

# TECHNICAL MAGAZINE

Department of  
**Electronics & Communication Engineering**

A.Y. 2022-23



**VELAGAPUDI RAMAKRISHNA  
SIDDHARTHA ENGINEERING COLLEGE**

(AUTONOMOUS)

(Sponsored by Siddhartha Academy of General & Technical Education)

# **DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING**

## **Department Vision**

To produce globally competitive and socially sensitized engineering graduates and to bring out quality research in the frontier areas of Electronics and Communication Engineering.

## **Department Mission**

To provide quality and contemporary education in the domain of Electronics and Communication Engineering through periodically updated curriculum, best of breed laboratory facilities, collaborative ventures with the industries and effective teaching-learning process.

To pursue research and new technologies in Electronics and Communication Engineering and related disciplines in order to serve the needs of the society, industry, government and scientific community.

## **PROGRAM OUTCOMES**

Program outcomes examine what a program or process is to do, achieve, or accomplish for its own improvement and/or in support of institutional or divisional goals: generally numbers, needs, or satisfaction driven. They can address quality, quantity, fiscal sustainability, facilities and infrastructure, or growth.

After completion of the Electronics & Communication Engineering programme, the students will be able to have:

**PO1: Engineering knowledge:** An ability to apply knowledge of mathematics, science, fundamentals of engineering to solve electronics and communication engineering problems.

**PO2: Problem analysis:** An ability to identify, formulate and analyze electronics and communication systems reaching substantiated conclusions using the first principles of mathematics and engineering sciences

**PO3: Design/development of solutions:** An ability to design solutions to electronics and communication systems to meet the specified needs.

**PO4: Conduct investigations of complex problems:** An ability to design and perform experiments of complex electronic circuits and systems, analyze and interpret data to provide valid conclusions

**PO5: Modern tool usage:** An ability to learn, select and apply appropriate techniques, resources and modern engineering tools for modeling complex engineering systems.

**PO6: The engineer and society:** Knowledge of contemporary issues to assess the societal responsibilities relevant to the professional practice.

**PO7: Environment and sustainability:** An ability to understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development

**PO8: Ethics:** An understanding of professional and ethical responsibilities and norms of engineering practice.

**PO9: Individual and team work:** An ability to function effectively as an individual, and as a member in diverse teams and in multidisciplinary settings.

**PO10: Communication:** An ability to communicate effectively with engineering community and with society at large.

**PO11: Project management and finance:** An ability to demonstrate knowledge and understanding of engineering and management principles and apply these to manage projects.

**PO12: Life-Long Learning:** An ability to recognize the need for, and engage in independent and life-long learning in the broadest context of technological change.

## **ABOUT THE DEPARTMENT**

Established in the year 1977, the department of ECE offers B. Tech Programme in Electronics & Communication Engineering with an intake of 240 and two M. Tech Programmes in Communication Engineering & Signal Processing and VLSI Design & Embedded Systems . The department has been accredited by NBA of AICTE four times. More than 40% faculties are with Ph.D. qualification. Led by a team of highly qualified experienced faculty with specializations such as RF & Microwave, Antennas, Digital Signal Processing, Wireless Communications, Digital Image Processing, VLSI and Embedded systems. The department provides excellent academic and research environment to the UG, PG and research students. A Centre of Excellence (TIFAC CORE- DST) in Telematics was established in the year 2009 with the state of the art facilities. Having successfully completed many research projects funded by UGC, AICTE, DST, NRSC-ISRO DLRL & ANURAG-DRDO etc., it is also recognized by JNTUK as "**Research Center.**" Faculty members extend guidance to research scholars, produce Ph.D.'s and publish their findings in peer reviewed national and international journals and conferences.

### **Message by HoD**

As a part of nurturing the students with qualities like teamwork, *technical* skills and a glimpse of the competitive world of *engineering* and *technology we are encouraging students to publish articles in the frontier areas of electronics and communication engineering.*

I am confident that all the faculty members and student community involved with this magazine have put their efforts in this in a way that the magazine both entertains and ignites the reader's mind. I would like to thank the editorial team members for bringing out this magazine regularly.. I express my considerable appreciation to all the authors of the articles in this magazine. These contributions have required a generous amount of time and effort. It is this willingness to share knowledge, concerns and special insights with fellow beings that has made this magazine possible.



Dr Venkata Rao Dhulipalla



# Department of Electronics & Communication Engineering

Editorial Board

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Dr D. Venkata Rao, Mr. K V Prasad

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# MUTUAL COUPLING REDUCTION IN MIMO ANTENNA FOR UWB APPLICATIONS

*N.Venkateswari, V.Sai Gopichand, M.D.S.S.D. Manisha*

## Introduction:

In recent years, multiple-input-multiple-output (MIMO) antennas with the ability to radiate waves in more than one pattern and polarization play a great role in modern telecommunication systems. Now we see different mutual coupling reduction techniques in MIMO antenna systems. The increase in the mutual coupling can affect the antenna characteristics drastically, therefore, degrades the performance of the MIMO systems. It is possible to improve the performance partially by calibrating the mutual coupling in the digital domain. However, the simple and effective approach is to use the techniques, such as defected ground structure, parasitic or slot element, complementary split ring resonator and decoupling networks which can overcome the mutual coupling effects by means of physical implementation. An extensive discussion on the basis of different mutual coupling reduction techniques, their examples and comparative study is still rare in the literature. Mutual coupling defines as the energy absorbed by a proximate antenna when another antenna is radiating. Mutual coupling has a tendency to change the radiation pattern, reflection coefficient and input impedance of the MIMO antennas.

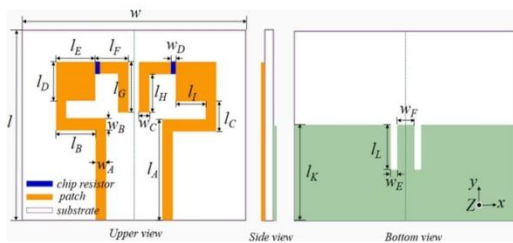


Fig1: Antenna Simulation

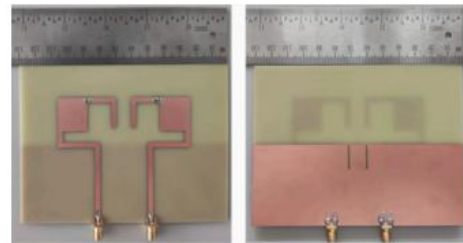


Fig 2: Hardware Implementation

A monopole MIMO antenna with low mutual coupling is proposed in this article. This antenna is compact with the inter-element spacing of  $0.075\lambda_0$ . It has two elements, where each element is formed by a radiation patch with L-shaped stub. Therein, a chip resistor is embedded into the middle of patch and stub. The metal ground of the antenna is etched to form two slots as the DGS. Through utilizing these decoupling structures of subs, DGS and chip resistors, the designed array antenna obtains good isolation. Simulation and measurement results reveal that the antenna has the mutual coupling of  $-36$  dB and the ECC of 0.002 at resonance along with the peak gain of 4.03dBi. Such high-performance MIMO antenna could be applied in wireless routers, railway radio television network, offshore wireless communication and other fields with the need of multi-antenna.

# WHOLE CLASS ATTENDANCE USING FACE DETECTION WITH RASPBERRY PI

J. Tejaswini, K. Nikhitha, E. Akhila, G. Yathisha

## Introduction:

Attendance is critical for both teachers and students in a learning environment. It is critical to maintain track of attendance since it reveals a student's consistency in attending classes and learning from the teachers in those subjects. In addition, the institute can keep track of students and notify parents on their children's behavior and punctuality. In some countries, students are not required to attend class, and the stipend is only awarded to pupils who pass all of the previous year's examinations with no backlogs. Therefore, the students must study on their own, or to simplify the learning process they must attend the classes. This type of approach is ideal for both students and educators. However, in most of the country's educational system, it is required to keep track of their attendance. When it comes to the traditional way of recording attendance in the classroom, we encounter some issues. Calling the student's name or roll number for attendance is not only time-consuming but also needs a great deal of patience, with this manual process wasting at least 10 minutes. Furthermore, in a noisy environment, a child with hearing impairments may miss attendance, and as a result, parents are misinformed about their children. Various ways of attendance monitoring are now being used by some universities. One of these systems is the biometric technique. Despite being involuntary and a step ahead of the traditional method, it fails to meet the time constraint.

The method suggested can recognize faces from images as well as image frames from a video accurately. The used method can detect faces in unfavorable conditions like partially exposed regions of faces, crowded scenes and irrespective of the external factors such as haircut, beard, spectacles, etc.,

## Methodology:

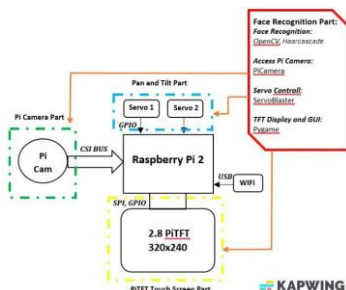


Fig 1: Block diagram



Fig 2: Facial Recognition

The proposed system meets the needs of accuracy, speed, and cost effectiveness. The used algorithms, CNN, used for locating faces, and k-NN, used for the facial features classification is already proved to have an accuracy of 99.27%. and have low complexity in terms of computation. Finally, in our



method, we integrated the CNN object detection method for detecting faces in classrooms and deep residual learning for face recognition to overcome the problems faced with the current face recognition-based solutions. And we met our goal of faster execution time, less development time, simple data collection.

# SMART CLASS

*S.Geetha, B.Hemath Kumar, B.Tejaswini*

## Introduction:

The classroom automation system is developed by the automatic switching of light and fan. The temperature will be above 40 degree Celsius in most regions during summer. It becomes very uncomfortable to live without a fan. In fact, a fan plays a major role in our households. For many people fan is the standard way of cooling down. Sometimes the individuals forget to turn off the light when they are out and this leads to wastage of electricity. Thus, we have decided to initiate a system that could save the electricity by automatic switching on and off the fan and light. Generally, our whole world depends on electricity which can be generated from the non-renewable resources like coal. But there exists a problem that we cannot store a huge amount of electricity. If these resources get extinct then there is no proper electricity for our future generations so we need to save it. So by doing this work, we can save some amount of electricity.

## Methodology:

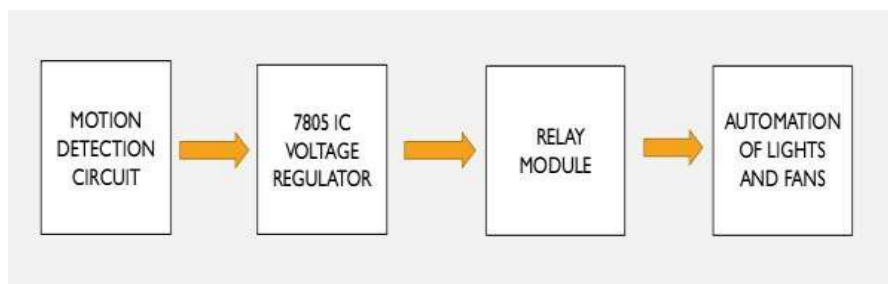


Fig 1: Block Diagram

The growing world is largely dependent on electricity. As there is usage there is also a lot of wastage. Conservation of Energy is important. A lot of electricity is also wasted in schools and colleges where students leave the class without turning of the lights and fans. Hence to deal with this problem a circuit is designed which works using a motion detector sensor (PIR SENSOR). With the help of this circuit lights and fans are turned on only when some student is under them and are turned off automatically when no person is near them, so that electricity consumption can be reduced and energy can be saved. Our proposed system mainly contains a Passive infrared sensor (PIR Sensor) which is an electronic device that measures infrared light radiations from objects in its field of view. PIR sensor is the most often used motion detector. Now when the person enters in to the PIR sensor region then it detects the motion of that person and it gives high voltage signal to the relay module.



Fig 2: Hardware Connection

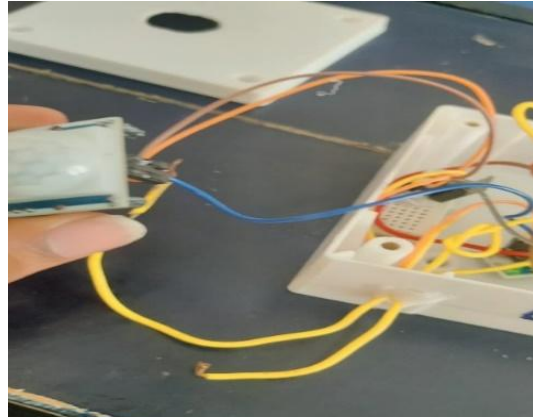


Fig 3: PIR Sensor testing

In the absence of person, the PIR sensor detects no motion and sends a low voltage signal to the relay module. When the relay module receives the high voltage signal from the PIR sensor then it turns on the lights and fans. When it receives the low voltage signal it turns off the lights and fans. Then the lights and fans are automatically turned on and off based on the signal received by the relay module from PIR sensor. So that a lot of power has been saved.

# SCALABILITY ANALYSIS OF LORAWAN TECHNOLOGY

K.R.M.Aishwarya, V.Divya, V.Adarsh Venkata Sai

## Introduction:

As there is continuous growth in the Internet of Things (IoT), the number of IoT application domains and deployments continues to increase. Market forecasts illustrating this growth estimate that the number of connected IoT devices will continue to grow at an annual rate of 32% and will reach 20.8 billion IoT end points by the end of this decade. Some of these novel IoT applications require low rate, long-range and delay-tolerant wireless communication at very low energy usage and cost. These types of requirements are hard to full fill using traditional machine to machine technologies such as cellular or WPAN. Low power wide area networks (LPWANs) are a new set of technologies that are designed to fill this gap in traditional technologies.

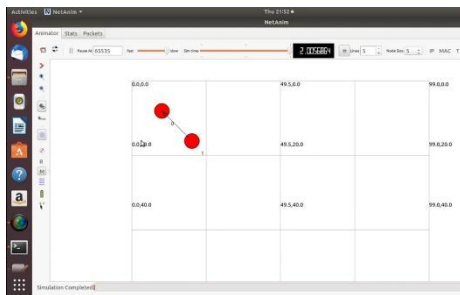


Fig 1: Node Connection in Linux

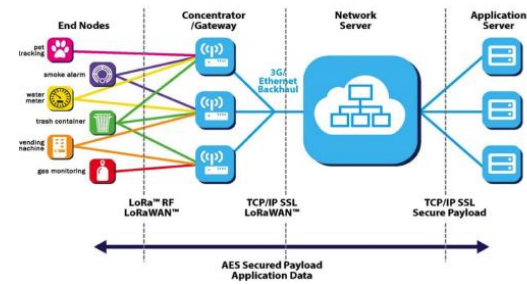


Fig 2: Block diagram of lorawan

By combining low energy usage with long range communication, they promise to bring connectivity that suits large scale, low power, and low cost IoT deployments with battery lives up to ten years. LoRaWAN is an LPWAN technology that builds on top of the LoRa modulation scheme, which is developed by Sem-tech. The LoRa alliance has standardized LoRa radio usage in sub-GHz unlicensed spectrum for most areas in the world. By combining sub-GHz propagation and the LoRa modulation, LoRaWAN networks can cover large areas with only limited amounts of infrastructure. LoRaWAN networks are being deployed today.

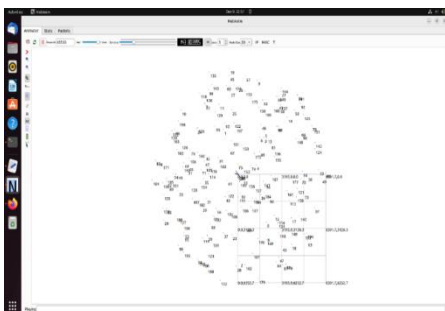


Fig 3: Node Simulation in NS 3

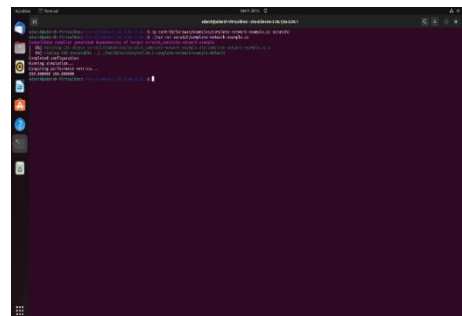


Fig 4: Linux Terminal for launching NS 3

Our modelling of LoRaWAN networks in ns-3 comprises a number of different elements. First, we will build an error model for the LoRa modulation for different code rates and spreading factors (SFs). Second, we will develop a comprehensive implementation of the LoRaWAN standard in the ns-3 simulator with support for class A end-devices, multi-gateway networks and an elementary network server (NS). Third, we will conduct a scalability study focusing on the impact of confirmed versus unconfirmed messages and the impact of downstream traffic in large-scale LoRaWAN networks.

# GAS LEAKAGE & TEMPERATURE MONITORING SYSTEM

*K.Lohith ,M.ThanmayeeE,M.Suraj preetham.*

## Introduction:

Rapid urban and economic development results in global warming, climate change, and energy imbalance ecosystem pollution and other forms of environmental contamination issues. The combustion of fuel creates carbon dioxide and both carbon monoxide and methane contribute to global warming. Sulphur dioxide and nitrogen oxide were also emitted. and particle matter are the most significant contributor's pollution in the air. The prototype's central concept is to save human lives from hazardous gas leakage accidents. We planned to build this prototype after reading several articles about the Bhopal gas tragedy and the Vishakhapatnam gas leakage incidents. The prototype relies heavily on GPS and GSM modules to track the location of the gas leak and send an alert message. These two modules, along with the buzzer that alerts the surrounding area of the leakage-prone area, can be embedded in the Arduino UNO microcontroller. As a result, our prototype will be useful for both industrial and domestic purposes.

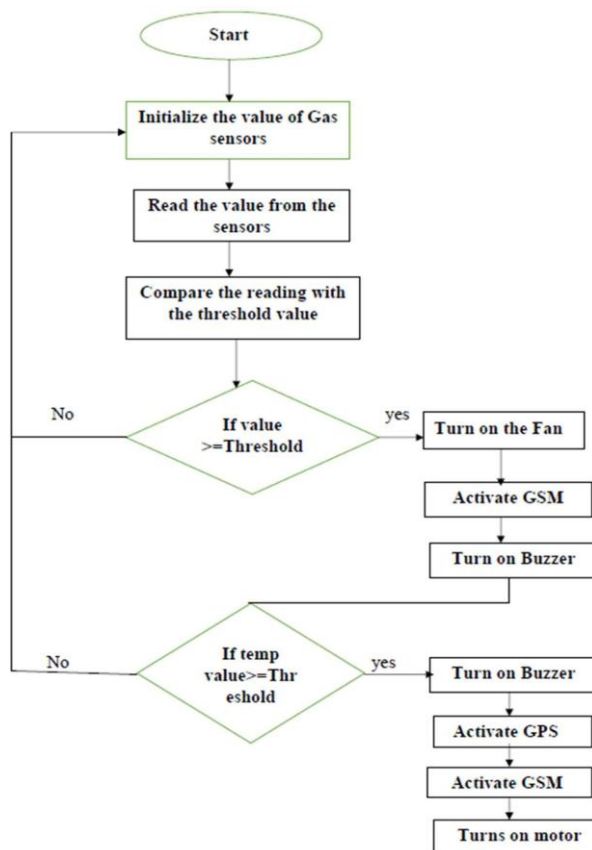
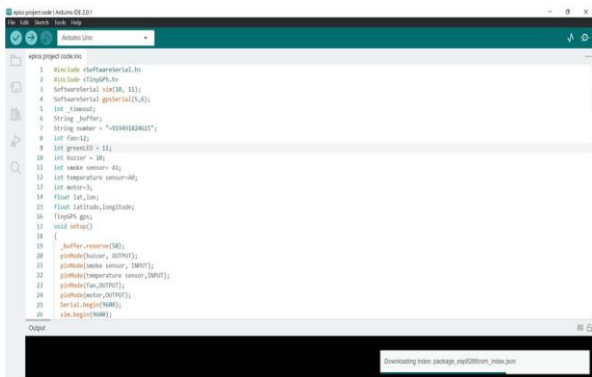


Fig 1: Flow Chart

High population and urbanization growth rate raises the issue of air pollution in recent years. The issue of air pollution has recently come to light due to rapid population and urbanization growth. Now that the project is being implemented, we are evaluating the air using gas, smoke, and flame sensors to see how the environment is. If poisonous gas is detected, the system detects it, activates the exhaust fan, sounds the bell, and then notifies the local authority and our neighbors. It aids in lowering the likelihood of accidents. In today's modern world, accidents are increasing on a day by day and fire-related mishaps are the most common, according to data. As we consider some of the previous fire accidents which are occurred due to the leakage of the gas.



```
1 #include <SoftwareSerial.h>
2 #include <Tsp47.h>
3 #include <Wire.h>
4 #include <GSM.h>
5 int _stano;
6 String _buff;
7 String number = "09988888888";
8 int fan=2;
9 int greenLED = 11;
10 int buzzer = 8;
11 int water sensor=0;
12 int temperature sensor=0;
13 int motor=1;
14 float lat,lon;
15 float lat1,lon1,longitude;
16 Tsp47 tsp;
17 void setup()
18 {
19   _buff.reserve(50);
20   pinMode(buzzer, OUTPUT);
21   pinMode(water sensor, INPUT);
22   pinMode(temperature sensor, INPUT);
23   pinMode(fan,OUTPUT);
24   pinMode(motor,OUTPUT);
25   Serial.begin(9600);
26   tsp.begin(5000);
```

Fig 3: Arduino Uno sample code

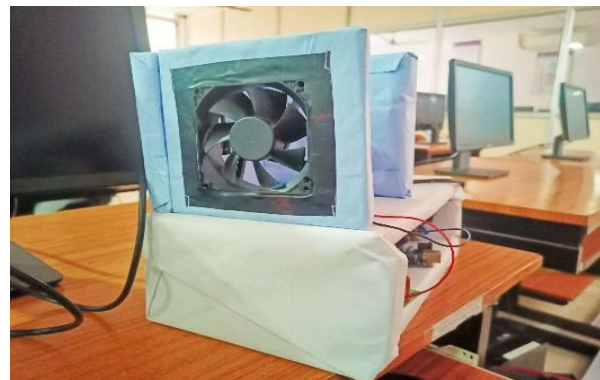


Fig 4: Exhaust Fan Prototype

So, in order to prevent accidents, we are developing a prototype that can be used to stop accidents by using a sensor that reads the value if the gas is detected then automatically the buzzer will ring and a message is sent to the concerned authority and if the fire catches up then it will turn on the motor that pumps the water and tries to reduce the fire and a message is sent to the concerned authority with the location tag.

# FPGA IMPLEMENTATION OF CONGENITAL HEART DISEASES FROM FETAL ECG

Ch.Mohitha, B.Naga Poojitha, Ch.Kishore

## Introduction:

Extracting the Electrocardiogram (ECG) of a fetus from the ECG signal of the maternal abdomen is a challenging task due to different artifacts. The report proposes a  $N$ -tap non-causal adaptive filter (NC-AF) that update the weight by considering the  $N$  number of past weights and  $N - 1$  number of the reference signal and error signal samples after the processing sample number  $n$ . Using the maternal abdominal signal as the primary signal and thorax signal as the reference input, the output  $e(n)$  is obtained from the mean of  $N$  number of errors.

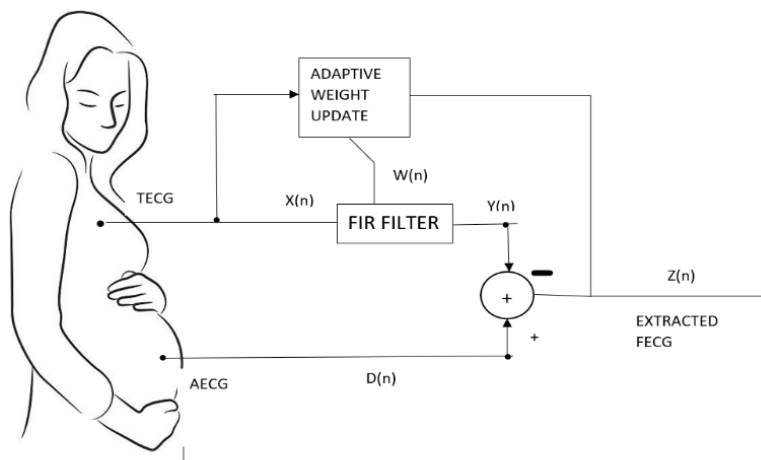


Fig 1: Flow Diagram

The filtering performance of NC-AF was evaluated using the Synthetic dataset and Daisy dataset with the metrics such as correlation coefficient ( $\gamma$ ), peak root mean square difference (PRD), the output signal to noise ratio (SNR), root mean square error (RMSE), and fetal R-peak detection accuracy (FRPDA). The report also proposes the architecture of NC-AF that can be implemented in hardware like FPGA. Further, the NC-AF was implemented on Vivado 2019.2 FPGA and its performance is evaluated in terms of resource utilization, throughput, and power consumption.

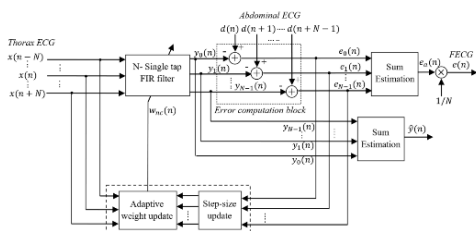


Fig 2: Functional Block Diagram

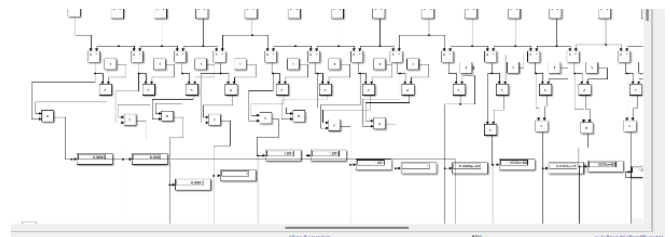


Fig 3: FPGA Block Implementation



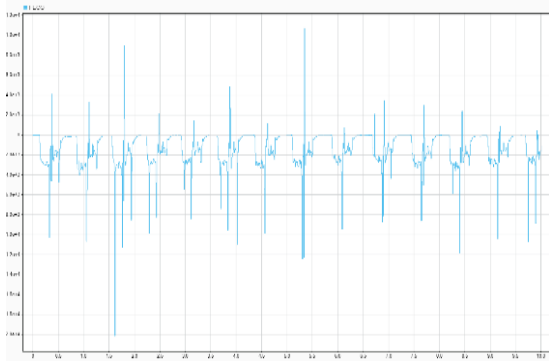


Fig 4: ECG Signal

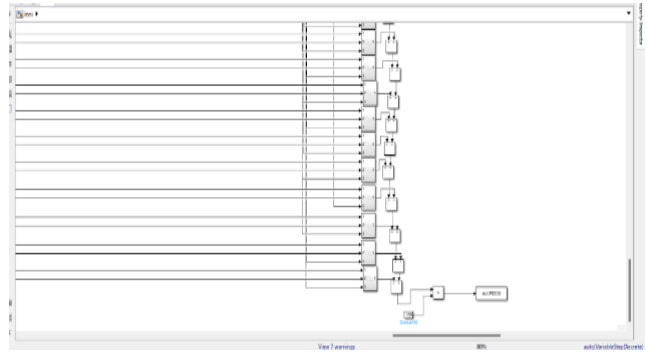


Fig 5: FPGA Synthesis

# Smart LoRa WAN Based Water Quality Monitoring System

*K.Prasad , K.S.Sai Kiran,M. Venkatesh Babu*

## Introduction:

Contamination of water is a serious problem which needs an immediate solution. Water pollution is dangerous to the environment. Water is an important aspect of our ecosystem. This contamination will destroy the aquatic ecosystem which will ultimately results in destroying of our entire ecosystem. In modern era due to the emergence of IOT now we are able to monitor the real time water quality using analog and digital sensors. By deploying the devices in overhead tanks, rivers, reservoirs, lakes etc. This enables us to collect the data of water quality which helps us to understand where the contamination is occurring and cause of this pollution and helps us to identify necessary water treatment method. The proposed device will collect the water parameters like pH of water, turbidity of water, conductance of water, temperature of water and also the level of water in tanks or rivers. This are the basic parameters required to measure the quality of water. The IOT device uses (LP-WAN)-Low Power Wide Area Network, LoRa WAN- Long Range Wide Area Network as it has long range coverage, ultra low power consumption, cost effective and strong security. The device collects the data of water quality and sends it to the cloud server with the help of gateway and we can see the data by accessing the server. Here we use the TTN- The Things Network server for implementation of our IOT device where we can access and monitor the real time water quality of various node devices deployed at different places

## Methodology:

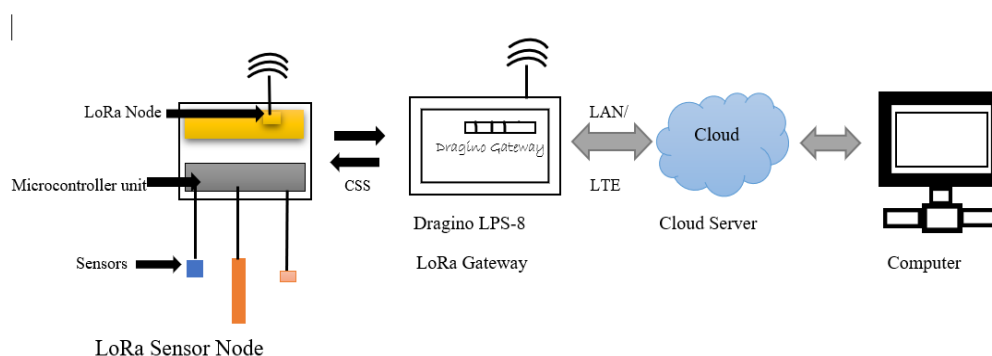


Fig 1 : Flow Diagram

Here we use LoRa shield to transmit the sensor node data to cloud server via LPS8 gateway. By using TTN, the Things Network we need to create an application for the device and then the end device needs to be registered with the corresponding key details. Gateway has to be configured first with the device node.

## Flow Chart:

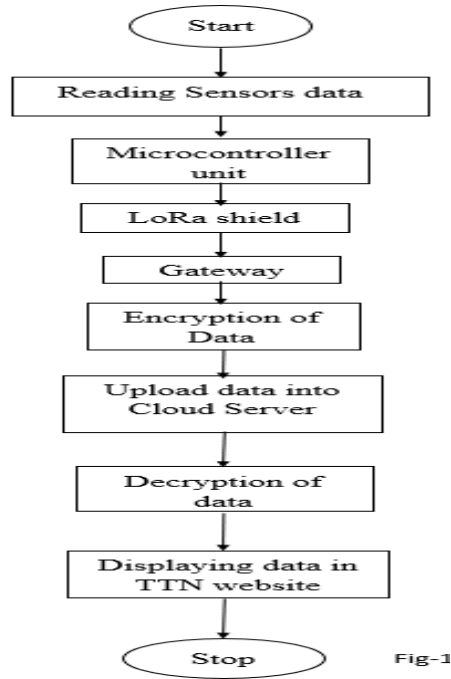


Fig 2: Flow Chart

LoRa is along range communication protocol. Using LoRa shield which is an Arduino featuring LoRa technology. It allows us to send the sensor data over long distances. LoRa is developed by semtech technology. It provides ultra-long range spread spectrum communication. LoRaWAN is a set of protocols designed for transmission of data over long-range areas.

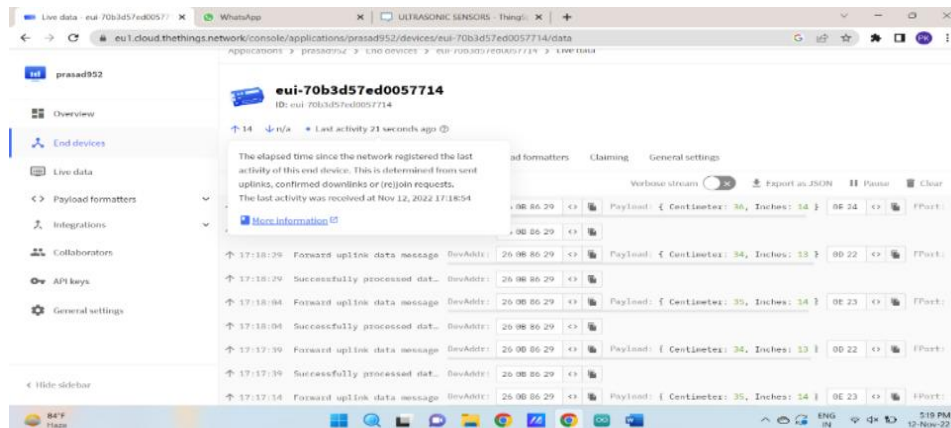


Fig 3: Data monitoring using cloud

The proposed system devices use LoRaWAN for the data transmission to the TTN server for checking the quality of water. The test results of the device prove that the LoRa will be the best suitable technology for long range communication devices to monitor the quality of water. In this research we have discussed the design of water quality system, LoRaWAN and TTN technologies. The device data enables us to monitor the quality of water and helps us in purification of water.

# SMART WATER METRE WITH SENSOR

S.Alekhya ,Sk.Nausheen ,Ch.Swapna

## Introduction:

As seen, water wastage has been a serious threat to the world, therefore many methods were introduced to save water. Automatic taps were created so as to not decrease water wastage. But it is not totally beneficial in all places like household bathrooms. Our system solves this problem by introducing a delay so that the tap automatically turns off after a particular interval of time.

No one can deny the importance of real time monitoring for effective management. It is especially very important in this fast-paced world. This is the main disadvantage of traditional water metres that have been developed for the purpose of measuring the daily usage of water. They lack real time monitoring, cloud computing capabilities. As it cannot be monitored in real time, the user will not have any idea if the metre stops working. Also, the previous data also cannot be stored, which gives rise to a serious problem. An idea for an android-based smartphone application to visualise water consumption for water pipes is presented in another study



Fig 1: Hardware Model

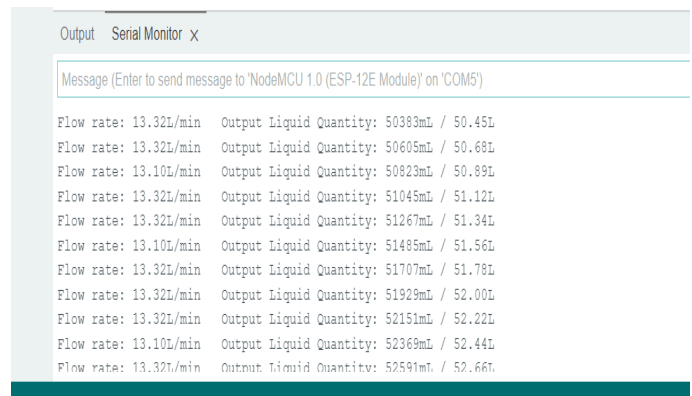


Fig 2: Data in serial monitor

In this application, the data from the data acquisition devices is directly sent to the cell phones. Despite leveraging the Cloud platform in other recent research, their data gathering module was built using Raspberry Pi or Arduino UNO micro-controllers rather than our NodeMCU, making their solution far more expensive than ours. Our architecture, however, makes use of cloud computing, which has a number of additional advantages, including the ability to guarantee server-less architecture, ease of scalability, the visualization of numerous users simultaneously through mobile computing devices, the implementation of machine learning techniques, and effective centralized data storage, among others.

In our system for data collection, we are going to use NodeMCU which is a low-cost open source IoT platform. It includes a firmware which runs on the ESP8266 Wi-Fi system on chip (SoC) from Espressif Systems and hardware based on the ESP-12 module. We interfaced YFS201 Hall Effect Water Flow Sensor with NodeMCU ESP8266 Board. Which displays the water flow rate & Total Volume in the serial monitor. We then integrated the hardware with IoT Server. For IoT Server, we used ThingSpeak. The water flow rate & volume data can be uploaded to ThingSpeak Server & can be viewed or monitored from any part of the world.

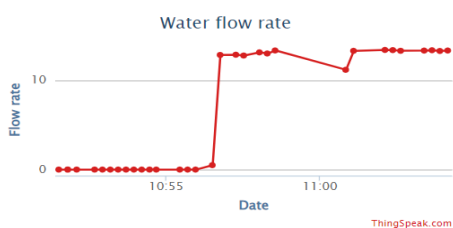


Fig 3a: monitoring water flow rate

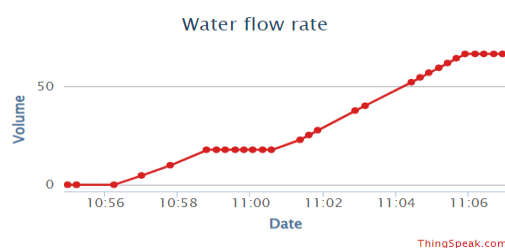


Fig 3b: monitoring water flow rate

Because only the NodeMCU and the water flow sensor were utilised for recording, displaying, and analysing the water flow patterns, our smart water metre has a cheap infrastructure cost. For a large-scale implementation, there would be a fee for using the Cloud's resources. As the data can be easily accessed and can be stored leak detection can be monitored. It requires less human intervention to monitor water consumption in different house holds.

# UNMANNED RC RESCUE BOAT

*P.Hareesha, T.Dheeraj*

## Introduction:

Lifeguards are the unsung heroes who work relentlessly to protect lives at sea. Patrolling beaches for hours and, keeping a sharp eye on every tourist, and risking their own lives day-in and day-out to save others is not an easy job. The sea is unpredictable and involves a lot of risk. In order to reduce the risk and time in the rescue operation an unmanned remote-control boat is designed (Prototype Model), which can be used by the lifeguards to save the drowning people. The unmanned rescue boat is more efficient and faster in reaching the drowning person and has the power to pull the person to the shore and safely complete the rescue operation.

## System Diagram:

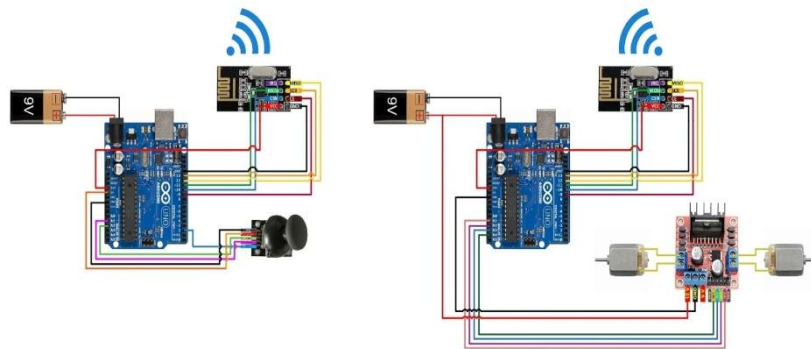


Fig 1: Circuit Diagram



Fig 2: Hardware Model



Fig 3: Prototype Testing

# PESTICIDE SPRAYING AGRICULTURE UNMANNED AERIAL VEHICLE

Jaxa Hruday Pemula , Anakapalli bharath venkata siva kiran

## Introduction:

The demand of new communication techniques arising day by day, due to the increasing population. There are many techniques in spraying pesticides but using drones to spray the pesticides is the best and effective way. The drones can be used in any place like small fields to vast lands. Using drones plays an important in decreasing the health issues of the farmers. The adoption of drones in further can do just more than spraying pesticide, it can monitor the crop cycle and humidity and moisture control etc. Autonomous drones can also monitor the crops 24/7 by recharging them self's using solar power. Drones can also replace the traditional spraying of pesticides.



Fig 1: Drone Hardware Model

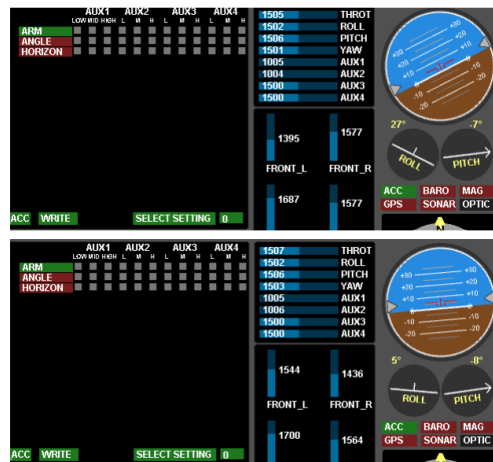


Fig 2: Gyro Testing

The performance of the NRF (transceiver) module is evaluated through a platform called multiwii and the performance of the MPU6050 (Gyro + accelerometer) is evaluated through the same platform. Found that the MPU6050 and NRF are working fine in balancing and trans-receiving the signal when tested. build a drone for spraying the pesticide. We used an own built transmitter and receiver setup for controlling the drone and used a gyro and accelerometer in stabilizing the drone. We used the Gyro and accelerometer for better controlling of the drone, without this sensor the drone may become out off control because of the unbalanced weight of the drone. The transmitter and receiver modules are of low range but works effectively in transmitting.

# AUTO PLASTIC SEGREGATION BIN

*K. S. Shanti Priya , N. V Sai Teja , G. Roshan Chowdary*

## Introduction:

Plastic has become one of the most pressing environmental issues that we are facing today. According to UNDP India is generating about 15 million tons of plastic waste every year but only one fourth of this is recycled due to lack of a functioning solid waste management system. This leads to burden on the landfills and poor socioeconomic conditions of the waste pickers, mostly women. The problem is segregation at primary level. Plastic is being dumped along with other materials. So after few days it is becoming really tough to separate plastic due to decomposition of other materials. And hence the plastic waste is ended up in landfills or clogging the water bodies. Segregating plastic at educational and working places then sending it for recycling can decrease the above mentioned effects. Keeping the effects in consideration, we are making a prototype to segregate the plastic and naming it as Auto-Plastic Segregation Bin. This bin gives us a heap of trash which is full of plastic separated at the end. In this prototype we are using IR sensors. Plastic can be segregated by the method of spectroscopy. In spectroscopy, we can identify if the waste is a plastic or not by using an IR sensor. By using this sensor, we can segregate the plastic which is our main goal to increase recycling rate and decrease plastic waste.

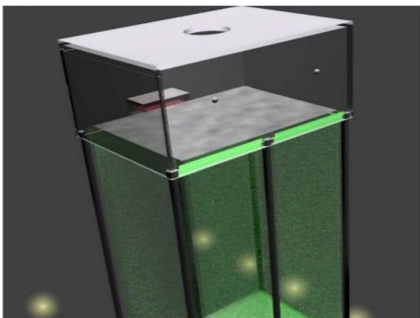


Fig 1: Simulated Model

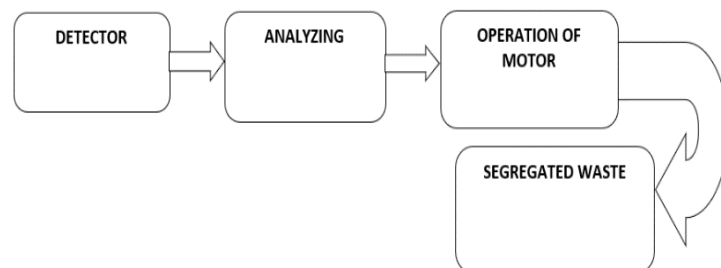


Fig 2: Block Diagram

For plastic detection, there are no specific sensors developed. According to some research articles we identified that the plastic can be detected using Infrared sensors. First, research for IDEC sensors to detect different grades of plastic is done.. These sensors were developed by Mistubishi Company, Osaka. Then we switched for IR sensors. But the output from the sensor is either high or low (gives whether object is present or not). We can detect plastic using IR rays as different objects excites in different states. We searched for sensors which can measure wavelength from rays as we cannot detect plastic with IR sensors alone. But there are only equipments available in industrial scale rather than sensors.



# Bidirectional Visitor Counter with Security System and Automatic Room Light Controller

Haarathi Padamati, P. B. Naveena, P. Hema Nandini

## Introduction:

This project describes a circuit that is used for controlling the room lights according to the count of persons in the room and simultaneously works as a security system when the camera is attached. With the advancement of technology, intelligent devices are fast approaching the realm of necessity from the status of luxury. With limited energy resources, it is a need of time to revolutionize the traditional methods of counting visitors inside hotels, recreational places, meeting rooms, and cinemas to control electrical appliances. Moreover, the improved living standards demand developing circuits that would ease the complexity of life. Many systems have been developed to fill this technological gap but most of them are not applicable in real-time scenarios due to their limitations. When somebody enters into the room then the counter will be incremented accordingly the LED light in the room will be switched ON and when anyone leaves the room then the counter will be decremented. The light will be only switched OFF when the room is vacant. The number of LED lights will be ON according to the total number of persons inside the room and the count will be displayed.

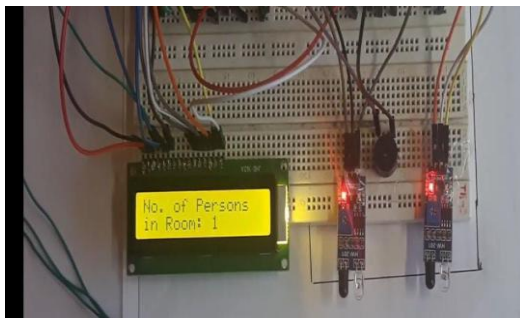


Fig1: Sensors detected person

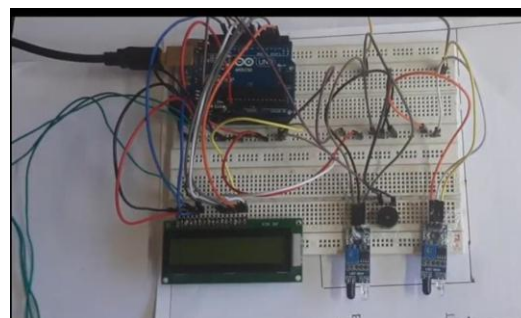


Fig 2: Hardware Model

In today's world, there is a continuous need for automatic appliances that will increase the standard of living, there is a sense of urgency for developing a circuit that would ease the complexity of life. Also if someone wants to know the number of persons present in a room so as not to have congestion, this circuit will be helpful and so this article describes a circuit that is used for controlling the room lights according to the count of persons in the room and simultaneously works as a security system when the camera is attached. When somebody enters the room then the counter will be incremented accordingly the LED light in the room will be switched ON and when anyone leaves the room then the counter will be decremented. The light will be switched OFF when the room is vacant.

# Empirical mode fusion of MRI-PET images using deep convolutional neural networks

Maheshwar reddy ,Prema vani, Tejaswi

## Introduction:

with functional data that depicts the metabolism of various tissues. However, PET images cannot contain structural information about tissues and have limited spatial resolution. On other hand, magnetic resonance imaging (MRI), a different non-invasive imaging technique, offers strong spatial resolution information about the soft tissue structure. However, gray colour information that indicates the metabolic function of certain tissues is absent in MRI images. Fusion of MRI and PET can deliver complementary data useful for better clinical diagnosis. Image fusion is the technique of combining two or more images together to create a composite image that incorporates the data included in each original image.

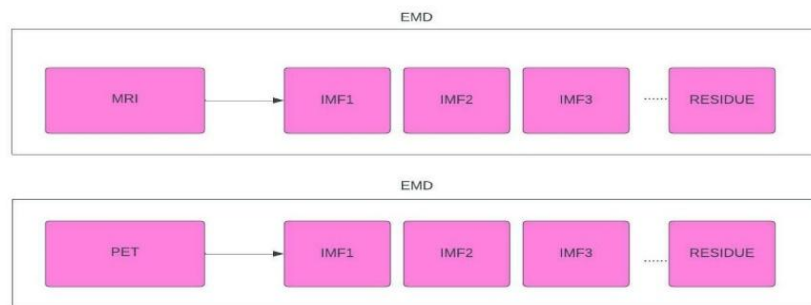


Fig 1: Block Diagram

There are three types of techniques in image fusion, namely spatial domain fusion, transform domain fusion and deep learning techniques. Principal component analysis (PCA) and average fusion are the simple spatial fusion techniques. In these techniques the output image is directly obtained by fusing the input images. Due to this, spatial domain fusion techniques produce degradation and distortion in the fused image. Hence the fused images produced by spatial domain fusion techniques are less efficient compared to transform domain fusion techniques. Positron emission tomography (PET) produces an image. In transform domain techniques, the input images are first transformed from spatial domain technique to frequency domain prior to fusion. Discrete and stationary wavelet transforms are primarily employed in transformed domain techniques.

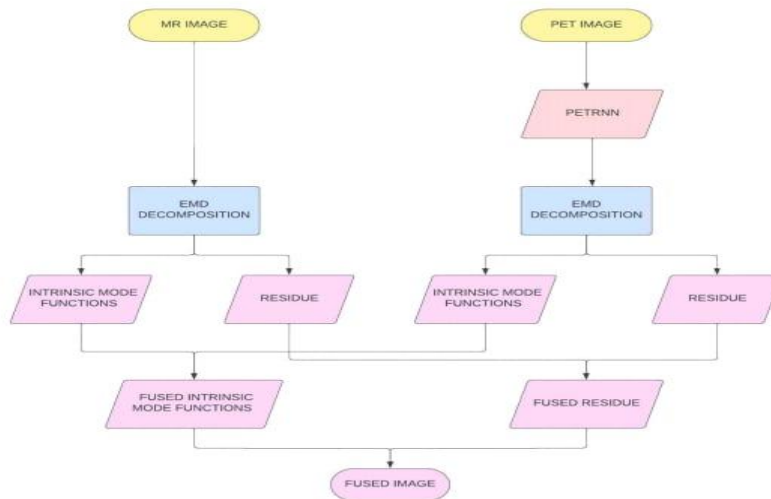


Fig 2: Flow Chart

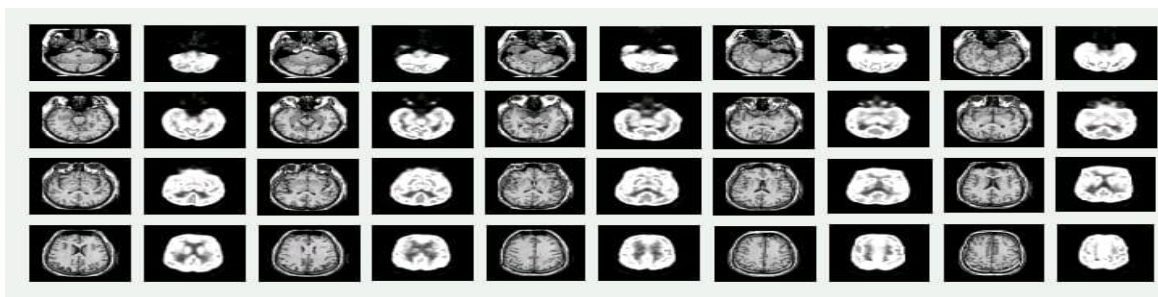


Fig 3: MRI images

These techniques convert the input image sources into low-low, low-high, high-low and high-high frequency bands which are referred as wavelet coefficients. However, these methods suffer from translational invariance problem leading to distorted edges in the fused image. Deep learning techniques for image fusion has been popularized in recent times due to their dominance over the existing spatial and transformed domain techniques. Zhang et al. proposed convolution neural network for estimating the features of input source images. In the obtained image, the input source images are fused region by region. The hierarchical multi scale feature fusion network is initiated by Lang et al. They used this technique for extracting multi features from input images.

# Antenna Position Control

*P.Sree Pranavi , N.Poojitha , G.Susmitha*

## Introduction:

Currently the modern world depends on control systems. Various application in our surrounding use the concepts of control systems. Such applications include the automatic lifts, robotics, the rocket fire and the space shuttle lifts of to earth, car's hydraulic pistons and many other real-life applications. Our body organs as pancreas which regulates our blood sugar, heart which pumps through all parts of our body and brain which controls electric pulses through our backbone etc. all are natural control systems. So control systems have lot of applications in our life, we are surrounded by modern technologies which based on scientific innovations. One would have heard about an aircraft flying in auto mode, a moving vehicle without operator and an antenna which gives maximum auto signal strength all are the applications of control systems.

Control system is a system designed for obtaining required characteristics of a process. For getting desired yield with desired performance many subsystems and processes linked in a control system (Nise, 2000).

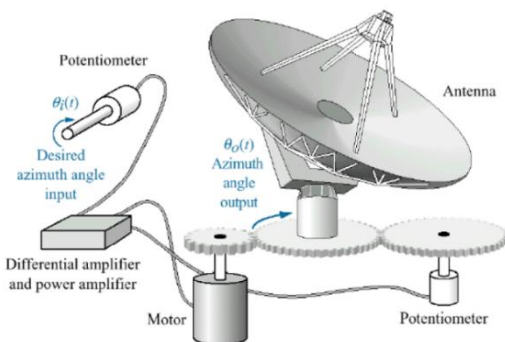


Fig 1: Working Diagram

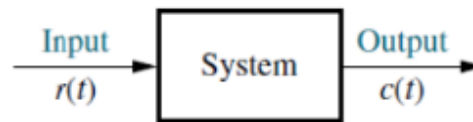


Fig 2: Block Diagram

The position of antenna is controlled by using gears and feedback potentiometer. Antenna azimuth is also controlled by using some controllers. We will check response of the system without using any controller. For getting a better response we will use PID controller and we will see that response will be better than without controller, further we will use LQR controller for getting better response than PID. Commanding the place of an antenna is called azimuth. Getting the output angle of the antenna  $\theta_o(t)$  from the angle of potentiometer  $\theta_i(t)$  as input is the purpose of this scheme. System concept for controlling the position of antenna azimuth.

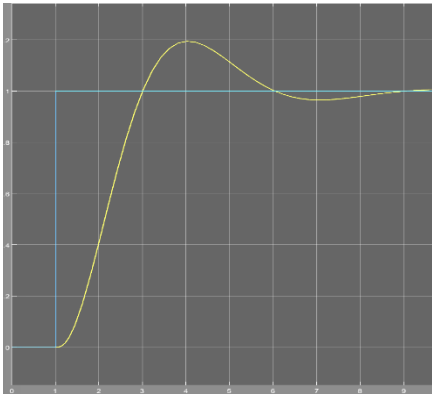


Fig 3: Output Waveform

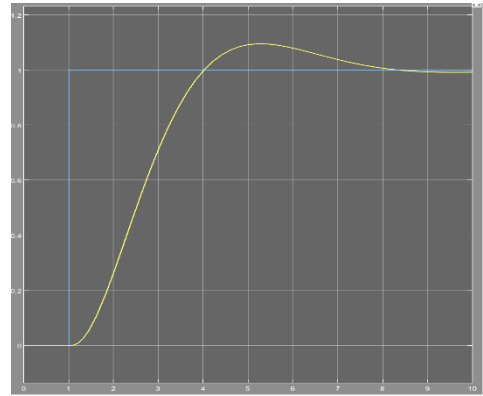


Fig 4: Matlab Output result

The performance of the algorithm is evaluated through radiation pattern and convergence analysis. The comparison between two training based algorithm is investigated by computer simulations using MATLAB/ SIMULINK. A system equipped with eight antennas with half wavelength spacing is considered for this purpose.

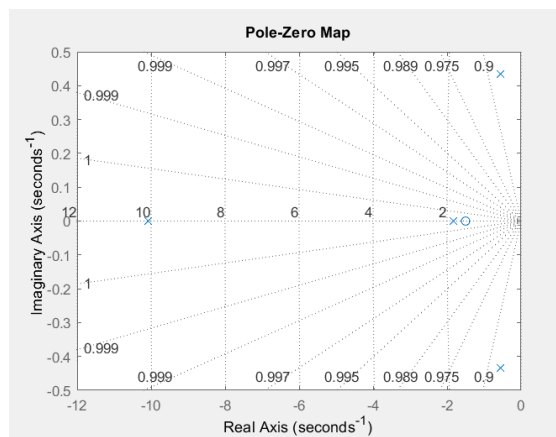


Fig 5: Matlab Pole-Zero Map

# PEDIATRIC SLEEP STAGE CLASSIFICATION

*P Lurdhu Merin , V S V S Prapoornetri , K Ashok*

## **Introduction:**

At present, most of the computing tasks of the remote sleep monitoring (such as sleep staging) are deployed on platforms with large-scale computing resources such as computing centers, which largely limit the convenience to people. Sleep-induced diseases such as insomnia, drowsiness, obstructive sleep apnea (OSA) and other sleep disorders are becoming more and more common and have become a major medical challenge. For children, high-quality sleep helps children's intellectual development and is closely related to children's cognitive function, learning and attention. If school-age children are not able to get enough and good sleep, it will affect their mental development and cause emotional, behavioral, and attention problems.

Polysomnography (PSG) recordings is used to diagnose sleep-related diseases, which include electroencephalogram (EEG), electrooculogram (EOG), electrocardiogram (ECG), electromyogram (EMG), breathing exercises (chest and abdominal), oral and nasal airflow, body movement, blood oxygen saturation (SaO<sub>2</sub>) and other physiological parameters. Sleep stage scoring is to divide the physiological parameters in the polysomnography chart into 30 s continuous epochs according to the time axis, and divide these epochs into different sleep stages according to the American Academy of Sleep Medicine (AASM) rules . Sleep stage scoring can be performed using single-channel EEG or multiple physiological parameters. The hypnogram obtained from the results of sleep staging can intuitively reflect the sleep of subjects throughout the night, and is used to evaluate sleep quality and sleep-related problems.

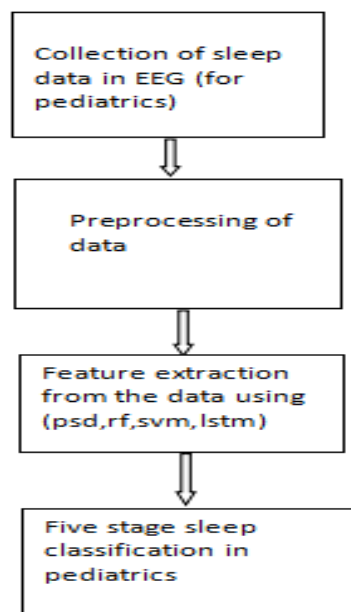


Fig 1: Flow Chart

The HNN-based classifier yields the best performance metrics using 30 s time series in combination with an instantaneous frequency using a 19-channel, three-stage classification, with an overall accuracy, F1 score, and Cohen’s Kappa, equal to 92.21%, 0.90, and 0.88, respectively. An effective combination of temporal and spatial time domain clues with time-varying frequency domain information plays a pivotal role in pediatric, automatic sleep staging. Sufficiently reasonable performance of the HNN-based approach coping with highly complicated pediatric EEG signatures hopefully sheds light on the clinical feasibility of DNN-based automatic sleep staging for pediatric neurology.

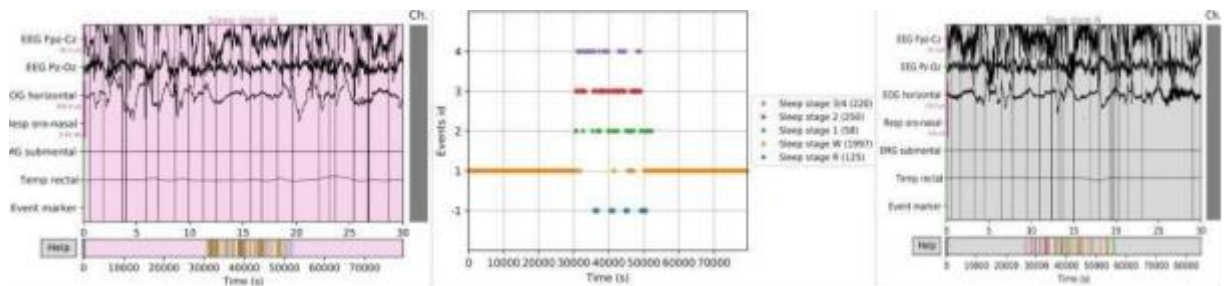


Fig 2: Simulation Result

EOG, EMG and EKG are considered as input signals and all the sleep stage classification is done accordingly and we demonstrated the influences of the length of input signals, number of channels, and types of input signals on the HNN-based automatic sleep-stage classification for pediatric scalp EEG datasets in the time and frequency domains. Therefore, Pediatric Sleep stage classification is a great benefit in clinical neurology and helps us detect any kind sleep related disorders which we can diagnose before hand and take the necessary solutions.

## Object detection using Ultrasonic sensor

*G.Balakrishna ,J.Waran job ,N.Om venkata Vamsi*

### Introduction:

Target/object detection, recognition, position, movement speed, etc. is easy when the object is near or easily visible. But, the same doesn't stand true especially when the object is far or not visible due to so many factors like weather conditions, day/night cycle, etc. Therefore, Radio Detection and Ranging (RADAR) was invented, which uses radio waves to determine the range, angle, or velocity of objects.

This project provides a method in which the Ultrasonic Sensor (HC-SR04) acts as RADAR. The HC-SR04 is connected to Servo Motor (SG90) for the rotation/movement purpose. These modules are also used to notify object detection via message on LCD. These components are connected to Arduino uno and for being processed to detect and notify the object, the range of ultrasonic wave is 20kHz but here the HC-SR04 range is 3cm to 4m as it is smaller in terms of project usage. Advantages are: it is not affected by color or transparency of objects, can be used in dark environments, not highly affected by dust, dirt, or high-moisture environments, etc.

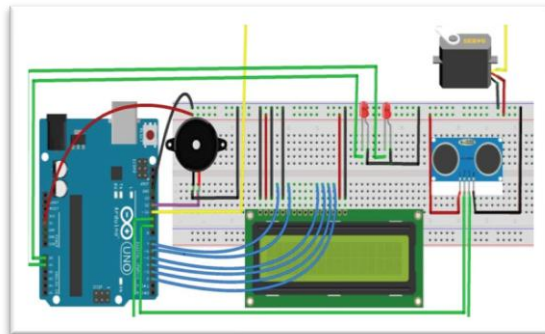


Fig 1: Circuit Diagram

Ultrasonic sensors measure the distance by using ultrasonic sound waves which are above the human audible range 20kHz. The sensor emits an ultrasonic wave and receives the wave reflected back from the target. Ultrasonic Sensors measure the distance to the target by measuring the time between the emission and reception. The advantages of ultrasonic sensors are that they are cheap, easy to setup and handle, can be interfaced with any IoT module, high frequency, sensitivity, penetrating power, great accuracy, easily sense the nature, shape, orientation of the object, they are independent of light, smoke, color, dust, material, etc. Therefore, they are used for liquid level control, car parking system, distance measurement and almost all the applications of RADAR. Therefore, in the proposed work, ultrasonic sensor, HC-SR04 is used which is made to act as RADAR.



The HC-SR04 uses sonar to determine the distance to an object. The transmitter (trig pin) sends a signal: a high frequency sound, when the signal finds an object, it is reflected and the transmitter (echo pin) receives it. For the RADAR like movement/rotation, servo motor SG90 is used. For notifying the object detection via message on LCD with its location. As one can see that with these cheap, lightweight, easy to setup and handle modules, the RADAR can be replaced and even then all the application can be handled.

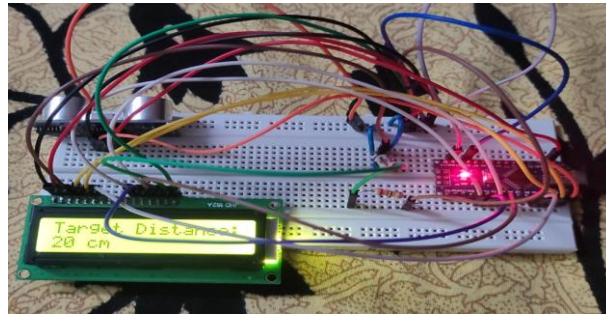


Fig 2: Hardware Prototype

In this project, the work i.e. RADAR based Object Detector using Ultrasonic Sensor has been successfully carried out. It gives solution for easy object detection with ultrasonic, working like RADAR instead of using actual RADAR which is costly and tough to handle. The work included IoT devices and software for the connection. Data was processed by the computer and Arduino Uno board. Object detection was done via the Ultrasonic sensor with servo motor attached to the boards and the distance, angle, timestamp of object detected was sent to the given number via message on the LCD module. The results included sample test cases to check range of the object detection. Therefore, the work provides easy to setup and handle solution for object detection as there are lot of advantages of ultrasonic over RADAR as mentioned in the introduction section. In future, higher range ultrasonic sensor can be used with 360o angle rotation for large area coverage. Also, different types of camera can be fixed to identify the object clearly.

# GEO-FENCING AND OVERSPEED ALERT SMS SYSTEM WITH EMERGENCY RIDING GLOVE

Venkata Naga Vamsi Marriwada, Sai Krishna Vallepu, Karthikeya Sesham

## Introduction:

Higher performance and speed Vehicles are more prone to accidents than ever before. A person can drive recklessly, which affects the safety of the public. Speed limits and other preventative measures have been put in place, but traffic accidents continue to occur everyday. Geofencing (geofencing) is a powerful feature of software programs that use the Global Positioning System (GPS) Or useradio frequency identification (RFID) to define geographic boundary features. Geofences are in fact virtual barriers. Geofencing is a revolutionary technology. Tracking and monitoring systems based on global satellite navigation services, including geofencing capabilities, may also help determine the precise location of your child. The main issue with the geofencing approach is that parents and caretakers find it difficult to use, therefore they do not utilize it. To make the geofencing technique more simple and easy to use by everyone, this research work intends to develop an app and attach it to the built prototype. The proposed task is to develop devices that control speeding and reckless driving accidents and provide safety in emergencies, and also an app is developed to make it easy to use and set the speed limits, Max distance etc. The device can detect speeding, emergency gestures, virtual geological barriers and is programmed to send SMS alerts. This device model was developed using the Arduino MEGA, Global System for Mobile Communication (GSM), Global Positioning System "GPS", and Flex sensor.

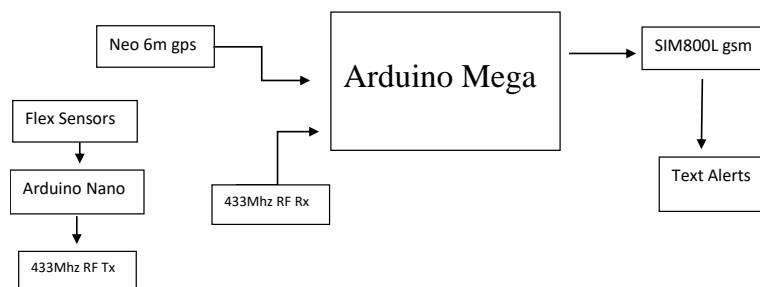


Fig 1: Block Diagram

A geofence is a virtual geographical boundary or fence defined by GPS technology. This Allows the software to trigger an alarm when an object enters or exits a designated area and can be used to monitor livestock and other animals. Parents can use it to monitor their children. that is a great feature of a software program that uses the Global Positioning System (GPS) defines geographic boundary features. Anytime when the child crosses the virtual barrier, the system will

send an SMS notification to the parent's phone.



Fig 2: Vehicle inside fence



Fig 3: Vehicle Outside fence



Fig 4: Hardware Model

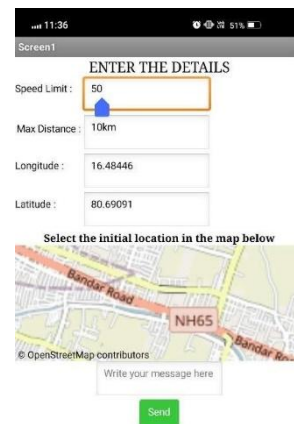


Fig 5: Geofencing Settings

This initiative will help reduce traffic deaths caused by speeding and abrupt driving by installing such a device the speed of the driver is continuously monitored and broadcast Alerting authorities when crossing borders not only promotes road safety for people. Not only drivers, but also pedestrians. Therefore, this work will reduce the number of fatalities from traffic accidents. The main reasons are excessive speed and hasty driving. The proposed system can handle geofence detections and alert them. It also avoids accidents by providing a warning system that can be overcome by stopping the vehicle. The hand glove lets the authorities respond quickly by recognizing her gesture. There is a quick response by police and there might be a chance of reducing risk with the help of this emergency gesture recognizer especially for women safety.

# Investigation and implementation of Dielectric Resonator Antenna for sub-6GHz new radio band for vehicle to vehicle applications

M.Raghava ,sk.NagurBasha ,N.Sanjay

## Introduction:

A singly fed wideband circularly polarized DRA, including a rectangular DRA, conformal metal strip of Roman three shape for excitation purpose, parasitic strip, and the ground plane made up of PEC. The size of the DRA is kept similar as in [20], where having a height (H), width (B) and depth of (C) 26.1 mm, 25.4 mm, and = 14.3 mm, respectively. Additionally, the relative permittivity of DRA has  $\epsilon_r = 10$ . Conformal metal feed comprises up to 5 separate strips used to excite the antenna. After the numerous parametric sweeps, the optimized dimensions of the feeds are  $h_3$  &  $h_4 = 12$  mm,  $w_1 = 7.0$  mm,  $h_5$  &  $h_6 = 4$  mm. The widths of all the strips are optimized at 1mm. For the PEC ground plane, a square plate of 35x35 cm<sup>2</sup> has been used. DRA has been placed in the middle of the ground plane.

The proposed antenna can be used vehicle to infrastructure and vehicle to vehicle applications. We designed Circularly polarized Dielectric resonator antenna (DRA) is proposed for future 5G new radio applications. A Roman feed circularly polarized DRA was introduced of operating frequency 3.7-4.2GHz and excited by different higher order modes to cover the whole 5G new radio bands. Parasitic metal strips are introduced for novel feed mechanism to get good characteristics parameters for 5G new radio band sub- 6GHZ frequency application.

S Parameters: S-parameters (or scattering parameters) are used to describe how energy can propagate through an electric network. S-Parameters are used to describe the relationship between different ports, when it becomes especially important to describe a network in terms of amplitude and phase versus frequencies, rather than voltages and currents. From the S- parameter matrix, you can calculate characteristics of linear networks such as gain, loss, impedance, phase group delay, and voltage standing wave ratio (VSWR). The operating frequency of the above antenna is 4.5GHz.

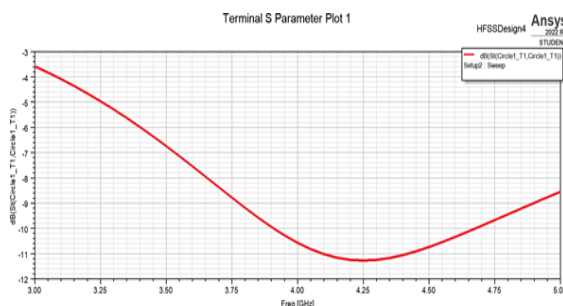


Fig 1: S parameter plot

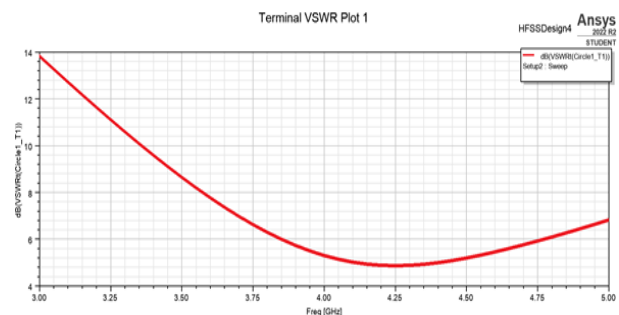


Fig 2: VSWR plot

VSWR Plot: VSWR (Voltage Standing Wave Ratio) is a measure of how efficiently radio-frequency power is transmitted from a power source, through a transmission line, into a load (for example, from a power amplifier through a transmission line, to an antenna). In an ideal system, 100% of the energy is transmitted. VSWR value under 2 is considered suitable for most antenna applications. The antenna can be described as having a “Good Match”. So when someone says that the antenna is poorly matched, very often it means that the VSWR value exceeds 2 for a frequency of interest.

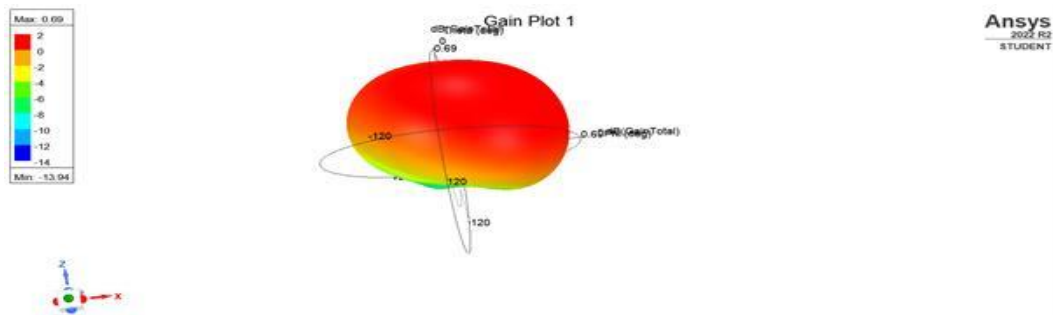


Fig 3: Gain Plot

In this article, we are designed basic microstrip patch antenna and Dielectric Resonator antenna. In dielectric resonator antenna a novel roman three-feed CP DRA for sub-6 GHz 5G NR band was examined and has been successfully investigated in this article initially, the proposed antenna has produced a very narrow S11 and CP bandwidth. It has been revealed that by just deploying a parasitic metallic strip on the wall of the DRA nearby the novel feed, the antenna has exhibited a very broad 10-dB impedance operation of 27.73% (3.26 – 4.35 GHz) and CP waves of 23.71% (3.37–4.23 GHz) that can easily cover 5G NR Band (n77/n78). Because the proposed wideband CP DRA has a simple structure and feeding mechanism and stable gain and radiation patterns, it is a good candidate for 5G NR band (sub-6 GHz) applications.

# ARDUINO Based Wheelchair Fall Detection System Using GPS and GSM Module

Ch.V.Sai Revanth ,M.Hadi Abbas

## Introduction:

Every country in the world was focused on improving their country, which included increasing the population. As the population grows, so does the number of elderly and sick people. As the number of these people grows, so does the demand for healthcare services. Those with health issues or the elderly frequently do not have enough strength to walk, so a wheelchair is employed. Those who use a wheelchair but live alone are at a higher risk of falling. Furthermore, falling repeatedly can create psychological and physiological damage, which can lead to severe injury and even death if medical assistance is not immediately provided. Medical treatment is required to lessen the danger of these people being injured by a fall.

So, a reliable fall detection system can help in the identification of senior falls as well as the search for support and assistance. Commercial and smart or motorised wheelchairs are the two types of wheelchairs that are currently available. Commercial wheelchairs, which lack any form of technology and are used extensively worldwide. In order for the wheelchair to go to the destination automatically, a smart or powered wheelchair has a controller device that enables the user to input information via a joystick, voice command, etc. Smart or powered wheelchairs are generally less frequently employed in traditional family or healthcare settings due to their high cost.

## System block diagram

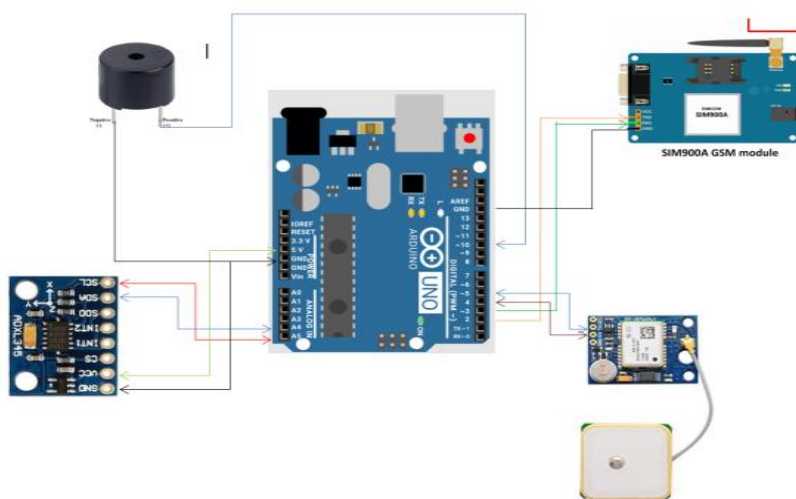


Fig 1: Circuit Diagram

**ALGORITHM:**

The algorithm used for the Fall detection system is mentioned below

Step 1: Start

Step 2: Read data from the ADXL345 accelerometer sensor

Step 3: check if fall occurred or not

Step 4: If yes- activate the buzzer

Step 5: The check time will be for 2 min

Step 6: If no- the buzzer will be deactivated

Step 7: If yes- activate GSM and GPS module  
Step 8: send the location of fall and message to the registered mobile number of concerned person for help/assistance

Step 9: Stop

**FLOWCHART:**

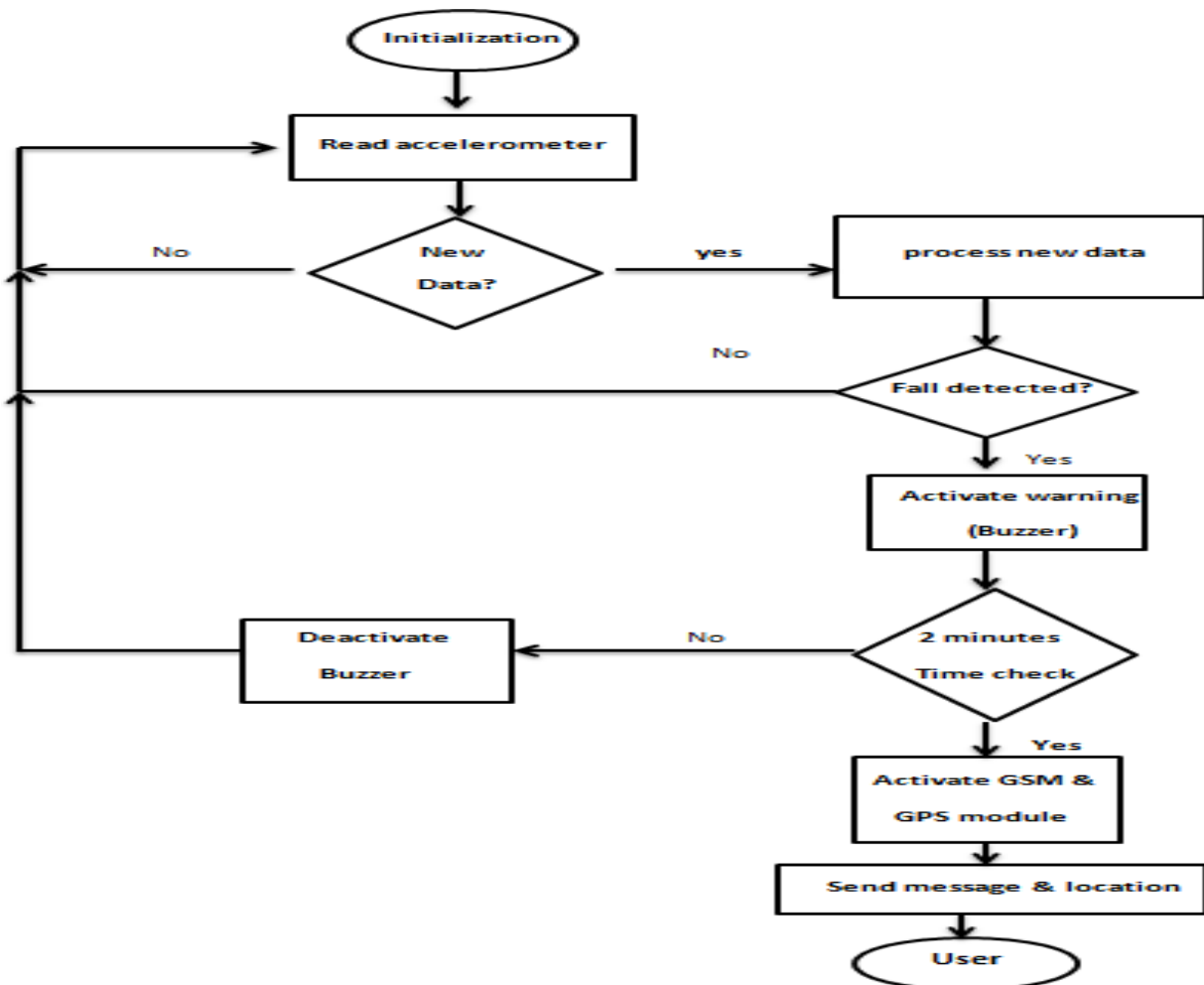


Fig 2: Flow Chart

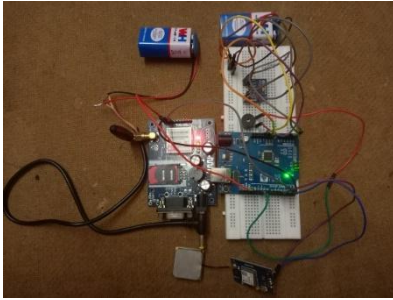


Fig 3: Connected Circuit



Fig 4: Wheel Chair attachable kit

**Conclusion:**

With the ADXL345 accelerometer, GSM SIM900A module, and GPS Neo6m module, Arduino-based wheelchair fall detection systems can provide a low-cost and adaptable solution for detecting falls and issuing notifications. Fall detection approaches such as threshold-based techniques, machine learning techniques, and pattern recognition techniques can all be applied. The GSM module can be used to send messages or make calls to alert caregivers or emergency services, while the GPS module can provide location information. Further research is needed to evaluate the accuracy and effectiveness of these systems in real-world scenarios.

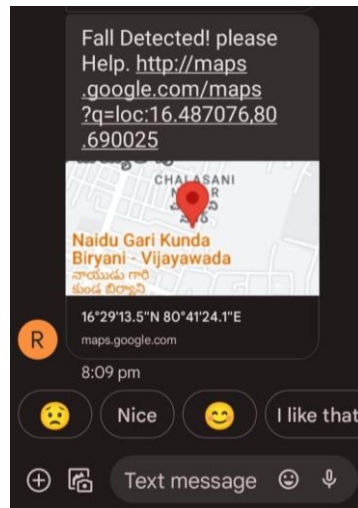


Fig 5: Location as text msg

Wheelchair fall detection systems can be extremely beneficial to wheelchair users, particularly the elderly, who are at a higher risk of falling. These technologies can detect falls and provide a warning to carriers or emergency personnel. Arduino-based fall detection systems have grown in popularity in recent years because to their low cost, ease of use, and adaptability. The purpose of this literature review is to provide an overview of Arduino-based wheelchair fall detection systems that use the ADXL345



accelerometer, GSM SIM900A module, and GPS Neo6m module.

Arduino-based fall detection systems: Arduino is an open-source microcontroller platform that provides a versatile and low-cost alternative for building electronic projects. In Arduino-based fall detection systems, an accelerometer, a sensor that senses acceleration, is typically employed. The ADXL345 accelerometer is a popular choice for Arduino-based fall detection systems because to its high accuracy and low power consumption. The accelerometer can detect the orientation of the wheelchair as well as the acceleration caused by a fall.

# Real Time Analysis of Weather Statistics using Weather Station based on ESP-32

Ch.Kowshik ,N.Kaushik ,Y.Yaswanth

## Introduction:

The proposed system puts forward an IOT based weather station which helps in measuring various weather parameters and analysing them over a period of time. In this system we will mainly use ESP32 microcontroller, sensors and software requirements such as ARDUINO IDE software for running and dumping code and BLYNK web application for creating a user interface that displays the obtained data and get updated time to time and data can be analysed on each parameter in the form of graphs over a period of time. This project is an extension of simple weather stations and their applications. We aim to design a system that is unique in its own way by creating up the more effective process and its applications. In this project we aim to build a more efficient, user-friendly system and make sure it is cost effective.

## SYSTEM BLOCK DIAGRAM

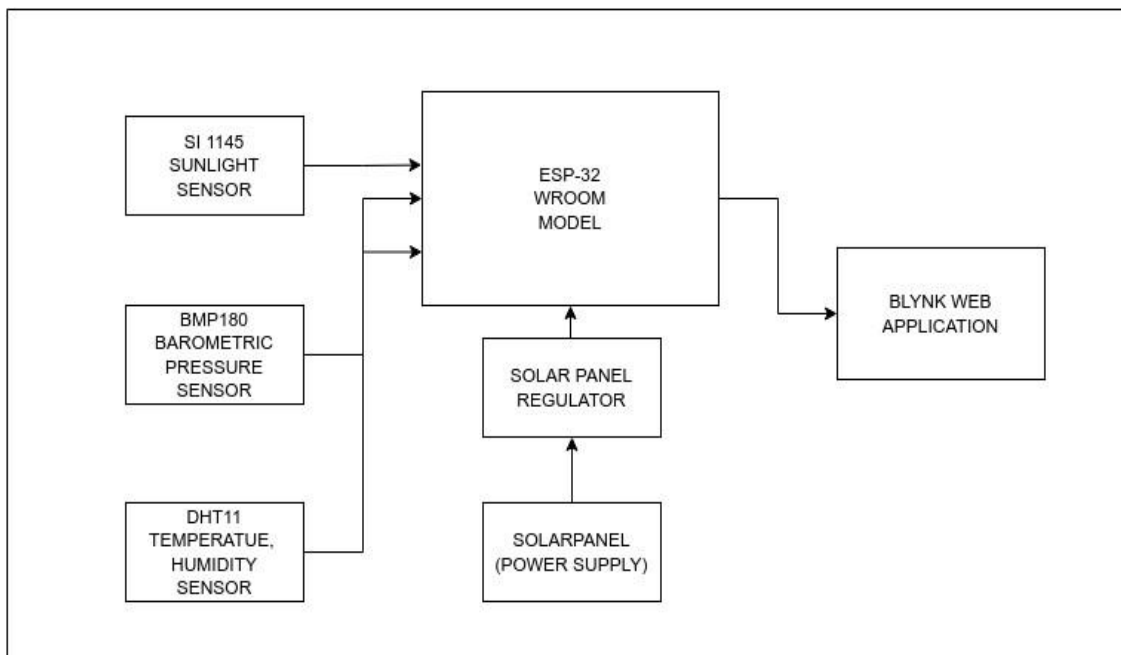


Figure 1-Flowchart of Weather Station

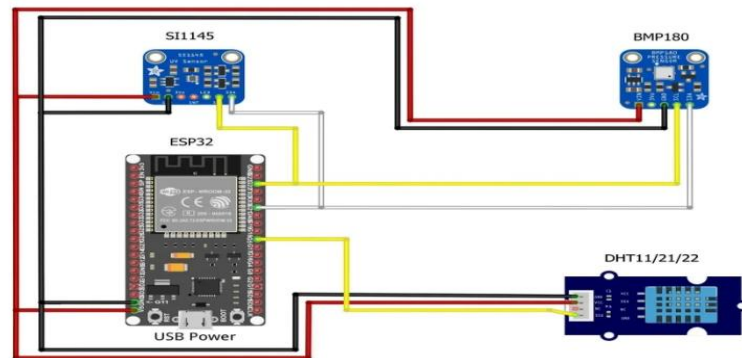


Fig 2: Circuit Diagram

## Methodology:

ESP32 is highly-integrated with in-built antenna switches, RF balun, power amplifier, low-noise receive amplifier, filters, and power management modules. ESP32 adds priceless functionality and versatility to your applications with minimal Printed Circuit Board (PCB) requirements. ESP32 can perform as a complete standalone system or as a slave device to a host MCU, reducing communication stack overhead on the main application processor. ESP32 can interface with other systems to provide Wi-Fi and Bluetooth functionality through its SPI / SDIO or I2C / UART interfaces.

## RESULT

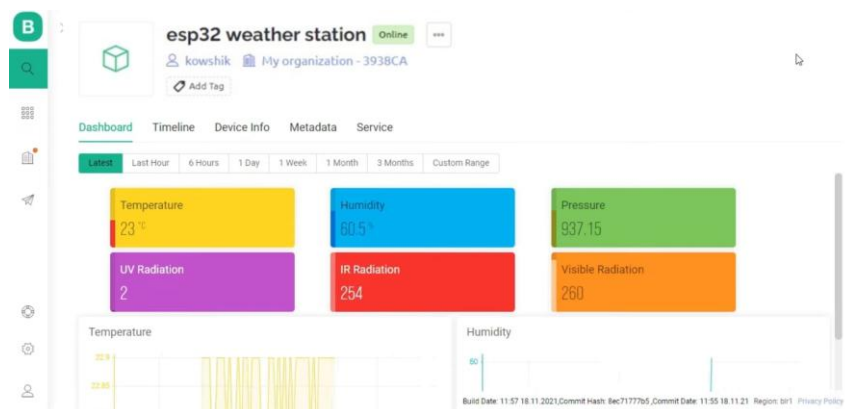


Figure 3: Blynk Interface

From fig.3, we can see that the blynk application software can run online, through this interface so that, we can ensure the required details about the weather condition.

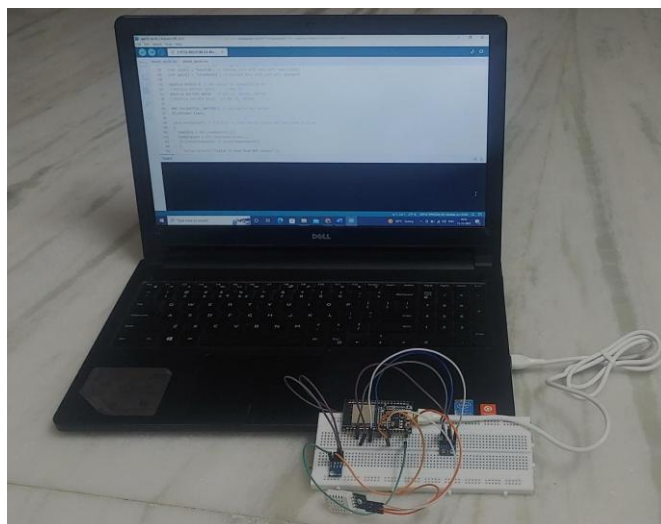


Fig 4: Node mcu connection to Arduino Ide

## CONCLUSION

In this project, the main function our project- 'Real time analysis of weather statistics using weather station based on ESP32' is to record and observe the weather conditions in live time using a remotely accessed through WiFi using ESP-32 kit that we have developed and this target (project goal) has been successfully carried out. It gives solution for weather condition detection with ESP32 and other weather condition detecting modules, which is easy and not so costly and simple to handle. Other author's work is mainly focused on the either of the things. The work included IoT devices and software for the connection. Data was processed by the computer and ESP-32.

# Smart Umbrella

*E.AdityaVardhan,B.Pooja,B.KumarSai*

## **Introduction:**

Shelter is an essential human need. When we go out whether it is a hot summer day or a rainy day, humans search for a shelter. So a shelter with basic requirements would always be helpful. Shelter doesn't only protect us but also fulfil our requirements. An umbrella is generally used to protect from rain. Now it is modified to a modernized, smart umbrella that does many functions. The modernization includes mist, charging ports, automatic night lights. The power source for this smart umbrella is the renewable energy source, sunlight. The energy from sunlight is trapped using solar panel and stored in power bank for further uses.

The climatic conditions nowadays are terrible and there's an intense degree of heat most of the time. So the cooling is required in a shelter. In order to get cooling, mist sprayers are used, that automatically sense the person and sprays the mist. There's no one nowadays without a mobile phone. And it is not possible to carry a mobile phone everywhere. So a mobile phone charger is also need to be provided. Irrespective of day and night it must work. And during nights the most essential part is lights. And automatically lights get on as soon as the sun sets down. A smart shelter is required in public places, bus stops, and watchman at organizations. Every person who comes out always search for a shelter while waiting. So with the developing country the smart systems are to be developed. This can also be a small block of making a smart India.

## **Block Diagram:**

Smart umbrella is an integrated system which consists of four modules. This smart umbrella mainly consists of four functionalities. Firstly renewable energy source is converted into electrical energy with the help of the solar panel, which is placed on the umbrella and this energy is used in different ways as per our requirements. And then this energy source is used to make the portable charger which is our next module. And then this energy source is also used for automatic lights. The lights will glow whenever it is dark. And finally this energy is used to generate the mist sprinkles whenever it detects the person. In this way, the energy generated through the solar panel is used for various purposes. we can use this energy either directly or we can use energy storage elements like power bank to store that energy and to use that energy whenever required

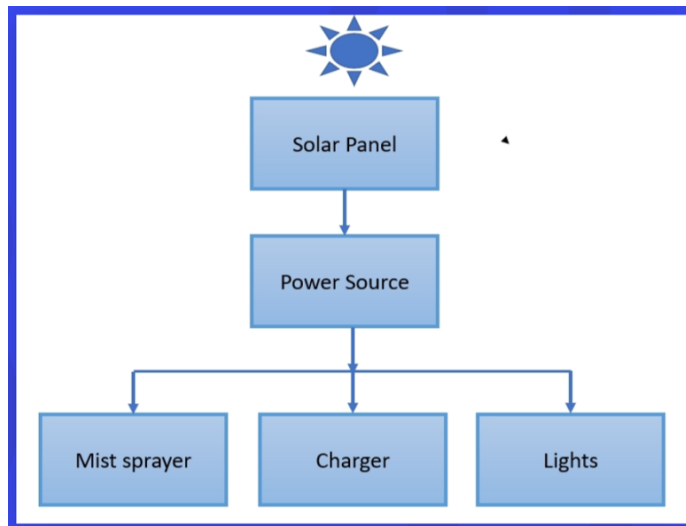


Fig 1: Flow Chart

## CONCLUSION

In this project, a society related problem is taken and solution is brought up. The smart umbrella and its functionalities are very useful for present day life. The renewable energy source sunlight is used and supplies the power to all the units. The mist is sprayed as cooling, the mobile phone charging is provided and automatic lights are installed that glow during night. This smart umbrella can be placed at public places, junctions, bus stops. This is very useful mainly for watchmen at organizations, for students, for traffic police, and all general people. This is a fully automated machine that works day and night.

# Design and analysis of dual band dielectric resonator antenna for 5G application.

*A.R.V.Manoj Kumar, sk.Ashraf, B.Yaswanth*

## **INTRODUCTION:**

The need for faster communication is rapidly increasing with the rising demand for multimedia and real-time traffic data. Co-channel interference is one of the key issues while accommodating users within the same spectrum. High-speed streaming needs advanced technological requirements beyond the 3G and 4G communication systems. The 5G communication technology provides quite a high data rate without any major sacrifice in the user bandwidth [1, 2].

The 5G system has much lower latency and delay compared to the earlier communication systems. With the evolution of each generation, a multifold rise in data rate has been attained by employing advanced technology. The multiple-input multiple-output (MIMO) technology facilitates the requirements of a 5G communication system, and it is expected to also provide the platform for the 6G communication system. In 5G communication, it was necessary to cover multiple frequency resonances to provide coverage to a range of standards and also provide diverse gains within the allocated bands. The MIMO technology provides high spectrum efficiency to facilitate seamless connectivity. The 5G communication system supports a significantly higher count of mobile users with unobtrusive connectivity through adequate frequency channel allocation.

To improve communication reliability, the 5G technology employs multiple antennas. The MIMO technology addresses the multipath fading issue by sending data from multiple transmitting antennas to multiple receiving antennas. The information received by each antenna is different as it undergoes inconsistent fading across different antennas. A wide range of multiplexing schemes is in existence for providing degrees of freedom by the use of MIMO technology. The mobile terminals are posing a space-constrained environment. Planar and surface-mountable antennas are the most viable choices for supporting multiple antenna systems.

**FLOW CHART:**

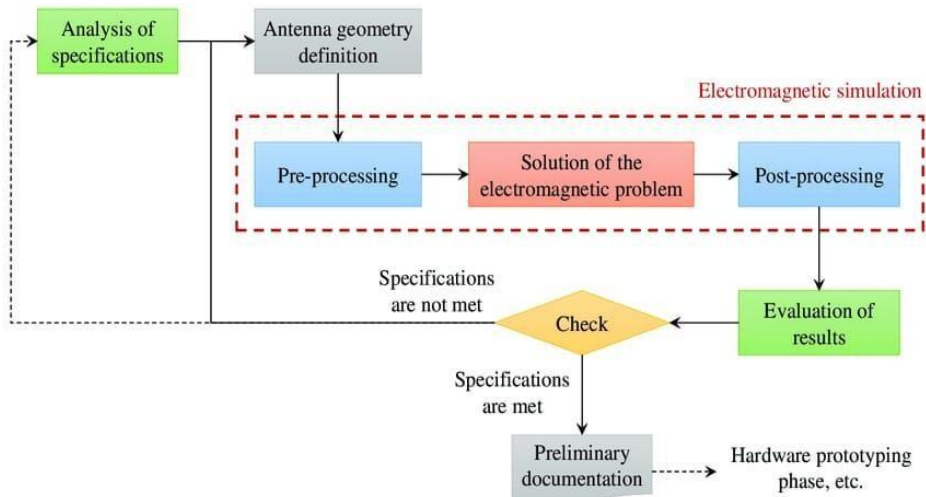


Fig 1: Flow chart

**S parameters:**

**S-parameters (or scattering parameters)** are used to describe how energy can propagate through an electric network. S-Parameters are used to describe the relationship between different ports, when it becomes especially important to describe a network in terms of amplitude and phase versus frequencies, rather than voltages and currents. From the S-parameter matrix, you can calculate characteristics of linear networks such as gain, loss, impedance, phase group delay, and voltage standing wave ratio (VSWR).

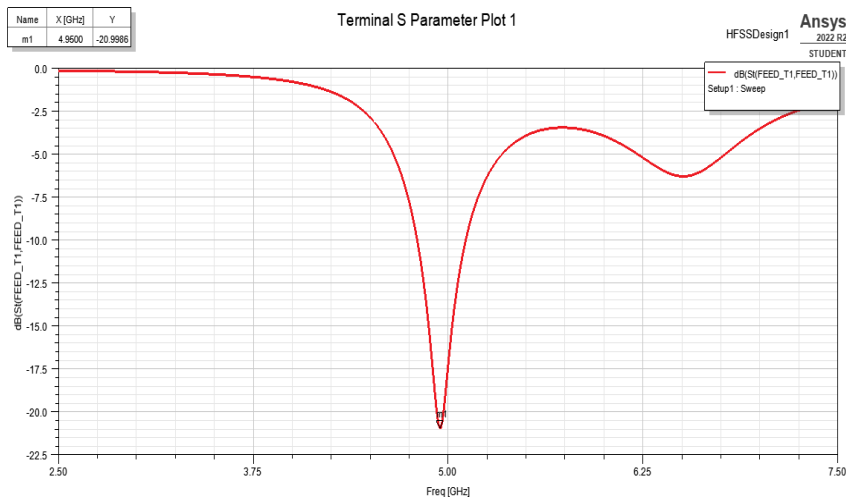


Fig 2: S parameter plot

**VSWR plot:**

VSWR (Voltage Standing Wave Ratio) is a measure of how efficiently radio-frequency power is transmitted from a power source, through a transmission line, into a load. In an ideal system, 100% of



the energy is transmitted. VSWR value under 2 is considered suitable for most antenna applications. The antenna can be described as having a “Good Match”. So when someone says that the antenna is poorly matched, very often it means that the VSWR value exceeds 2 for a frequency of interest. VSWR is a very important parameter in RF transmission systems where a high VSWR can reduce the power delivered to an antenna or system significantly. This can lead to reduced range, heating of cables, damaged amplifiers, etc.

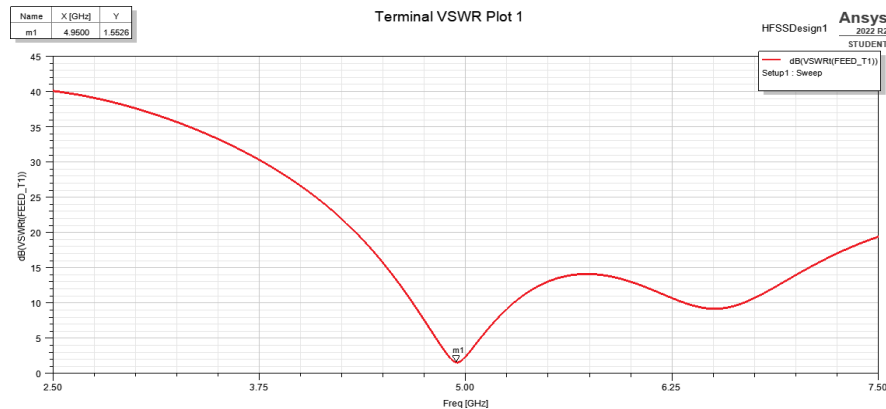


Fig 3: VSWR Plot

## CONCLUSION

In this article we are designed basic microstrip patch antenna and Dielectric Resonator antenna. In dielectric resonator antenna a dual band dielectric resonator MIMO antenna is proposed electromagnetic couple feeding technique is introduced for dual band operation to optimize physical properties of antenna using different slots. Antenna operating frequencies are 4.5 to 5 GHz and 4.96 to 5.04 GHz respectively. Various element dimension are measured using HFSS with multiple iterations. The fundamental mode is utilized to achieve the desired antenna characteristics. The advantage of this antenna is that provides different parameters with various isolation techniques. The performance of proposed antenna provides the utilization of Sub-6 GHz, 5G, WLAN communication applications.

# POWER GENERATION WITH FOOTSTEP USING ARDUINO UNO

*D.B.S.Rohan,P.NagaSridhar,D.KumarReddy*

## INTRODUCTION

Power assumes a critical part being developed of the country. Power is characterized as physical wonder connected with the stream of charge. There are Power assumes a critical part being developed of the country. Power is characterized as set of physical wonder connected with the stream of charge. There are two sorts of power to be specific Static power, that can be held steady and Dynamic electricity which can spill out of one potential to another. With the upgrading population and foundation of the forthcoming organizations and production lines there have been an awesome interest for the need of power so as to run the machines and types of gear. Power can spill out of one section to another either as flash or current in metal. Power is created in the power stations by generators. These generators themselves require extensive measure of info energy to deliver power which thus relies on upon the "NON RENEWABLE" assets of vitality to create power with a specific end goal to run them.

"Renewable" assets of vitality, for example, Solar Cell Panel, Wind Energy can likewise be utilized to collect power. However these sources are constrained to a specific region for eg. we can say that SOLAR ENERGY can be utilized just at the spot where the sun focus is entirely great and continuous. Wind Energy can fundamentally be utilized as a part of the seaside territory's the place the wind pace and accessibility is all the time present. Aside from all there human movements such as nonstop driving of the hand wrenches and little generators can be additionally used to deliver power however all these wonder of producing power requires a consistent human exertion and checking.

## Flow Chart

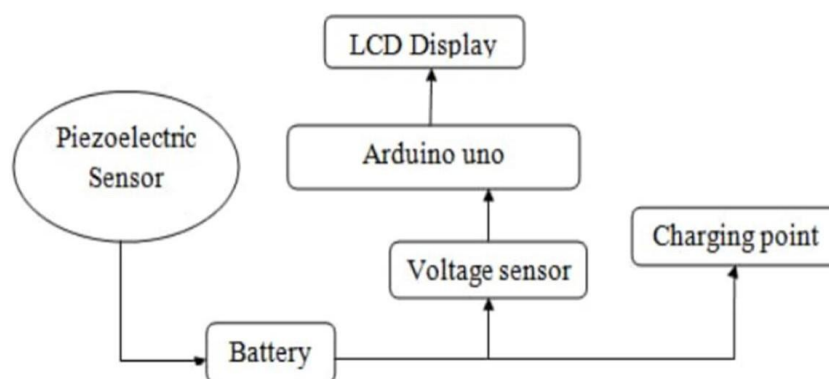


Fig 1: Flow Chart

In this manner there is a need to locate a substitute technique for the generation of power separated from these strategies with the goal that it can be made effortlessly accessible to even the weaker segment and needy individuals of the general public. There is a strategy to deliver power by utilizing the piezoelectric plates that can create voltage by the utilization of power on them which can be utilized to charge BATTERY and which thus can be effortlessly use to create power

This technique for generation of power is extremely prudent and is anything but easy to produce. It can be utilized as a part of Rural zones additionally where accessibility of power is less or exceptionally low. It can be utilized to drive both AC and in addition DC load. In developing nation like India we can utilize this strategy for power generation with a specific end goal to uncover the heaps from Renewable and non-Renewable wellspring of energy

## **RESULTS:**

The footstep power generation system is to capture the typically wasted energy surrounding a system and transforming it into electrical energy. The technique used in gaining the energy is via piezoelectric materials. This method employs piezoelectric components where deformations created by dissimilar means are directly transformed into electrical charge through piezoelectric effect.



Fig 2: Connecting piezo electric sensors

I2C is serial communication protocol, so data is transferred bit by bit along a single wire (the SDA line). Like SPI, I2C is synchronous, so the output of bits is synchronized to the sampling of bits by a clock signal shared between the master and the slave. The clock signal is always controlled by the master.

Take the 6 or 8 piezo electric sensors. Each piezo electric sensors have two wires, positive and negative. The positive wires of all sensors are connected together. The negative wires of all sensors are connected together. Piezoelectric sensors have two output pins one is positive potential and other is at

negative potential means ground. Positive potential pin connected with pin 3 analog channel of Arduino and negative potential pin connected to ground. A resistor of 2 mega ohm connected between them for protection purpose.

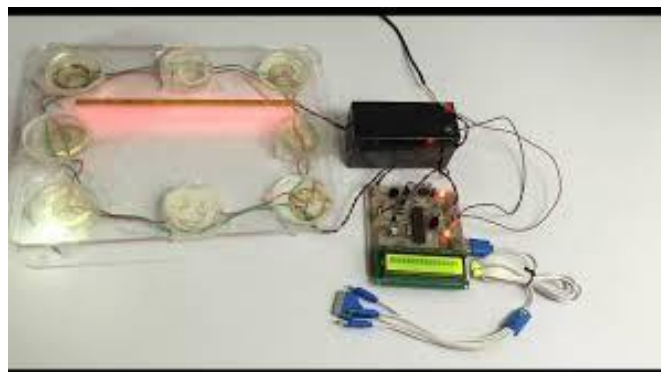


Fig 3: Testing Output Voltage



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