

"IOT BASED FIRE ALARM SYSTEM"

A Socially Relevant Project-I

Report submitted to

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR.

In Partial Fulfillment of the Requirements for the Award of the degree of

BACHELOR OF TECHNOLOGY
IN
COMPUTER SCIENCE AND SYSTEMS ENGINEERING
BY

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2021-2022

DEPARTMENT OF COMPUTER SCIENCE AND SYSTEMS ENGINEERING

VISION AND MISSION

VISION

- To become a Centre of excellence in Computer Sciences and Systems Engineering through Teaching, Training and Innovation to produce high quality engineering professionals who can solve the growing complex problems of the society and industry.

MISSION

- Established with cause of development of Technical education in advanced Computers Sciences and Systems Engineering with applications to systems there by serving the society and Nation.
- Transfer of knowledge through contemporary curriculum and fostering faculty and student development.
- Create keen interest for research and innovation among students and faculty by understanding the needs of the society and industry.
- Skill Development among diversity of students in technical in technical domains and profession for development of systems and processes to meet the demands of the industry and research.
- Imbibing values and ethics in students for prospective and promising engineering and develop a sense of respect for all.

Program Educational Objectives (PEO's)

After few years of graduation, the graduates of B.Tech(CSSE) will:

1. Demonstrate competencies in the Computer Science domain and Management with an ability to comprehend, analyze, design and create software systems for pursuing advanced studies in the areas of interest.
2. Evolve as entrepreneurs or be employed by acquiring required skill sets for developing computer systems and solutions in multi-disciplinary areas.
3. Exhibit progression and professional skill development in Computer programming and systems development with ethical attitude through life-long learning.

Program Specific Outcomes (PSO's)

On successful completion of the Program, the graduates of B. Tech (CSSE) program will be able to:

- PSO1** Employ Systems Approach to model the solutions for real life problems, design and develop software systems by applying Modern Tools.
- PSO2** Develop solutions using novel algorithms in High Performance Computing and Data Science.
- PSO3** Use emerging technologies for providing security and privacy to design, deploy and manage network systems.

Program Outcomes (PO's)

1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems (**Engineering knowledge**).
2. Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences (**Problem analysis**).
3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations (**Design/development of solutions**).
4. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions (**Conduct investigations of complex problems**).
5. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations (**Modern tool usage**).
6. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice (**The engineer and society**).

7. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development (**Environment and sustainability**).
8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice (**Ethics**).
9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings (**Individual and team work**).
10. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions (**Communication**).
11. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments (**Project management and finance**).
12. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change (**Life-long learning**).

Course Outcomes

COURSE OUTCOMES: After successful completion of the course, the students will be able to:

CO1. Create/Design engineering systems or processes to solve complex societal problems using appropriate tools and techniques following relevant standards, codes, policies, regulations and latest developments.

CO2. Consider environment, sustainability, economics and project management in addressing societal problems.

CO3. Perform individually or in a team besides communicating effectively in written, oral and graphical forms on socially relevant project.

Socially Relevant Project- I

CO-PO-PSO Mapping

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C01	3	3	3	3	3	3	-	3	-	-	-	3	3	3	3
C02	-	-	-	-	-	-	3	-	-	-	3	-	3	3	3
C03	-	-	-	-	-	-	-	-	3	3	-	-	3	3	3
Average	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Level of correlation of the course	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
<div style="display: flex; justify-content: space-between; padding: 0 10px;"> Level of Correlation: 3 - High 2 - Medium 1 - Low </div>															

DECLARATION

We hereby declare that this project report titled "**IOT BASED FIRE ALARM SYSTEM**" is a genuine Socially Relevant Project - I work carried out by us, in **B.Tech (*Computer Science and Systems Engineering*)** degree course of **Jawaharlal Nehru Technological University Anantapur** and has not been submitted to any other course or University for the award of any degree by us.

Signature of the student

- 1.
- 2.
- 3.
- 4.



SREE VIDYANIKETHAN ENGINEERING COLLEGE

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DEPARTMENT OF COMPUTER SCIENCE AND SYSTEMS ENGINEERING

CERTIFICATE

This is to certify that the
Socially Relevant Project-I
entitled
"IOT BASED FIRE ALARM SYSTEM "
is the Bonafide work done by

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In the Department of Computer Science and Systems Engineering, Sree Vidyanikethan Engineering College, A. Rangampet. is affiliated to JNTUA, Anantapuramu in partial fulfillment of the requirements for the award of Bachelor of Technology in Computer Science and Systems Engineering.

This work has been carried out under my guidance and supervision.

The results embodied in this Project report have not been submitted in any University or Organization for the award of any degree or diploma.

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We are also thankful to all the faculty members of CSSE Department, who have cooperated in carrying out our project. We would like to thank our parents and friends who have extended their help and encouragement either directly or indirectly in completion of our project work.

ABSTRACT:

Fire is the most widespread cause of death by accident. Fire affects thousands of residents each year, resulting in injury and loss of life. In this project, an Internet of Things (IoT) based Fire Detection System is designed to prevent people from fire by providing an alert message in the emergency. The system is designed using (temperature) sensors embedded with NodeMCU to get the fire event information in the surrounding more accurately. This research distinguishes the conditions in a surrounding as fire, no fire, and may be fire. It is used for classification, and if fire conditions arise then a safety message is sent to the registered mobile number using Python programming.

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Chapter 1

INTRODUCTION

The Internet of Things (IoT) is an ever-growing network of natural items that feature an IP address for internet valency, and the communication that happen between these items and other Internet-enabled devices and systems.

Home automation is the use and control of home appliances remotely or automatically as well as fire detection. Fire is an unexpected event that could fetch a big loss of social assets and human life. To obviate these losses, several alarm systems have been evolved such as smoke detectors, temperature sensor-based systems.

STATEMENT OF THE PROBLEM

Fire is very deadly and it leads to loss of human life and property. Fire detection systems are necessary to reduce the destruction of personal belongings and caused by fire both manmade and induced. Thankfully by the usage of more smart fire detecting systems the number of fire accidents have been reducing steadily. One of the most destructive properties of fire is that it spreads exponentially and with the right medium can spread uncontrollably. This is why timely detection of fire is necessary for avoiding a fire hazard.

Detection of fire in homes is necessary to avoid destruction of property due to fire accidents both natural and induced. Detection of fire can prove to be very important as it could mean the difference between life and death. Fires can occur from anywhere and at any point of time, hence the presence of Fire Alarm System helps in keeping your family safe.

OBJECTIVES

- ❖ The aim of this project is to provide a reliable and swift responsive fire alarm system through the use of SMS.
- ❖ To design and construct a fire alarm for a building that will detect the presence of fire accident in the building.
- ❖ To provide cost-effective fire alarm system which performs reliably to ensure safety from fire.
- ❖ Larger scale industrial or residential area can be monitored through the proposed system installing multiple modules, each for one floor or unit.
- ❖ To avoid financial loss and also save people from dangerous fire accidents.

SCOPE

Fire Detectors play a very important role in Industries, Shops, Malls, Residential complexes, parking areas etc. They help in detecting fire or smoke at an early stage and can help in saving lives. Commercial Fire detecting systems usually have an alarm signalling, with the help of a buzzer or Siren.

We have designed an IOT based Fire Alerting System using Temperature and a smoke sensor which would not only signal the presence of fire in a particular premise but will also send related information through IOT. False alarms aside, fire alarm systems are installed primarily for life safety and we need smoke detectors to meet that early-warning, life-safety goal.

APPLICATIONS

- ❖ Fire alarms that are properly installed and maintained play a vital role in reducing fire deaths and injuries.
- ❖ These will automatically detect and warn you of the presence of fire.
- ❖ It is a cost-effective fire alarm system which performs reliably to ensure safety from fire.
- ❖ These can save your life in the event of the fire.
- ❖ Helps in reducing the fire accidents in the society.

LIMITATIONS

- ❖ The amount of “smoke” present may be insufficient to alarm smoke detectors. Smoke detectors are designed to alarm at various levels of smoke density. If such density levels are not created by a developing fire at the location of detectors, the detectors will not go into alarm.
- ❖ Smoke detectors are subject to false alarms and nuisance alarms. For example, a smoke detector located in or near a kitchen may go into nuisance alarm during normal operation of kitchen appliances. In addition, dusty or steamy environments may cause a smoke detector to falsely alarm.

Chapter 2

LITERATURE SURVEY

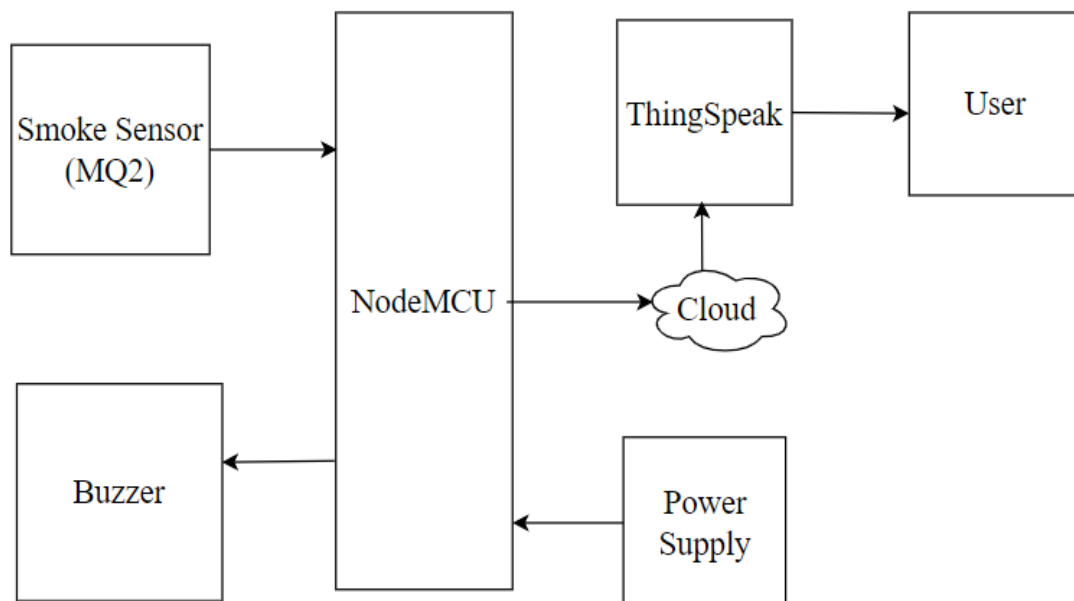
Numerous answers for identification of out of control fire are displayed and executed in recent years. Video Surveillance System is most generally utilized for identification of wild fire. It is isolated into four classifications. Video Cameras delicate in unmistakable range in light of acknowledgment of smoke amid sunlight and fire blazes at night, Infrared(IR) Thermal Imaging cameras in view of discovery of warmth transition from the fire.

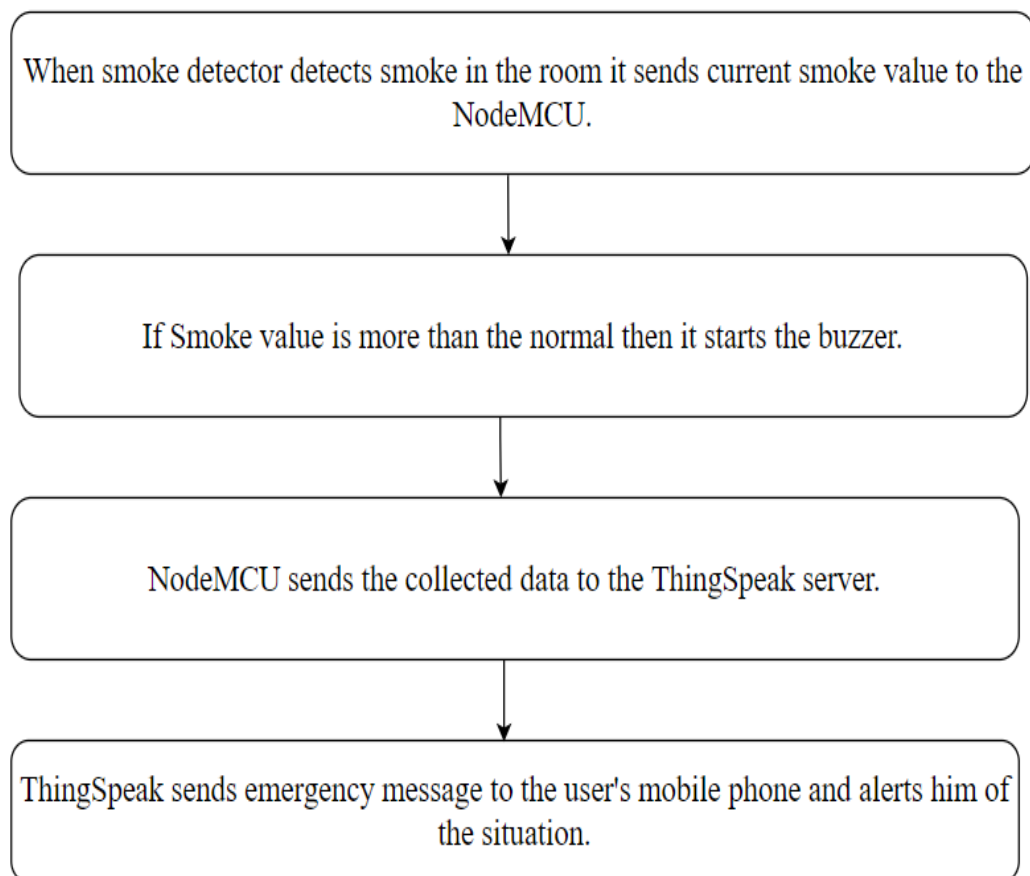
IR Spectrometer which distinguish unearthly attributes of smoke gases and Light Detection and Ranging (LIDAR) system which measures the laser light back scattered by smoke particles. The limitation of these systems was high false alert rate as a result of climatic conditions, for instance, proximity of fog, shadows, clean particles etc. Another strategy is the utilization of Visual-Cameras that take depictions of the forest to identify the fire. These cameras were mounted on the highest point of correspondence towers. A turning engine is introduced to give a full round perspective of the forest. The pictures got from the camera are prepared utilizing project or MATLAB code and are contrasted and the reference pictures taken at introductory stage. This framework additionally had impediment of high false caution rate. Additionally the cost of establishment of visual cameras on correspondence towers w

Chapter 3

ANALYSIS

Block Diagram:



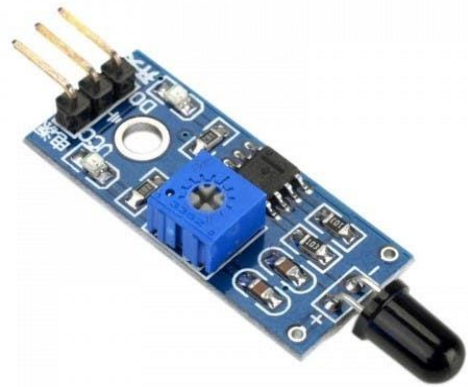
Flowchart:

Chapter 4

DESIGN

Flame Sensor

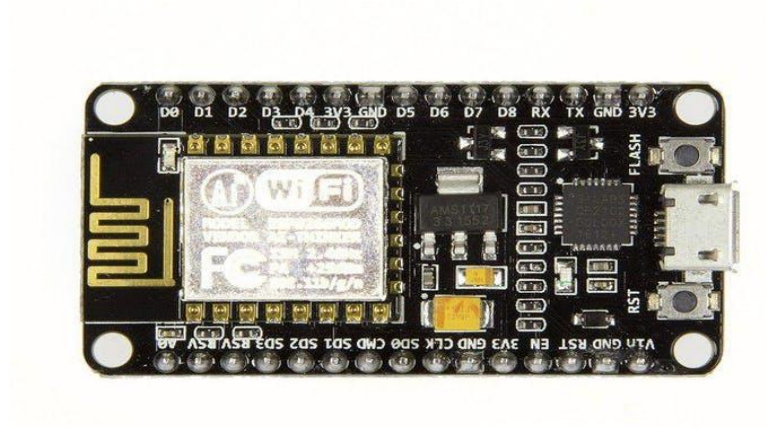
- A Flame Sensor is a device that can be used to detect presence of a fire source or any other bright light sources.
- There are several ways to implement a Flame Sensor but the module used in this project is an Infrared Radiation Sensitive Sensor.



Smoke Sensor

- In this project we are using a MQ2 smoke sensor.
- This sensor can detect various gases including Methane, Butane and LPG. We are using a MQ2 gas sensor module in this project for better interface.



NodeMCU:

- It includes firmware which runs on the low cost Wi-Fi enabled ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module.
- It has GPIO, SPI, I2C, ADC, PWM AND UART pins for communication and controlling other peripherals attached to it.

Chapter 5

IMPLEMENTATION

Blynk App

Blynk was designed for the Internet of Things. It can control hardware remotely, it can display sensor data, it can store data, visualize it and do many other cool things.

Setting Up a Blynk Project

- We have connected the components as per the circuit diagram and now it's time to test the project.
- For both the alert LED will glow and buzzer will start beeping.
- You will receive below alert notification when flame sensor detects flame or fire.
- Once the smoke sensor detects smoke and the value in the gauge goes beyond 500 then smoke alert will be detected. You can change the value in the code as per your need.

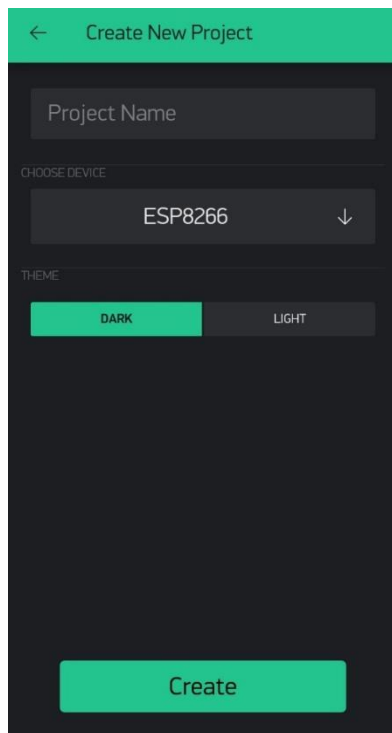


Fig:5.1

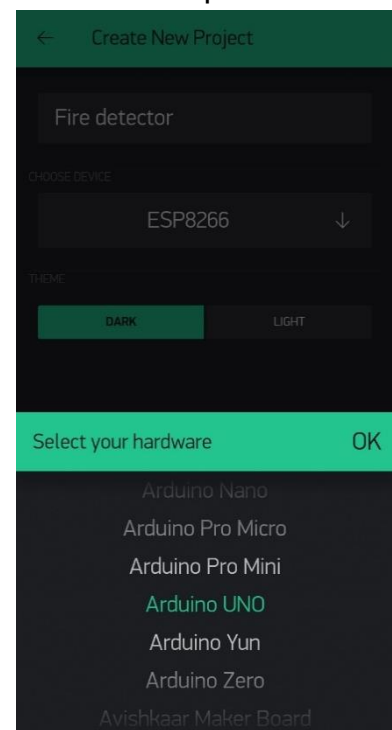


Fig:5.2

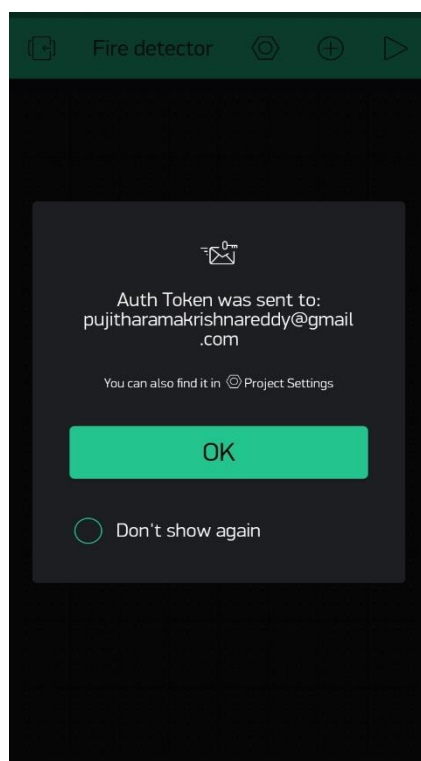


Fig:5.3

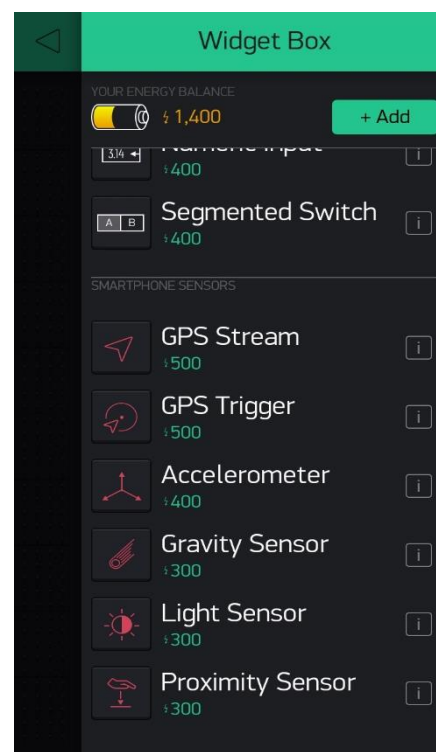


Fig:5.4

Program:

```
float temp;
float vout1;
int LED = 13;
int gasSensor;
int piezo = 7;
void setup()
{
  pinMode(A0,INPUT);
  pinMode(float vout;
  A1, INPUT);
  pinMode(LED,OUTPUT);
  pinMode(piezo,OUTPUT);
  Serial.begin(9600);
}
void loop()
{
  vout=analogRead(A1);
  vout1=(vout/1023)*5000;
  temp=(vout1-500)/10;
  gasSensor=analogRead(A0);
  if (temp>=80)
  {
    digitalWrite(LED,HIGH);
  }
  else
  {
    digitalWrite(LED,LOW);
  }
  if (gasSensor>=100)
```

```
{  
digitalWrite(piezo,HIGH);  
}  
else  
{  
digitalWrite(piezo,LOW);  
}  
Serial.print("in DegreeC= ");  
Serial.print(" ");  
Serial.print(temp);  
Serial.print("\t");  
Serial.print("GasSensor= ");  
Serial.print(" ");  
Serial.print(gasSensor);  
Serial.println();  
delay(1000);  
}
```

Chapter 6

Results

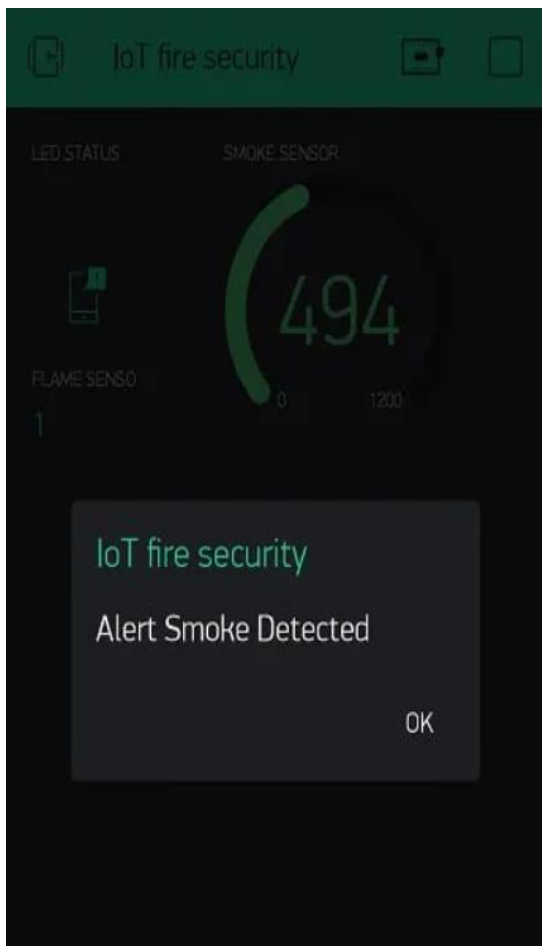


Fig:6.1

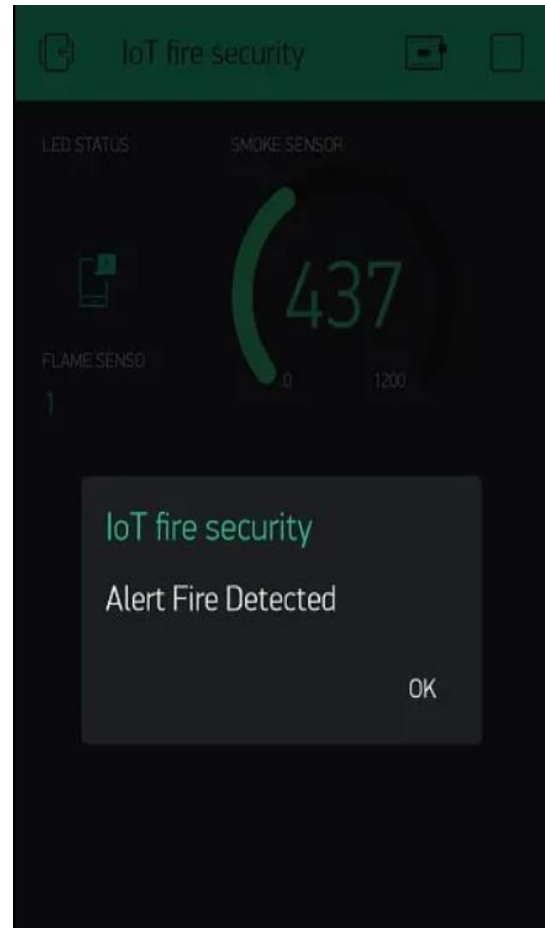


Fig:6.2

Chapter 7

Conclusion and future work

In conclusion it is important to have a fire protection system in place as a part of a building's safety plan. Without a fire protection system, the lives of those who are inside the building are placed at a high risk in the event an emergency. To avoid financial loss and also save people from dangerous fire accidents.

Furthermore, the proposed platform also provides a very prompt and cheaper embedded system to detect true incident of fire. It automatically sends SMS to alert the control room. In future work encryption of data for security purpose should be added

References

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