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IoT Based Fire Detector and Extinguisher

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Abstract - The objective of the paper is to study, analyze and design a fire detection and extinguisher system. This topic was acceptable because it covered a basic and important aspect in our modern life. The author has gained the valuable experience in the field of fire detection and alarm system from studying and conducting the project. The objectives of the project were to provide information on fire alarm system and the extinguishing techniques used in India and around the globe, to show the differences and similarity between the systems and the lack in existing systems used for fire detection. Secondly, in the practical part, the objective was to build a demo system to demonstrate how a basic fire alarm system works and the improvements can be added to it to make better systems to detect and extinguish fire in order to reduce the casualties and loss of capital. To achieve the purpose of this thesis, the author studied the main standards on fire detection and alarm systems in India and around the world. For the practical part,Node MCU-ESP 8266 and Blynk Application are used as the control unit with other necessary components.

Key Words**:** *Node MCU-ESP 8266, Blynk Application, Fire Detection, Fire Alarm System*

I. INTRODUCTION

In our current life, hearthplace safety has grown to be a pinnacle concern, because there are continually hearthplace risks round us which could purpose a high- quality lack of assets and human life. Therefore, having a hearthplace alarm device performs a critical role, which help save you and deal with in time when hearthplace occurs. Fire detection and alarm structures (FDAS) are all established and brought with the equal essential goal in mind: to find out a hearthplace; powerful alarm and offer statistics to the inhabitants; warn and deliver statistics to first responders. How those goals are glad is depend upon the unique situations – and also, the same old of the location of thesector under consideration. warn and give information to first responders. A hearthplace alarm device is one of the primary structures this is required to be mounted in every family and constructing in lots of countries. Having the device mounted enables alert human beings of a probable hearthplace, deliver them early warnings; robotically name the emergency offerings and contacts,decrease the time it takes for the hearthplace branch to come; lower the dangers of fake hearthplace alarm.

II. Objective of Project Work

a. To make a more efficient fire alarm system.
b. To study the different type of fire alarm system.
c. Analyze the efficiency and the lack in the performance of fire alarm systems available.
d. To study the loss of life and property damage occurs due to fire accidents.
e. To make the communication much smootherbetween the authorities.
f. To make a fire detector and extinguisher system which will be easy to operate by a person of any age group.

III. Node MCU ESP 8266

ESP-8266 NODE MCU The ESP-12E module, which contains the ESP8266 chip with Tensilica Xtensa 32-bit LX106RISC microprocessor, is included with the Node MCU ESP8266 development board. This microprocessor runs at 80 to 160 MHz and supports RTOS, the frequency of the clock can be changed The Node MCU comes with 128 KB of RAM and 4 MB of Flash memory data and programs are stored It has a high processing power, as well as built-in Wi-Fi and Bluetooth. It's suitable for IoT

projects because of its Deep Sleep Operating characteristics. A Micro USB jack and VIN pin can be used to power the Node MCU (External Supply Pin). It UART, SPI, and I2C interfaces are all supported. Figure 1: ESP-8266 Microcontroller Node MCU. Node MCU programming ESP-8266 with arduino IDE. The Node MCU is a microcontroller that runs on the ESP-8266. Because it is simple to use, the Arduino IDE can simply program the Development Board.

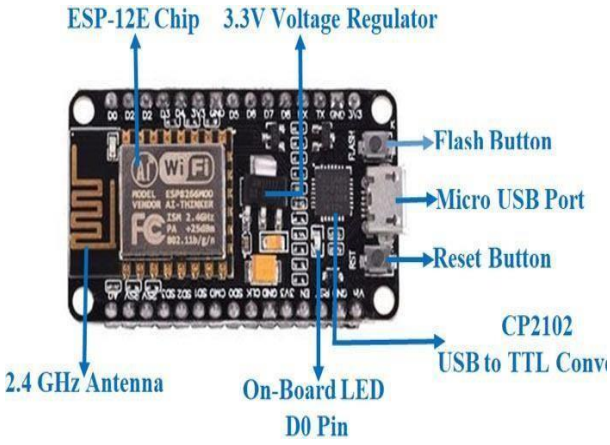

Fig-1: Node MCU ESP-8266 Microcontroller

IV. Programming Node MCU ESP-8266 With Arduino IDE

It will take no more than 5-10 minutes to program Node MCU using the Arduino IDE. The Arduino IDE, a USB cable, and the Node MCU board are all you'll need. To prepare your Arduino IDE for Node MCU, see this Getting Started Tutorial for Node MCU. Once Connect the board to the computer using the Arduino IDE that has been installed on the computer. the USB cord Now launch the Arduino IDE and choose the relevant board from the drop-down menu. Choose the right Port by going to Tools>Boards>NodeMCU1.0(ESP-12E Module) and selecting it. pick Tools>Port from the menu bar. To begin, connect the Node MCU board to the computer and flash the built-in LED, Select Files>Examples>Basics>Blink to load the examplecode. As soon as the example code is loaded into the top bar's button. When the upload is complete, after that the blinking in the led 3 could be seen.

V. Blynk Application

Blynk is an IoT startup that offers a platform for developing mobile (IOS and Android) applications that can link electronic products to the Internet and remotely monitor and control them. Platform Blynk Engineers use it to link MCUs and prototyping development boards such as Over Wi-Fi, Ethernet, or cellular to Arduino, ESP8266, or SBCs like Raspberry Pi Remote monitoring and control of electronic devices via the internet and custom mobile applications.

VI. Working Principle

IoT Based Fire Alerting System employs two sensors: Sensors for temperature and smoke. An ADC convertoris a device that transforms analogue signals into digital signals. Signals received at the sensor end areconverted to digital and then sent to the controller. ESP-8266 microcontroller. The buzzer is activated by the microcontroller, which is programmed to do so.

- Temperature (in Degree Celsius)
- Smoke Value (in Percentage)
- Device ID
- Date and Time Stamp

A Device ID is a unique identifier assigned to a device that allows personnel to obtain information about the location where a fire has been detected.

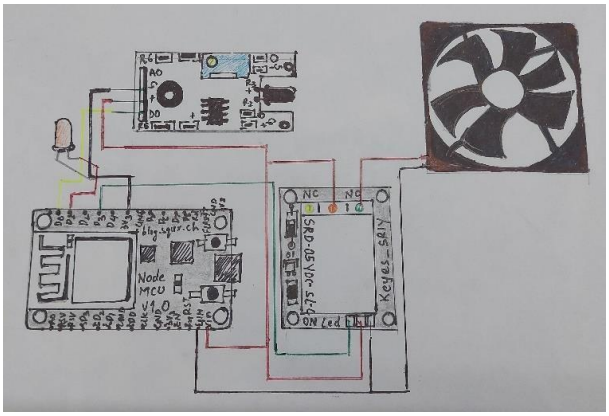

Fig-2: Circuit Diagram for Iot Fire Detector and Extinguisher

VII. 5V Single Channel Relay

A single-channel relay module is more than a simple switch. It is a simple relay that contains components that make switching and connecting easier, as well as acting as a switch. Indicators to show whether the module is powered and whether the relay is active. The screw terminal is the first. This is the component of the module that makes contact with the power supply, ensuring a secure connection is required. Thick main cables can be easily connected using screw terminals. which may make direct soldering problematic. The three terminal block connections are connected to the relay's generally open, normally closed, and common terminals. The relay makes use of to open or close the contacts of a switch, an electric current is used. This is typically accomplished with the use of a coil that attracts the contacts of a switch. When the coil is triggered, it pulls them together, and when it isn't, a spring pushes them apart energized. This technique has two advantages: first, the current required to the current required to activate the relay is substantially lower than the current that relay contacts can handle. Second, the coil and contacts are galvanically separated, which means there is no current flowing between them. There is no electrical link between them.

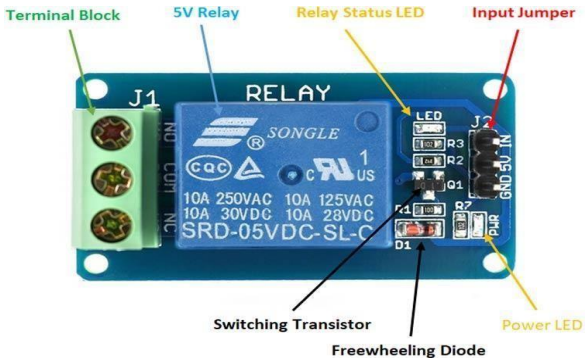

Fig-3: Single Channel 5V Relay

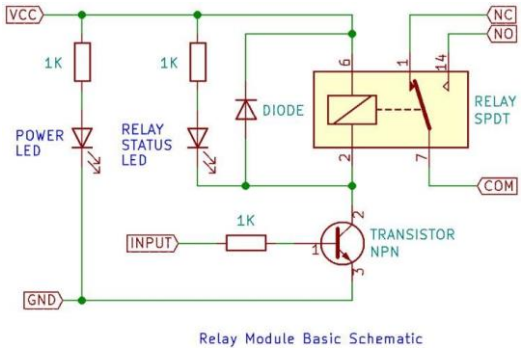

Fig-4: Internal Circuit Diagram of Single Channel Relay

VII. Infrared Flame Sensor

A flame sensor module with an integrated circuit that includes a flame sensor (IR receiver), resistor, capacitor, potentiometer, and comparator LM393. It can detect infrared light with a wavelength between 700 and 1000 nanometers. The light detected in the form of infrared light is converted into current changes by the far-infrared flame probe. With a detection angle of 60 degrees, the integrated variable resistor can be used to alter sensitivity. With a digital output to show the presence of a signal, the working voltage is between 3.3v and 5.2v DC.

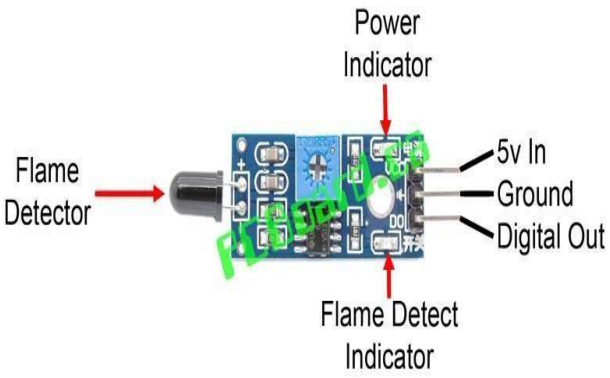

Fig-5: Infrared Flame Sensor

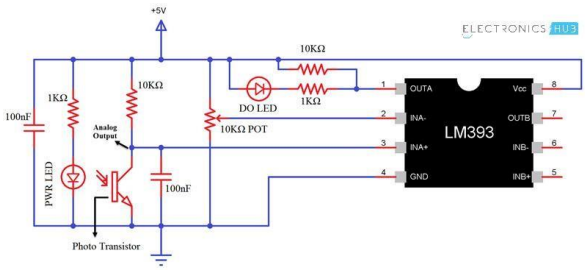

Fig-6: Internal Circuit Diagram of Infrared Flame Sensor

VIII. Simulation and Result

On performing various tests, we found that our system operating successfully under domestic condition. When the Fire occurs the flame and temperature sensors got activated and send the data to the Wi-Fi Module which sends data to the user via Blynk application and the extinguisher starts working when command is sent by the user. This model will help us in monitoring hazardous source and will give us early fire warnings. Fire alarm systems can be used in a variety of situations. Chemical factories, shopping malls, small stores, educational institutes, parking lots, and businesses can all benefit from an IoT-based fire alarm system based on Arduino. Notification of a fire based on IoT at all of the locations specified, the Wi-Fi system can be used as a precautionary step. above, which can assist in informing fire departments as soon as possible. If it's appropriate, as soon as the buzzer goes off, appropriate action is performed, which can assist avoid an accident. Future Development of the IOT Based Fire Detection System — this project can be enhanced to sense leakage of LPG GAS.

IX. Conclusion and Discussion

IoT based fire detector and extinguisher is designed by using Node MCU ESP-8266 and is fully and functionally applicable for domestic situations. On using Node MCU ESP-8266 we faced problems with directories because of which, it was not functioning according program installed. In order to overcome this problem, we flashed the Node MCU ESP-8266 using some tools and changed the circuit program accordingly. We further designed a PCB board and applied it in a confined space i.e. a small box to make it small and efficient and it is ready to use and can be fitted easily inside households or any specific place according to requirement.

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BIOGRAPHIES

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