IOT BASED FIRE ALARM SECURITY SYSTEM

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ABSTRACT

Fire alarm systems are essential in alerting people before fire engulfs their homes. However, fire alarm systems, today, require a lot of wiring and labor to be installed. This discourages users from installing them in their homes. Therefore, we are proposing an IoT based wireless fire alarm system that is easy to install. The proposed system is an ad-hoc network that is distributed over the house. This system consists of a microcontroller (ESP8266 nodeMCU) connected to an infrared flame sensor that continuously senses the surrounding environment to detect the presence of fire. The microcontrollers create their own Wi-Fi network. Once fire is detected by a sensor, it sends a signal to a microcontroller that is triggered to send an SMS to the user, call the user and alert the house by producing a local alarm. The user can also get information about the status of his home via sending an SMS to the system. A prototype was developed for the proposed system and it carried out the desired functionalities successfully with an average delay of less than 30 seconds.

Keywords :

Blynk, Fire, IoT, Fire alarm.

1. INTRODUCTION

1.1 PREAMBLE

The traditional way of fire alarm was designed with two fire alarm boxes, each of which contained a telegraphic key. When someone detected a fire, they would crank the handle that was attached to the fire alarm box, which would then send the details of the fire alarm box number to a central alarm station. As soon as the telegrapher at the station received the message they would notify the fire department response team of the box location.

Now we are in the 21st century, everything is modernised. By using those old methods, we cannot save everything. That is why we are introducing the IoT based fire alarm security system. This can save our time and lives.

The fire alarm system is a solution to one of the most dangerous fire disasters. To build a Smart IoT based Fire Alarm System there is a need to integrate different hardware components such as ESP8266 NodeMCU, Flame sensor, Buzzer which in turn needs to be connected with the Computer through which data communication and data handling takes place. Further can be achieved by using the blynk app, which will send the message to the system. Thus the Fire Alarm System is built by basic blocks which comprises both the software and the hardware component. This helps us to identify the fire quickly and can control them.

1.2 LITERATURE REVIEW

In [1], the research on fire using fire alarm systems is discussed. In [3], Fire Behaviour and Fire line Safety is discussed. In [5], Review on Forest Fire Detection using sensors is discussed. In [7], Forest Fire Smoke Video Detection Using Spatiotemporal and Dynamic Texture is discussed. In [10], Multilayer Neural Network Based Fall Alert System Using IOT is discussed. In this paper, we introduce Node MCU instead of Arduino. It will consume less power from the source.

1.3 INTERNET OF THINGS

As the concept "Internet of Things" (IoT) has recently attracted growing attention from both academia and industry. IoT is a scenario where devices (even animals or people) are provided with unique identifiers and the ability to automatically transmit data over a network without requiring human-to computer interaction. ESP8266 NodeMCU forms an essential block of IoT are wireless microchips used for tagging objects for automated identification. ESP8266 NodeMCU is an open source IoT platform. 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. In this IoT Fire Alarm, we are using two GPIO pin to get the digital data from the flame sensor.
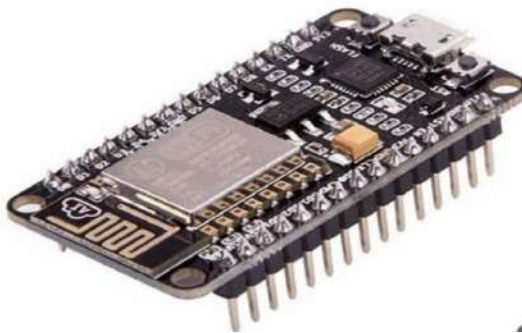

Figure 1. Node MCU

1.4 FIRE ALARM SYSTEM

Our framework utilizes Chemical Factories, Shopping Malls, local shops, Educational institutes, Parking Areas, Companies etc.

2. DEVICES USED IN THE ENTIRE SYSTEM

A Flame Sensor is a device that can be used to detect the 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.

The module uses a LM393 comparator chip to provide a stable digital output signal. This comparator has a driving ability of 15 mA. This flame detector sensor can be used in different projects including fire alarms and other fire detecting devices or projects.

Figure 2. Flame sensor
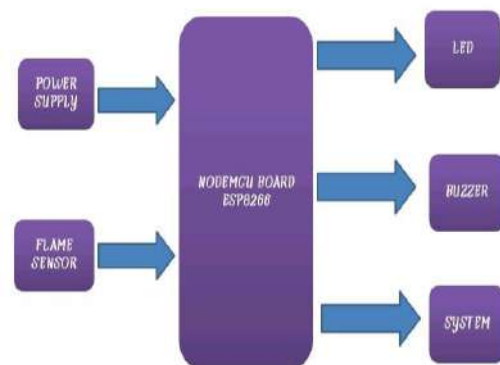
2.1 FUNCTIONAL DIAGRAM

Figure. 3. Functional block diagram

2.2 OVERVIEW

Node MCU is an open source firmware for which open source

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prototyping board designs are available. The name "Node MCU" combines "node" and "MCU" (micro-controller unit).The term "Node MCU" strictly speaking refers to the firmware rather than the associated development kits. Both the firmware and prototyping board designs are open source. It also informs the authority using IoT Blynk Application.

3. SOFTWARE DESCRIPTION

This system can be done by using programming language C. SMTP (Simple Mail Transfer Protocol) is a platform used to send and receive large numbers of emails from remote locations automatically. Due to its fast and reliable service it is mostly used by developers and marketers to save their time in sending emails in a secure way. Its servers and data centres are all around the world which helps it to select the nearest server and hence provides the fastest connection in sending and receiving emails. It can be used in IOT projects to send emails automatically when a particular task occurs. In this project we will be using SMTP2GO to send email alerts when fire is detected by the flame sensor.

3.1 FIRE ALARM SECURITY SYSTEM

Flexible: Fire alarms are now available that can also be monitored on mobile devices and can receive messages from the alarm, including an alarm event; which detector has triggered so you know the location of the potential fire.

Accessible: It can be used from anywhere through the system or mobile.

4. PROPOSED METHODOLOGY

Fire safety is one of the crucial factors to ensure the safety of your premises, be it home or office. It is essential to have a good quality fire alarm system in place to protect the premises and warn people when a fire breaks out. In case you own a commercial property, it is your fundamental duty to install a conventional fire alarm control panel to ensure 100% safety of the employees and resources. The primary aim of installing a fire alarm system is to get warned when the fire or smoke is detected in premises giving people enough time to escape. There are various types of fire alarms that provide different features, and you can choose one according to the requirement of your premises. Installing a fire alarm in your premises must be in your priority security checklists as it saves lives and there is nothing more important than securing the lives of people entering your residence or commercial space.
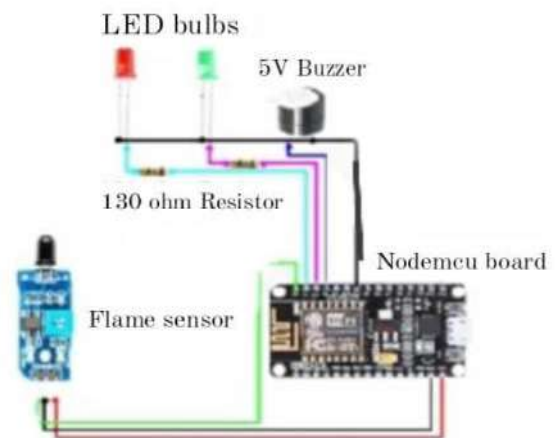
4.1. SCHEMATIC OF THE SYSTEM

Figure 4. Schematic diagram

This is the schematic diagram of the fire alarm security system.
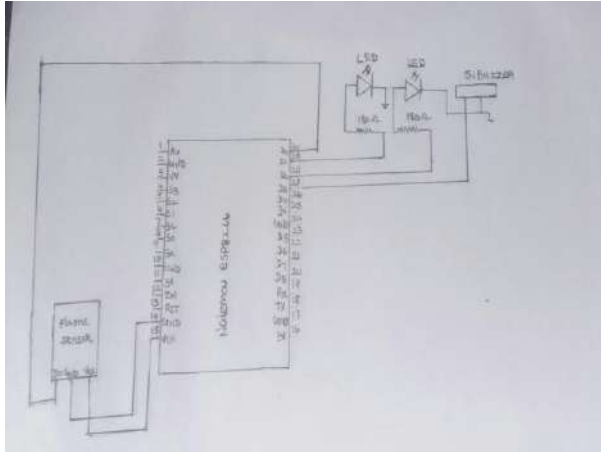
4.2. CIRCUIT CONNECTION

Figure 5. Circuit diagram

4.3.EXPERIMENTAL SETUP/ HARDWARE

The below figure depicts the hardware prototype that has been developed to realize the proposed methodology. The tests were conducted using the below experimental setup.
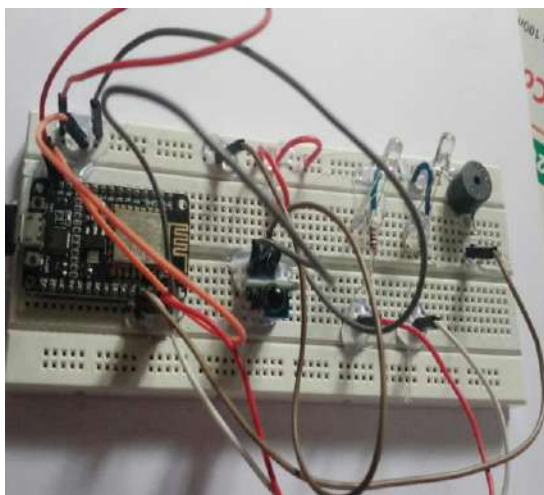

Figure 6. Experimental design

4.4. WORKING

A fire alarm system is an active fire protection system that controls all the fire alarm modules in a building. It is composed of alarm initiating devices (smoke detectors and heat sensors), alarm notification appliances (sirens or devices that produce loud noises), fire control units (sprinkler systems or fire extinguisher systems), power supplies and wirings. The fire alarm system can be set off automatically by smoke detectors, heat detectors or manually. These sensors are set to detect certain levels of heat or smoke that could be an indication of fire. A loud bell or a siren sometimes accompanied by blinking or flashing lights for individuals who have hearing problems, blasts to alert occupants in the building. To truly understand how a fire alarm system works, let us go further into the components of the fire alarm system. In a fire alarm system there is always a smoke detector to detect smoke or fire. The process of this system When this system is powered on, the Node mcu board connects to the Blynk cloud through the internet. Then, we can turn ON and OFF this system using the Blynk app interface. When the system is activated, the smartphone receives a push notification as soon as the red LED and buzzer is activated in the event of a fire. Afterward, the system goes back to normal. Then the green LED bulb is activated.

5. RESULTS
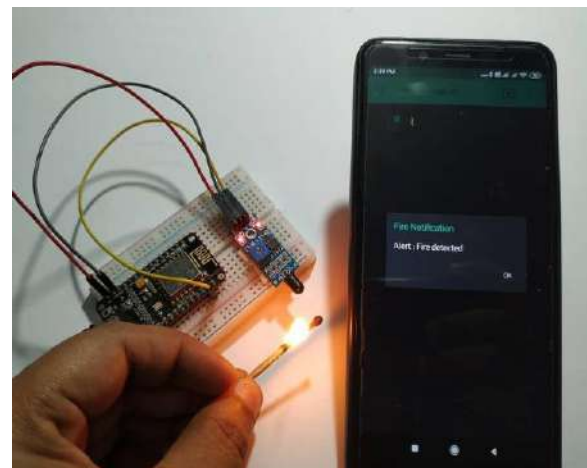
The result is shown below.

Figure 7. Result

6. CONCLUSION AND FUTURE SCOPE

Thus the IoT based non-contact fire alarm security system was successfully developed and validated. The proposed scheme can be extended by using GSM(Global System Mobile) for long distance.

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