A Micro Project report on

# FIRE DETECTION SYSTEM

Submitted to the CMR Institute of Technology in partial fulfillment of the requirement forthe award of the Laboratory of

## IOT WITH CLOUD COMPUTING

of

## III-B.Tech. II-Semester

in

## Computer Science and Engineering


Submitted by

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Under the Guidance of

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**CMR INSTITUTE OF TECHNOLOGY**

**(UGC AUTONOMOUS)**

**(Approved by AICTE, Affiliated to JNTU, Kukatpally, Hyderabad)**

**Kandlakoya, Medchal Road, Hyderabad**


**2022-2023**

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## Department of Computer Science and Engineering


## CERTIFICATE

This is to certify that a Micro Project entitled with: **"FIRE DETECTION SYSTEM"** is being

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In partial fulfillment of the requirement for award of the IOT with Cloud Computing (20-CS-PC-324) of III- B. Tech. II- Semester in Department of Computer Science and Engineering towards a record of a bonafide work carried out under our guidance and supervision.

**Signature of Faculty** **Signature of HOD**

# ACKNOWLEDGEMENT

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# INTRODUCTION

## What is Internet Of Things?

IoT stands for Internet of Things. It refers to the interconnectedness of physical devices, such as appliances and vehicles, that are embedded with software, sensors, and connectivity which enables these objects to connect and exchange data. This technology allows for the collection and sharing of data from a vast network of devices, creating opportunities for more efficient and automated systems. IoT is network of interconnected computing devices which are embedded in everyday objects, enabling them to send and receive data.

## What is Cloud Computing?

The term cloud refers to a network or the internet. It is a technology that uses remote servers on the internet to store, manage, and access data online rather than local drives. The data can be anything such as files, images, documents, audio, video, and more.

## What is IOT with Cloud Computing?

Cloud Internet of Things (IoT) uses cloud computing services to collect and process data from IoT devices, and to manage the devices remotely. The scalability of cloud IoT platforms enables the processing of large amounts of data, as well as artificial intelligence (AI) and analytics capabilities.

## IoT based Fire Detection System

Fire detecting system has a wide range of applications. IOT based fire alarm system using arduino can be used in Chemical Factories, Shopping Malls, local shops, Educational institutes, Parking Areas, Companies, etc. IoT Based Fire alarm Notification System Using Wi-Fi can be used as a precautionary measure at all the places listed above, which can help in notifying the fire departments early. If appropriate and immediate action is taken as soon as the buzzer turns ON, it can help in avoiding an accident. The fire can possibly make hurt its inhabitants and serious harm to the property. Mechanical security survey magazine expresses that there are 25,000 people passed on because of fire mishaps in India in the time of 2001-2014. IOT is truly appropriate for putting out fires with wide degree alongside remote sensor network. A key part of fire insurance in the business is to build up the wellbeing framework by utilizing alarm sign to the association by methods for IOT innovation to the encompassing territory in the business.

# COMPONENTS

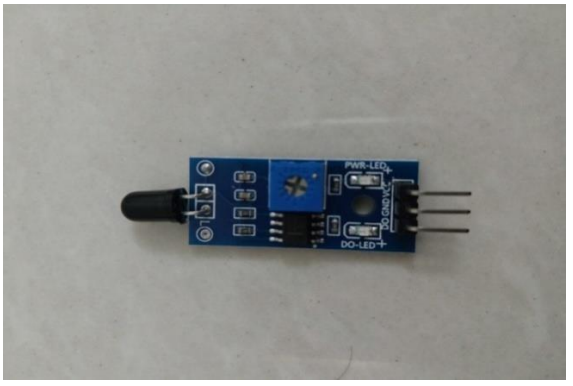
## Hardware components:

### Arduino UNO:-

Arduino UNO is a microcontroller board based on the **ATmega328P**. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.


### Flame Sensor Module:-

A Flame Sensor module or Fire Sensor module is a small size electronics device that can detect a fire source or any other bright light sources. This sensor basically detects IR (Infrared) light wavelength between 760 nm – 1100 nm that is emitted from the fire flame or light source. The flame sensor comes with a YG1006 Phototransistor sensor which is a high speed and high sensitivity. Two types of IR Infrared Flame Sensor Module available in the market one having three pins (D0, Gnd, Vcc) and another one having four pins (A0, D0, Gnd, Vcc) both are can be easily used with Arduino and other microcontroller boards.

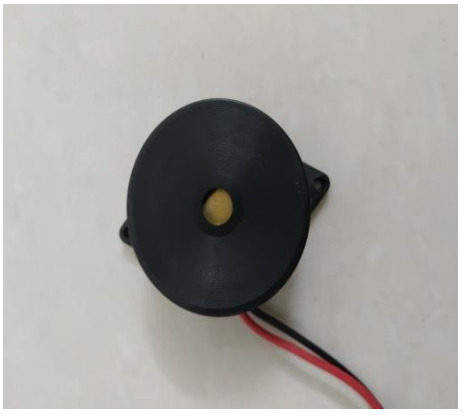


## Relay Module:-

A power relay module is an electrical switch that is operated by an electromagnet. The electromagnet is activated by a separate low-power signal from a micro controller. When activated, the electromagnet pulls to either open or close an electrical circuit.


## Buzzer:-

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, train and confirmation of user input such as a mouse click or keystroke.

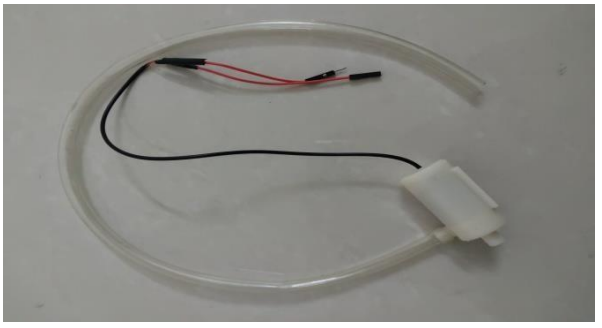


## DC Battery:-

DC batteries use direct current, which flows in a single direction and is generally used to power small appliances, radios, laptops, mobile phones and other electronic gadgets.

## DC Pump:-

DC water pumps are small pumps powered by a battery, dc power supply, or solar panel. Their primary use is to circulate, pressurize, and emulsify liquids. They are particularly useful in environments where water is in short supply.

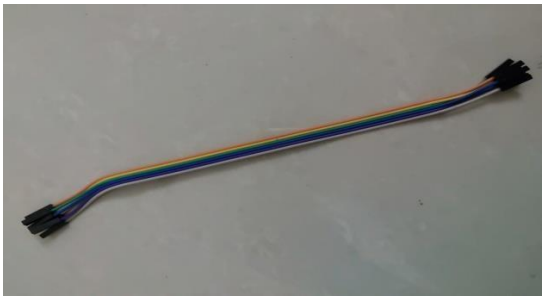


## Bread board:-

A breadboard (sometimes called a plug block) is used for building temporary circuits. It is useful to designers because it allows components to be removed and replaced easily. It is useful to the person who wants to build a circuit to demonstrate its action, then to reuse the components in another circuit.

## Jumper Wires:-

A jumper wire is an electric wire that connects remote electric circuits used for printed circuit boards. By attaching a jumper wire on the circuit, it can be short-circuited and short-cut (jump) to the electric circuit.



## Software components:

### Arduino 1.8.13:-

Arduino IDE is the **free software used to program Arduino circuit boards**. Arduino IDE has a unique programming language to ensure that all the hardware products associated with it can be programmed in the same way. It's also **open-source**, and so many tech-savvy individuals have taken to creating boards of their own.


## PROCEDURE

### Software setup:-

- Download Arduino Software on the computer.
- Install and open an Arduino IDE.
- Connect your Arduino board to your computer using a USB data cable.
- Click on new sketch and enter the code.
- Set port as COM3.
- Save the code and upload this code to the Arduino UNO board. After the code upload is completed, the device can start to detect any fire in a fixed area.

### Hardware setup:-

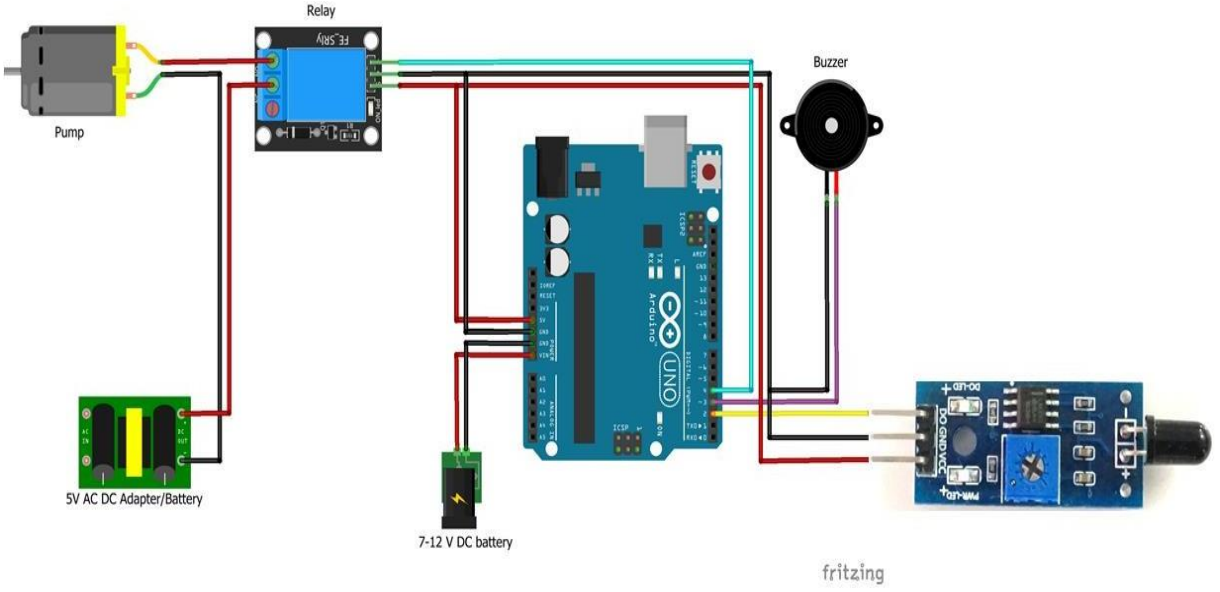
- Give connection from 5V and GND of Arduino board to bread board power rail.
- Connect Flame sensor to Arduino.

| Sensor Pins | Arduino Pins |
|---|---|
| VCC | +5V |
| GND | GND |
| D0 | D2 |

- Place buzzer on bread board and connect GND and D2 of Arduino to it.
- Provide +5V and GND from breadboard to the relay module and connect IN pin of relay module to D4 pin of Arduino.

- Now, connect DC pump to relay module. Provide +5V from separate DC Adapter to COM pin of relay and negative end to Adapter's ground.

## CIRCUIT DIAGRAM




## SOURCE CODE

```
#define SENSOR_PIN 2
#define BUZZER_PIN 3
#define RELAY_PIN 4
#define SPRINKLER_START_DELAY 5000  //5 seconds
#define SPRINKLER_ON_TIME 3000      //3 seconds Sprinkler on time
unsigned long previousTime = millis();
void setup()
{
  pinMode(RELAY_PIN, OUTPUT);
  pinMode(SENSOR_PIN, INPUT);
}
void loop()
{
  //If there is fire then the sensor value will be LOW else the value will be HIGH
  int sensorValue = digitalRead(SENSOR_PIN);
  //There is fire
```

```
  if (sensorValue == LOW)
  {
    analogWrite(BUZZER_PIN, 50);                    //Turn on buzzer
    if (millis() - previousTime > SPRINKLER_START_DELAY)  //We will wait for
few seconds before sprinkler can be started once fire is detected.
    {
      digitalWrite(RELAY_PIN, LOW);                 //Relay is low level triggered relay
so we need to write LOW to switch on the light
      delay(SPRINKLER_ON_TIME);                     //Keep sprinkler on for sometime.
    }
  }
  else
  {
    analogWrite(BUZZER_PIN, 0);
    digitalWrite(RELAY_PIN, HIGH);
    previousTime = millis();
  }
}
```

## RESULT

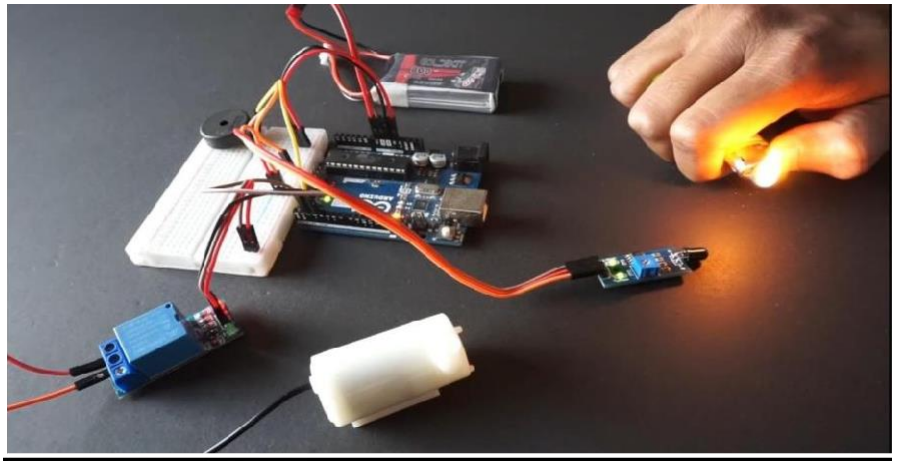


Fig 1: Buzzer beeps when there is flame

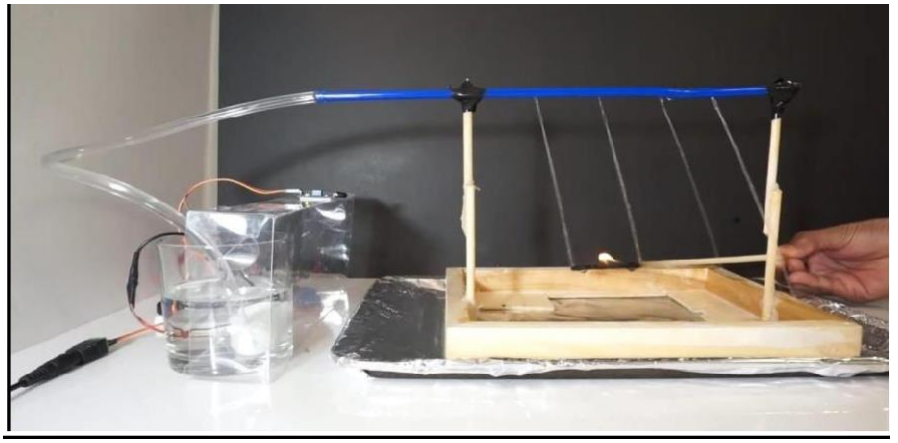


Fig 2: Water starts sprinkling when there is flame

## CONCLUSION

IoT helps us work smarter, live smarter, and gain complete control over our lives, but it's also supporting our wellbeing behind the scenes. By using IoT we made fire detection system which in result saves many lives and assets when there is any fire accident happens. This system helps industries and factories a lot. Fire alarm systems automatically warns everyone that a fire has broken out, thus bystanders, guests or employees inside the premises can respond immediately, take action and reduce the loss.

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- https://www.google.com/search?q=dc+battery+description&oq=dc+battery+des&aqs=chrome.1.69i57j33i10i160.6966j0j7&sourceid=chrome&ie=UTF-8
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