Experiment - 8

Student Name: Sandeep Kumar **UID: 20BCS4885**
Branch: BE - CSE **Section/Group: 603/A**
Semester: 6th semester **Subject: IOT LAB**

Aim:

Interfacing Air Quality Sensor (MQ135), displays data on LCD.

Objective:

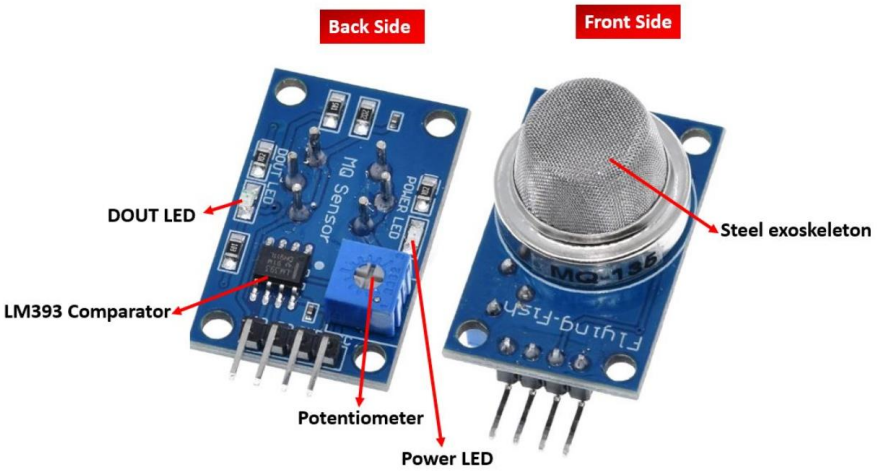
1. Learn about Air Quality Sensor (MQ135).
2. Learn about IoT programming.

Components Required:

1. Arduino Uno R3
2. MQ 135 AirQuality Sensor Module
3. Male to Female Jumper Wire
4. Software: Arduino IDE

About Air Quality Sensor:

MQ-135 sensor belongs to the MQ series that are used to detect different gasses present in the air. The MQ-135 sensor is used to detect gases such as NH3,NOx, alcohol, Benzene, smoke,CO2 ,etc. steel exoskeleton houses a sensing device within the gas sensor module.

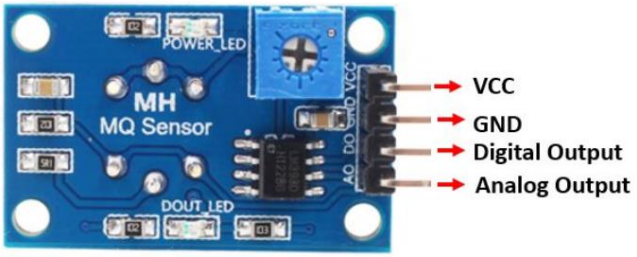


Specifications:

The table below shows some key specifications of the MQ-135 sensor module:

Feature	Description
Operating Voltage	2.5-5.0V
Detecting Concentration	10ppm-300ppm for NH3 10ppm-1000ppm for Benzene 10ppm-300ppm for Alcohol
Load Resistance	Adjustable
Heater Resistance	33Ω ± 5%
Heater Consumption	less than 800mW
Operating Temperature	-10 to 45°C

Pinout:



MQ-135 Sensor Pinout:

This sensor has 4 pins:

1. 5V: Module power supply – 5 V
2. GND: Ground
3. DOUT: Digital output
4. AOUT: Analog output

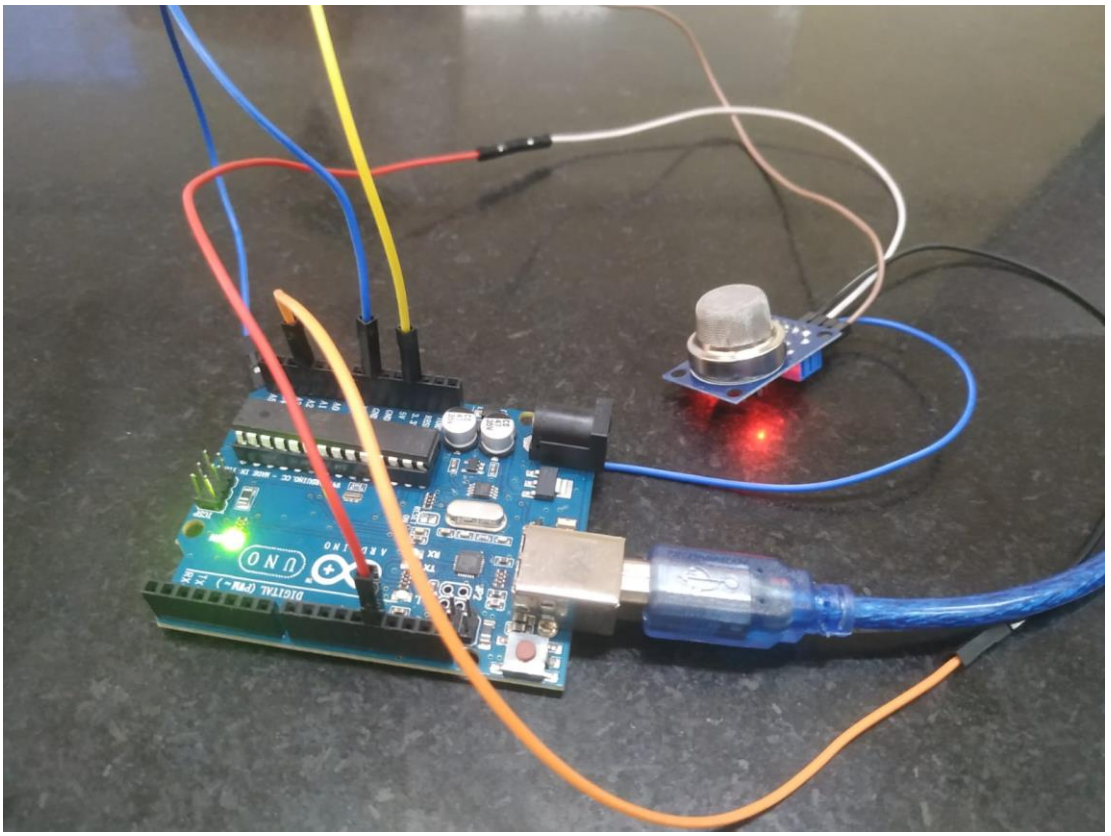
Circuit

The following circuit shows how you should connect Arduino to MQ-135 module. Connect wires accordingly.

The MQ-135 sensor module consists of four pins namely VCC, GND, DO, and DO. The table below gives a brief description of them.

Pin	Description
VCC	Positive power supply pin that powers up the sensor module.
GND	Reference potential pin.
AO	Analog output pin. It generates a signal proportional to the concentration of gas vapors coming in contact with the sensor.
DO	Digital Output pin. It also produces a digital signal whose limit can be set using the in-built potentiometer.

Interfacing MQ-135 Gas Sensor with Arduino:



The table below shows the connections you need to make between the MQ3 sensor module and Arduino using both the analog output and the digital output pins of the sensor.

MQ-135 Module	Arduino
1. VCC	5V
2. GND	GND
3. AO	A0
4. DO	Pin 2

Connect MQ-135 sensor's VCC pin with 5V terminal of Arduino UNO. This will power up the sensor. Additionally, we will connect the analog pin AO with A0 and DO with Pin 2 of Arduino UNO. Both the devices will be commonly grounded.

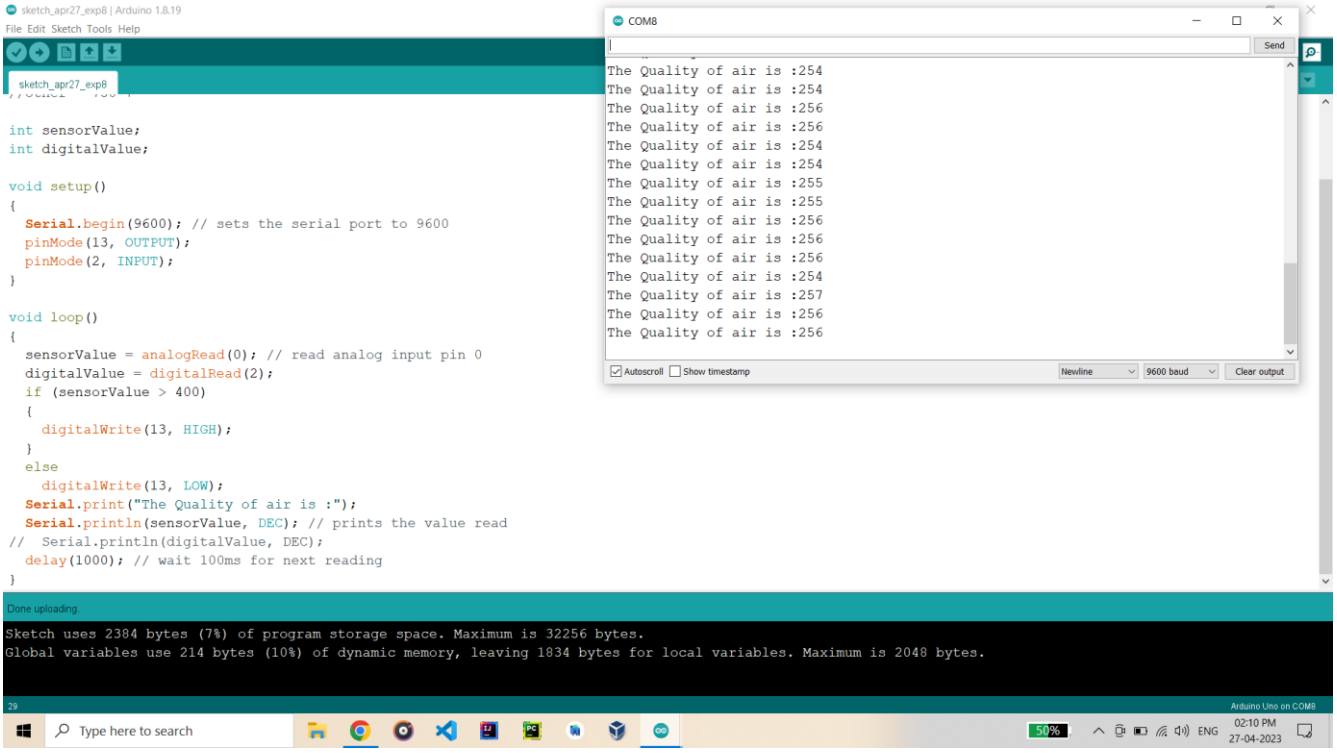
MQ-135 Gas Detection Arduino Sketch:

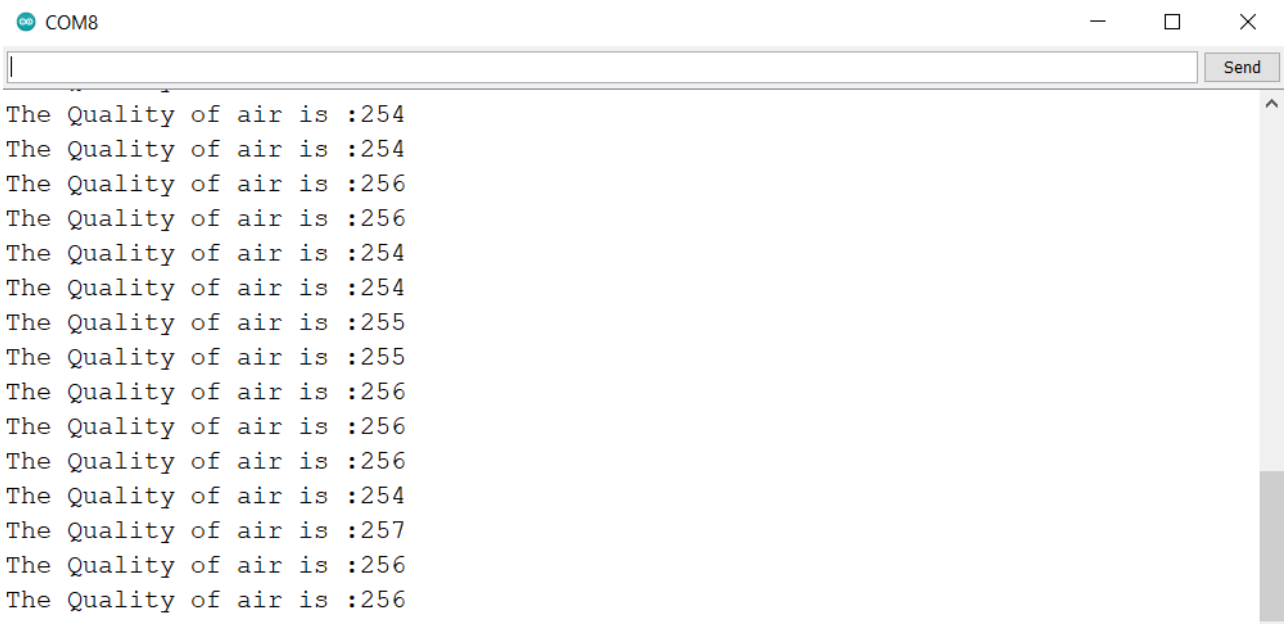
```
int sensorValue;
int digitalValue;

void setup()
{
  Serial.begin(9600); // sets the serial port to 9600
  pinMode(13, OUTPUT);
  pinMode(2, INPUT);
}

void loop()
{
  sensorValue = analogRead(0); // read analog input pin 0
  digitalValue = digitalRead(2);
  if (sensorValue > 400)
  {
    digitalWrite(13, HIGH);
  }
  else
    digitalWrite(13, LOW);
  Serial.print("The Quality of air is :");
  Serial.println(sensorValue, DEC); // prints the value read
  delay(1000); // wait 100ms for next reading
}
```

Output:





Learning Outcomes:

1. Learn about IoT based simulations.
2. Learn about Air Quality based on MQ - 135 Gas Detection Sensor.
3. Learn about Air Quality Index Values:

   - Normal air returns approximately 100-150
   - Alcohol returns approximately 700
   - Lighter gas returns approximately 750