Experiment No. - 8

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Branch: BE-CSE(LEET)
Semester: 6th
Subject Name: IOT Lab

UID: 21BCS8129
Section/Group:20BCS-ST-801/B
Date of Performance: 21/04/2023
Subject Code: 20CSP-358

1. **Aim:**
   Interfacing Air Quality Sensor (MQ135), display data on LCD.
2. **Objective:**
   a. Learn about Gas sensor in detail.
   b. LED and LCD
   c. Learn about IoT programming.
   d. Measure the pollution in the air.
3. **Requirements:**
   a. Arduino Uno R3 board
   b. LED and LCD
   c. Gas Sensor
   d. USB or 5V Power Supply
   e. Jumper Wires

4. **Procedure:**

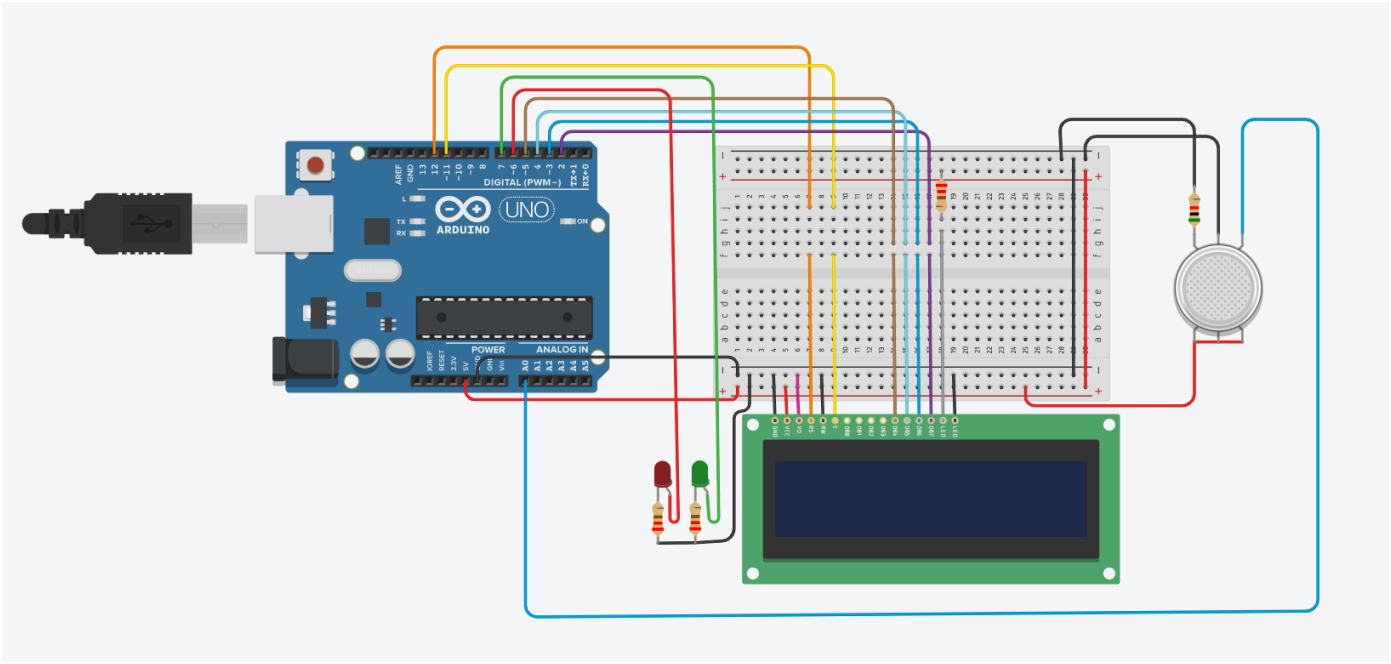
Arduino:

It is an open-source electronics platform. It consists ATmega328 8-bit Micro controller. It can be able to read inputs from different sensors & we can send instructions to the micro controller in the Arduino. It provides Arduino IDE to write code & connect the hardware devices like Arduino boards & sensors.

Gas Sensor:

A **gas sensor** is a device which detects the presence or concentration of gases in the atmosphere. Based on the concentration of the gas the sensor produces a corresponding potential difference by changing the resistance of the material inside the sensor, which can be measured as output voltage. Based on this voltage value the type and concentration of the gas can be estimated.

The type of gas the sensor could detect depends on the **sensing material** present inside the sensor. Normally these sensors are available as modules with comparators as shown above. These comparators can be set for a particular threshold value of gas concentration. When the concentration of the gas exceeds this threshold, the digital pin goes high. The analog pin can be used to measure the concentration of the gas.

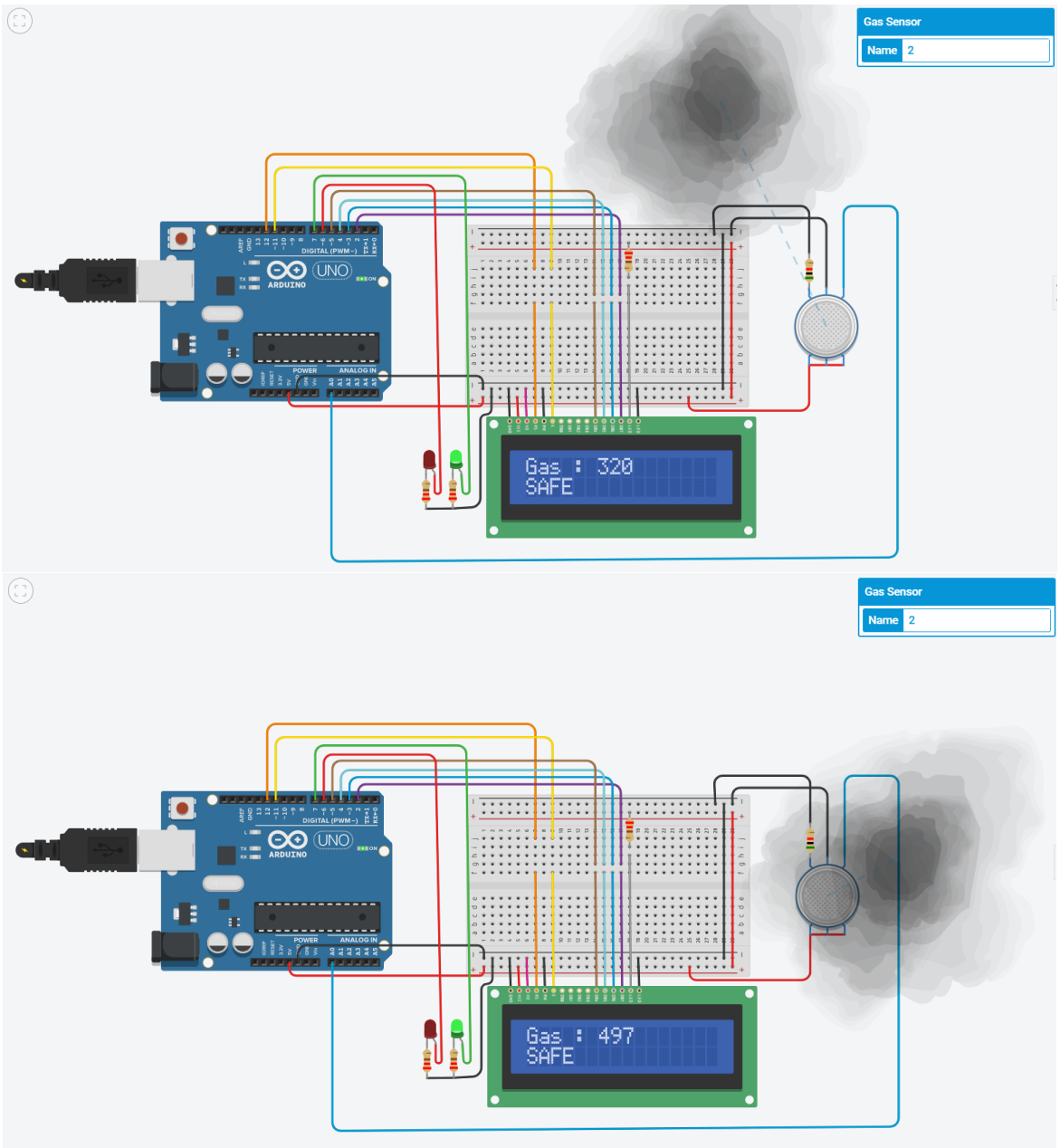


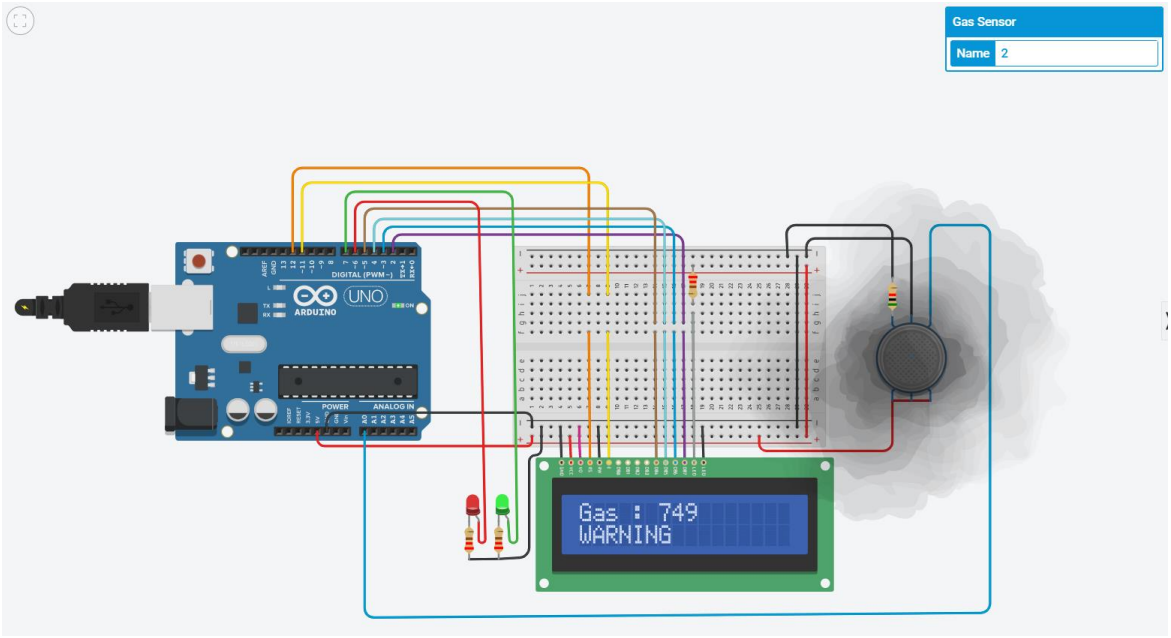
5. **Steps/Program:**

```
#include <LiquidCrystal.h>
LiquidCrystal lcd(12, 11, 5, 4, 3, 2);
void setup() {
  Serial.begin(9600);
  lcd.begin(16, 2);
  pinMode(13,OUTPUT);
  pinMode(7,OUTPUT);
  pinMode(6,OUTPUT);
}
void loop() {
  int gas_data;
  gas_data = analogRead(A0);
  lcd.setCursor(00,00);
  lcd.print("Gas :");
  lcd.setCursor(6,00);
  lcd.print(gas_data);
  if(gas_data > 800){
    digitalWrite(13,HIGH);
    delay(100);
    digitalWrite(13,LOW);
    lcd.setCursor(00,1);
    lcd.print("DANGER");
  }else if(gas_data > 700){
    digitalWrite(6,HIGH);
    delay(100);
    digitalWrite(6,LOW);
    lcd.setCursor(00,1);
    lcd.print("WARNING");
```

```
}else {
  digitalWrite(7,HIGH);
  lcd.setCursor(00,1);
  lcd.print("SAFE");
}
Serial.println(gas_data);
delay(100);
lcd.clear();
}
```

6. Output:





Learning outcomes (What I have learnt):

- Learnt about Gas sensor in detail.
- Learnt about IoT programming.
- Measured the room gas purity using a gas sensor.

Evaluation Grid (To be created per the faculty's SOP and Assessment guidelines):

Sr. No.	Parameters	Marks Obtained	Maximum Marks
1.	Worksheet completion including writing learning objectives/Outcomes. (To be submitted at the end of the day).		
2.	Post-Lab Quiz Result.		
3.	Student Engagement in Simulation/Demonstration/Performance and Controls/Pre-Lab Questions.		
	Signature of Faculty (with Date):	Total Marks Obtained:	