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EEE 2004: MEASUREMENT AND INSTRUMENTATION

FINAL PROJECT REVIEW

TOPIC: IOT BASED AIR QUALITY INDEX MONITORING

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ABSTRACT

In IoT Based Air Pollution Monitoring System we will monitor the Air Quality and will trigger an alarm when the air quality goes down beyond a certain level, means when there are su cient amount of harmful gases are present in the air like CO2, smoke, alcohol, benzene and NH3. It will show the air quality in PPM on the LCD so that we can monitor it very easily.The alarm will set o to alert the user to switch on appliances (exhaust fan, Fan) to remove excess of gas from the room or cabin and maintain the air quality at a certain range. We are using an MQ135 sensor because it is the best choice for monitoring air quality as it can detect most of the harmful gases and can measure their amount in the sample/air accurately.

CURRENT STATUS

We successfully completed the project and checked the efficiency of the device comparing the data with pollution control board data.

MOTIVATION

The level of pollution has increased with times by lot of factors like the increase in population, increased vehicle use, industrialization and urbanization which results in harmful e ects on human wellbeing by directly a ecting health of population exposed to it. In order to monitor. In this project we are going to make an IOT Based Air Pollution Monitoring System in which we will monitor the Air Quality over a web server using internet and will trigger an alarm when the air quality goes down beyond a certain level.

LITERATURE SURVEY

1) Monika Singh Et al. in August 2019 proposed an Air Pollution Monitoring System. This system uses an Arduino microcontroller connected with MQ135 and MQ6 gas sensor which senses the di erent types of gases present in the environment. It was then connected to the Wi-Fi module which connects to the internet and LCD is used to display the output to the user and buzzer alerts when the ppm crosses certain limit. Their applications were industrial

perimeter monitoring, indoor air quality monitoring, site selection for reference monitoring stations, making data available to users.
2) Nithin Et al. in November 2018 used IoT by measuring the concentration of gas using various sensors which were observed through serial monitor of Arduino. This data is collected in Thing speak channels by means of Ethernet shield which is available in live for further processing. These analyzed results were viewed through thing speak in a graphical format. Then the average pollution level was calculated using MATLAB analysis and the time controlled results were viewed through an android app. Further based on the location, the air quality index value was obtained through the android app. Along with this, the health effects were also displayed in this app, so that the users can stay aware of the pollution levels.

PROBLEM STATEMENT

TOPIC: IOT BASED AIR QUALITY INDEX MONITORING

Our project supports the advanced technology and the concept of healthy life. This system enables people to monitor the amount of pollution in an area on their mobile phones using the application/website and also on an LCD Display. This system is budget friendly and therefore can be easily purchased in the market for a safer and healthier future

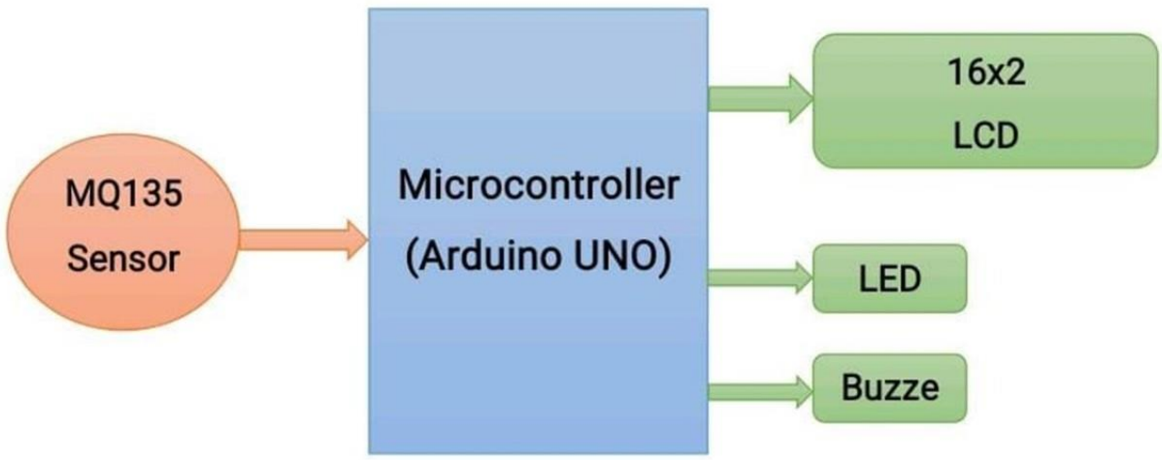
METHODOLOGY

PHASE 1
Detection of Air Pollutant Level It indicates the early phase of the project. An IoT based air pollution detection kit is developed. It deals with the collection of data from gas sensors connected to Arduino and the information is sent to the cloud platform that stores it.
PHASE 2
Creating the interface This stage involves the clari cation of the various components for optional performance. The data collected is stored, processed and can be monitored using the Mobile Application. Users can review the stored data through the application.
PHASE 3
Execution and Testing The various components are interfaced together and the project deliverables are built with the help of different circuit designs. The testing, debugging and troubleshooting of the design is performed to test the performance of the design under various conditions. If a circuit design fails to pass the tests, then a newer circuit design should be completed, implemented and tested.

DESIGN IMPLEMENTATION- HARDWARE DETAILS

1)MQ135 Gas sensor
2)Arduino Uno
3)16X2 LCD
4)Breadboard
5)10K potentiometer
6)1K ohm resistors
7) 220 ohm resistor
8) Buzzer

ALGORITHM



ARDUINO CODE

```
#include <LiquidCrystal.h> //Header le for LCD
const int rs=12, en=11, d4=5, d5=4, d6=3, d7=2; //pins of LCD connected to Arduino
LiquidCrystal lcd(rs,en,d4,d5,d6,d7); //lcd function from LiquidCrystal


int buz = 8; //buzzer connected to pin 8
int led = 9; //led connected to pin 9
```

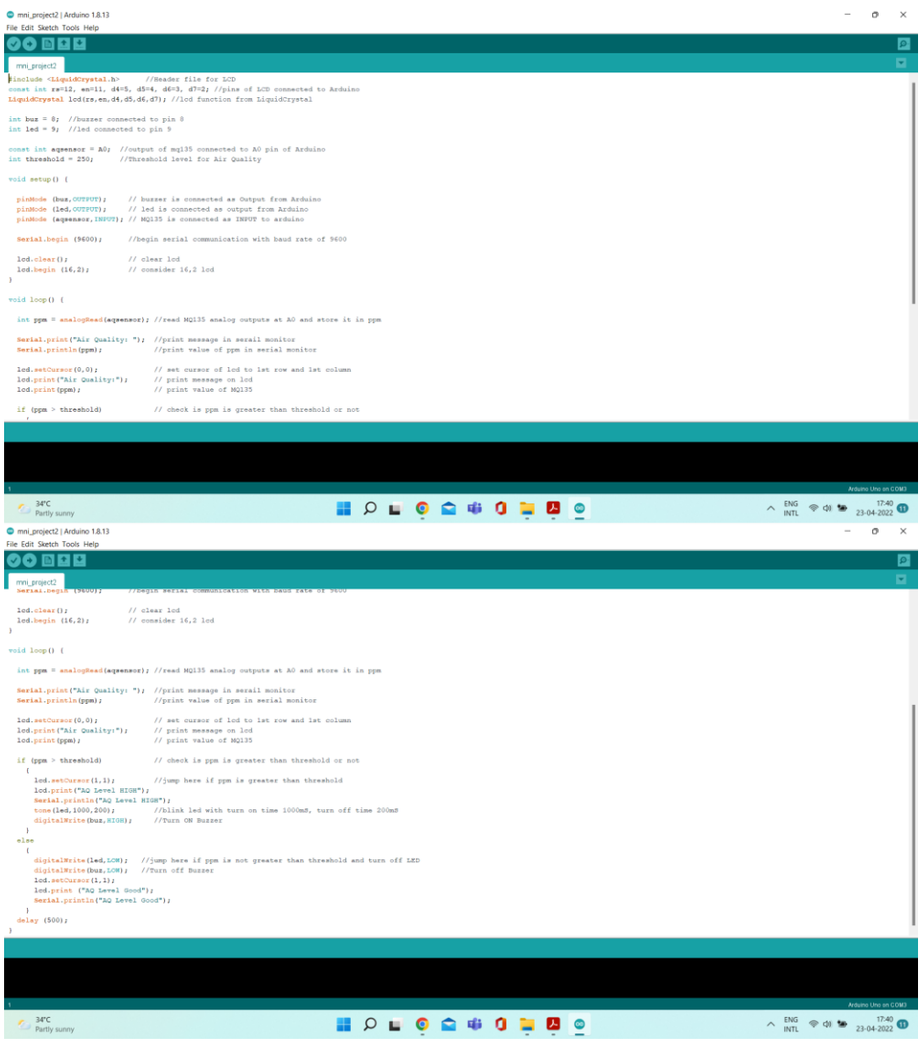
```
const int aqsensor = A0; //output of mq135 connected to A0 pin of Arduino
int threshold = 500; //Threshold level for Air Quality


void setup()


pinMode (buz,OUTPUT); // buzzer is connected as Output from Arduino
pinMode (led,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


lcd.clear(); // clear lcd
lcd.begin (16,2); // consider 16,2 lcd



void loop()


int ppm = analogRead(aqsensor); //read MQ135 analog outputs at A0 and store it in ppm
Serial.print("Air Quality: "); //print message in serial 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<100)

lcd.print("AQ level very good");
else 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");
tone(led,1000,200); //blink led with turn on time 1000mS, turn o time 200mS
digitalWrite(buz,HIGH); //Turn ON Buzzer

else

digitalWrite(led,LOW); //jump here if ppm is not greater than threshold and turn o LED
digitalWrite(buz,LOW); //Turn o Buzzer
lcd.setCursor(1,1);
lcd.print ("AQ Level Good");
Serial.println("AQ Level Good");

delay (500)
```

WORK FLOW

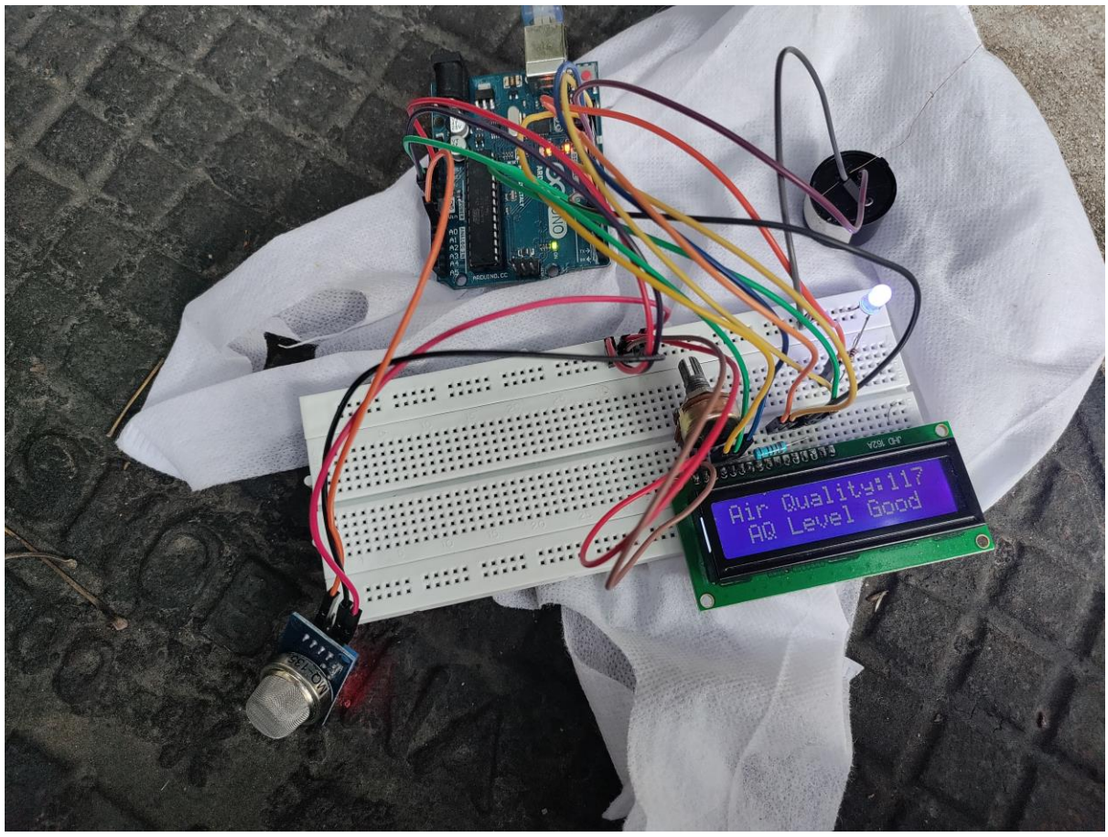
The MQ135 sensor can sense NH3, NOx, alcohol, Benzene, smoke, CO2 and some other gases, so it is perfect gas sensor for our Air Quality Monitoring Project. When we will connect it to Arduino then it will sense the gases, and we will get the Pollution level in PPM (parts per million). MQ135 gas sensor gives the output in form of voltage levels and we need to convert it into PPM. So for converting the output in PPM, here we have used a library for MQ135 sensor.

When the value will be less than 500 PPM, then the LCD will display “Fresh Air”. Whenever the value will increase 500 PPM, then the buzzer will start beeping and the LCD will display “Poor Air”.

SCREENSHOT OF THE CODE



PICTURE OF THE HARDWARE



RESULTS ACHIEVED TILL DATE

1)The hardware part was completed using sensor MQ135, Arduino, LCD, LED and Resistor.
2)The implementation was done when the Arduino was connected to the laptop using the port.
3)After running and compiling the code using Arduino IDE we were successfully able to nd the air quality index of the surrounding.

LESSONS LEARNED AND SCOPE FOR IMPROVEMENT

1) Implementation of Arduino code into the project helped us know more about the features and wide reach of this electronics platform .
2)Addition of ESP8266 would be a step forward in improvement of the project as it can store the data which can be used in the future.
3)Implementing the model in the large scale so that it is available for common people.

4)The project has many scopes of improvement which involves wide and deep research.

STANDARDS ADOPTED

i) IEEE P2143 standard
ii) Every safety-related hardware component and part used within the scope of ISO 26262 is subject to standard quali cation.

TIME LINE

In the month of January, we decided the problem statement for our project. As our project demands the concepts of micro controller and arduino.We started learning concepts. In the month of February we presented our review 1 for the project .It included all the progress we did till that date. Also it included the making of power point that we presented in our review. Then we ordered the hardware components. In the month of March we successfully made the required Arduino code. In the month of April, we assembled all the hardware that was required. We successfully got the required result and we also made the Power Point for our nal review.

ROLE AND RESPONSIBILITIES

Pulkit Saraf: Hardware implementation in the project.
Pratik Jain: Software simulation of circuit and hardware implementation.
Shreya Biswas: Software implementation required in the project and documentation.

GOOGLE DRIVE LINK OF THE VIDEO

https://drive.google.com/file/d/1HzAfjNXZKx7vC0uKMz_4DkUTZL2T_qvX/view?usp=drivesdk

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