Project Development Phase
Sprint – I (IOT Device)

Date	24 November 2022
Team ID	PNT2022TMID18250
Project Name	Project – Gas leakage monitoring and alerting system for industries

Hardware Required:

1. NodeMCU ESP8266
2. LED - 1
3. Buzzer
4. Resistor – 1KΩ - 1
5. Jumper Wires – Few
6. Gas Sensor
7. LCD Display
8. I2C Module
9. Bread Board

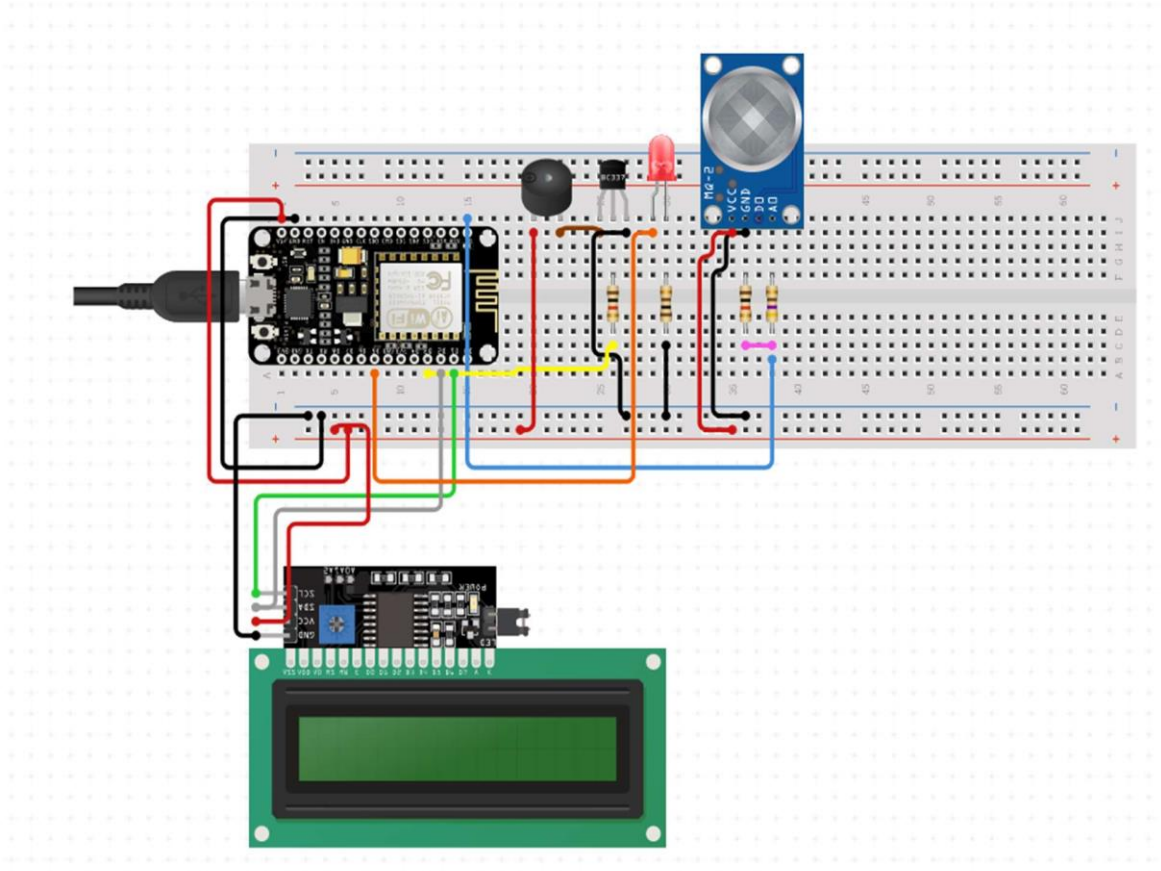
Software Required:

1. Arduino IDE

Installed Library – Arduino IDE:

1. LiquidCrystal_I2C
2. ESP8266WiFi

IOT Device - Circuit Diagram:



Exposure Chart:

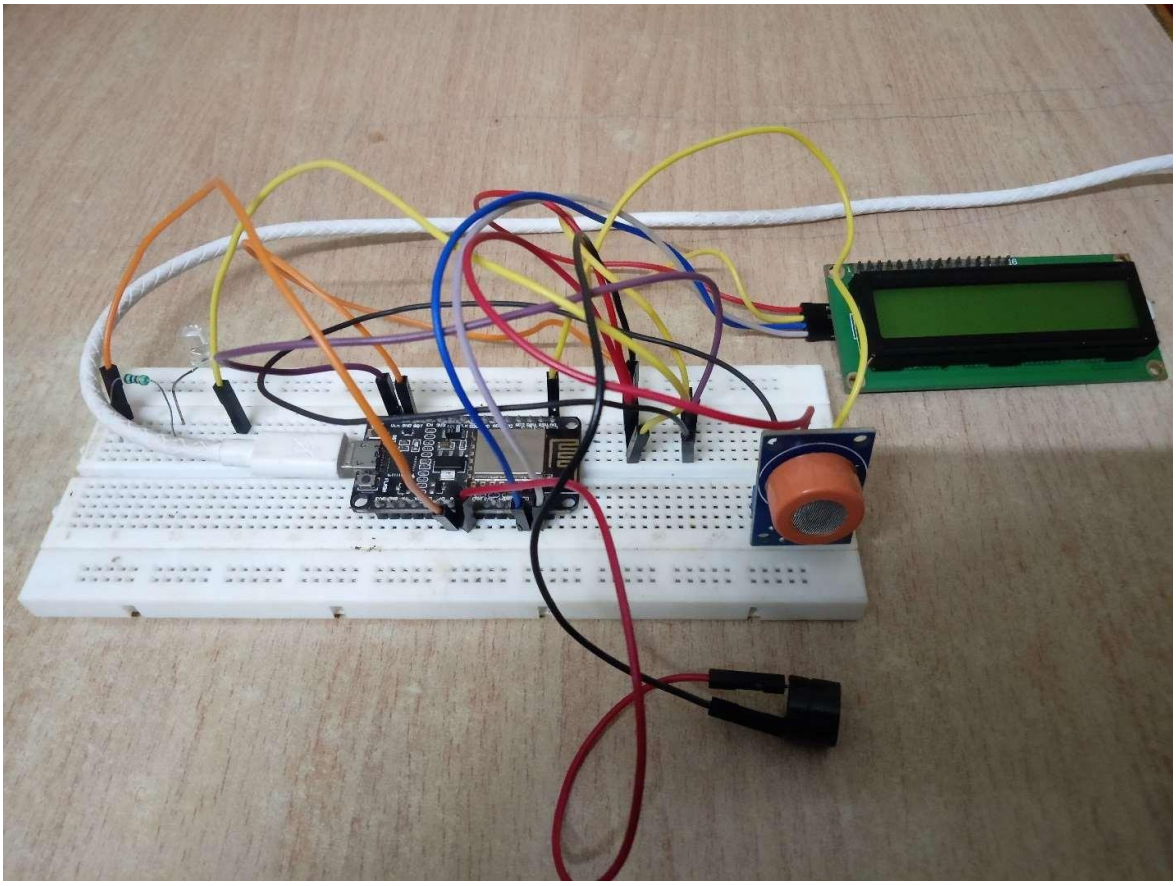
Concentration (ppm)	Level	Effect
>= 840	High – Danger	Instant Death
780 - 840	Medium – Alert	Death within a minute
<= 780	Normal	Death with 30-60 minutes

Source Code:

```
#include <LiquidCrystal_I2C.h>
#include <ESP8266WiFi.h>
LiquidCrystal_I2C lcd(0x27, 16, 2);
#define Buzzer D5
#define Green D6
#define Sensor A0
void setup() {
Serial.begin(9600);
lcd.backlight();
lcd.init();
  pinMode(Green, OUTPUT);
  pinMode(Buzzer,  OUTPUT);
  pinMode(Sensor, INPUT);
}
void notifiaction() {
  int sensor = analogRead(Sensor);
  Serial.println(sensor);
  if (sensor >= 840) {
    digitalWrite(Green, HIGH);
    digitalWrite(Buzzer, HIGH);
    delay(3000);
    lcd.setCursor(0, 1);
    Serial.println("Danger! Gas value: High");
  } else if (780<=sensor){
    digitalWrite(Buzzer, HIGH);
    digitalWrite(Green, HIGH);
    delay(750);
    digitalWrite(Buzzer,LOW);
    digitalWrite(Green, LOW);
    delay(1000);
    lcd.setCursor(0, 1);
    Serial.println("Gas value: Moderate - Alert");
  }
  else{
    digitalWrite(Green, LOW);
    digitalWrite(Buzzer, LOW);
    lcd.setCursor(0, 1);
    Serial.println("Gas value: Normal");
  }
  lcd.setCursor(0, 0);
  lcd.print("Value : ");
  lcd.print(sensor);
}

void loop() {
  notifiaction();}
```

Hardware Implementation:



Output:

Serial Monitor:

COM4

Send

```
22:15:19.340 -> 762
22:15:19.340 -> Gas value: Normal
22:15:19.340 -> 761
22:15:19.340 -> Gas value: Normal
22:15:19.397 -> 775
22:15:19.397 -> Gas value: Normal
22:15:19.397 -> 793
22:15:21.067 -> Gas value: Moderate - Alert
22:15:21.067 -> 807
22:15:22.798 -> Gas value: Moderate - Alert
22:15:22.838 -> 860
22:15:25.806 -> Danger! Gas value: High
22:15:25.858 -> 853
22:15:28.838 -> Danger! Gas value: High
22:15:28.884 -> 845
22:15:31.852 -> Danger! Gas value: High
22:15:31.899 -> 830
22:15:33.607 -> Gas value: Moderate - Alert
22:15:33.658 -> 837
22:15:35.396 -> Gas value: Moderate - Alert
22:15:35.429 -> 838
22:15:37.173 -> Gas value: Moderate - Alert
22:15:37.211 -> 840
22:15:40.184 -> Danger! Gas value: High
22:15:40.222 -> 840
22:15:43.178 -> Danger! Gas value: High
22:15:43.225 -> 864
22:15:46.223 -> Danger! Gas value: High
22:15:46.273 -> 844
22:15:49.258 -> Danger! Gas value: High
22:15:49.258 -> 838
22:15:51.021 -> Gas value: Moderate - Alert
22:15:51.069 -> 842
22:15:54.031 -> Danger! Gas value: High
22:15:54.067 -> 894
22:15:57.047 -> Danger! Gas value: High
```

Autoscroll Show timestamp | No line ending | 9600 baud | Clear output

Verification:

Concentration (ppm)	Level	Indication
>= 840	Danger - High	Buzzer - ON LED – ON
780 - 840	Alert - Medium	Buzzer – ON (With delay) LED – ON (With delay)
<= 780	Normal	Buzzer – OFF LED - OFF

Hardware Output: