B. P. College of Computer Studies, Gandhinagar
&
S.V. Institute of Computer Studies, Gandhinagar
(constituent Colleges of Kadi Sarva Vishwavidyalaya)

BCA PROGRAMME
SEMESTER- VI

BCA 606(A) ROBOPEDIA-III
PROJECT REPORT – VI

Air Quality Detector
E1

STUDENT NAME	ENROLLMENT NUMBER	EXAM NUMBER
Aman Singh Bhadoriya	19BCA04014	016016
Rohit Singh	19BCA04265	016225
Abhishek Patel	19BCA04006	016009

Table of Contents

PHASE I: BUILDING A PROJECT PLAN FROM SCRATCH

1.1 PROJECT TITLE

Air Quality Detector

1.2 PROJECT DEFINITION

- Air quality detector are devices that monitor the presence of air pollution in the surrounding area. They can be used for both indoor and outdoor environments. Air quality detector are devices used to detect contaminants in the air. This includes particulates, pollutants and noxious gases that may be harmful to human health.

1.3 GROUP DETAILS

Group Member Name	Enrollment no.	Roll No.	Group No.	Exam no.
Aman Singh Bhadoriya	19BCA04014	19302	E1	016016
Rohit Singh	19BCA04265	19357	E1	016225
Abhishek Patel	19BCA04006	19333	E1	016009

1.4 PLANNING ACTIVITIES

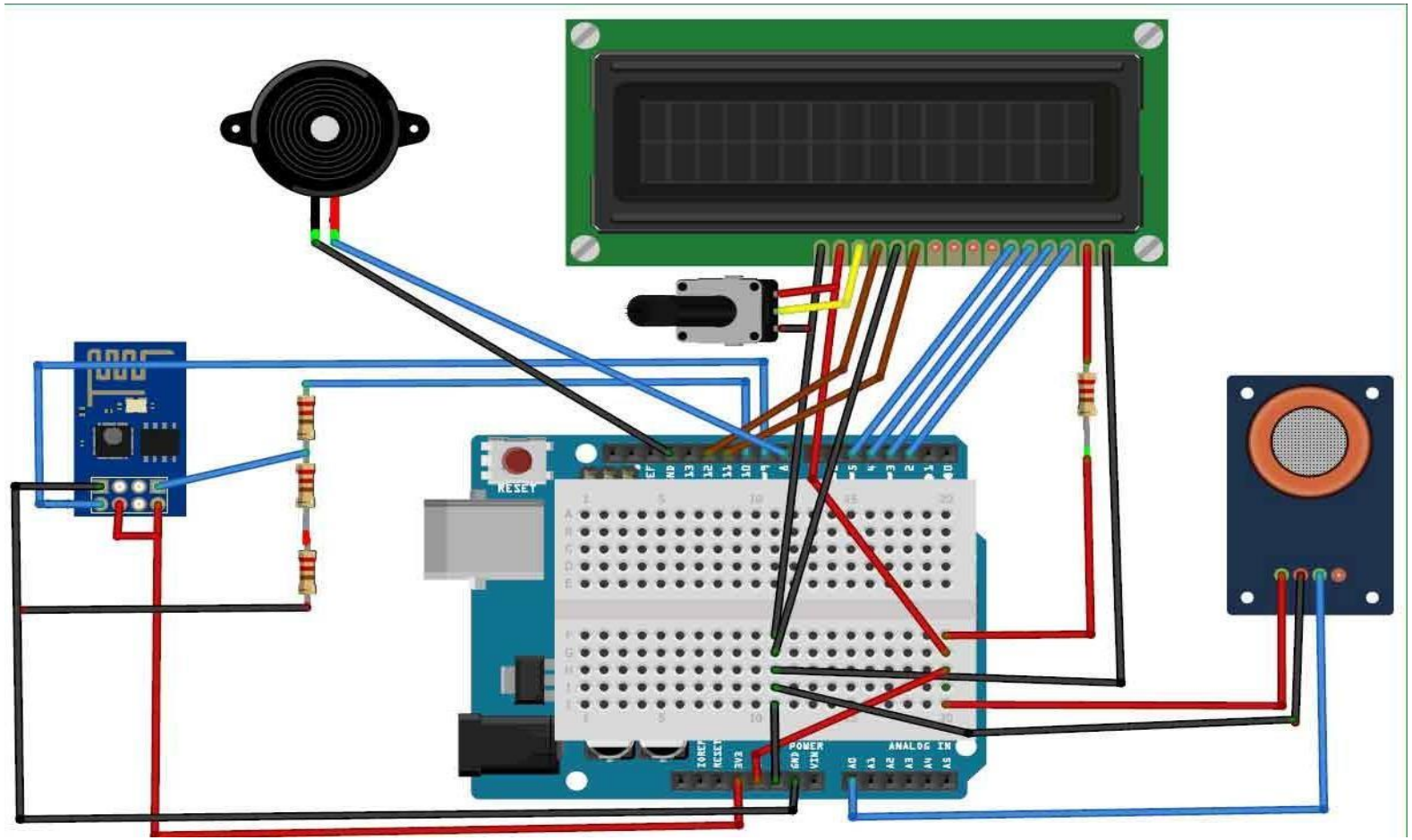
- In this project we are show you how to measure air Quality.
- In this project, we are going to use an MQ-135 Sensor with Arduino to measure the CO2 concentration.
- CO2 concentration values will be displayed on the OLED module.
- We can also measure the concentration of using Arduino. LPG, SMOKE, and Ammonia gas.
- Our project is use to School, home, hospital and heavy Air polluted place etc.

1.5 SYSTEM REQUIREMENTS SPECIFICATION

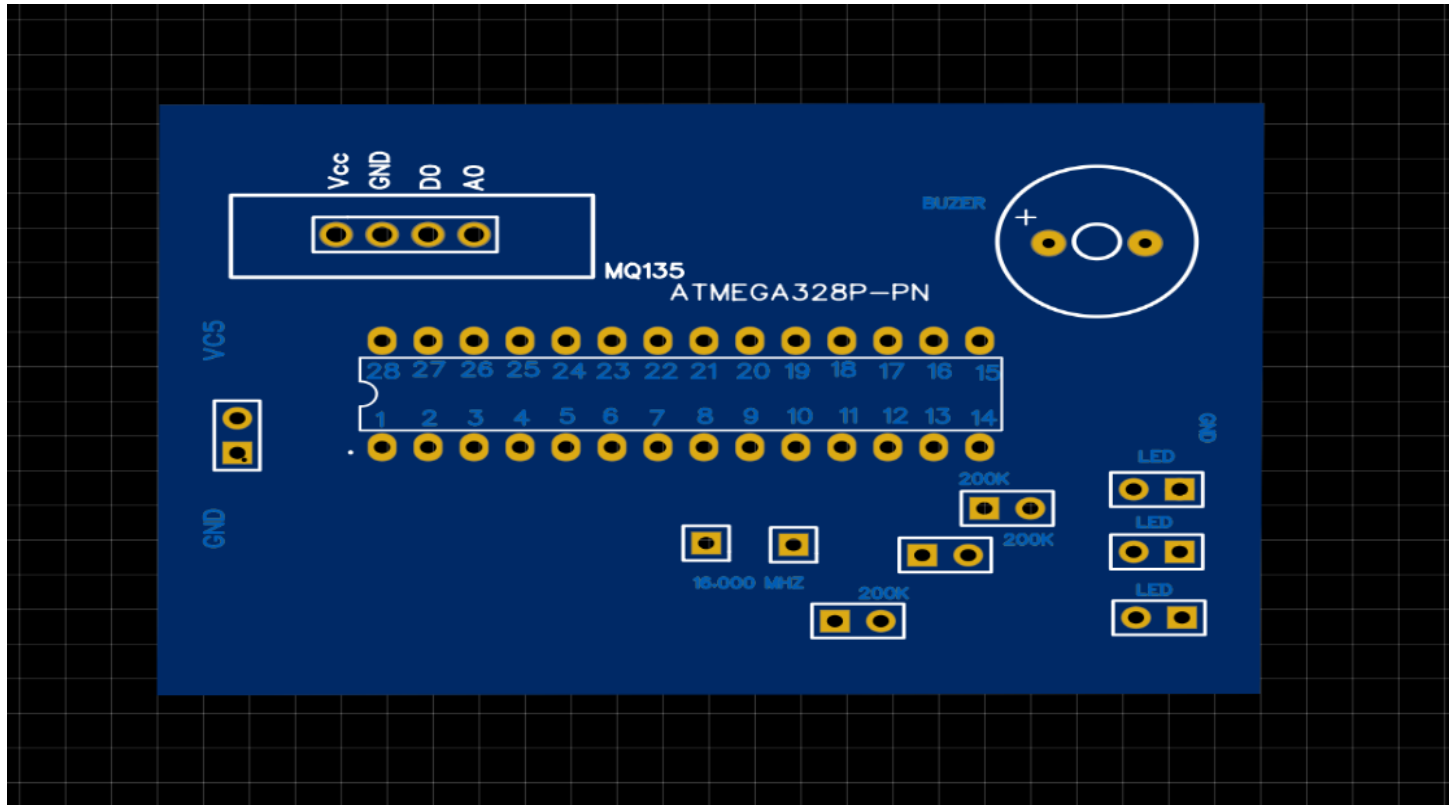
Arduino Uno with ATMEGA328p	3x 200k register
MQ-135 Air Quality Sensor	1x 16.000 MHZ crystal
Jumper Wires	3x R,Y,G LED
16x4 LCD display	1x Atmega328P IC
Breadboard	5v battery Charging Module
Coper board	Buzzer

1.6 DESIGNATING WITH SOFTWARE

1. First Device



2. Second device



1.7 DEVICE COST SPECIFICATION

Component	Quantity	Price	Configuration	Vendor
Arduino Uno	1	600	R3	Krishna Electronics
MQ-135 Sensor	1	120	MQ-135	Krishna Electronics
Jumper Wires	40	40	Male To Male	Krishna Electronics
16x4 LCD display	1	300	16*4	Krishna Electronics
Breadboard	1	60		Krishna Electronics
Buzzer	1	10		Krishna Electronics
Atmega328p IC	1	250	328P	Krishna Electronics
5V charging Module	1	50		Krishna Electronics
LED	3	15	R,Y,G	Krishna Electronics
200k Register	3	6		Krishna Electronics
16.000Mhz Crystal	1	10		Krishna Electronics
Coper Board	1	90		Krishna Electronics
Total		1685		Krishna Electronics

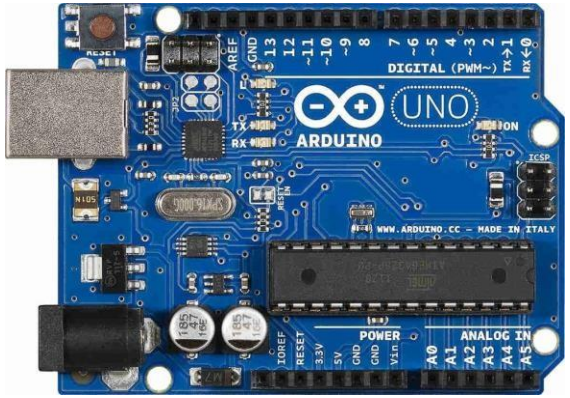
PHASE II: ASSEMBLING AND PROGRAMMING IN VIRTUAL ENVIRONMENT

2.1 SELECTION OF THE HARDWARE COMPONENTS

16*4 LCD Display

The system displays the air quality on a 16x4 LCD display. It will show the air quality in PPM on the LCD so that we can monitor it very easily.

- **Arduino Uno**



- **Buzzer**

Focusing on the device produced, it detects high temperature and sense the dusty air immediately. Once the sensitivity is high, the buzzer module will active to alert user.

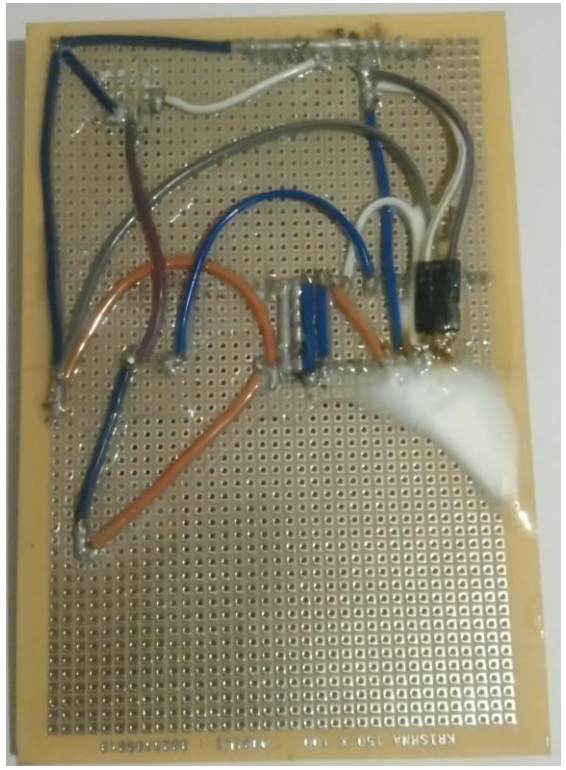
- **MQ-135 Sensor**

- This sensor is suitable for home and industrial use, it has fast response and recovery characteristics, long life and reliable stability.

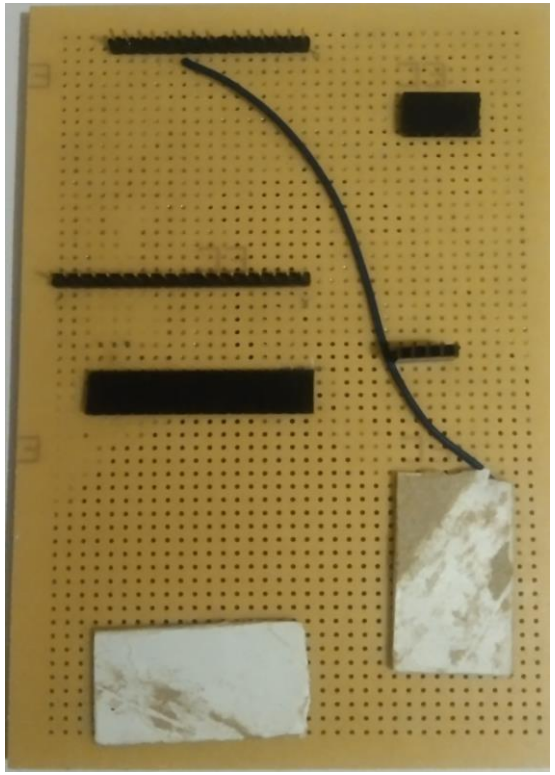
2.2 ESTABLISHING THE CONNECTIONS BETWEEN THE COMPONENTS

I. First Device

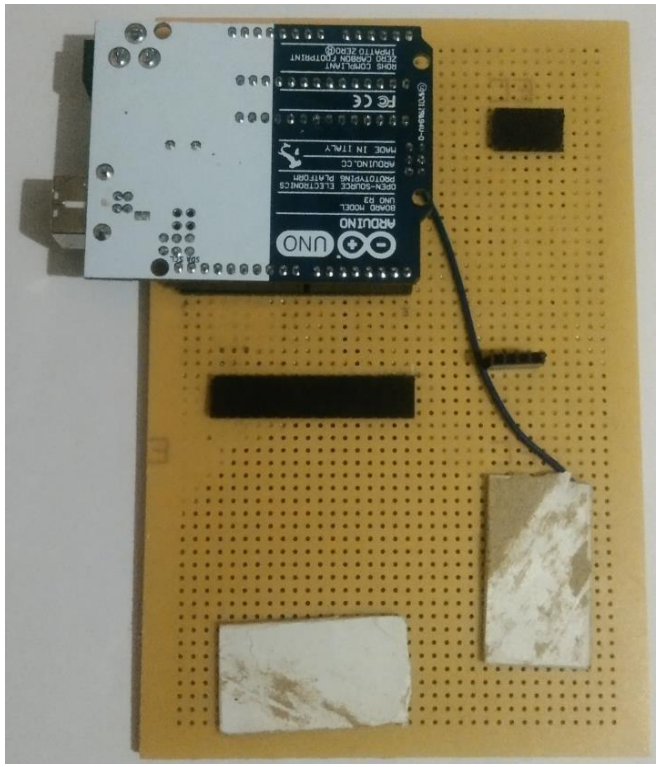
1. Circuit connection (Back Side)



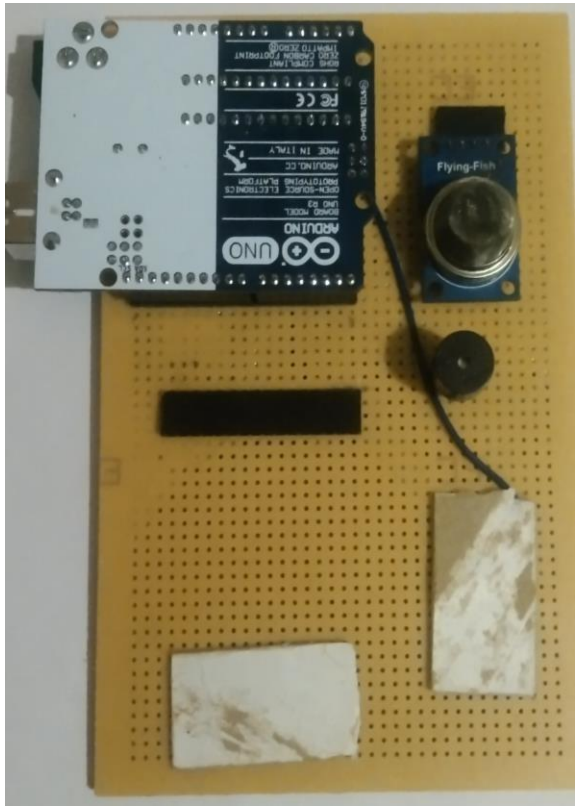
2. Frint side



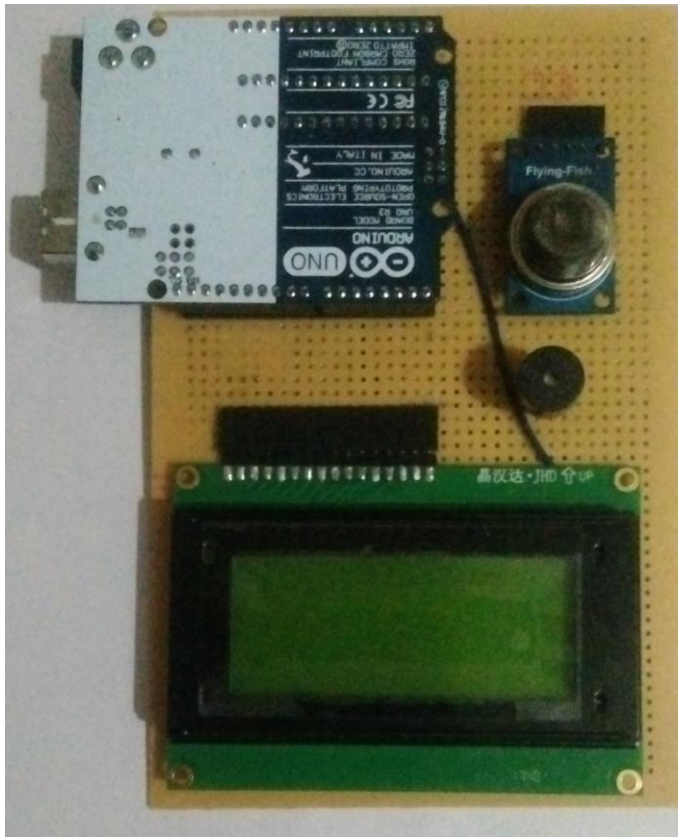
3. Arduino connection With Circuit



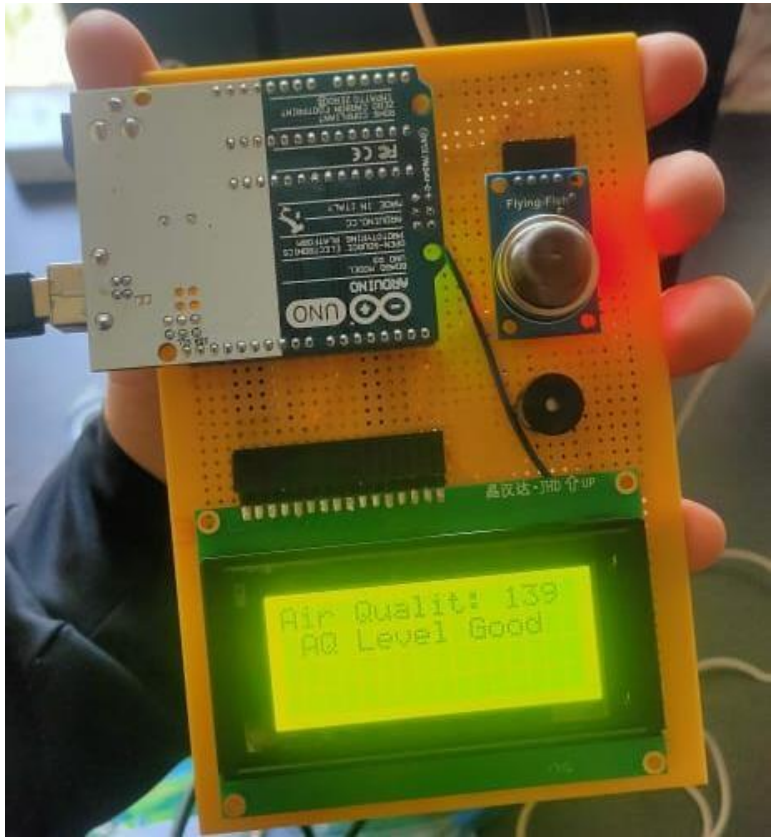
4.MQ-135 sensor and Buzzer connection with



5. Display connection with circuit

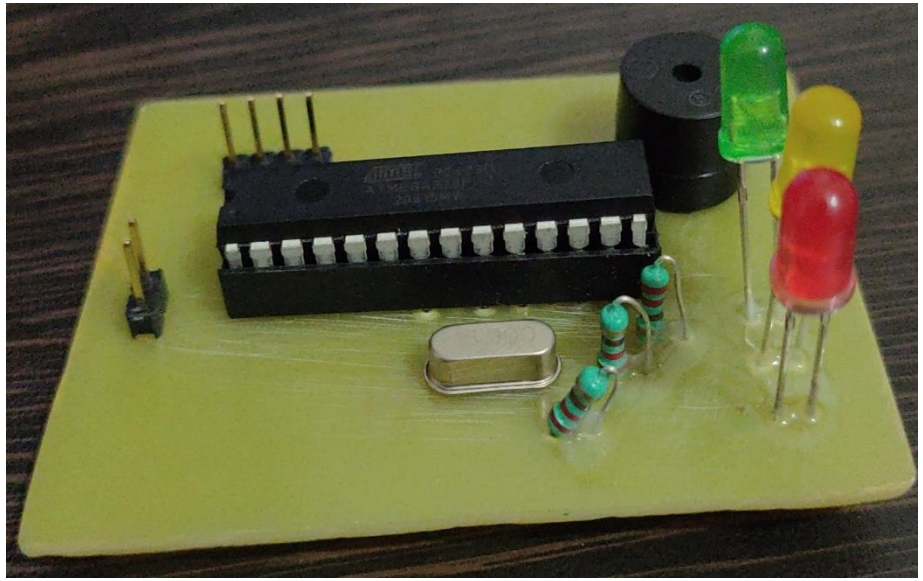


6.Working Module

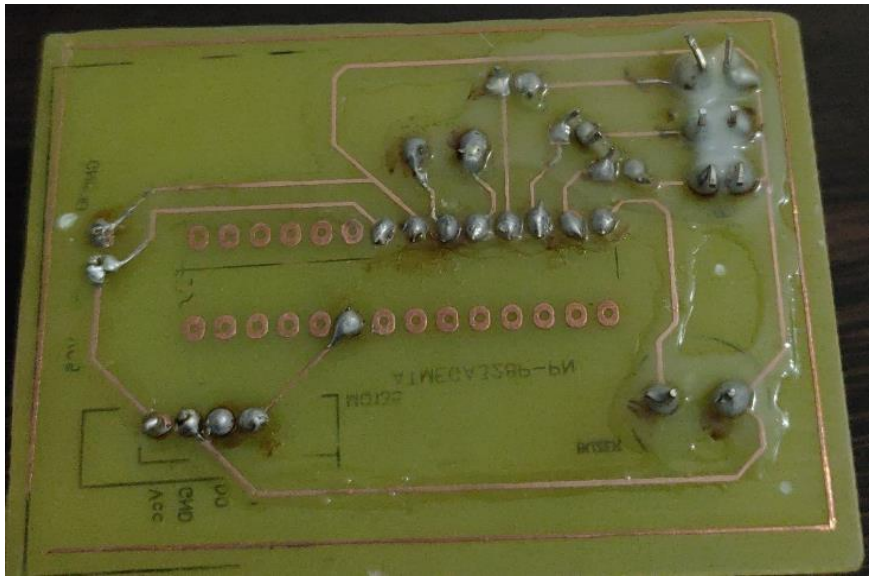


II. Second Device

1. **Front Side**



2. **Back Side**



2.3 DEVELOPING THE LOGIC

I. First Device Code

```
#include <LiquidCrystal.h>                          //Header file for LCD
const int rs=7, en=6, d4=5, d5=4, d6=3,            //pins of LCD connected to Arduino
d7=2; LiquidCrystal lcd (rs,en,d4,                    //lcd function from LiquidCrystal
d5,d6,d7);
int buz = 8;                                        //buzzer connected to pin 8
int led = 9;                                        //led connected to pin 9

const int aqsensor = A0;                            //output of mq135 connected to A0 pin
of Arduino
int threshold = 250;                                //Threshold level for Air Quality

void setup() {

  pinMode (buz,OUTPUT);                             // buzzer is connected as Output from
Arduino
  pinMode (aqsensor,INPUT);                         // MQ135 is connected as INPUT to
arduino

  Serial.begin (9600);                            //begin serial communication with baud
rate of 9600

  lcd.clear();                                    // clear lcd
  lcd.begin (16,4);                               // consider 16,4 lcd
}
```

```
void loop() {

  int ppm = analogRead(aqsensor);             //read MQ135 analog outputs at A0 and store it
ppm                                           in

  Serial.print("Air Quality: ");              //print message in serail monitor
  Serial.println(ppm);                        //print value of ppm in serial monitor

  lcd.setCursor(0,0);                         // set cursor of lcd to 1st row and 1st column
  lcd.print("Air Quality: ");                  // print message on lcd
  lcd.print(ppm);                             // print value of MQ135

  If (ppm > threshold)                        // check is ppm is greater than threshold or
    {                                         not
      lcd.setCursor(1,1);                     //jump here if ppm is greater than threshold
      lcd.print("AQ Level HIGH");
      Serial.println("AQ Level HIGH");
      digitalWrite(buz,HIGH);              //Turn ON Buzzer
    }
  Else
    {
      digitalWrite(buz,LOW);   //Turn off Buzzer
      lcd.setCursor(1,1);
      lcd.print ("AQ Level Good");
      Serial.println("AQ Level Good");
    }
  delay (500);
}
```

II. Second Device Code

```
 int buz = 8;  //buzzer connected to pin 8
int green = 7;  //led connected to pin 9
int yello = 6;  //led connected to pin 9
int red = 5;  //led connected to pin 9
const int aqsensor = A0;  //output of mq135 connected to A0 pin of Arduino
int threshold = 230;//Threshold level for Air Quality
int threshold1 = 200;
void setup() {
  pinMode (buz,OUTPUT);     // buzzer is connected as Output from Arduino
  pinMode (green,OUTPUT);     // led is connected as output from Arduino
  pinMode (yello,OUTPUT);     // led is connected as output from Arduino
  pinMode (red,OUTPUT);     // led is connected as output from Arduino
  pinMode (aqsensor,INPUT); // MQ135 is connected as INPUT to arduino
Serial.begin (9600);      //begin serial communication with baud rate of 9600
}
```

```
void loop() {
  int ppm = analogRead(aqsensor); //read MQ135 analog outputs at A0
and store it in ppm
 Serial.print("Air Quality: ");  //print message in serail monitor
  Serial.println(ppm);           //print value of ppm in serial monitor
 if (ppm > threshold)           // check is ppm is greater than threshold or not
    {
     Serial.println("AQ Level HIGH");
     tone(red,1000,200);        //blink led with turn on time 1000mS, turn off
time 200mS
      digitalWrite(green,LOW);
      digitalWrite(yello,LOW);
     digitalWrite(buz,HIGH);     //Turn ON Buzzer
}
else if (ppm < threshold)           // check is ppm is greater than threshold or
not
    {
 if (ppm <= threshold1)          // check is ppm is greater than threshold or
not
    {
Serial.println("AQ Level good");
```

```
tone(green,1000,200);        //blink led with turn on time 1000mS, turn off time 200mS
      digitalWrite(yello,LOW);
      digitalWrite(red,LOW);
      digitalWrite(buz,LOW);
   }
    Serial.println("AQ Level medium");
   tone(yello,1000,200);        //blink led with turn on time 1000mS, turn off time 200mS
      digitalWrite(green,LOW);
      digitalWrite(red,LOW);
      digitalWrite(buz,LOW);
   }
else
   {
 Serial.println("AQ Level Good");
     digitalWrite(green,HIGH);
      digitalWrite(yello,LOW);
     digitalWrite(red,LOW);
     digitalWrite(buz,LOW);
   }
  delay (500);
}
```

2.4 BURNING THE CODE INTO THE PROCESSOR

- Connect your Arduino using the USB cable.
- Choose Tools→Board→Arduino Uno to find your board in the Arduino menu.
- Choose the correct serial port for your board.
- Click the Upload button.

PHASE III: DEMONSTRATING ON THE KIT

3.1 OPTIMIZING THE COMPONENTS

- The biggest problem with connecting components is when connecting the wires between them in the

  right places.

- The most important thing was to make this device smaller so that its size can be reduced and it can be more effectively carried by anyone anywhere and can be disabled or enabled anywhere.

- Creating this device is the most common problem is a connecting each wire with a soldering so that soldering work is a most complicated and a time consuming work

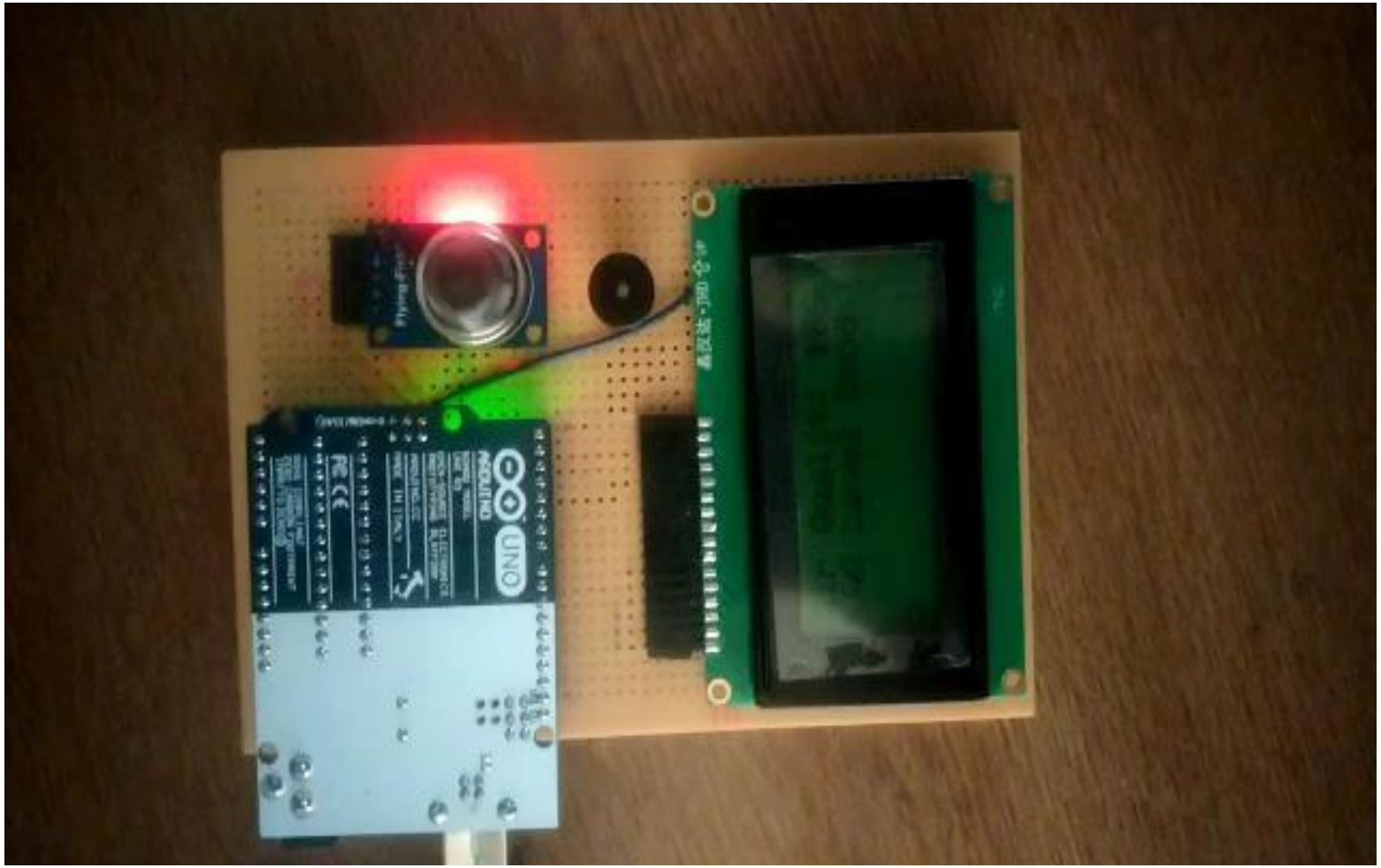
- The most serious thing when making this device was that if we put a single wire in the wrong place, there

  could be a problem with the components of our equipment, which could cost our equipment more.

3.2 DETAIL UNDERSTANDING THE HARDWARE COMPONENTS ON PCB

- This devise is Portable.
- It is easy to implement any place.
- This device gives output to current situation and current place
- We can disassemble and add any element of this device at any place

3.3 IMPLEMENTATION OF THE PROJECT



3.4 ADVANTAGES

- Thus, installing an air quality monitoring system helps monitor the presence of pollutants, resulting in better environmental conditions for humans to reside.
- This also impacts their health and reduces the chances of occurring any health issues by maintaining a moderate ambiance or as required.
- Monitoring helps in assessing the level of pollution in relation to the ambient air quality standards.
- Standards are a regulatory measure to set the target for pollution reduction and achieve clean air.

3.5 CHALLENGES

- The main problem to build this device was to find a compatible sensor for that device.

- The second main challenge is a connecting a circuit with a correct pin

- Main challenge of this device is a make this device portable for everyone

- The most important thing was to make this device smaller so that its size can be reduced and it can be more effectively carried by anyone anywhere and can be disabled or enabled anywhere.

3.6 REAL LIFE APPLICATIONS

Smock Detector

- Smoke sensors detect the presence of Smoke, Gases and Flame surrounding their field.

- It can be detected either optically or by the physical process or by the use of both the methods

Air Pollution detector

- The air pollution monitoring system was designed to monitor and analyse air quality in real-time and log data to a remote server, keeping the data updated over the internet.

- Air quality measurements were taken based on the Parts per Million (PPM) metrics and analysed using Microsoft Excel.

3.7 CONCLUSION

- This Air quality detector is devices that monitor the presence of air pollution and LPG GAS or Smock detector in the surrounding area.

- This device will be able to work in all three conditions

3.8 REFERENCES

To make this device we got a reference from online websites and Youtube.com platform.

Link of the Website :-

https://circuitdigest.com/arduino-projects

Link of the similar project :-

https://circuitdigest.com/microcontroller-projects/interfacing-mq135-gas-sensor- with-arduino-to-measure-co2-levels-in-ppm