels which give a possibility to have a network of 125 independently working modems in one place.

Servomotor is used for controlling the robot arms [12]. It is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration [5]. It consists of a suitable motor coupled to a sensor for position feedback.

The servo motor is the MG995 servo motor. MG995 Servo Motor [20] is a heavy-duty reliable servo motor. It is a low-power, cost-effective motor. The MG995 is a dual shock-proof ball-bearing servo design with metal gear making it quite feasible for industrial production. The motor has a quick response and rotates at high speed. It comes with great holding power and a stable constant torque range. MG995 servo motor is a popular servo motor mainly used in robotics and drones applications. MG995 provides precise rotation over 180º range and comes with metal geared, and shock proof double ball bearing design, so suited for designing robotic arm in which wear and tear of motor is high.

The flex sensor measures the amount of bending. When the senor bends its resistance changes. The resistance is directly proportional to the amount of bend. The resistance can be measured using any controller. This is also called a flexible potentiometer. This sensor is used wherever you need to measure the bent, flex, otherwise, change of an angle for any device otherwise any instrument. The internal resistance of this sensor alters approximately linear with the angle of its flex. Thus by connecting the sensor to the device, we can have the flex angle within resistances of electrical parameters.

The lead–acid battery [11] is a type of rechargeable battery first invented in 1859 by French physicist Gaston Planté. It is the first type of rechargeable battery ever created. Compared to modern rechargeable batteries, lead–acid batteries have relatively low energy density. Despite this, their ability to supply high surge currents

means that the cells have a relatively large power-to-weight ratio. These features, along with their low cost, make them attractive for use in motor vehicles to provide the high current required by starter motors.

IV. METHODOLOGY

The system is divided into two separate units, they are the Transmitting (controller) and Receiving units (Animatronic hand)[17,19]. This system works using wireless technology, but it can also be wired if necessary. It consists of flex sensors, arduino UNO microcontroller[11], RF transceiver modules, servo motors, an animatronic hand and five batteries to power the servo motors. The microcontrollers on both the sides are programmed using Embedded C language[9]. Arduino IDE is the software platform used for programming. The flex sensors are used here to get the glove movement from the transmitting side. It is attached to each finger on a glove and the data from the flex sensors is sent to the arduino board. The data is sent to the receiving end using an RF transmitter.

On the receiving side the data is received using RF receiver [10], then the data which is received is sent to the five servo motors by the arduino. The arduino is attached to the RF receiver module. The five servo motors are attached to each finger of an animatronic hand. The fingers of the animatronic hand are moved by the five servo motors. So, the animatronic hand mimics the movement of the glove. So this system can be used to rescue the children who fell into the borewell and the rescue operation is less risky.
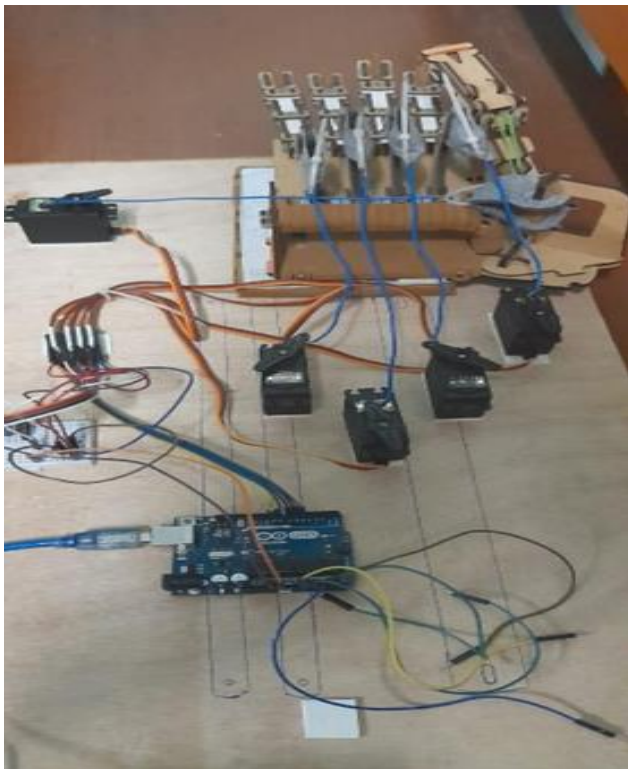
V. PROTOTYPE DESIGN

Fig.6. Prototype

VI. CONCLUSION

Thus, this animatronic hand can be used to rescue children who fell into the borewell. The prototype is shown in fig.6. This prototype is capable of lifting upto to a weight of 75kg. This animatronic arm has a human hand-like behaviour and can pick up the victim without causing issues. If we adopt this system the life of the child can be rescued within a short period of time. The lives of many children can be saved.

VII.   FUTURE SCOPE

In the future different types of sensors can also be attached with this system to monitor the status of the child.Also AI can also be used in the arm for more accurate and better results. This system can also be used for purposes other than borewell rescue.

VIII.   REFERENCES

[1]. Agarwal, Nitin & Singhal, Hitesh & Pathak, Shobhit. (2019). Child Rescue System from Open Borewells. International Journal of Trend in Scientific Research and Development. Volume-3.

[2]. S. Arthika, S. C. Eswari, R. Prathipa and D. Devasena, "Borewell Child Fall Safeguarding Robot," 2018 International Conference on Communication and Signal Processing (ICCSP), 2018, pp. 0825-0829.

[3]. Balachandar, P. Kumaravel, R. PradeepRaj, M. Gokul, M. Gokulakrishnan and S.Jayalakshmi, "Borewell Kid Evacuation System with Zigbee for Long Range Applications," 2021 3rd International Conference on signal processing and communication (ICPSC), 2021, pp.144-147.

[4]. M R Chaitra, Monika P, Sanjana M, Shobha Sindhe S R, Manjula G, 2018, Smart Child Borewell Robot Rescue System, International Journal Of Engineering Research & Technology (IJERT) NCESC – 2018 (Volume 6 –Issue 13).

[5]. N. M. Kurukuti, M. Jinkala, P. Tanjeri, S. R. Dantla and M. Korrapati, "A novel design of robotic system for rescue in bore well accidents," 2016 International Conference on Robotics and Automation for Humanitarian Applications (RAHA), 2016, pp. 1-5.

[6]. S.Magibalan, A.Mohanraj, S.Navin, N.Nirmal kumar,C.V.Pranav suresh, 2020.Child Rescue from Bore Well,International Journal of ChemTech Research.Vol.13 No.03, pp 120-124, 2020.

[7]. S.Prakash, Melvin Paul Miki .V, Amarnath. M.K.V, K.Naveen Kumar,2020. Arduino controller based borewell child rescue system, International Journal of Reconfigurable and Embedded Systems (IJRES) Vol. 9, No. 2, July 2020, pp. 133~140

[8]. M. Raj, A. Bansal, A. Makhal, P. Chakraborty and G. C. Nandi, "An approach towards rescue robotics in bore well environment," 2014 International Conference on Communication and Signal Processing, 2014, pp. 1097-1100

[9]. Satyaprasad Tadavarthy, Tarun Chowdary, Naga Sushma Yalamanchali, Yammanuru Jahnavi Reddy,2014.Borehole Robot for Rescue of a Child,International Journal of Computer Science and Mobile Computing,IJCSMC, Vol. 3, Issue. 11, November 2014, pg.183 –193

[10]. P. P. Sarker, F. Abedin and F. N. Shimim, "R3Arm: Gesture controlled robotic arm for remote rescue operation," 2017 IEEE Region 10 Humanitarian Technology Conference (R10-HTC), 2017, pp. 428-431

[11]. S. Singh, M. J. Baruah and R. Kumar Verma, "Implementation of a Child Rescue System from Borewell using Zigbee for Long Range Applications," 2020 7th International Conference on Signal Processing and Integrated Networks (SPIN), 2020, pp. 1029-1032

[12]. T. Sultana and B. Patil, "Arduino based Smart Borewell Ambulance Rescue System," 2020 Second International Conference on Inventive Research in Computing Applications (ICIRCA), 2020, pp. 563-567.

[13]. N A Sumalatha, M Pradeepika, M Srinivasa Rao, M Ramya, 2018, Arduino Based Child Rescue System from Borewells, International Journal Of Engineering Research & Technology (IJERTT) Volume 07, Issue 02 (February 2018).

[14]. P.Sumathy A.Monika R. Dhanashree,2018. Smart And Safe Child Rescue System. International Journal of Pure and Applied MathematicsVolume 119 No. 15 2018, 861-865.

[15]. L. D. William Raj, R. Abinaya, A. Brundha, N. D. Lakshmi and S. Geethapriya, "Robotic Arm for Extricate Operation in Bore well," 2020 International Conference on System, Computation, Automation and Networking (ICSCAN), 2020, pp. 1-5

[16]. B. Bharathi, B. Suchitha Samuel, "Design and Construction of Rescue Robot and Pipeline Inspection Using Zigbee", International Journal Of Scientific Engineering and Research (IJSER), vol. 1, no. 1, September 2013K.

[17]. Ch.Kutumba Rao, T.Ramesh , P.Naga Sai MadhusudhanaRao "Design and Development of Innovative Method to save Child from Bore Well Using Embedded System", International Journal of Advanced Research in Science, Engineering and Technology, Vol. 6, Special Issue , August 2019

[18]. K P, Sridhar. (2011). Life Saving Machine. The First International Conference on Interdisciplinary Research and Development Thailand Volume: 31.

[19]. S.Gopinath, T.Devika, L.Manivannan, Dr.N.SuthanthiraVanitha, Rescue Child from Bore well using Embedded System, International Research Journal of Engineering and Technology, Volume: 02 Issue: 03 June 2015.

[20]. Jayasudha.M, M.Saravanan "Real Time Implementation of Smart Child Rescue Robot from Bore Well using Arm and Belt Mechanism", International Journal of Innovative Technology and Exploring Engineering (IJITEE)ISSN: 2278-3075,Volume-8 Issue-12, Octobe 2019

Data Cleaning and Backup System in Cloud Computing Using Attribute Based Encryption

Mrs. A. Kalaiyarasi[1], Dr. E. Punarselvam[2], Mr. S. Hari Prasath[3], Mr. T. Muralitharan[3], Mr. V. Prasanth[3]

[1]Assistant Professor, Department of Information Technology, Muthayammal Engineering College
(Autonomous), Rasipuram - 637 408, Tamil Nadu, India

[2]Professor and Head, Department of Information Technology, Muthayammal Engineering College
(Autonomous), Rasipuram - 637 408, Tamil Nadu, India

[3]Student, Department of Information Technology, Muthayammal Engineering College (Autonomous),
Rasipuram - 637 408, Tamil Nadu, India

ABSTRACT

Big data is widely considered as potentially the next dominant technology in IT industry. It offers simplified system maintenance and scalable resource management with storage systems. As a fundamental technology of cloud computing, storage has been a hot research topic in recent years. The high overhead of virtualization has been well addressed by hardware advancement in CPU industry, and by software implementation improvement in hypervisors themselves. Existingsystems have made efforts to reduce storage image storage consumption by means of de-duplication within a storage area network system It also provides a comprehensive set of storage features including instant cloning for STORAGE images, on-demand fetching through a network, and caching with local disks by copy-on-read techniques. Experiments show that SILO features perform well and introduce minor performance overhead.

I. INTRODUCTION

CLOUD COMPUTING

Cloud computing is a computing paradigm, where a large pool of systems are connected in private or public networks, to provide dynamically scalable infrastructure for application, data and file storage. The idea of cloud computing is based on a very fundamental principal of reusability of IT capabilities. The difference that cloud computing brings compared to traditional concepts of "grid computing", "distributed computing", "utility computing", or "autonomic computing" is to broaden horizons across organizational boundaries. Forrester defines cloud computing as: "A pool of abstracted, highly scalable, and managed compute infrastructure capable of hosting end customer applications and billed by consumption." Cloud Computing is a technology that uses the internet and central remote servers to maintain data and applications. A simple example of cloud computing is Yahoo email, Gmail, or Hotmail.

BIG DATA

Big data is a broad term for data sets so large or complex that traditional data processing applications are inadequate. Challenges include analysis, capture, data curation, search, sharing, storage, transfer, visualization, and information privacy. The term often refers simply to the use of predictive analytics or other certain advanced methods to extract value from data, and seldom to a particular size of data set. Accuracy in big data may lead to more confident decision making. And better decisions can mean greater operational efficiency, cost reduction and reduced risk. the wide variety of types of data and the velocity at which the data must be must processed. Although big data doesn't refer to any specific quantity, the term is often used when speaking about petabytes and exabytes of data, much of which cannot be integrated easily relational database for analysis, new approaches to storing and analyzing data have emerged that rely less on data schema and data quality. Instead, raw data with extended

STUDY OF DEDUPLICATION

In computing, data deduplication is a specialized datacompression technique for eliminating duplicate copies of repeating data. Related and somewhat synonymous terms are intelligent (data) compression and single-instance (data) storage. This technique is used to improve storage utilization and can also be applied to network data transfers to reduce the number of bytes that must be sent. In the deduplication process, unique chunks of data, or byte patterns, are identified and stored during a process of analysis. As the analysis continues, other chunks are compared to the stored copy and whenevera match occurs, the redundant chunk is replaced with a small reference that points to the stored chunk. Given that the same byte pattern may occur dozens, hundreds, or even thousands of times (the match frequency is dependent on the chunk size), the amount of data that must be stored or transferred can be greatly reduced.

ALGORITHM

Secure Hash Algorithm
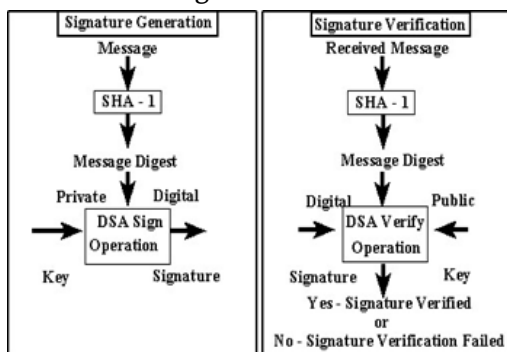
ALGORITHM

SILO similarity algorithm
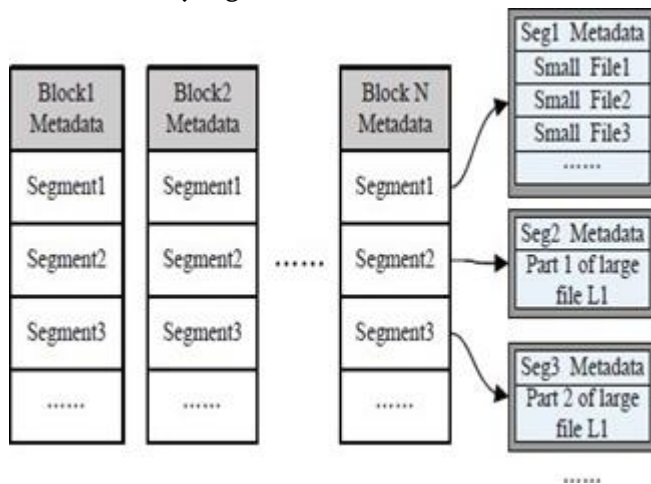
Files in the backup stream are first chunked, fingerprinted, and packed into segments by grouping strongly correlated small files and segmenting large files in the File Agent. For an input segment Snew, Psuedocode for SiLo:

Step 1: Check to see if Snew is in the SHTable. If it hits in SHTable, SiLo checks if the block Bbk containing Snew's similar segment is in the cache. If it is not in the cache, SiLo will load Bbk from the disk to the Read Cache according to the referenced block ID of Snew's similar segment, where a block is replaced in the FIFO order if the cache is full.

Step 2: The duplicate chunks in Snew are detected and eliminated by checking the fingerprint sets of Snew with LHTable (fingerprints index) of Bbk in the cache.

Step 3: If Snew misses in SHTable, it is then checked against recently accessed blocks in the read cache for potentially similar segment (i.e., locality-enhanced   similarity detection).

Step 4: Then SiLo will construct input segments into blocks to retain access locality of the input backup stream. For an input block Bnew, SiLo does following:

Step 5: The representative fingerprint of Bnew will be examined to determine the stored backup nodes of data block Bnew.

Step 6: Silo checks if the Write Buffer is full. If the Write Buffer is full, a block there is replaced in the FIFO order by Bnew and then written to the disk.

II. PROPOSED SYSTEM

In de-duplication framework, propose system implement block level de-duplication system and named as similarity and locality based de-duplication framework that is a scalable and short overhead near-exact de¬duplication system, to defeat the aforementioned shortcomings of existing schemes. Data de-duplication not only reduces the storage space overheads, but also minimizes the network transmission of redundant data in the network storage system.

ADVANTAGES

- Silo is able to remove large amounts of redundant data, dramatically reduce the numbers of accesses to on-diskindex.
- Maintain a very high de-duplication throughput.

ARCHITECTURE
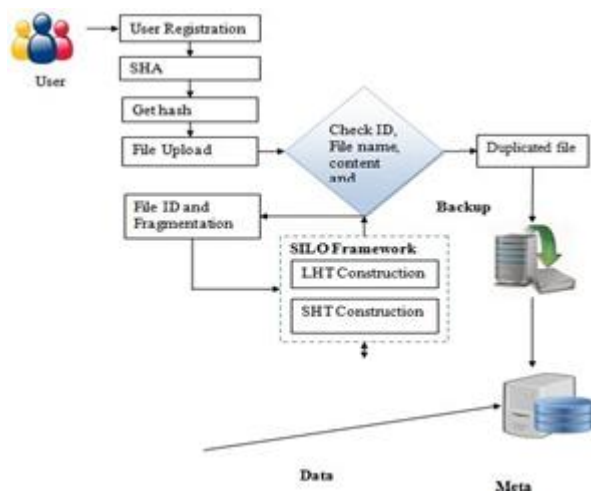
III. MODULES

- Cloud resource allocation
- De-duplication scheme
- File system analysis
- Data sharing components Evaluation criteria

MODULES DESCRIPTION

CLOUD RESOURCE ALLOCATION

The virtualization is being used to provide ever-increasing number of servers on virtual machines (STORAGEs), reducing the number of physical machines required while preserving isolation between machine instances. This approach better utilizes server resources, allowing many different operating system instances to run on a small number of servers, saving both hardware acquisition costs and operational costs such as energy, management, and cooling.

DATA SHARING COMPONENTS

In this module, we can analyze data sharing components and Meta server in SILO responsible for managing all data servers. It contains SHT and LHT table for indexing each files details for improving search mechanisms. A dedicated background daemon thread will immediately send a heartbeat message to the problematic data server and determines if it is alive. This mechanism ensures that failures are detected and handled at an early stage. The stateless routing algorithm can be implemented since it could detect duplicate data servers even if no one is communicating with them.

DEDUPLICATION SCHEME

De-duplication is a technology that can be used to reduce the amount of storage required for a set of files by identifying duplicate "chunks" of data in a set of files and storing only one copy of each chunk. Subsequent requests to store a chunk that already exists in the chunk store are done by simply recording the identity of the chunk in the file's blocklist; by not storing the chunk a second time, the system stores less data, thus reducing cost.

FILE SYSTEM ANALYSIS

In this module, we first broke STORAGE disk images into chunks, and then analyzed different sets of chunks to determine both the amount of de-duplication possible and the source of chunk similarity. We use the term disk image to denote the logical abstraction containing all of the data in a STORAGE, while image files refers to the actual files that make up a disk image. A disk image is always associated with a single STORAGE; a monolithic disk image consists of a single image file, and a spanning disk image has one or more image files, each limited to a particular size. Files are storedin data server with block id and this can be monitored by Data servers. Data servers are mapped by using Meta servers.

EVALUATION CRITERIA

We showed that data localization have little impact on deduplication ratio. However, factors such as the base operating system or even the Linux distribution can have a major impact on deduplication effectiveness. Thus, we recommend that hosting centers suggest "preferred" operating system distributions for their users to ensure maximal space savings. If this preference is followed subsequent user activity will have little impact on de-duplication effectiveness.

IV. CONCLUSION

In cloud many data are stored again and again by user. So the user need more spaces store another data. That will reduce the memory space of the cloud for the users. To overcome this problem uses the de¬duplication concept. Data de-duplication is a method for sinking the amount of storage space an organization wants to save its data. In many associations, the storage systems surround duplicate copies of many sections of data. For instance, the similar file might be keep in several dissimilar places by dissimilar users, two or extra files that aren't the same may still include much of the similar data Experimental metrics are proved that our proposed approach provide improved results in de-duplication process.

V. FUTURE ENHANCEMENT

In future we can extend our work to handle multimedia data for de-duplication storage. The multimedia data includes audio, image and videos. And also implement heart beat protocol recover each data server and increase scalability process of system.

VI. RESULTS

VII.   REFERENCES

[1]. D. Meyer and W. Bolosky, "A study of practical deduplication," in Proceedings of the 9th USENIX Conference on File and Storage Technologies, 2011.

[2]. B. Debnath, S. Sengupta, and J. Li, "Chunkstash: speeding up deduplication using flash inline storage memory," in Proceedings of the 2010 USENIX conference on USENIX annual technical conference. USENIX Association, 2010.

[3]. W. Dong, F. Douglis, K. Li, H. Patterson, S. Reddy, and P. Shilane, "Tradeoffs in scalable data routing for deduplication clusters," in Proceedings of the 9th USENIX conference on File and storage technologies. USENIX Association, 2011.

[4]. E. Kruus, C. Ungureanu, and C. Dubnicki, "Bimodal content defined chunking for backup streams," in Proceedings of the 8th USENIX conference on File and storage technologies. USENIX Association, 2010.

[5]. G.Wallace, F. Douglis, H. Qian, P. Shilane, S. Smaldone, M. Chamness, and W. Hsu, "Characteristics of backup workloads in production systems," in Proceedings of the Tenth USENIX Conference on File and Storage Technologies, 2012.

[6]. A. Broder, "On the resemblance and containment of documents," in Compression and Complexity of Sequences 1997.

[7]. D. Bhagwat, K. Eshghi, and P. Mehra, "Content-based document routing and index partitioning for scalable similarity-based searches in a large corpus," in Proceedings of the 13th ACM SIGKDD international conference on Knowledge discovery and data mining. ACM, 2007, pp. 105–112.

[8]. Y. Tan, H. Jiang, D. Feng, L. Tian, Z. Yan, and G. Zhou, "SAM: A Semantic-Aware Multi-Tiered Source De- duplication Framework for Cloud Backup," in IEEE 39th International Conference on Parallel Processing. IEEE, 2010, pp. 614–623.

[9]. M. Lillibridge, K. Eshghi, D. Bhagwat, V. Deolalikar, G. Trezise, and P. Camble, "Sparse 7th conference on File and storage technologies, 2009, pp. 111–123.

[10]. D. Bhagwat, K. Eshghi, D. Long, and M. Lillibridge, "Extreme binning: Scalable, parallel deduplication for chunk-based file backup," in IEEE International Symposium on Modeling, Analysis & Simulation of Computer and Telecommunication Systems. IEEE, 2009, pp. 1–9.

Credit Card Fraud Detection Using Deep Learning

Selvi P. Sankara Parvathy M.Sc., M.Phil.[1], M. Selvi[2]

[1]Assistant Professor, Department of Computer Science, Sri Sarada College for Women (Autonomous),
Tirunelveli, Tamil Nadu, India

[2]II M.Sc. Computer Science, Department of Computer Science, Sri Sarada College for Women (Autonomous),
Tirunelveli, Tamil Nadu, India

ABSTRACT

There is a rising issue in today's financial sector with credit card fraud. An rise in the number of fraudulent operations is generating a significant financial loss for numerous organizations, corporations, and government bodies. Many academics in this sector are focusing on identifying fraudulent conduct early using powerful Deep learning approaches since the numbers are projected to grow in the future. However, detecting credit card fraud is not an easy process due to two primary reasons: I the fraudulent conduct is generally different for each attempt and (ii) the dataset is highly skewed, i.e. the frequency of the majority samples (genuine instances) outnumbers the minority samples (fraudulent cases).

A new fraud detection algorithm for streaming transaction data will be developed in order to evaluate prior client transaction information and extract behavioural patterns. Transaction amount is used to categorize cardholders into various groupings For each set of cardholders, a sliding window method is used to aggregate their transactions so that the corresponding behavioural patterns may be identified. After that, several classifiers are trained on the various subsets of data. Then, the classifier with the highest rating score may be selected as one of the best approaches for predicting fraud. Convolutional Neural Networks (CNNs) and K Nearest Neighbour (KNN) and naive bayes may be used to overcome this challenge and forecast frauds using K Nearest Neighbour (KNN)). As a result, a feedback system was implemented to address the issue of notion drift. This article used Convolutional Neural Networks (CNN) and fuzzy logic(FL) to analyze a dataset of European credit card fraud

INDEX TERMS. Deep learning,fraud detection, Convolutional Neural Networks, K Nearest Neighbour

I. INTRODUCTION

Nowadays People throughout the globe are increasingly using credit cards to make purchases, as they believe in being cashless and relying only on the internet for their transactions. credit card has made online transactions more convenient and accessible. Criminal usage of credit cards results in enormous monetary losses every year. There are an infinite number of ways to commit fraud, and it's been around since the dawn of time. According

to the 2017 PwC global economic crime study, around 48% of firms have been the victim of economic crime [1]. As a result, credit card fraud detection is an issue that must be addressed. In addition, the development of new technology opens up new avenues for scammers. Credit cards are widely accepted in contemporary culture, and as a result, the number of cases of credit card fraud has steadily risen in recent years.

Fraud rates tend to rise when credit cards become the most common method of payment for both online and brick-and-mortar purchases. The emergence of big data has rendered manual techniques of detecting fraudulent transactions impracticable since they are time consuming and unreliable[3]. Financial institutions, on the other hand, have resorted to more sophisticated methods. CI-based approaches make up the majority of these clever fraud methods. Unsupervised and supervised statistical fraud detection systems have been split into two major categories: To identify new transactions as either fraudulent or genuine, models based on samples of fraudulent and valid transactions are used in supervised fraud detection techniques.

II. EXISTING SYSTEM

Credit card fraud has emerged as major problem in the electronic payment sector. In this survey, we study data-driven credit card fraud detection particularities and several Deep learning methods to address each of its intricate challenges with the goal to identify fraudulent transactions that have been issued illegitimately on behalf of the rightful cardowner[3]. In particular, we first characterize a typical credit card detection task: the dataset and its attributes, the metric choice along with some methods to handle such unbalanced datasets. These questions are the entry point of every credit card fraud detection problem.

Then we focus on dataset shift (sometimes called concept drift), which refers to the fact that the underlying distribution generating the dataset evolves over times: For example, card holders may change their buying habits over seasons and fraudsters may adapt their strategies. This phenomenon may hinder the usage of Deep learning methods for real world datasets such as credit card transactions datasets[4]. Afterwards we highlight different approaches used in order to capture the sequential properties of credit card transactions. These approaches range from feature engineering techniques (transactions aggregations for example) to proper sequence modelling methods such as recurrent neural networks Long short Term memory(LSRM)) or graphical models (hidden mark ov models).

III. PROPOSED SYSTEM

In this proposed project we designed a protocol or a model to detect the fraud activity in credit card transactions. This system is capable of providing most of the essential features required to detect fraudulent and legitimate transactions. As technology changes, it becomes difficult to track the modelling and pattern of fraudulent transactions. With the rise of Deep learning, artificial intelligence and other relevant fields of information technology, it becomes feasible to automate this process and to save some of the intensive amount of labour that is put into detecting credit card fraud [9]. We propose a Deep learning model to detect fraudulent credit card activities in online financial transactions. Analysing fake transactions manually is impracticable due to vast amounts of data and its complexity. However, adequately given informative features, could make it is

possible using Deep learning. This hypothesis will be explored in the project. To classify fraudulent and legitimate credit card transaction by supervised learning Algorithm such as Random Forest. To help us to get awareness about the fraudulent and without loss of any financially.

In the proposed we used CNN algorithm to detect the correct accuracy and prediction in existing we used SVM algorithm so that we have three drawbacks we cannot detect the correct fraud and non-fraud using the date set and cannot accessible correct prediction and the accuracy so we use CNN algorithm to detect a model to detect the fraud activity in credit card transactions. This system is capable of providing most of the essential features required to detect fraudulent and legitimate transactions. The correct accuracy of a dataset
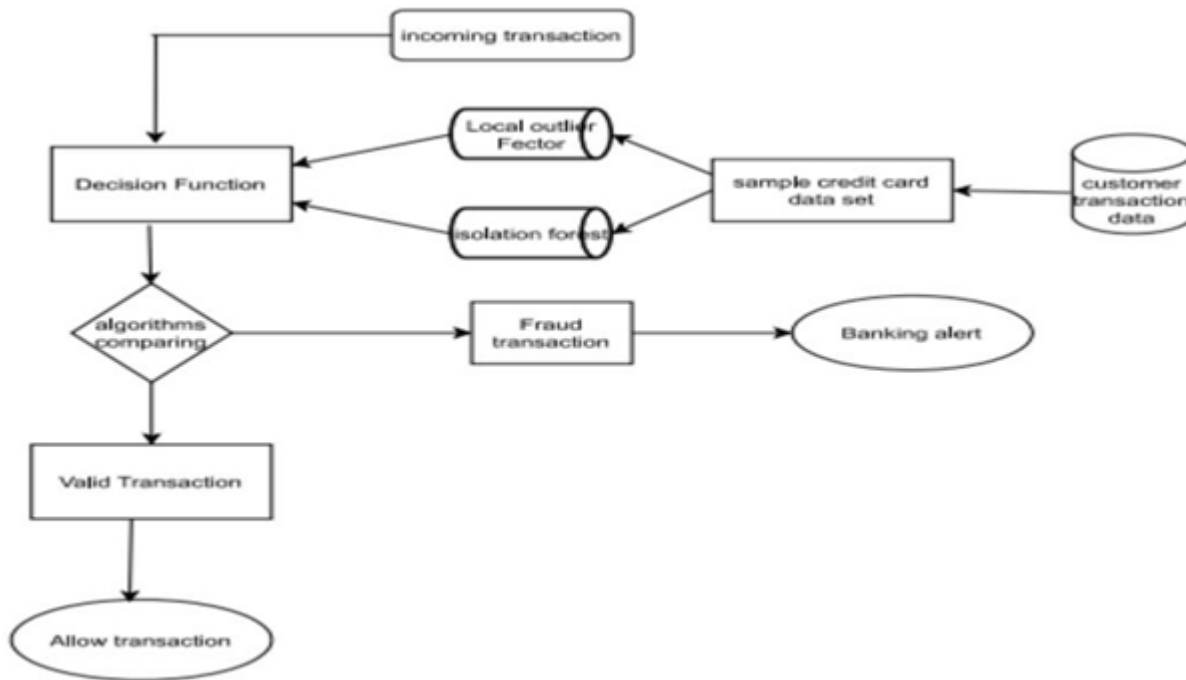
IV. RESULT
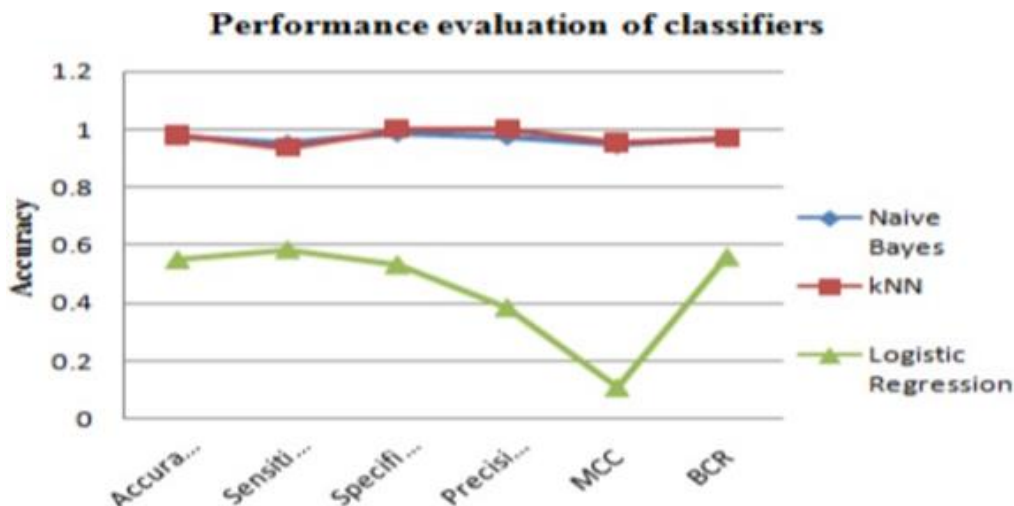
Performance evaluation chart for Naïve bayes, kNN andLogistic Regression

Figure 1 shows the performance of k-NN algorithms with five training sets. When training sets 1 and 2 are used, the classifier performs best. However, k-NN performance is more precise when training set 2 is used instead of training set 1.
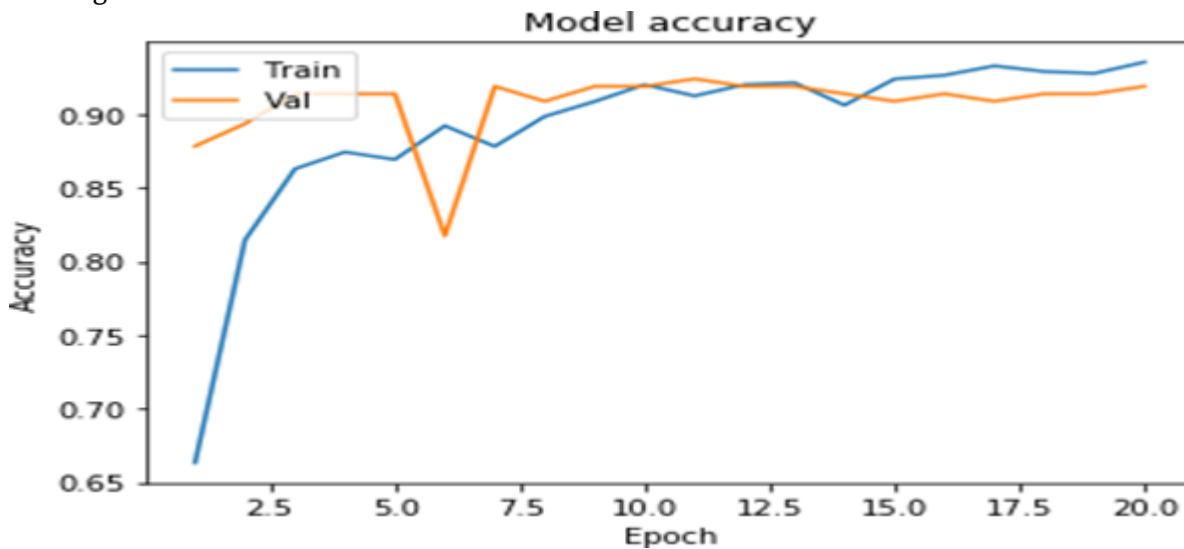
Figure 2shows the performance of the Nave Bayes classifier using the same training data. When utilizing training set 2, Nave Bayes performs best. The greatest properly categorized instance and precision, and the lowest mistakenly classified occurrence, demonstrate this.

V. CONCLUSION

The data set contains just 0.172 percent of fraudulent transactions, whereas the remainder of the transactions are legitimate. An oversampling resulted in 60% of fraudulent transactions and 40% of legitimate ones in the data set. The predictive model tends to be biased towards the majority samples when the input data is severely imbalanced. The upshot is that fraudulent transactions are often misrepresented as legitimate ones. Re sampling approaches, such as random under sampling, to mek-link elimination, random oversampling, Synthetic Minority Oversampling Technique (SMOTE), and a hybrid re sampling method, were used to solve this issue. To address the issue of class imbalance, we used algorithmic techniques like bagging and boosting. We used the random forest model as a bagging approach and the CNN as a boosting method for this task. For comparison with the other models, we used a logistic regression model in addition to these two. All three models were then examined using resampling techniques and without resampling methods. The comparative findings showed that the random forest in conjunction with a hybrid resampling strategy of SMOTE and link removal worked better than other m-methods.

VI.REFERENCES

[1]. https://towardsdatascience.com/the-random-forestalgorithm-d457d499ffcd
[2]. https://www.xoriant.com/blog/productengineering/decision-trees-machine-learningalgorithm.html

[3]. Gupta, Shalini, and R. Johari." A New Framework for Credit Card Transactions Involving Mutual Authentication between Cardholder and Merchant."International conference on Communication Systems and Network TechnologiesIEEE,2021:22-26.

[4]. Y. Gmbh and K. G. Co, "Global online payment methods: the Full year 2020," Tech. Rep., 2020.

[5]. Bolton, Richard J., and J. H. David. "Unsupervised Profiling Methodsfor Fraud Detection." Proc Credit Scoring andCredit Control VII (2020): 5– 7.

[6]. Drummond, C., and Holte, R. C. (2019). C4.5, class imbalance, and cost sensitivity: why under- sampling beatsoversampling. Proc of the ICML Workshop on Learning from Imbalanced Datasets II, 1–8.

[7]. Quah, J. T. S., and Sriganesh, M. (2020). Real-time credit card fraud detection using computational intelligence. ExpertSystems with Applications, 35(4), 1721-1732.

[8]. S. Xuan, G. Liu, Z. Li, L. Zheng, S. Wang, and G. N. Surname, Random Forest for credit card fraud detection, IEEE 15th International Conference on Networking, Sensing and Control (ICNSC),2018.

[9]. Satvik Vats, Surya Kant Dubey, Naveen Kumar Pandey, A Tool for Effective Detection of Fraud in Credit Card System, published in International Journal of Communication Network Security ISSN: 2231 1882, Volume-2, Issue-1, 2013.

[10].Rinky D. Patel and Dheeraj Kumar Singh, Credit Card Fraud Detection & Prevention of Fraud Using Genetic Algorithm, published by International Journal of Soft Computing and Engineering (IJSCE) ISSN: 2231-2307, Volume-2, Issue-6, January 2013.

A Novel Approach for Examination of Visually Challenged Candidates By E-Evaluation Techniques

Smt. M.Vijayalakshmi M.Sc. M.Phil. SET, M.Pushkala

[1]Assistant Professor, Department of Computer Science, Sri Sarada College for Women (Autonomous), Tirunelveli, Tamil Nadu, India

[2]II M.Sc. Computer Science, Department of Computer Science, Sri Sarada College for Women (Autonomous), Tirunelveli, Tamil Nadu, India

ABSTRACT

The evaluation of physically challenged is always a challenging task as any evaluation of them is compared with that of normal candidates. The case of visually challenged is still more difficult as vision is a nunerono sensor in the field of study and knowledge enhancement and evaluation of them on pair with another candidate is very difficult. The aim of this paper is to present an approach for E-evaluation model for the visually challenged students/candidates for the screening tests conducted by the different examination authorities.

The major attempt is made to use the personal computer and avoid the use of a scriber by the candidate so that candidate can take the exam independently with the help of voice recognition using Google Text To Speech Algorithm (GTTS). A portion of the PC keyboard is slightly modified in its software functionality to help them in undergoing the test using GTTS. Also described is the functioning of this model of E-Evaluation and its relative advantages.

Index terms: GTTS,PC,E-Evaluation, nunerouno sensor.

I. INTRODUCTION

Online Examination for visually challenged is a software solution, which allows a particular company or institute to arrange, conduct and manage examinations via online environment. This can be done through the Internet or Local Area Network Environment. Candidate can answer his/her examination paper on the computer and submit answers. The Examination Software evaluates the submitted answers and the results will be available immediately after completion of the examination.

The online examinations system provides the facility for the visually challenged students to interact with the system comfortably. Writing an online exam would be a big task for anybody if there is no proper Internet connection and when it comes to visually challenged students there would be a lot of issues for them to face while writing any exam. In order to avoid such issues and this project has come up with new features to facilitate the visually challenged with an ease. With the help of packages in python, the facility of text-to-

speech and speech-to-text conversion is implemented to provide more functional support for visually challenged students. In order to avoid such issues and this project has come up with new features to facilitate the visually challenged with an ease[9]. With the help of packages in python, the facility of text-to-speech and speech-to-text conversion is implemented to provide more functional support for visually challenged students. Also, by integrating with the keys of keyboard it was possible to enhance the functionalities provided. There are various systems which use Internet for utilizing packages / functions of speech-to-text for controlling the flow of the system The systems which using speech-to-text for maintaining the flow of system, will require the student voice as input.

II. EXISISTING SYSTEM

The system is a stand-alone application which uses Speech-To-Text (STT) and Text-To-Speech(TTS) technology to provide the users almost all of the capabilities of a conventional online examination.[3] The online examination system is adaptable to different types of questions pertaining to different subjects, different time limits and different marking schemes, and can be customized according to the needs of any organization[4]. All the data pertaining to the test is stored in a database which is linked to the application. The Voice Enabled Examination System is able to read aloud the questions and the different options available to the test taker. The candidate has to answer the question by pressing the option number. The system registers the answer given by the candidate and moves on to the next question when next question button or right arrow key is pressed[5]. At the end of the test, a report is generated by the system.

- Time delay due to speech-to-text usage for taking answers.
- Minimal accuracy.
- Manual process needs to be monitored.
- Blind students cannot access independently, rely on others.
- The noise suppression also arises for the lengthy word, entered by the student.
- The voice entered is even in a smooth method there could some mismatch occur.

III. PROPOSED SYSTEM

This system would be operating with the help of internet services which is useful for Speech-To-Text conversions and for database connections.[6] This system was being proposed with the sole purpose of reducing the pressure form upon the student while writing exam with the help of text to speech Students or candidates who are visually challenged can go through the online exams with ease

- There is no need for scribers while examination.
- Visually challenged students can do their work and go through the examination procedure independently by the help of this product.
- The user can comfortably recheck all the attempted questions as well as un-attempted questions at the end of the examination before submitting the examination.

- While the user attempting the examination, the user can also be able to hear the alert messages regarding time left.
- This system facilitates the efficiency to the user by providing minimal usage of keys on the keyboard such that it reduces the mismatch errors, noise suppression problems and voice synthesis problems.
- The user can answer the respective questions in the examination by using keys which are numbered as 1, 2, 3, and 4 on the keyboard. Therefore, mismatch errors which are caused by voice synthesis problems can be completely avoided.
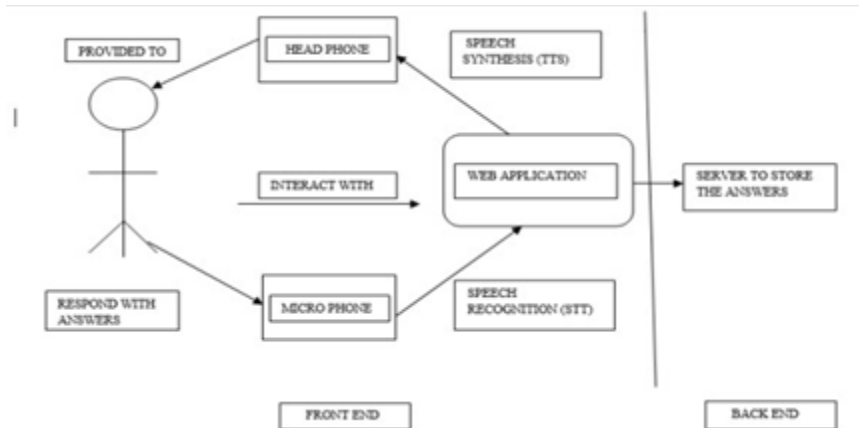
IV. RESULT
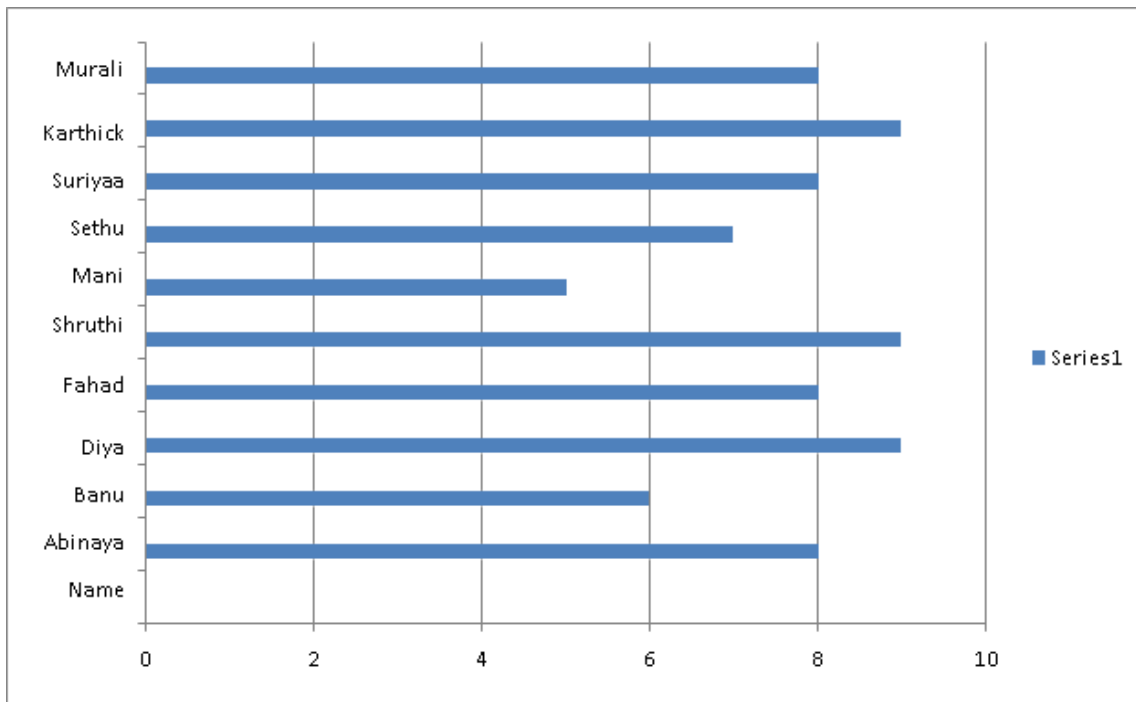
o The above graph explains the marks obtained by the blind candidates who attended the examination using the software. By analyzing the graph, we can coach the students according to the marks scored by them .So that it could be easy for the institution or coaching center to train the blind people.

V. CONCLUSION

This project is a useful application for every visually challenged student to know their talent easily through online exams like other students. Visually challenged people could give an extra dedication to test their internal abilities by using web examination.

The user interface for individuals is the system keyboard. Thus, visually challenged people can easily take up the exam like a common man without much difficulty. This project facilitates a visually challenged person to attempt an online examination without any human assistance.

This project mainly focuses on the complete avoidance of voice synthesis, voice recognition & noise suppression problems and also deals with mismatch errors issues. This project aims to deliver a portal which provides minimal usage of the keyboard such that it reduces ambiguity which is caused while prompting through a microphone.

VI.REFERENCES

[1]. B.Shanmuga Sundari, Essaki Durai.K,Srinivasan.S (2014), 'Online Examination System for Blinds' ,International Journal of Technology Enhancements and Emerging Engineering Research.

[2]. Akshay Naik, Kavita Patil, Vishal Patil, Ajinkya Tandel(2015), 'E-Blind Examination System' ,International Journal of Innovative Research in Science and Technology.

[3]. Akriti Vats, Apoorv Tandon, Deepam Varshney, Amit Sinha(2016), 'Voice Operated Tool-Examination Portal for Blind Persons' ,International Journal of Computer Applications.

[4]. J.Kanimozhi, A.Karkuzhali and K.Suresh kumar(2017), 'Online Examination for Visually Challenged People' ,Asian Journal of Applied Science and Technology.

[5]. Pawan Bharadwaj, Tirumala Balaji.G, Valleesh Prabhu, Shreehari.N, Rahul Kumar(2019), 'E-Blind Examination Portal' , International Journal of Intelligence in Science and Engineering.

[6]. Susumu Harada , Jacob O. Wobbrock James A.Landay (University of Washington) 'Voice Driven Application for people with motor Impairments',2001 ACM New York, USA

[7]. M.A.Anusuya and S.K.Katti (Sri Jayachamarajendra College Of Engineering, Mysore) , 'Speech Recognition by a Machine' : A review , : International Journal of Computer Science and Information Security (2009)

[8]. National Braille Association Tape Recording Manual, National Library of Congress, Washington, DC.

[9]. "Briding the Gap: Best Practices for Instructing Adults Who are Visually Impaired and Have Low Literacy Skills" American Foundation for the Blind, 2002.

[10].Sania Khan, Sanskriti verma,Shewta Agarwal, Prateek krishnatrey, Shivam sharma "Voice Based Online Examination for Physically Challenged" MIT International Journal of Computer Science and Information Technology,Vol.5, No.2, August 2015.

Twitter Post Approach for Feature Extraction and Communicating Metadata

K. Amutha MCA. M.Phil., R. Janaki Rama

[1]Assistant Professor, Department of Computer Science, Sri Sarada College for Women (Autonomous),
Tirunelveli, Tamil Nadu, India
[2]II M.Sc. Computer Science, PG and Research Department of Computer Science, Sri Sarada College for Women
(Autonomous), Tirunelveli, Tamil Nadu, India

ABSTRACT

Because of the enormous use of social networking, Twitter has become a popular medium for disseminating information. According to existing studies, Twitter can be utilized for successful post-incident measures since it has a considerably greater reach than conventional media. On Twitter, people employ colloquial language such as acronyms, misspelling words, synonyms, transliteration, and unclear terminology. As a result, extracting incident-related data is a difficult undertaking. This information, on the other hand, may be useful to public safety groups in the event of an emergency. This study presents a framework for extracting and reporting early event-related information from Twitter streams, which monitors and synthesizes event-specific information, such as a terrorist attack, and warns law enforcement, emergency services, and media sources. Tweet-to-Act (T2A) is a suggested system that uses word embedding to convert tweets into a vector space model and then uses the Word Mover's Distance (WMD) to cluster tweets for event detection. The proposed system uses sequence labelling with random forest to extract trustworthy and relevant information from a huge dataset of short and informal tweets

INDEX TERMS : Random forest, machine learning, ,Sentiment analysis, Natural Language processing, opinion mining

I. INTRODUCTION

Microblogging has been a major study field for sentiment analysis. In platforms like Twitter, people submit messages about their everyday lives, and these tweets are often linked to a wide range of themes. Prior to and throughout the feature selection process, pre¬processing is critical to the success of many research on sentiment analysis classification algorithms. Texts are cleaned and prepared for classification as part of the pre-processing process.

On the Internet and in particular on Twitter, there is a large quantity of noise. Data that does not provide any helpful information for our study, such as sentiment analysis, is referred to as "noise."

As much as 40% of a dataset has noise, which presents problems for machine learning systems. The use of acronyms and slang is common among Twitter users, as are spelling and typographical mistakes. [1] – [3]They may also employ punctuation marks, such as exclamation marks, to express their feelings. Most of the time, it is not required to incorporate every word in the original form of the text in the machine learning stage. To ensure that machine learning succeeds, pre-processing data must be cleansed and normalized, which necessitates this step.

Using two well-known datasets, this work aims to collect and assess a variety of popular pre-processing methods as well as some innovative ones, such as the replacement of contractions and negations with antonyms, to see whether they have any importance in feature selection. Based on our findings, we recommend to future researchers which strategies are most suited for Twitter sentiment analysis, and which ones should be avoided.

Text sentiment analysis begins with pre-processing, which may be made more accurate by using several methodologies. We tried a large number of pre-processing methods that had never been compared before on two different datasets. Three example machine learning algorithms assessed the accuracy of each strategy. Finally, depending on the findings, we divide the techniques into different performance groups and count the number of features for each one. Tests demonstrate that certain Twitter sentiment analysis algorithms are more accurate than others when it comes to classifying tweets, while others are less reliable. Stemming, replacing punctuation repeats, and deleting numerals are all highly suggested.

II. EXISTING SYSTEM

Online Social Networks (OSNs) such as Facebook, Google, and Twitter are inherently designed to enable people to share personal and public information and make social connections with friends, co-workers, colleagues, family, and even with strangers. [3]-[6] In recent years, we have seen unprecedented growth in the application of OSNs. For example, Twitter, one of representative social network sites, claims that it has more than 800 million active users and over 30 billion pieces of content (web links, news stories, Tweets, blog posts, notes, photo albums, and so on.) shared each month. To protect user data, access control has become a central feature of OSNs. A typical OSN provides each user with a virtual space containing profile information, a list of the user's friends, and webpages, such as wall in Twitter, where users and friends can Tweet content and leave messages.

A user profile usually includes information with respect to the user's birthday, gender, interests, education, work history, and contact information. In addition, users can not only upload a content into their own or others' spaces but also tag other users who appear in the content. Each tag is an explicit reference that links to a user's space. For the protection of user data, current Twitter indirectly require users to be system and policy administrators for regulating their data, where users can restrict data sharing to a specific set of trusted users. OSNs often use user relationship and group membership to distinguish between trusted and untrusted users. For example, in Twitter, users can follow peoples, create friends, groups, or public to access their data, improve our business qualities and income, depending on their personal authorization and privacy requirements.

III. PROPOSED SYSTEM

In Proposed System this project is implemented with a proof-of-concept Twitter application for the collaborative management of shared data, are managed by sentiment analysis. Our prototype application enables multiple associated users to specify their authorization policies and privacy preferences to CNN based co- control a shared data item. It is worth noting that our current implementation was restricted to handle photo sharing in OSNs. our approach can be generalized to deal with other kinds of data sharing and comments, in OSNs as long as the tweets holder of shared data are identified with effective methods like tagging or searching.

The proposed system shows a novel solution for collaborative management of shared data in OSNs. We have introduced an approach to propose and experimentally evaluate an automated system, called Filtered Wall, able to filter unwanted messages from OSN user walls. This project exploit Machine Learning text categorization techniques to automatically assign with each short text messages a set of categories based on its content.[7]-[9] A system to automatically filter unwanted tweet messages or emojis from OSN user walls on the basis of both message content and the message creator relationships and characteristics.
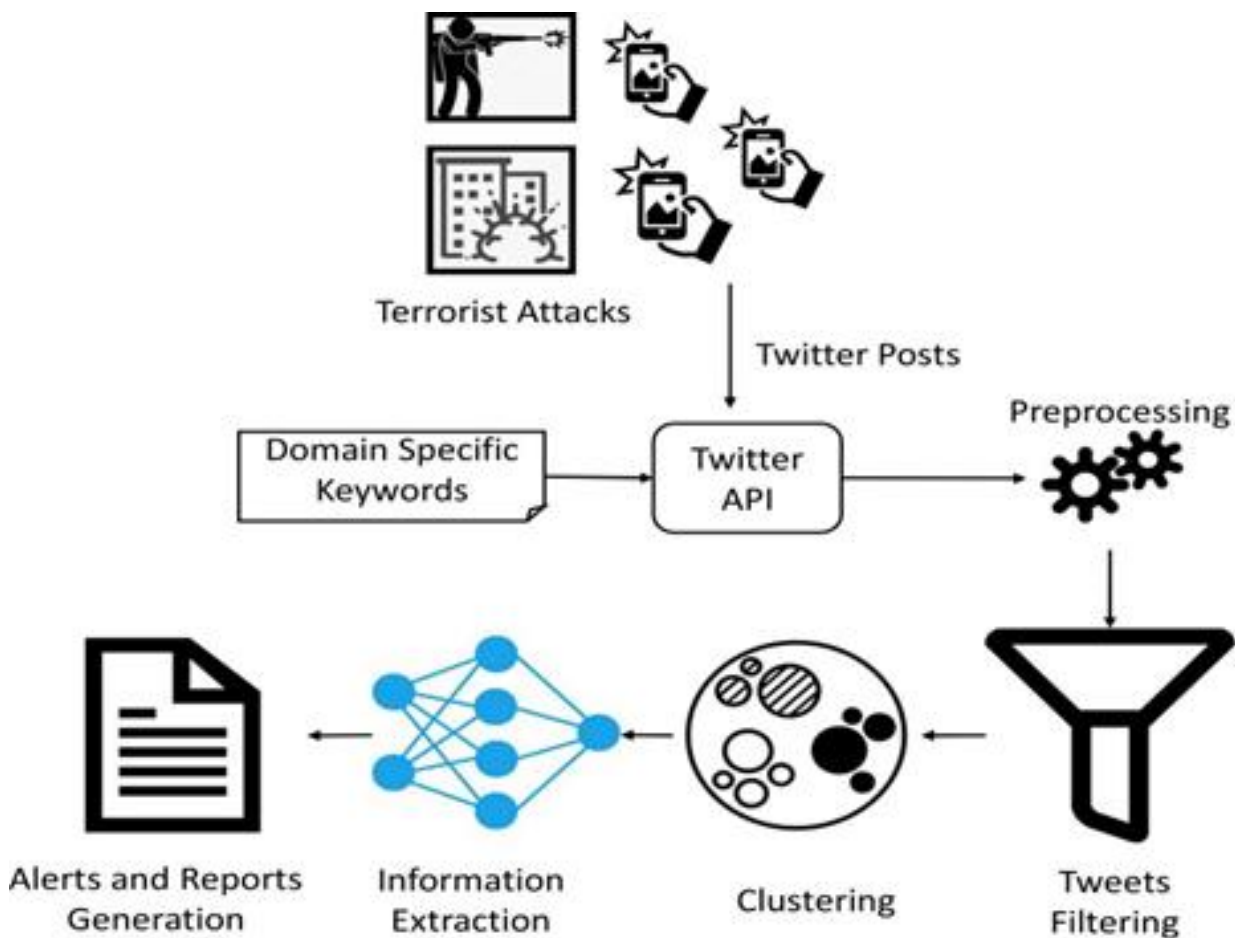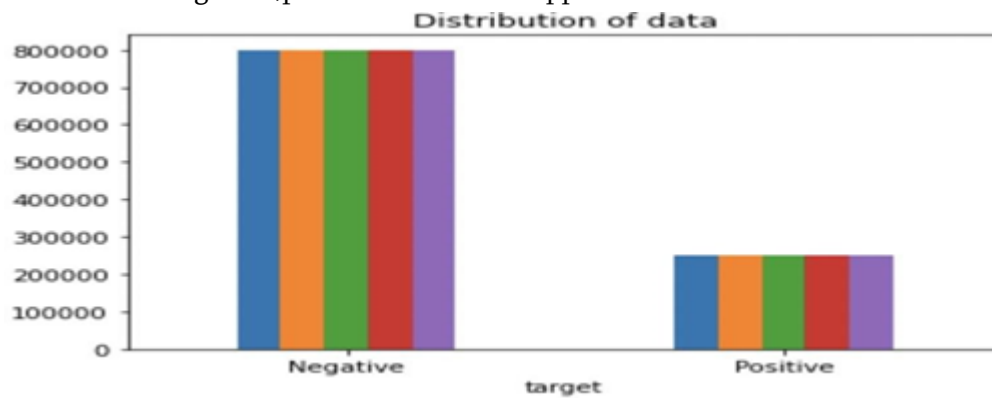
IV. RESULT
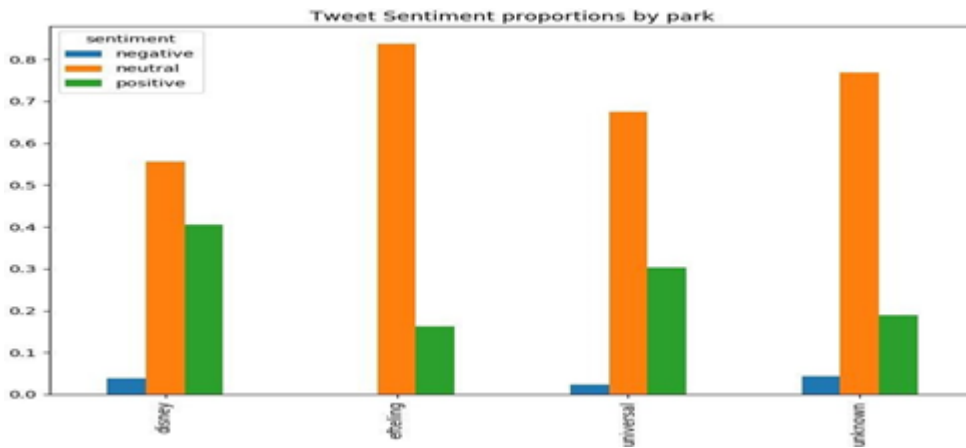
In this figure it shows that tweet sentimenrt proportions by park instead of many data's are written in pseudo assembler in negative ,positive and neutral approaches

In this figure it shows distribution of data's of many data's are read in negative and positive approaches are milliseconds counts

V. CONCLUSION

As Compared to the support vector machine and the baseline method for Twitter sentiment classification algorithm, the results indicate that the random forest has obvious advantages in datasets. This shows that random forest can effectively construct text semantics. The random forest directly models context sentiment feature from text, and selects the most important features in the tweet effectively. It avoids error propagation and improve the classification performance. The pre-trained word vector representation by learning on Twitter corpus can better describe the similarity between words in Twitter, and extract the implicit semantic relation and sentiment feature information between words in the tweet.

The similarity between words in Twitter, and extract the implicit semantic relation and sentiment feature information between words in the tweet. This project presented a comprehensive set of experiments for both these tasks on manually annotated data that is a random sample of stream of tweets. We investigated two kinds of models: tree kernel and feature based models and demonstrate that both these models outperform the

unigram baseline. For our feature-based approach, this project proposes feature analysis which reveals that the most important features are those that combine the prior polarity of words and their parts-of-speech tags.

VI.REFERENCES

[1]. Socher R et al., "Recursive deep models for semantic compositionality over a sentiment treebank," in Proc. Conf. Empirical Methods Natural Lang. Process., Seattle, DC, USA, Oct. 2013, pp. 1631-1642

[2]. Fern M, He Y and Saif H, "Evaluation datasets for Twitter sentiment analysis: A survey and a new dataset, the STS-Gold," in Proc. 1st ESSEM Workshop, Turin, Italy, 2013, pp. 21-26.

[3]. FuruWei Y N, Liu T, Qin B, Tang D and Zhou M, "Learning sentiment specific word embedding for twitter sentiment classification," in Proc. 52nd Annu. Meeting Assoc. Comput. Linguistics, Baltimore, MD, USA, Jun. 2014, pp. 1555-1565,2014.

[4]. FuruWei Q B, Liu T, Tang D and Zhou CoooolllM:, "A deep learning system for twitter sentiment classification," in Proc. 8th Int. Workshop Semantic Eval. (SemEval), Dublin, Ireland, Aug. 2014, pp. 208-212.

[5]. Martíín-Valdivia M T, Martínez-Cámara E, Montejo-Rááez A and Ureña-López L A, "A knowledge-based approach for polarity classification in Twitter," J. Assoc. Inf.Sci. Technol., vol. 65, no. 2, pp. 414-425, 2014.

[6]. Jianqiang Z and Xueliang C, "Combining semantic and prior polarity for boosting twitter sentiment analysis," in Proc. IEEE Int. Conf. Smart City/SocialCom/SustainCom (SmartCity), Dec. 2015, pp. 832-837.

[7]. Johnson R and Zhang T, "Semi-supervised convolutional neural networks for text categorization via region embedding," in Proc. Adv. Neural Inf. Process. Syst., 2015, pp. 919-927.

[8]. Büüchner M, Hagen M, Potthast M and Stein B, "Twitter sentiment detection via ensemble classification using averaged confidence scores," in Proc. Eur. Conf. Inf. Retrieval, 2015, pp. 741-754.

[9]. Jianqiang Z and Xiaolin G, "Comparison research on text preprocessing methods on twitter sentiment analysis," IEEE Access, vol. 5, pp. 2870- 2879, 2017.

[10].M. A. Gilbert, "Strengthening your social media marketing with live streamingvideo,"inSmartTechnologiesandInnovationforaSustainable Future. Cham, Switzerland: Springer, 2019, pp. 357–365.

Automated Detection of Age Macular Degeneration and Retinal Abnormalities Based on Age

(Smt) S. Rajalakshmi M.Sc. M.Phil.[1], S. Praveena[2]

[1]Assistant Professor, PG and Research Department of Computer Science, Sri Sarada College for Women (Autonomous), Tirunelveli, Tamil Nadu, India

[2]II MSc Computer Science, PG and Research Department of Computer Science, Sri Sarada College for Women (Autonomous), Tirunelveli, Tamil Nadu, India

ABSTRACT

Performance of an algorithm that automatically identifies DR and Age related macular degeneration (AMD) pictures based on their pathological properties. Age related macular degeneration (AMD) is the subject of this research, which proposes an automated categorization system for telemedicine purposes. The analyzing fundus photos, the most important elements for AMD characterization were identified using texture, color and visual context analysis. The Age-Related Eye Disease (ARED) protocol and the Support Vector Machine (SVM) and Random Forest (RF) algorithms were used to categorize pictures according to the various AMD phases, and the FCN method was utilized to assess the features importance. According to the findings, independent of the classifier utilized (DCNN) or the feature selection method (PDA), local binary patterns in multiresolution are the most significant for AMD classification. In addition, the suggested automated DCNN classification system using FCN is resilient to picture quality changes.

INDEX TERMS: Drusen, Constant False Alarm Rate, Support Vector Machine, Oculus Dextrux , Region of Interest, Fluorescien Angiography.

I. INTRODUCTION

A new method for detecting anomalies in retinal images. An age-related macular degeneration (AMD) pathology is the topic of this research, and it is a pathology that frequently goes unnoticed in the early or middle stages and may end in blindness if left untreated. In order to identify retinal anomalies, we use fundus imaging and a single class classifier. A multiresolution, locally-adaptive approach is used to identify both normal and abnormal retinal areas[1]. A hybrid parametric/non-parametric representation of the support for normal retinal tissue's probability distribution in color and intensity feature space is used to accomplish this. Patients may be automatically screened for retinal problems using this method. In this study, AMD is the primary emphasis because of its prevalence and clinical significance: Many countries in Western Europe and North America have a high prevalence of AMD, which is a primary cause of blindness. Central vision may be

substantially reduced in advanced AMD, affecting tasks like reading, driving, or recognizing faces. This is mainly caused by the development of choroidal neovascularization (CNV).

In the United States alone, nearly 200,000 adults over the age of 50 acquire the advanced stage of AMD each year. 70% of these patients will have significant vision loss in one eye within two years if left untreated in the following five years, about half of these patients will experience significant vision loss in both eyes. In recent clinical studies, anti VEGF has shown promising results in slowing the progression of cancer. Identifying people who are most at risk for developing advanced AMD, particularly those with the intermediate stage of AMD, is crucial. The appearance of drusen, or little aberrant structures in the fovea, is the primary sign of intermediate AMD. It is common for drusen to go undetected over long periods of time. When it comes to AMD's intermediate stage there is no visual loss and hence no external indicators of its existence.

II. EXISTING SYSTEM

A fair amount of work has been devoted to the design of automated detectors for specific retinal pathologies such as diabetic retinopathy. However, despite its prevalence, much less has been done for AMD. Exploitation of digital fundus image processing for AMD was first reported by the study. Early AMD detection methods such as the study reported required user intervention. Recently, researchers have turned their attention to automated approaches: used adaptive equalization and wavelets; employed mathematical morphology on angiographic images with fluorescein injection; used adaptive thresholding; exploited a probabilistic boosting approach for the classification of non-homogeneous drusen textures; used probabilistic modelling and fuzzy logic; employed histogram normalization and adaptive segmentation; finally, exploited texture discrimination and the intensity topographical profile[5].

A common route employed by the most promising of the previously cited approaches consisted in using a two-class or multiclass classifier (drusen vs. vessels vs. retinal background tissue vs. other tissue). Because of variations in imaging conditions (fundus image quality, illumination, blur, background uniformity) and variations in patient specific appearance (variability in pigmentation and drusen appearance within and across subjects), it is difficult to identify stable image features characteristic of drusen that can be used to build a robust classifier that will perform reliably over a large dataset. Because of this, we explore an alternate route, and investigate the use of a one-class classifier[9]: we characterize the statistical distribution of 'normal' background retinal tissue, and search for areas exhibiting abnormalities. The salient features of the proposed algorithm are as follows: (a) Intensity, color, and gradient information is exploited. (b) A hybrid parametric Constant False Alarm Rate (CFAR) detector (for the fundus image intensity value) is used in conjunction with a non-parametric (adapted to color space features) CFAR detector based on Support Vector Machine (SVM). (c) The algorithm uses a multiscale and locally adaptive approach. In addition, our approach addresses other challenges in drusen detection including the presence of a background intensity gradient in retinal fundus imagery, the presence of various anatomical features (vessels, optical nerve, etc) and artifacts (flashes) resulting from specific Illumination conditions. To address these issues we develop additional processing stages that identify appropriate regions for training and testing and eliminate some of these spurious features.

III. PROPOSED SYSTEM

The proposed diagnostic system consists of different stages including preprocessing, OD localization, blood vessels detection and segmentation, and macula detection for the purpose of features set extraction from detected macular region. In preprocessing, image segmentation is performed to segment out background part of input image from its foreground and to remove noisy part of the input fundus image[7]. Background and noisy parts of image is not necessary for further processing and also increase processing time in later stages of processing. Based on mean and variance segmentation background elimination is performed. HSI channel is utilized for noise removal. Block diagram of retinal fundus image segmentation. Implementation details of used method generated background segmentation mask, noise removal mask, and final segmentation mask that were generated by combining background and noise removal masks, and final segmented retinal fundus images. For macula detection, OD localization is important as macula can be found at distance of 1.5 disk diameter from OD. OD can be notable in retina as a brightest yellowish rounded disk from where optic nerve and blood vessels arise. To localize OD, mean filter and histogram values of image are utilized to identify ROI. OD detection is further performed using circular Hough. OD detection of two randomly selected fundus images from STARE dataset is presented in blue circle around the macular part.

Due to similar intensity levels of blood vessels and macular region, macula detection can be confused. To eliminate chances of detecting forged regions as macula, reliable detection and extraction of retinal blood vessels is crucial. To this regard, blood vessels segmentation for macula detection is also vital step in automated diagnosis system of AMD. For vascular pattern detection and extraction, multilayered thresholding approach with the combination of Gabor wavelets method is used in our proposed system. These methods are very efficient to segment out delicate and tinny vessels. For macular region estimation, a template is formatted having same force intensity values as of macula, is utilized and adapted[10].
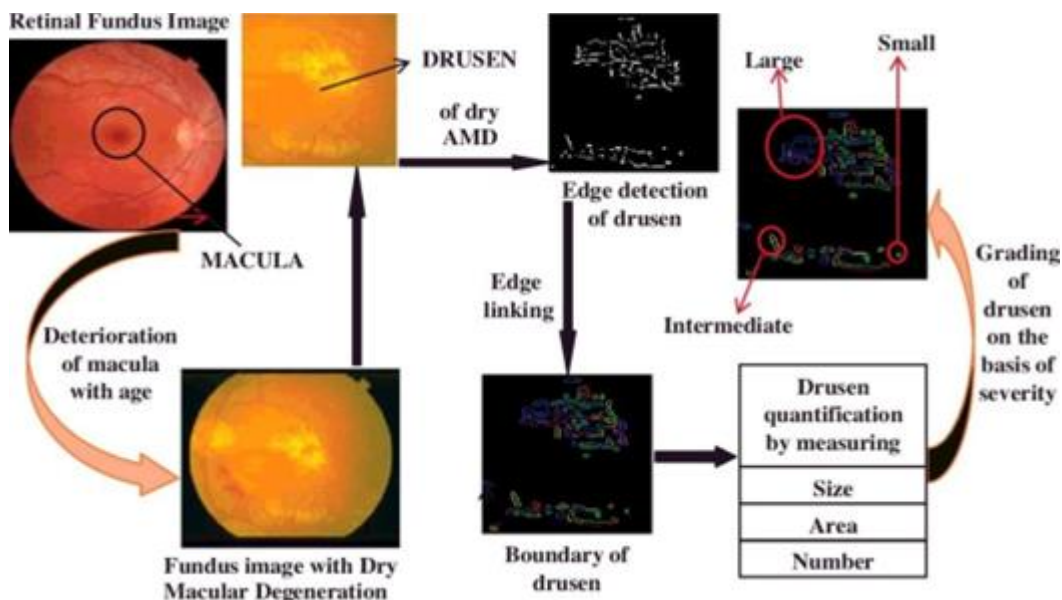
IV. RESULT
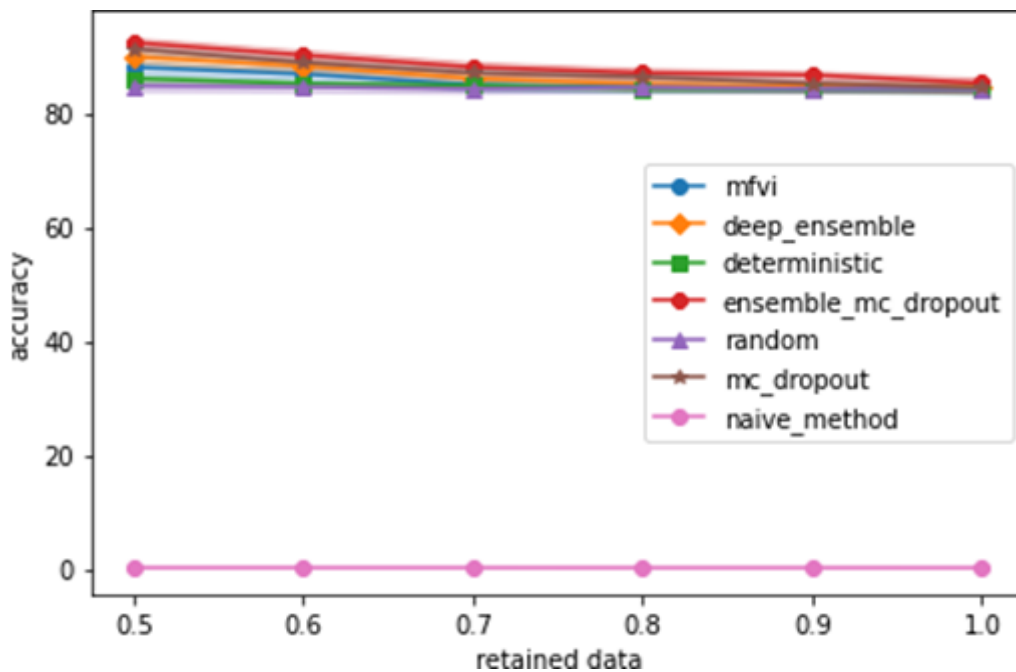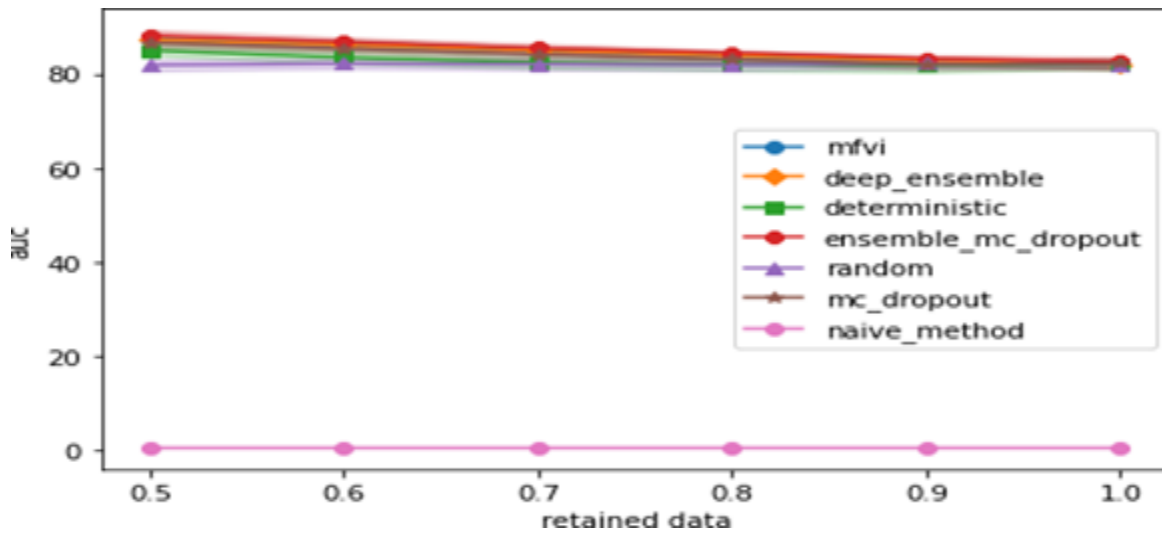
V. CONCLUSION

AMD is one of the regular retinal issues. If not treated timely can cause irreversible central vision loss. Automated diagnosis of AMD is important to help ophthalmologists in lowering their load and can also be used in tele-medicine systems for timely detection and diagnosis. In this project a diagnostic system for automatic and early identification of AMD by investigating the macular area with the assistance of various textural, color, and shape/structural features. The experimental results demonstrate the reliability of the proposed technique. In this proposed system has achieved 95.45% and 92.34%, accuracy for STARE and AFIO datasets, respectively.

Early detection of drusen may have substantial impact on the prevention of blindness due to AMD .The results presented here are still preliminary and the data set used to test our algorithm was relatively small and needs to be increased before definitive conclusions can be made regarding the robustness of the method. The goal is to continue characterizing and refining our algorithm on expanding datasets to eventually allow for large-scale deployment. Furthermore, we plan to construct ROC curves in order to quantify algorithm performance. In addition, This algorithm is to be applicable to image modalities other than standard fundus images (e.g. Optical Coherence Tomography (OCT) images). Finally, emphasize here that the algorithm we have presented should be viewed as an anomaly detector. Although we have explicitly applied it to the specific problem of drusen detection in early or intermediate stage AMD, it is not limited to just this application. It is applicable to screening for other retinal pathologies which entail the formation of abnormal tissue or bleeding such as diabetic retinopathy or geographic atrophy.

VI.REFERENCES

[1]. Khalid S, Usman Akram M, Khalil T, Hybrid Textural Features Based Automated Diagnosis System of Age-Related Macular Degeneration Using Fundus Images, In Proceedings of CCODE2017; 2017.

[2]. Liang DZ, Wong JL, Chan KL, Wong TY, Towards automatic detection of age-related macular degeneration in retinal fundus images, 2010 Annual International Conference of the IEEEEngineering in Medicine and Biology; 2010.

[3]. Justice J. Cilioretinal arteries. Arch Ophthal. 1976;94(8):1355.

[4]. Sinthanayothin C, Boyce J, Cook H, Williamsn T. Automatic localisation of the optic disk, fovea, and retinal blood vessels from digital color fundus images. Br J Opthalmol. 1999;83(8):902-910.

[5]. Samanta S, Saha S, Chanda B, A Simple and Fast Algorithm to Detect the Fovea Region in Fundus Retinal Image, 2011 Second International Conference on Emerging Applications ofInformation Technology; 2011.

[6]. Raj V, Devi V. Retinal image analysis using fovea detection using unsymmetrical trimmed median filter (MDBUTMF). IntJ Eng Innov Technol. 2013;3(3):263-269.

[7]. Babu AS, Vadarkuzhali T, Ravichandran C. Fovea detection and disease identification using integrated GF-SVM method. Int J Curr Med Pharmaceut Res. 2015;1(2):28-34.

[8]. Niemeijer M, van Ginneken B, Russell S, Suttorp-Schulten M, Abra'moff M. Automated detection and differentiation of drusen, exudates, and cotton-wool spots in digital color fundus photographs for diabetic retinopathy diagnosis. InvestigOpthalmol Vis Sci. 2007;48(5):2260.

[9]. Van Grinsven MJJP, et al. A Bag of Words approach for discriminating between retinal images containing exudates or drusen. Biomedical Imaging (ISBI), IEEE 10th InternationalSymposium on IEEE; 2013.

[10]. Bressler, N.M., "Age-related macular degeneration is the leading cause of blindness", JAMA, 291:1900-1, 2004.

Smart Search Engine

Dr. V. Vallinayagi M.Sc. M.Phil. Ph.D.[1], S.Vinitha[2]

[1]Associate Professor and Head, Department of Computer Science, Sri Sarada College for Women (Autonomous), Tirunelveli, Tamil Nadu, India

[2]II M.Sc. Computer Science, Department of Computer Science, Sri Sarada College for Women (Autonomous), Tirunelveli, Tamil Nadu, India

ABSTRACT

Machine learning algorithms based on expert knowledge are used to categorize web pages into three predetermined categories depending on the degree of content modification to the search engine optimization (SEO) suggestions. We used classifiers to categorize an unknown sample (web page) into one of three predetermined groups and to find crucial elements that influence the degree of page modification in this research. In the training data set, the data is manually labeled by experts in the field. Using machine learning, it is possible to forecast the level of conformity of web pages to SEO guidelines. Building software agents and expert systems that can automatically identify web pages that require change in order to comply with SEO criteria and, therefore, possibly obtain better search engine ranks is the practical importance of the suggested technique. Measuring the semantic similarity search between words is an important component in various tasks on the web such as relation extraction, community mining,clustering and automatic metadata extraction. In addition, the findings of this study contribute to the research area of determining the best values for ranking variables used by search engines to rank websites. According to the conclusions of prior study, page titles, meta descriptions, H1 tags, and body content are all crucial aspects to consider when creating a web page. As a by-product of our investigation, a new collection of manually labeled web pages has been created. Web service discovery has received considerable attention in the literature, and academics are continually working to improve the process. Using machine learning methods such as KNN (K-Nearest Neighbor) and OCR (Optical Character Recognition), this study examines the work of a number of prominent researchers in this field (Optical Character Reorganization). Researchers have a lot to look forward to in machine learning as a way to consistently deliver correct estimations. From completed project training sets, a machine learning system "learns" how to accurately predict future work. It is an aim that this publication will serve as a springboard for future research and provide researchers a sense of the direction in which they should be heading.

INDEX TERMS: Natural Language Processing, Machine Learning, K Nearest Neighbor, Optical character recognition, Lexical Pattern Extraction, Ranking, Search Engine Optimization, Semantic relations, Targeted traffic SEO, Snippets.

I. INTRODUCTION

Search Engine Optimization (SEO) is a method to get a better ranking for a website in search engines such as Google, Yahoo or Bing. A search engine optimization campaign pairs on-site optimization with off-site tactics which means that one makes changes to the site itself while they build a portfolio of natural looking back links to increase their organic rankings[1].When internet users search for the product or service related, the website relevance to specific keywords which internet users search for online. The process of optimizing search engine includes keywords, creating more content, building links and making sure that the website is visible in the search engines using Targeted Traffic SEO. Web search engines have become an important part. Searching some kind of information on the web became hectic.SEO procedure work includes two types of optimization techniques, on-page and off-page SEO optimization.

Both techniques have their personal, discrete and extensive processes to rank websites on top of search engines.[2],[3] The SEO process starts with on-page SEO optimization. Just the once the whole on-page SEO optimization is complete, the off-page SEO optimization starts. Off-page SEO includes tricks which are chosen to make relevant back links towards the website to make the web page appropriately in front of search engine spiders. Second off-page SEO is doing the responsibility to improve our site's search engine rankings outside of our site. The only thing one can do off-site to increase the rankings is building up more links. SEO Benefits: Popularity of Search engine technique popularity will increase, Increase Visibility once a website has been optimized, it will increase the visibility of a website in search engine. More people will visit the website.

All existing search engines adopt several techniques and approaches to improve the performance of the search engines but the answer is differ from one another. However, after evaluating the performance of search engines based on the retrieved web contents, it is apparent that only a few attempts were made to restructure the query, providing alternate queries or personalizing the web search. Data mining represents the integration of several fields, including machine learning, data visualization, statistics and information theory.[5]Clustering is an unsupervised algorithm, which requires a parameter that specifies the number of clusters k. Cloud Computing is a computing platform which is distributed in large-scale data centers, and can dynamically provide various server resources to meet the needs of research, e-commerce and other fields. Clustering is the task of dividing the data or data points into a number of groups such that data points in the same groups are more similar to other data points in the same group than those in other groups.

Cloud computing is the availability of computer system resources, especially data storage (cloud storage) and computing power, without direct active management by the user. Cloud computing is the delivery of computing services—including servers, storage, databases, networking, software, analytics, and intelligence—over the Internet ("the cloud") to offer faster innovation, flexible resources, and economies of scale. Cloud computing is a virtualization-based technology that allows us to create, configure, and customize various applications via an internet connection.

II. EXISTING SYSTEM

The Existing system uses a straightforward method to calculate similarity between two words is to find the length of the shortest path connecting the two words in the taxonomy.[6] It will produce only the irrelevant

results matches to the user query. It uses the page counts to retrieve results but using page counts alone as a measure of co-occurrence between words presents several drawbacks. SEO is a long term process which means it is not fast moving. It takes lots of time and patience to see the desired results. Therefore, No guarantee exists for all the information and it is a need to measure semantic similarity between a given pair of words is contained in the top-ranking snippets.

Some of the disadvantages for this system are as follows

➢ Not an automatic extraction
➢ Very Low Efficiency
➢ It becomes difficult for the user to get the relevant content.
➢ It would take more time
➢ Irrelevant Results
➢ Page counts are unreliable.

III. PROPOSED SYSTEM

This web search engine provides the most semantic relativity between the given words, and it will generate the semantic measures automatically.[7]It is time consuming to analyze each document separately. Web search engines provide an efficient interface to vast information. Page counts and snippets are two useful information sources provided by most web search engines. And then train a two-class support vector machine to classify synonymous and non-synonymous word pairs.

[8]A synonymous word having the same or nearly the same meaning as another in the language. Both novel pattern extraction algorithm and pattern clustering algorithm outperforms well in the case of page counts for given words with the text snippets. A search engine is an information retrieval system designed to help find information stored on a computer system. The search results are usually presented in a list and are commonly called hits.[9],[10] Search engines help to minimize the time required to find information and the amount of information which must be consulted, to other techniques for managing information overload. Search engines provide an interface to a group of items that enables users to specify criteria about an item of interest and have the engine find the matching items. The system will cover entirely any text information that can be found on the internet.

Major advantages of the system are as follows

➢ Simplicity
➢ More reliable and efficiency
➢ Time consuming
➢ Most related data to the given words
➢ Ranking based results
➢ Semantic similarity based on words co-occurrences
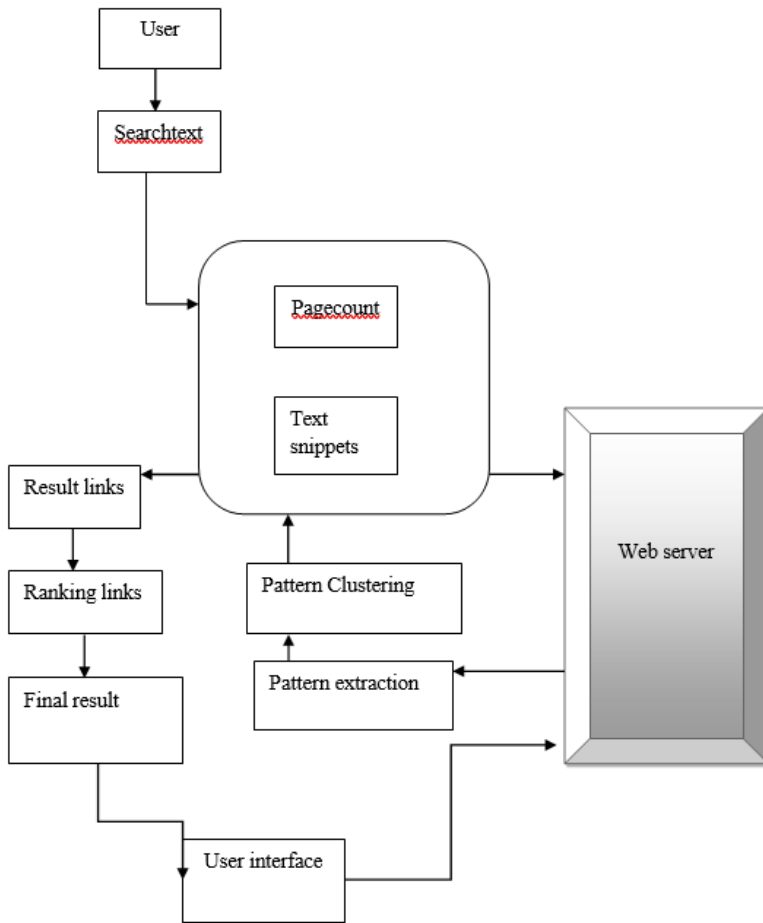
IV. RESULT
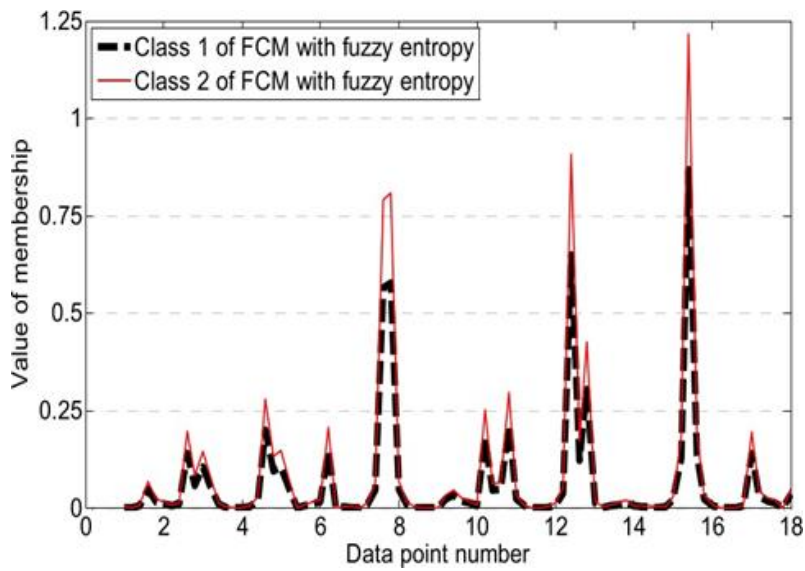
The fuzzy entropy is applied to the seal impression problem to measure the subjective value of information. This model involves the value of membership and data point number should arrange in wave signal dedicator. The upward frequencies show the exact result of tiny Google if any user searches for anything it will give the exact result. Both vertical and horizontal scalability are related to the distributed architecture selected by the algorithm. Both vertical and horizontal scalability are related to the distributed architecture selected by the algorithm. KNN algorithm assumes the similarity between the new case/data and available cases and put the new case into the category that is most similar to the available categories. Optical Character Recognition (OCR) based on AI and machine learning is a widely used to put a good visual Presentation.Making the text part more informative to the customer visiting the website with an improved website design.

V. CONCLUSION

When search engines recognized the distortive effects of keyword Meta tags, they changed their algorithms to ignore keyword Meta tags. Search result relevancy improved, and the problem was solved without regulatory intervention. Search engines naturally will continue to evolve their ranking algorithms and improve search result relevancy a process that, organically, will cause the most problematic aspects of search engine bias to largely disappear. This work proposes a semantic similarity measure using both page counts and snippets retrieved from a web search engine for two words. A lexical pattern extraction algorithm is used to extract numerous semantic relations that exist between two words. The purpose of data selection is to identify the data to be analyzed, reduce the processing scope, and improve the quality of data mining. Search Engine Optimization tools are an important consideration to help optimize a website for search engines. This algorithm tends to terminate iterative process quickly to only obtain partial optimal results.Tiny Google uses the address to retrieve information.It shows the result in ranking order.A search engine optimization campaign pairs on-site optimization with off-site tactics which means that one makes changes to the site itself while they build a portfolio of natural looking back links to increase their organic rankings. Targeted traffic Search Engine Optimization can increase the number of visitors to the website for the targeted keywords. It gives the correct result compare to existing system. Some of the most important areas to be analyzed are keywords, content, back links, domain and social media.

VI.REFERENCES

[1]. P. Resnik, "Using Information Content to Evaluate Semantic Similarity in a Taxonomy," Proc. 14th Int'l Joint Conf. Aritificial Intelligence, 1995.

[2]. R. Rada, H. Mili, E. Bichnell, and M. Blettner, "Development and Application of a Metric on Semantic Nets," IEEE Trans. Systems, Man and Cybernetics, vol. 19, no. 1, pp. 17-30, Jan./Feb. 1989.

[3]. G. Miller and W. Charles, "Contextual Correlates of Semantic Similarity," Language and Cognitive Processes, vol. 6, no. 1, pp. 1-28, 1998.

[4]. M. Hearst, "Automatic Acquisition of Hyponyms from Large Text Corpora," Proc. 14th Conf. Computational Linguistics (COLING), pp. 539-545, 1992.

[5]. D. Mclean, Y. Li, and Z.A. Bandar, "An Approach for Measuring Semantic Similarity between Words Using Multiple Information Sources," IEEE Trans. Knowledge and Data Eng., vol. 15, no. 4, pp. 871-882, July/Aug. 2003.

[6]. Kilgarriff, "Googleology Is Bad Science," Computational Linguistics, vol. 33, pp. 147-151, 2007.

[7]. M. Sahami and T. Heilman, "A Web-Based Kernel Function for Measuring the Similarity of Short Text Snippets," Proc. 15th Int'l World Wide Web Conf., 2006.

[8]. D. Bollegala, Y. Matsuo, and M. Ishizuka, "Disambiguating Personal Names on the Web Using Automatically Extracted Key Phrases," Proc. 17th European Conf. Artificial Intelligence, pp. 553- 557, 2006.

[9]. H. Chen, M. Lin, and Y. Wei, "Novel Association Measures Using Web Search with DoubleChecking," Proc. 21st Int'l Conf. Computational Linguistics and 44th Ann. Meeting of the Assoc. for Computational Linguistics (COLING/ACL '06), pp. 1009-1016, 2006.

[10].M. Pasca, D. Lin, J. Bigham, A. Lifchits, and A. Jain, "Organizing and Searching the World Wide Web of Facts - Step One: The One- Million Fact Extraction Challenge," Proc. Nat'l Conf. Artificial Intelligence (AAAI '06), 2006.

M-Learners' Performance Using Deep Learning Techniques with Intelligent and Adaptive Web Data Extraction

Dr. (Smt.). B. Parvathi Devi MCA. M.Phil. Ph.D.[1], M. Rameswari[2]

[1]Assistant Professor, PG and Research Department of Computer Science, Sri Sarada College for Women (Autonomous), Tirunelveli, Tamil Nadu, India

[2]II M.Sc., Computer Science, PG and Research Department of Computer Science, Sri Sarada College for Women (Autonomous), Tirunelveli, Tamil Nadu, India

ABSTRACT

Educational institutions are one of a kind and play a crucial part in the development of every nation. People, communities, nations, and perhaps the planet will be transformed as a result of education's impact. This is the reason why we are so content in our present circumstances. Today's education does not stop at classroom instruction; it also includes things like online education, web-based education, seminars, workshops, and massive open online courses (aka MOOCs). Data recorded in educational databases and learning management databases makes it more difficult to predict student success. There are several methods for assessing student achievement. Educational data mining is the most common method of evaluating student performance and is utilized widely in the educational industry.

Classification, prediction, and feature selection are just a few of the strategies used in this growing field of research. It is used to forecast students' performance and learning behaviour by extracting the hidden information from learning records or educational data. Electronic Data Mining (EDM) may be used to extract relevant information from a large educational database. The student's performance is then projected based on the valuable information and patterns that have been gathered. The primary goal of our research is to identify the categorization strategy that produces the greatest performance outcomes for pupils.

INDEX TERMS: Deep neural networks, Deep learning, Machine learning, Learners' classification, Adaptive M-learning, Feature weights.

I. INTRODUCTION

Educational data mining tends to focus on developing new tools for discovering patterns in data. These patterns are generally about the micro concepts involved in learning: one digit multiplication, subtraction with carries, and so on [3]. Learning analytics—at least as it is currently contrasted with data mining focuses on applying tools and techniques at larger scales, such as in courses and at schools and postsecondary institutions. But both disciplines work with patterns and prediction: If we can design the pattern in the data and make sense of what

is happening, we can predict what should come next and take the appropriate action. Educational data mining and learning analytics are used to research and build models in several areas that can influence online learning systems [5]. One area is user modelling, which encompasses what a learner knows, what a learner's behaviour and motivation are, what the user experience is like, and how satisfied users are with online learning.

Robust applications of educational data mining and learning analytics techniques come with costs and challenges. Information technology (IT) departments will understand the costs associated with collecting and storing logged data, while algorithm developers will recognize the computational costs these techniques still require [9]. Another technical challenge is that educational data systems are not interoperable, so bringing together administrative data and classroom-level data remains a challenge. Yet combining these data can give algorithms better predictive power. It also requires careful attention to student and teacher privacy and the ethical obligations associated with knowing and acting on student data.

The teacher and the institution have access to the online learning data, which they can use to certify the student's accomplishments. This scenario shows the possibility of leveraging data for improving student performance; another example of data use for "sensing" student learning and engagement is described in the sidebar on the moment of learning and illustrates how using detailed behaviour data can pinpoint cognitive events [6]. The increased ability to use data in these ways is due in part to developments in several fields of computer science and statistics.

II. EXISTING SYSTEM

The current situation is very limited too few resources, students are unable to get knowledge more than that the lecture provides to them [2]. This in the end limits student's performances, because everything a student gets is collected from lectures in class. Here are some of the problems of the current system:

- The current system at Zanzibar University is that lectures download references for students or for lecturing.
- Students submit assignment to lectures through hard copies or personal emails.
- Students only get help from lectures if the lectures are in they're office.
- New lectures to a course have to get materials on their own.
- Student are required to physical be in the classroom in order to gain knowledge thereby sacrificing all other responsibilities.
- Students are unable to share resources effectively and hold group discussions that are monitored or supervised by lectures.

III. PROPOSED SYSTEM

The system will hopefully serve as a centralized database of syllabus for the courses offered at the university allowing students and faculties (current, past and prospective), to view them [10]. The system will end up bringing an effective communication among students, lectures, and the administration, by accessing information and other resources anytime, anywhere. Here are some expected results of the project:

- Lectures to upload assignments and resources for their units.
- Students to download the resources and upload assignments.
- It provides an easy-to-use way to manage course websites that include schedule information, announcements, as well as course discussions.

M-Learning represents an innovative shift in the field of learning, providing rapid access to specific knowledge and information [4]. It offers online instruction that can be delivered anytime and anywhere through a wide range of electronic learning solutions such as Web-based courseware, online discussion groups, live virtual classes, video and audio streaming, Web chat, online simulations, and virtual mentoring.
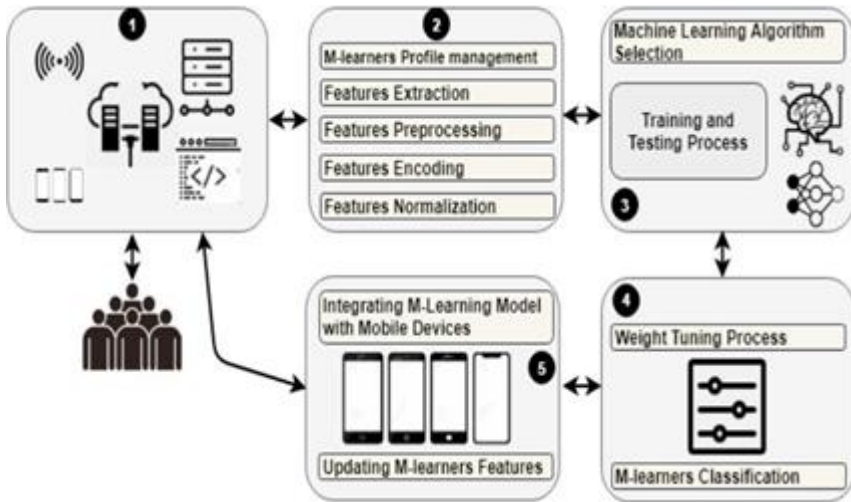
IV. RESULT

The techniques consider the different algorithms, methods and tools that process the data to analyze and predict the above objectives.
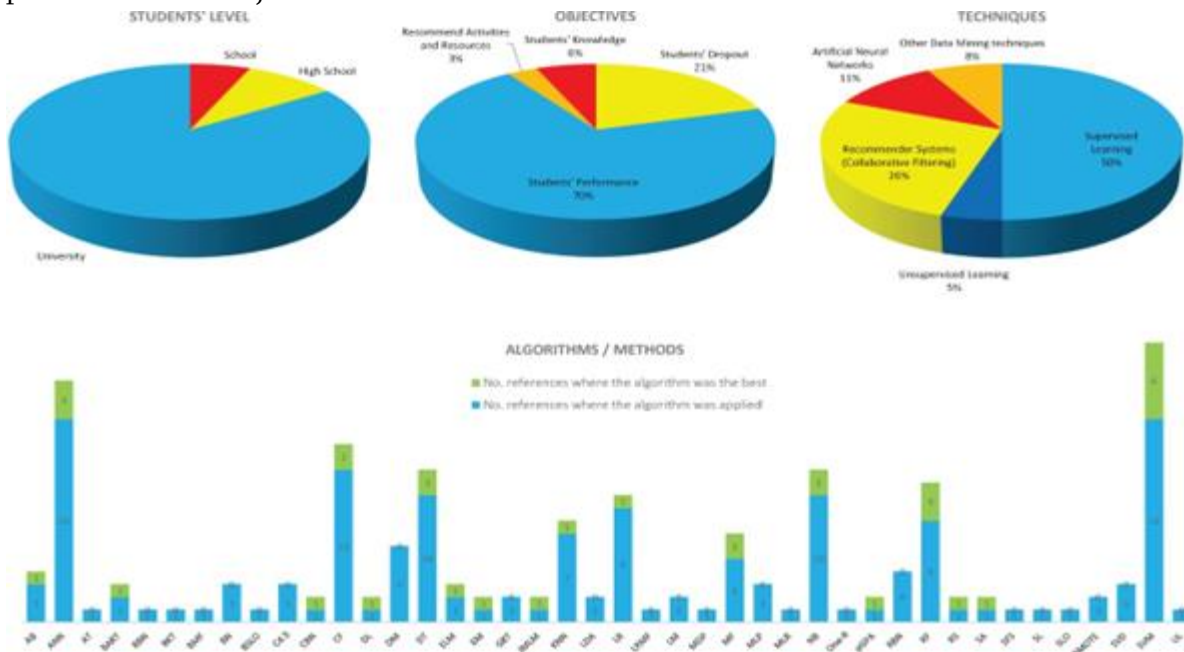
V. CONCLUSION

These results demonstrate the effectiveness of our proposed M-learning system in predicting M-learners' performance and determining significant features with high impact on learning outcomes. Our predictive models are useful for institutions in formulation of a proactive analytics model that supports their decision-making process. In future, we intend to incorporate additional deep learning algorithms such as Long Short-Term Memory (LSTM), Recurrent Neural Network (RNN), Self-Organizing Maps (SOMs), etc.

VI. REFERENCES

[1]. Krizhevsky, I. Sutskever, and G. E. Hinton, "ImageNet classificationwith deep convolutional neural networks," in Proc. Adv. Neural Inf. Process. Syst. (NIPS), vol. 25, Dec. 2012, pp. 1097–1105.

[2]. Y. Xu, L. Fei, J. Wen, and D. Zhang, "Discriminative and robust competitive code for palmprint recognition," IEEE Trans. Syst., Man, Cybern.,Syst., vol. 48, no. 2, pp. 232–241, Feb. 2016.

[3]. Y.-T. Luo, L.-Y. Zhao, B. Zhang, W. Jia, F. Xue, J.-T. Lu, Y.-H. Zhu,and B.-Q. Xu, "Local line directional pattern for palmprint recognition,"Pattern Recognit., vol. 50, pp. 26–44, Feb. 2016.

[4]. G. Li and J. Kim, "Palmprint recognition with local micro-structure tetrapattern," Pattern Recognit., vol. 61, pp. 29–46, Jan. 2017.

[5]. L. Zhang, L. Li, A. Yang, Y. Shen, and M. Yang, "Towards contactlesspalmprint recognition: A novel device, a new benchmark, and a collaborative representation-based identification approach," Pattern Recognit.,vol. 69, pp. 199–212, Sep. 2017.

[6]. F. Wang, J. Cheng, W. Liu, and H. Liu, "Additive margin softmax forface verification," IEEE Signal Process. Lett., vol. 25, no. 7, pp. 926–930,Jul. 2018.

[7]. P. Gupta, K. Tiwari, and G. Arora, "Fingerprint indexing schemes—A survey," Neurocomputing, vol. 335, pp. 352–365, Mar. 2019.

[8]. S. Fekri-Ershad, "Gender classification in human face images for smartphone applications based on local texture information and evaluatedKullback-Leibler divergence," Traitement du Signal, vol. 36, no. 6,pp. 507–514, Dec. 2019.

[9]. W. Jia, B. Wang, Y. Zhao, H. Min, and H. Feng, "A performance evaluationof hashing techniques for 2D and 3D palmprint retrieval and recognition,"IEEE Sensors J., vol. 20, no. 20, pp. 11864–11873, Feb. 2020.

[10]. D. Zhong, Y. Yang, and X. Du, "Palmprint recognition using Siamesenetwork," in Proc. Chin. Conf. Biometric Recognit., 2018, pp. 48–55.

Third International Conference on Materials, Computing and Communication Technologies ICMCCT-2022

Organized By

Annai Vailankanni College of Engineering,
AVK Nagar, Pothaiyadi Salai, Azhagappapuram.
P. O, K. K. District, Tamil Nadu, India

Publisher

Technoscience Academy
Website : www.technoscienceacademy.com
Email: info@technoscienceacademy.com