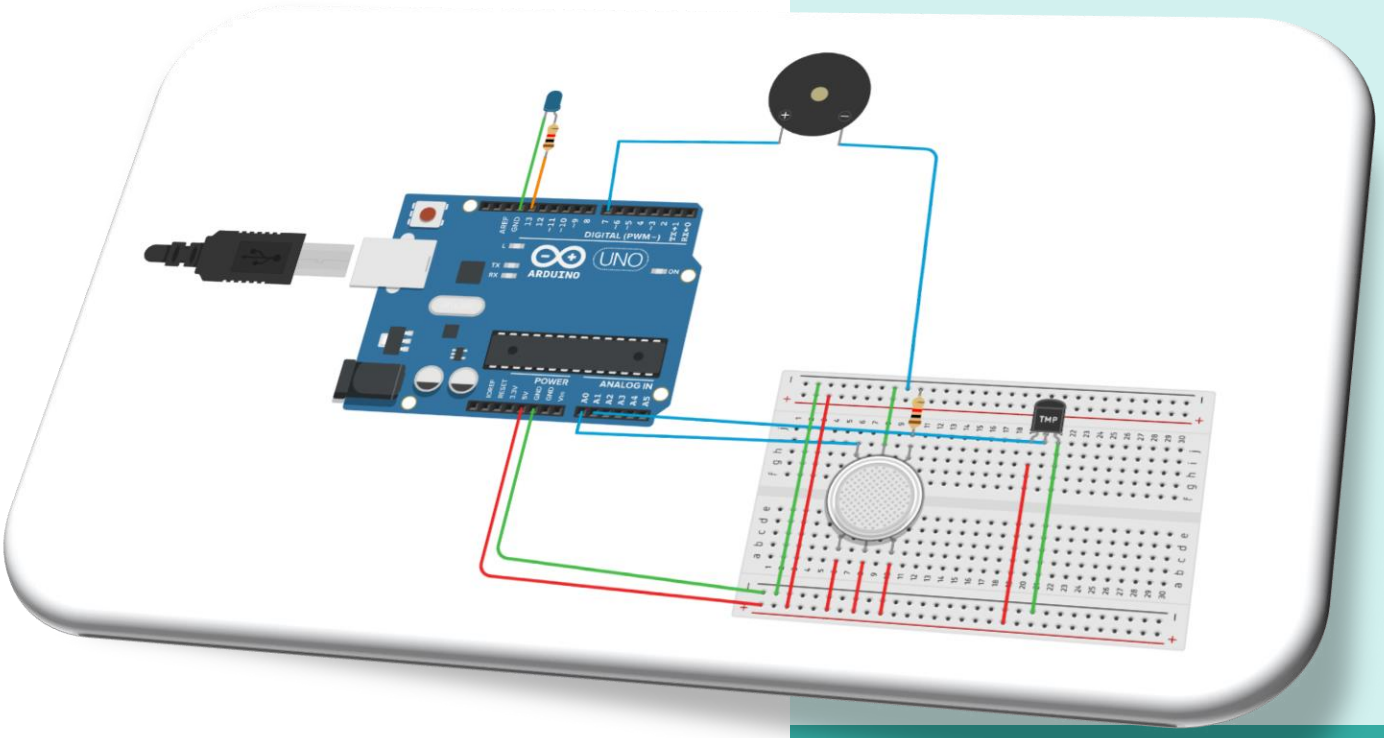
Fire Alarm



Electronics and Instrumentation Engineering
Sensors and Transducers Lab
4th Semester (2021-2025)

Submitted by:-

Group 2 {

- Muskan Gupta (21UEI007)
- Golu Kumar (21UEI008)
- Ashish Kumar (21UEI009)
- Abantika Deb (21UEI010)
- Rajan Singh (21UEI011)
- Suyash Gupta (21UEI012)

}

Submitted to:-

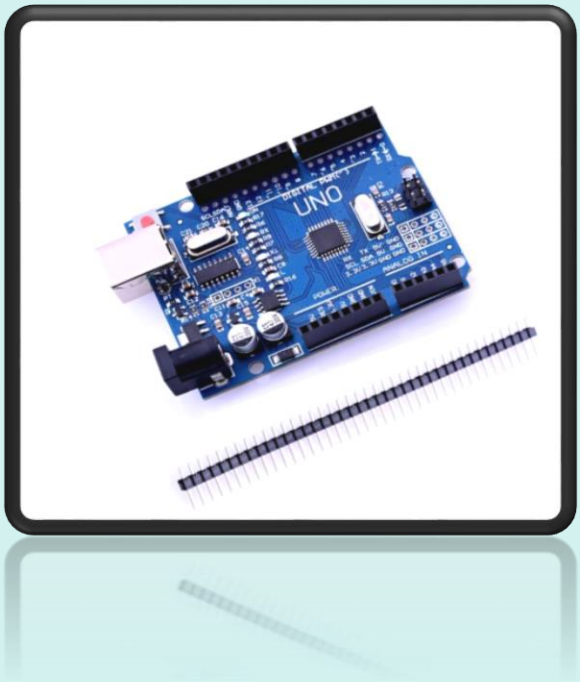
Introduction

Having a fire detection system can significantly reduce damages and maximize fire control efforts. It is also one of the most fundamental steps you can take for fire safety measures. Even if you are sleeping or busy working, early fire detection will warn you and help you respond quickly so you'll be out of danger.

Components

1. Arduino UNO R3

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. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.



2. LM35 Temperature Sensor

LM35 is a temperature measuring device having an analog output voltage proportional to the temperature.

It provides output voltage in Centigrade (Celsius). It does not require any external calibration circuitry.

The sensitivity of LM35 is 10 mV/degree Celsius. As temperature increases, output voltage also increases.

E.g. 250 mV means 25°C.

It is a 3-terminal sensor used to measure surrounding temperature ranging from -55 °C to 150 °C.

LM35 gives temperature output which is more precise than thermistor output.

- **Specification of LM35 Temperature Sensor**

Operating Voltage: 4 V to 30 V

Output Voltage: 10mV/°C

Sensitivity: 10mV/°C

Linearity Error: ±1°C (for 0°C to +100°C)

Operating Temperature: -55°C to +150°C

Output Impedance: 100 Ω

Power Consumption: 60 µA (typical)

Output Type: Analog

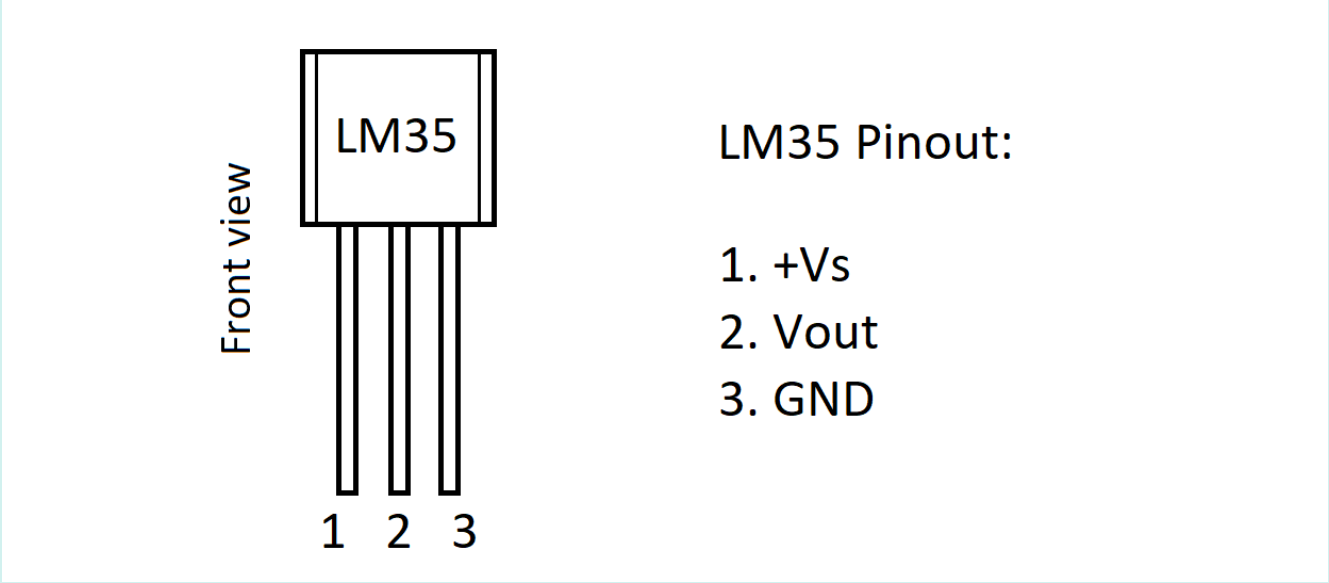
Accuracy: ±1°C (typical)

- **LM35 Temperature Sensor Pinout:**

VCC: Supply Voltage (4V – 30V)

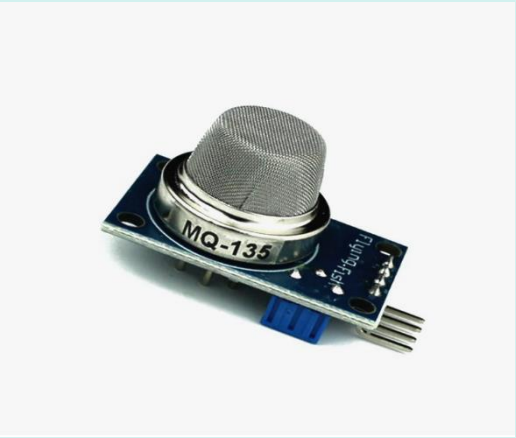
Out: It gives analog output voltage which is proportional to the temperature (in degree Celsius).

GND: Ground



3. MQ135 Gas Sensor

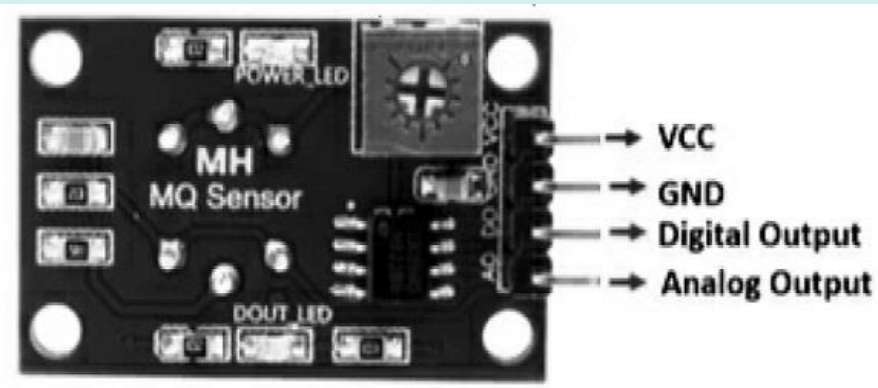
An MQ135 air quality sensor is one type of MQ gas sensor used to detect, measure, and monitor a wide range of gases present in air like ammonia, alcohol, benzene, smoke, carbon dioxide, etc. It operates at a 5V supply with 150mA consumption. Preheating of 20 seconds is required before the operation, to obtain the accurate output.



- **Pin Configuration:**

The MQ135 air quality sensor is a 4-pin sensor module that features both analog and digital output from the corresponding pins. The MQ135 air quality sensor pin

configuration is shown below.



Pin 1: VCC: This pin refers to a positive power supply of 5V that power up the MQ135 sensor module.

Pin 2: GND (Ground): This is a reference potential pin, which connects the MQ135 sensor module to the ground.

Pin 3: Digital Out (Do): This pin refers to the digital output pin that gives the digital output by adjusting the threshold value with the help of a potentiometer. This pin is used to detect and measure any one particular gas and makes the MQ135 sensor work without a microcontroller.

Pin 4: Analog Out (Ao): This pin generates the analog output signal of 0V to 5V and it depends on the gas intensity. This analog output signal is proportional to the gas vapor concentration, which is measured by the MQ135 sensor module. This pin is used to measure the gases in PPM. It is driven by TTL logic, operates with 5V, and is mostly interfaced with microcontrollers.

- **Specifications and Features:**

The MQ135 air quality sensor specifications and features are listed below:-
It has a wide detection scope.
High sensitivity and faster response.
Long life and stability.
The operating voltage: +5V.

Measures and detects NH3, alcohol, Nox, Benzene, CO2, smoke etc.
Heating Voltage: 5V±0.1.
Load resistance is adjustable.
Heating consumption:<800mW.

4. Resistor(1K-Ohm)

A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses.

5. Peizo Buzzer

When a voltage is applied across the two electrodes, the piezoelectric material mechanically deforms due to the applied voltage. This movement of the piezo disk within the buzzer creates sound in a similar manner as the movement of the ferromagnetic disk in a magnetic buzzer.

6. LED

A light-emitting diode (LED) is a semiconductor device that emits light when an electric current flows through it. When current passes through an LED, the electrons recombine with holes emitting light in the process.

7. Male to Male Jumper Wires

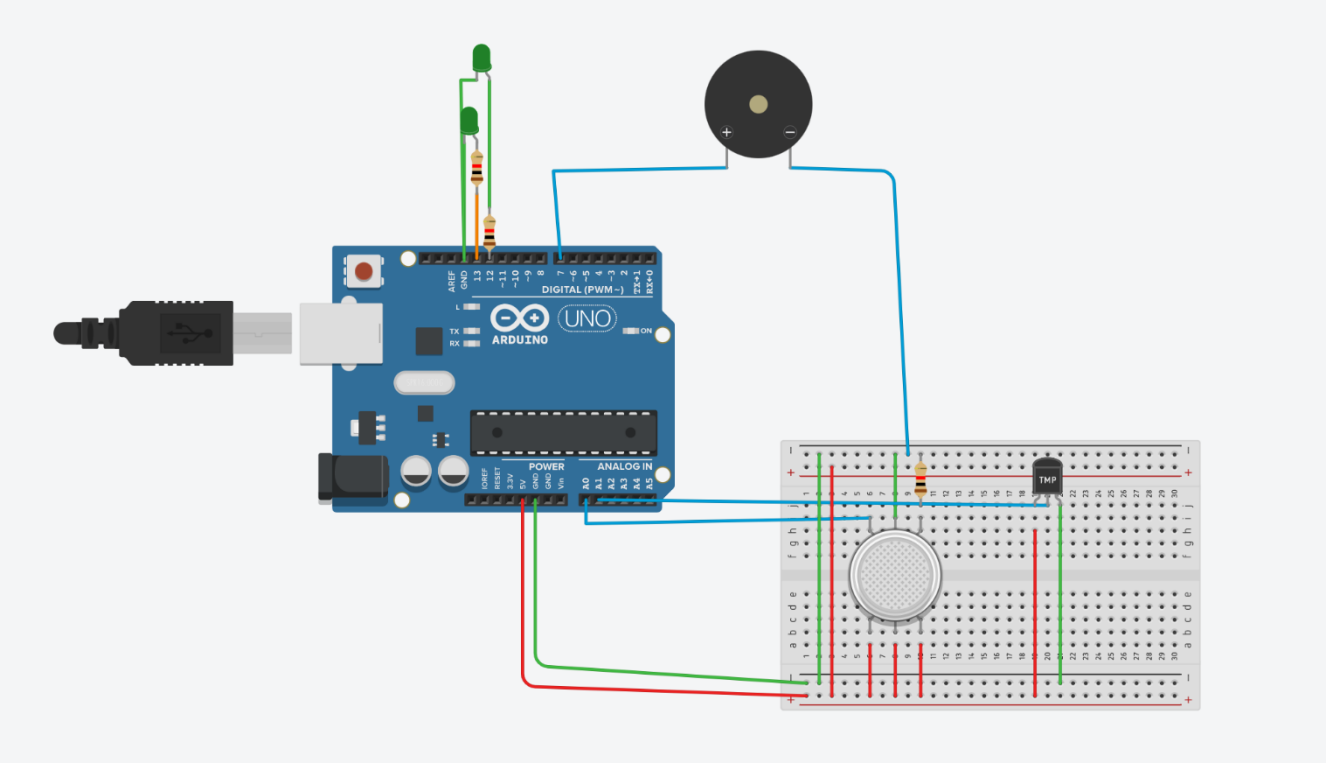
This cable is an electrical wire or group of them in a cable with a connector or pins at each end, which is normally for interconnecting the components of a breadboard or

other prototype or test circuit, internally or with other equipment or components, without soldering.

8. PCB

A printed circuit board, or PC board, or PCB, is a non-conductive material with conductive lines printed or etched. Electronic components are mounted on the board and the traces connect the components together to form a working circuit or assembly.

• Circuit Diagram



• Arduino Code

```
int buzzer=7;
int LED1=12;
int LED2=13;
int a=1;
void setup() {
  pinMode(A0,INPUT);
  pinMode(A1,INPUT);
  pinMode(buzzer,OUTPUT);
  pinMode(LED1,OUTPUT);
  pinMode(LED2,OUTPUT);
  Serial.begin(9600);
}

void loop() {
  int sv=analogRead(A0);
  float LMvalue=analogRead(A1);
  float temp=(LMvalue*500)/1023;
  if(sv>=55||temp>=50){
    digitalWrite(buzzer,HIGH);
    if(a==1){
      digitalWrite(LED1,HIGH);
      digitalWrite(LED2,LOW);
      a=0;
    }
    else{
      digitalWrite(LED2,HIGH);
      digitalWrite(LED1,LOW);
      a=1;
    }
  }
  else{
    digitalWrite(buzzer,LOW);
    digitalWrite(LED1,LOW);
    digitalWrite(LED2,LOW);
  }
  Serial.print("AQI =");
  Serial.print(sv);
  Serial.print("ppm");
  Serial.print("      ");
  Serial.print("Temprature= ");
  Serial.println(temp);
  delay(100);
}
```