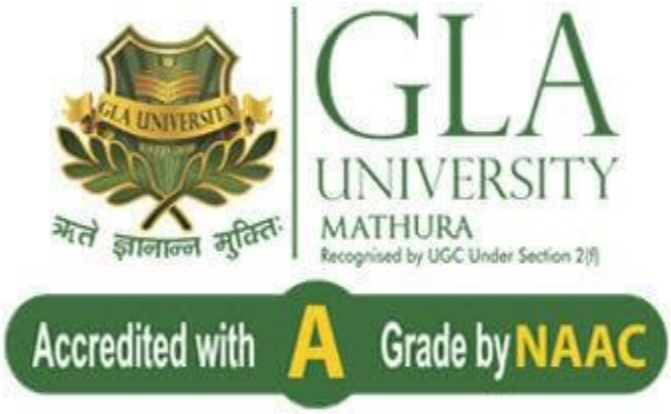


PROJECT FILE
ON

IoT Based Air Quality Monitoring System

Project Mentor : Mr Amir Khan Sir

Project Submission By: Abhishank Pandey

University Roll.No-181500011

CONTENT OVERVIEW

Project Synopsis

1.Introduction

As we know the level of the pollution has increased with times by lot of factors like the increase in the population,increased vehicle use,industrialization and urbanization which results in harmful effects on human wellbeing by directly affecting the health of population exposed to it.In order to monitor in this project we are going to make an IOT Based Air Quality Monitoring System in which we will monitor the air quality over a web server using internet and will trigger a alarm when the air quality goes beyond a certain level that means there are sufficient amount of harmful gases which are present in the pure air like C02,smoke,alcohol,benzene and ammonia(NH3).It will show the air quality in ppm(parts per million) on the LCD and as well as on webpage so that we can monitor it very easily.In this IOT project,we can monitor the air pollution level from anywhere using your computer or mobile. So it is necessary to monitor the air quality and keep it under control for a better future and healthy living for all.

2.Existing System

The commercial meters available in the market are Fluke CO220 carbon monoxide meter for CO, Amprobe CO2 meter for CO2, ForbixSemicon LPG gas leakage sensor alarm for LPG leakage detection. The researchers in this field have proposed various air quality monitoring systems based on WSN(Wireless Sensor Networks), GSM(Global System for mobile communications) and GIS(Geographic Information System). Now each technology has limited uses according to the intended function, as Zigbee is meant for users with Zigbee trans-receiver, Bluetooth. GIS based system is designed, implemented and tested to monitor the pinpoints of air pollution of any area. It consists of a microcontroller, gas sensors, mobile unit, a temporary memory buffer and a web server with internet connectivity which collects data from different locations along with coordinate's information at certain time of a day. The Global Positioning System (GPS) module is attached to a system to provide accurate representation of pollution sources in an area. The recorded data is periodically transferred to a computer through a General Packet Radio Service (GPRS) connection and then the data will be displayed on the dedicated website with user acceptance.The IoT based air pollution monitoring system can be produced by using sensors and microcontrollers present in the market.The microcontrollers are programmed to take the sensors as input and transmit the data to the cloud.An algorithm is developed to analyse the data and send it to the smartphones app.

Smartphone app will be developed for the user to access the air quality information in real time.Through this project,the potential impact around the worldwide globe can be improved upto some extent.There are many cities around the world which are facing air quality issues.The contaminated air results in death every year and decline in health conditions as people are exposed to unhealthy air quality.Awareness of the contaminated air enables the community and society to take precautionary steps. This will also enable the relevant authority to take the remedial actions.With this project both the community and society can enjoy cleaner air and improved health conditions.

3.Use of the Project

The use of this project is limited upto some extent only.Some of them are:

1.Industrial perimeter monitoring.

2.Indoor air quality monitoring.

3.Site selection for reference monitoring stations.

4.Making data available to users.

4.Idea of Project

The idea of my project is that to create a wireless distributed mobile air pollution monitoring system using General Packet Radio Service(GPRS) sensors.Since the smart air has been already developed based on the iot technology to efficiently monitor the air quality and transmit the data to a web server via LTE in real time.The device is composed of a microcontroller,pollutant detection sensor and a LTE modem. I am thinking about the new idea that we may display the information and graph levels of the pollutants present in the pure air about temperature ,humidity,various pollutants level such as methane,carbon dioxide ,alcohol level,liquified gases ,carbon monoxide level ,etc on both the cloud server called as thingspeak as well as on the television using hdmi cable,vga adapter.

Thus, Smart-Air was developed to collect accurate and reliable data for indoor air quality monitoring. Because the monitoring area is not constant, the device was designed to be easily customized to an environment by using an expandable interface. Thus, various types of sensors can be installed or adjusted based on the environment. Also, a Long-Term Evolution (LTE) modem is mounted in the device to transmit detected data directly to the web server for classifying and visualizing air quality. For most IoT platforms, gateway or data loggers are installed to gather and transmit data wirelessly to the web server. However, in this study, a microcontroller was installed in the device to gather the data from the sensors and transmit it to the web server using the LTE modem, eliminating the need for a gateway and a data logger.

5.Functional Specification

The functional specification of the project includes how the various IoT devices(components),sensors,bread-board etc. are connected i.e. circuit connection and the working of the project.So,here is the working of the project.

Working:

. The data of air is recognized by MQ135 gas sensor and MQ6 LPG gas sensor. The MQ135 sensor can sense NH3, NOx, alcohol, Benzene, smoke, CO2. So it is dynamic gas sensored for our Air pollution Monitoring system. When it will be connected to Arduino then it will sense all gases, and it will give the Pollution level in PPM (parts per million). MQ135 gas sensor will give the output in form of voltage levels and we have to convert it into PPM. So for converting the output in PPM, we have used a library for MQ135 gas sensor and MQ6 sensor.

Sensor is giving us value of 90 when there is no gas near it and the air quality safe level is 350 PPM and it should not exceed 1000 PPM. When it will exceed the limit of 1000 PPM, it will cause Headaches, sleepiness and stagnant, stuffy air. If it exceeds beyond 2000 PPM then it will cause increased heart rate and many different diseases. When the value will be less than 1000 PPM, then the LCD and webpage will display “Fresh Air”. When the value will increase from 1000 PPM, then the buzzer will start beeping and the LCD and webpage will display “Poor Air, Open Windows”. And when it will increase 2000, the buzzer will keep beeping and give an alert message on smartphone through GSM. The LCD and webpage will display “Danger! Move to fresh Air”. It will contain temperature and humidity so it will possibly show the current temperature and humidity of the air. For temperature we have used LM35 sensor and for humidity SY-HS-220 or DHT-11 sensor.For my easy purpose, I am using DHT-11 which is both a temperature as well as humidity sensor.

According to the model the 4 sensors works as input data, they transmit data for knowing which gas it is, what is the temperature and humidity. LCD and Buzzer are the output devices. LCD shows the data of the gases in ppm (parts per million) and Buzzer is used when ppm crosses above a threshold limit.

6.Hardware(Components) Requirements

1. MQ135 Gas sensor

2.Arduino Uno

3.Wi-Fi module ESP8266

4.Breadboard

5.Buzzer

6.10K potentiometer

7. 1K ohm resistors

8.220 ohm resistor

9.MQ 6 LPG gas sensor

10. Temperature & Humidity Sensor(DHT-11)

7.Software Requirements

1.Arduino UNO 1.6.13 Software

2.Embedded C programming Language

3.ThingSpeak cloud data server for displaying the output of the project.

(If needed as in my project while performing the connection my lcd display got damaged due to short circuit that's why I am unable to show the output on cloud server)

8.Future Scope

Air pollution monitoring is an important application of Internet of Things. In this project, we propose an air pollution monitoring system using IoT. The main objective of this model is to monitor and analyze the air pollution from any location. The hardware setup of the proposed system is detailed very short briefly in this project. Real time deployment of the proposed model is to be carried out in the future. Maintenance of the equipment in all weather conditions, transmission of data effectively etc. are the challenges that need to be addressed furthermore in future.

In future the project can be upgraded in more ways than one:

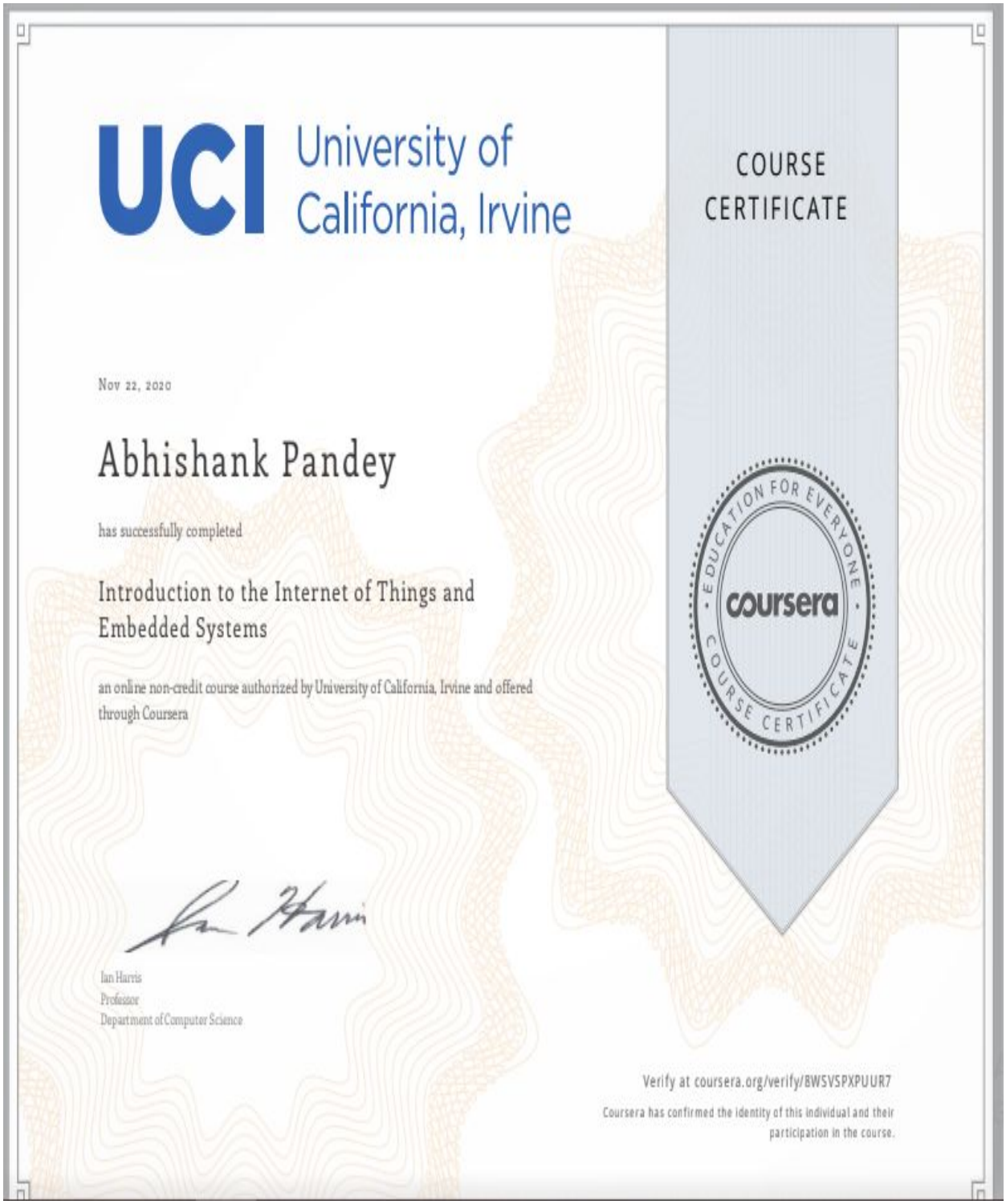
1.Interface more number of sensors to know the detail content of all gases present in the air.

2.Design a web page and upload data on it with date and time.

3.Interface SD card to store data.

4.Interface GPS module to monitor the pollution at exact location & upload on the webpage for the netizens.

Course Certificate Project



UCI University of California, Irvine

COURSE CERTIFICATE

Nov 22, 2020

Abhishank Pandey

has successfully completed

Introduction to the Internet of Things and Embedded Systems

an online non-credit course authorized by University of California, Irvine and offered through Coursera

EDUCATION FOR EVERYONE · coursera · COURSE CERTIFICATE

Ian Harris
Professor
Department of Computer Science

Verify at coursera.org/verify/8WSVSPXPUUR7

Coursera has confirmed the identity of this individual and their participation in the course.

Project Mid-Term Report

Abstract

As the world's population is becoming increasingly urban, the cities are under pressure to remain livable. In recent years, the air quality of the cities has become one of the major cause of concern around the world.Thus,in this project it is necessary to constantly monitor the air quality index of a city to make it smart and livable. In this paper, we propose and develop an IoT based Air Quality Monitoring System for Smart Cities or even other small cities and towns. The real-time data of the air quality is accessed through the smart devices and analyzed to measure the impact on city dwellers. The smart devices are capable of measuring the Temperature, Humidity, Carbon Monoxide, LPG, Smoke and other hazardous particulate matters like PM2.5 and PM10 levels in the atmosphere. The gathered data is accessed globally through an Android Application or any cloud data server of IoT.

IoT technology has evolved due to the convergence of multiple technologies real-time analytics,machine learning,commodity sensors, and embedded systems.Traditional fields of embedded systems, wireless sensor networks,control systems,automation(including home and building automation)and others all contribute to enabling the Internet of things. In the consumer market, IoT technology is most synonymous with products pertaining to the concept of the "smart home",including devices and appliances(such as lighting fixtures,thermostats,home security systems that support one or more common ecosystems, and can be controlled via devices associated with that ecosystem, such as smartphones and smart speakers.

There are a number of serious concerns about dangers in the growth of IoT, especially in the areas of privacy and security and consequently industry and governmental moves to address these concerns have begun including the development of international standards.

1.Introduction

To develop this IoT project first of all we need to know the basics of sensors,some basic knowledge of C and Python programming along with very little knowledge of embedded c programming(not enough) that is it should be sufficient.To build any type of IoT project we need these basic components first of all such as arduino uno development board, sensors,a well high speed internet connections, a cloud server through which we will be sending ,uploading , transferring and reading the data with it, well established database connectivity,etc. In this IoT project of " Air Quality Monitoring System" we need components such as: a arduino uno development board, node mcu(esp8266 wifi module), sensors such as MQ6 and MQ135 gas sensors,DHT11 sensor for measuring the temperature and humidity,bread board,jumper wires,16x2 LCD display for iot project ,a dc 5V power supply if needed for node mcu .

Air pollution is the biggest problem of every nation, whether it is developed or developing. Health problems have been growing at faster rate especially in urban areas of developing countries where industrialization and growing number of vehicles leads to release of lot of gaseous pollutants. Harmful effects of pollution include mild allergic reactions such as irritation of the throat, eyes and nose as well as some serious problems like bronchitis, heart diseases, pneumonia, lung and aggravated asthma. According to a survey, due to air pollution 50,000 to 100,000 premature deaths per year occur in the U.S. alone. Whereas in EU number reaches to 300,000 and over 3,000,000 worldwide. IOT Based Air Pollution Monitoring System monitors the Air quality over a web server using Internet and will trigger an alarm when the air quality goes down beyond a certain threshold level, means when there are sufficient amount of harmful gases present in the air like CO2, smoke, alcohol, benzene, NH3, LPG and NOx. It will show the air quality in PPM on the LCD and as well as on webpage so that it can monitor it very easily. LPG sensor is added in this system which is used mostly in houses. The system will show temperature and humidity. The system can be installed anywhere but mostly in industries and houses where gases are mostly to be found and gives an alert message when the system crosses threshold limit.

1.2 Analysis Of Project

IOT Based Air Pollution Monitoring System monitors the Air Quality over a webserver using internet and will trigger an alarm when the air quality goes down beyond a certain level, means when there are amount of harmful gases present in the air like CO2, smoke, alcohol, benzene, NH3, NOx and LPG.

The system will show the air quality in PPM on the LCD and as well as on webpage so that it can be monitored very easily. Temperature and Humidity is detected and monitored in the system.

LPG gas is detected using MQ6 sensor and MQ135 sensor is used for monitoring Air Quality as it detects most harmful gases and can measure their amount accurately. In this IOT project, it can monitor the pollution level from anywhere using your computer or mobile. This system can be installed anywhere and can also trigger some device when pollution goes beyond some level, like we can send alert SMS to the user.

1.3 Hardware And Software Requirements

Hardware Requirements:

1) MQ135 Gas sensor

2) Arduino Uno

3) Wi-Fi module ESP8266

4) 16x2 LCD display

5) Breadboard

6) MQ 6 LPG gas sensor

7) Buzzer

8) DHT-11 (both a temperaure and humidity sensor)

Software requirements:

1) Arduino 1.6.13 Software

2)Embedded C Language

3) ThingSpeak cloud data server for displaying output to the lcd display screen.

1.4 Components Description

1) Arduino UNO:-

Arduino Uno is a microcontroller board based on the ATmega328P It has 14 digital input/output pins 6 analog inputs, a 16 MHz quartz crystal, a USB Connection, power jack, an ICSP header and a reset button.

2) MQ135 sensor:-

The MQ135 sensor can sense NH3, NOx, alcohol, Benzene, smoke, CO2 and some other gases.It gives the output in form of voltage levels.

3) WIFI Module (ESP8266/Node MCU):-

The ESP8266 is a low-cost Wi-Fi chip with full TCP/IP stack and MCU (microcontroller unit) capability. It runs on 3.3V and gives our system access to Wi-Fi or internet.

4) Buzzer:-

A Buzzer or beeper is an audio signaling device.Whenever the air pollution goes above the threshold level the Buzzer starts beeping indicating Danger

5) LCD (Liquid Crystal Display):-

This is a basic (16x2) 16 character by 2 line display. Black text on Green background. It is used to indicate the Air and Humidity in PPM.

6) LPG Sensor:-

MQ-6 sensor is a simple-to-use liquefied petroleum gas (LPG) sensor, suitable for sensing LPG (composed of mostly propane and butane) concentrations in the air. The MQ-6 can detect gas concentrations anywhere from 200 to 10000ppm.

7) DHT-11 Temperature & Humidity Sensor:

DHT11 is a low-cost digital sensor for sensing temperature and humidity. This sensor can be easily interfaced with any micro-controller such as Arduino, Raspberry Pi etc… to measure humidity and temperature instantaneously.

2 Objective

Main objective or the motive of this project is to prevent the harmful effects of pollutants present in the air so that a healthy surrounding can be maintained by data analysis of stored data in IoT cloud.In today's world many pollution monitoring systems are designed by considering the different environmental parameters.The other objective of this project would be to analyze the data on any IoT cloud data server so that in future if needed we can improve the quality of air by minimizing the use of fossil fuels and other resources and can give more preference to renewable source of energy.

3 Implementation of Project

Proposed concept

a) Design Ideas: Air quality sensors are installed in the targeted area on top of buildings, industrial areas, traffic and residential areas. These sensors are connected to a microcontroller to control the sensors network. The data collected by the microcontroller is transmitted to the cloud for analysis. The analyzed data is shared to the public through a smartphone app.

b) How it works?: Wireless sensors placed at strategic locations sense the level of dust particles, carbon dioxide, carbon monoxide, nitrogen dioxide and sulfur dioxide in the air. This information is transmitted to a gateway which forwards it to a cloud database by means of cellular or WiFi communication. In the cloud, the data are analyzed to provide information on the air quality. The information on the air quality is shared through a smartphone app. This allows the relevant authority to take remedial action and the community to take precautionary measures

c) What makes it innovative?: This project proposes an idea to install monitoring applications on smartphones. It is innovative because it provides easy access to the public to monitor real time air quality in their area. It uses low cost and readily available devices such as a dust sensor, carbon monoxide gas sensor, carbon dioxide gas sensor, and nitrogen dioxide gas sensor. For controlling these sensors, microcontrollers are used and the microcontrollers also act as transmitter to transmit the data to the cloud database. The information on air quality can be accessed through a smartphone app in real time.

d) How would it be produced?: The IoT based air pollution monitoring system can be produced by using sensors and microcontrollers available in the market. The microcontrollers are programmed to take the sensors as input and transmit the data to the cloud. An algorithm is developed to analyse the data and send it to the smartphones app or computer or laptops. Smartphone app will be developed for user to access the air quality information in real-time.

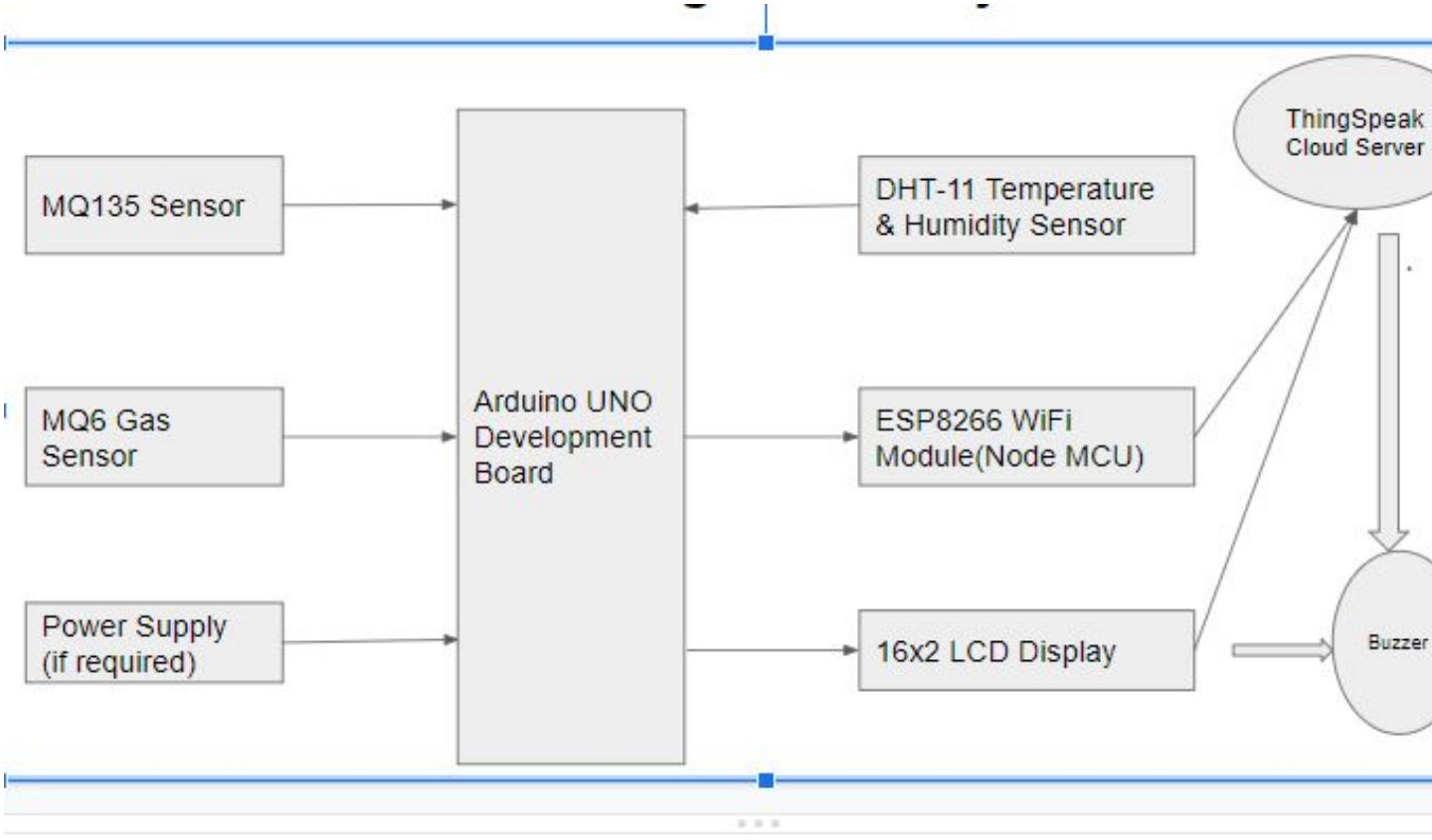
e) Where would it be applied?: i. Sensors will be installed on top of buildings, industrial areas, traffic and residential areas.

ii. Smartphone app for monitoring is installed in individual smartphone.

Potential impact around the globe?

There are many cities around the world facing air quality issues. The contaminated air results in death every year and decline in health conditions as people are exposed to unhealthy air quality. Awareness of the contaminated air enables the community to take precautionary steps. With this project the community can enjoy cleaner air and improved health conditions.

Block Diagram Of Project



4. Area(Scope) of IoT in Computer Science

Internet of Things (IoT) has been identified as one of the emerging technologies in IT. Future of IoT is very bright as this is feeding and empowering Data Science and Artificial Intelligence in a big way. Data from IoT network enables us to have better tracking, monitoring, prediction, management and control of various systems in different industries.

Career Opportunities

- Data Analytics
- Network and Structure
- Cell and UI Development Artificial Intelligence
- Infonomics and Data Broking
- Shift from Intelligent Edge to Intelligent Mesh
- IoT Governance
- Sensor Innovation
- Social, Legal and Ethical IoT.

- Innovation on the Chip.

Explanation Content

First of all we will connect the **ESP8266 with the Arduino**. ESP8266 runs on 3.3V and if you will give it 5V from the Arduino then it won't work properly and it may get damage. Connect the VCC and the CH_PD to the 3.3V pin of Arduino. The RX pin of ESP8266 works on 3.3V and it will not communicate with the Arduino when we will connect it directly to the Arduino. So, we will have to make a voltage divider for it which will convert the 5V into 3.3V. This can be done by connecting three resistors in series like we did in the circuit. Connect the TX pin of the ESP8266 to the pin 10 of the Arduino and the RX pin of the esp8266 to the pin 9 of Arduino through the resistors.

ESP8266 Wi-Fi module gives your projects **access to Wi-Fi or internet**. It is a very cheap device and make your projects very powerful. It can communicate with any microcontroller and it is the most leading devices in the IoT platform.

Then we will connect the **MQ135,MQ6 sensor with the Arduino**. Connect the VCC and the ground pin of the sensor to the 5V and ground of the Arduino and the Analog pin of sensor to the A0 of the Arduino.

Connect a buzzer to the pin 8 of the Arduino which will start to beep when the condition becomes true.

In last, we will connect LCD with the Arduino.The connections of the LCD are as follows

- Connect pin 4 (RS) to the pin 12 of the Arduino.
- Connect pin 5 (Read/Write) to the ground of Arduino. This pin is not often used so we will connect it to the ground.
- Connect pin 6 (E) to the pin 11 of the Arduino. The RS and E pin are the control pins which are used to send data and characters.
- The following four pins are data pins which are used to communicate with the Arduino.

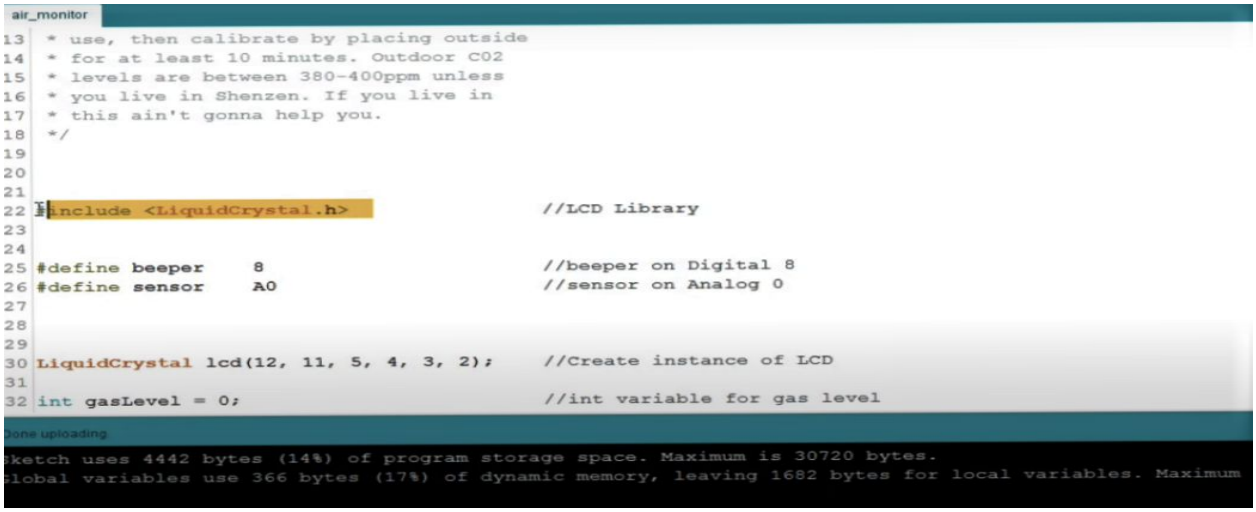
Connect pin 11 (D4) to pin 5 of Arduino.

Connect pin 12 (D5) to pin 4 of Arduino.

Connect pin 13 (D6) to pin 3 of Arduino.

Connect pin 14 (D7) to pin 2 of Arduino.

- Connect pin 15 to the VCC through the 220 ohm resistor. The resistor will be used to set the back light brightness. Larger values will make the back light much more darker.
- Connect pin 16 to the Ground.

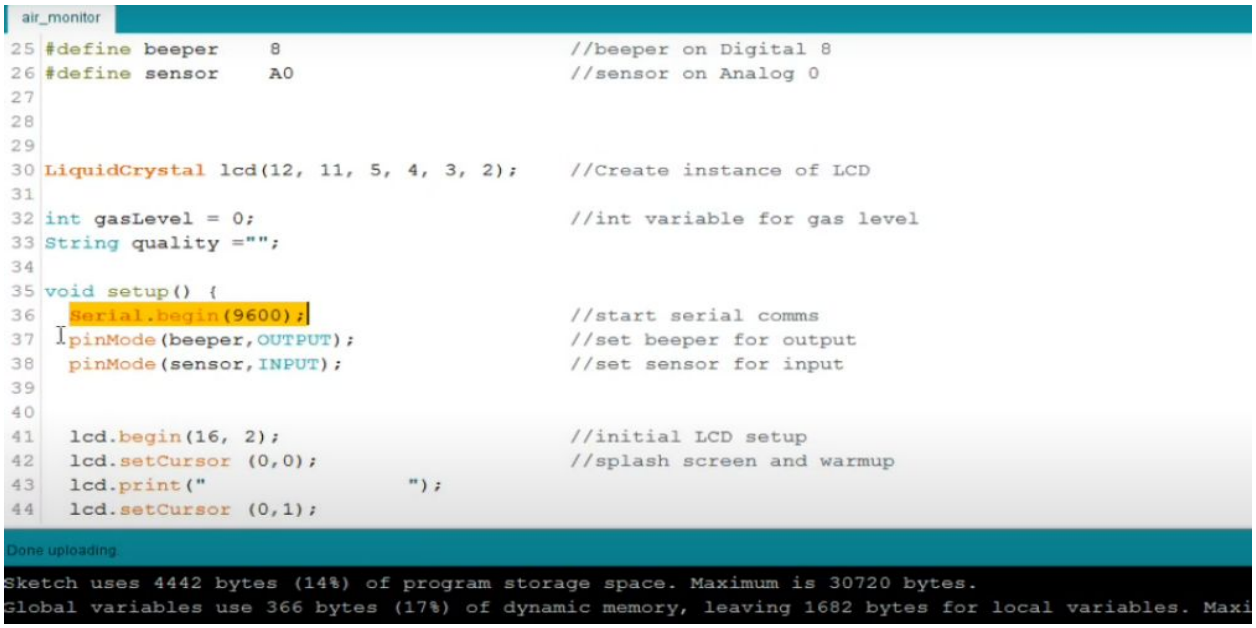


air_monitor

```
 * use, then calibrate by placing outside
 * for at least 10 minutes. Outdoor C02
 * levels are between 380-400ppm unless
 * you live in Shenzen. If you live in
 * this ain't gonna help you.
 */


#include <LiquidCrystal.h>                //LCD Library


#define beeper     8                      //beeper on Digital 8
#define sensor     A0                     //sensor on Analog 0


LiquidCrystal lcd(12, 11, 5, 4, 3, 2);    //Create instance of LCD

int gasLevel = 0;                         //int variable for gas level
```

Done uploading.

```
Sketch uses 4442 bytes (14%) of program storage space. Maximum is 30720 bytes.
Global variables use 366 bytes (17%) of dynamic memory, leaving 1682 bytes for local variables. Maximum
```

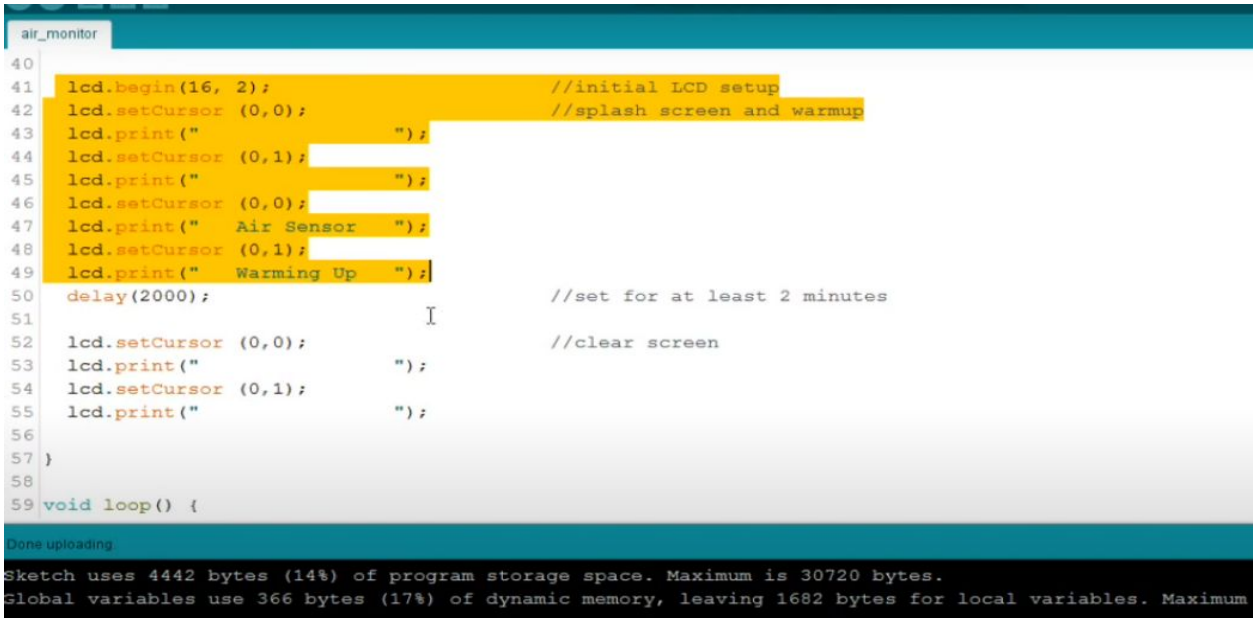


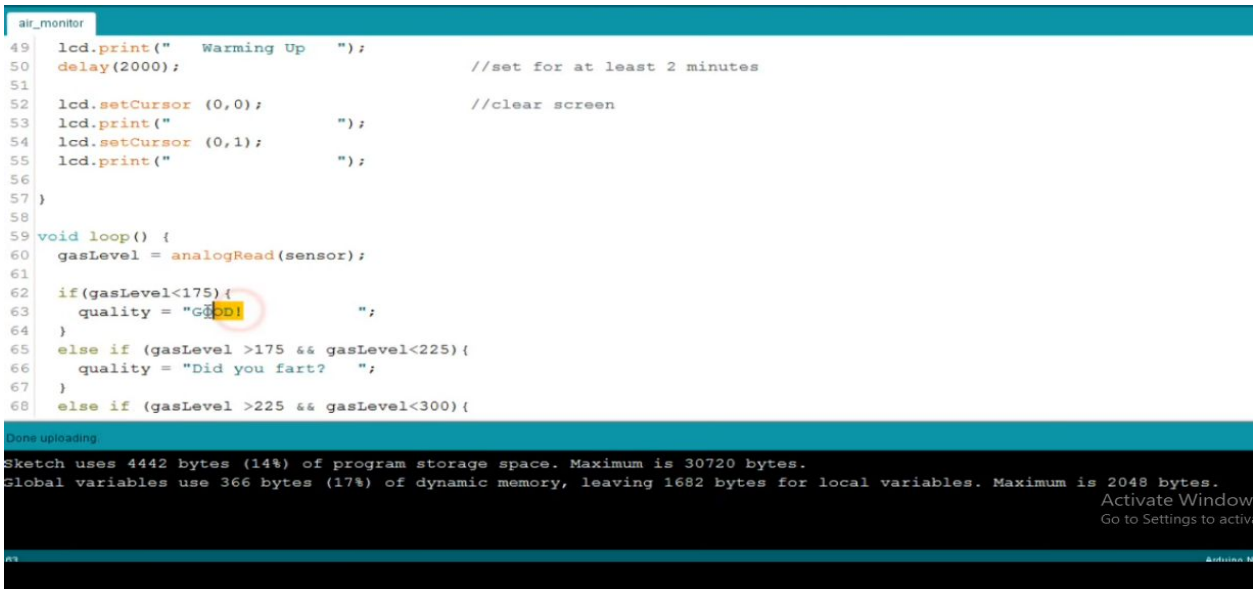
air_monitor

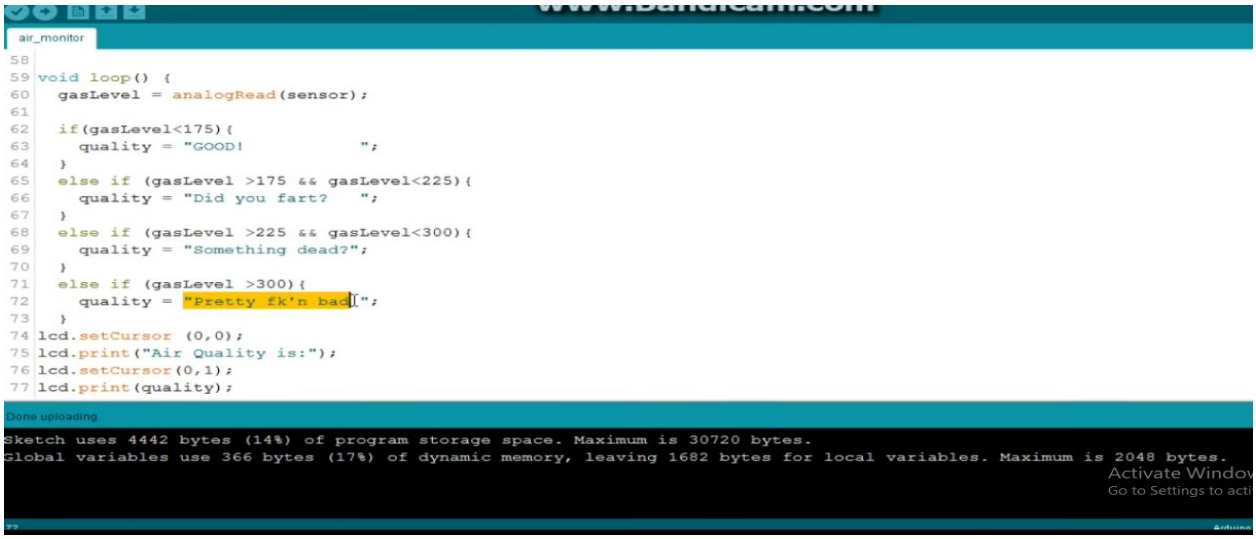
```
#define beeper     8                      //beeper on Digital 8
#define sensor     A0                     //sensor on Analog 0



LiquidCrystal lcd(12, 11, 5, 4, 3, 2);    //Create instance of LCD

int gasLevel = 0;                         //int variable for gas level
String quality ="";

void setup() {
  Serial.begin(9600);                     //start serial comms
  pinMode(beeper,OUTPUT);                 //set beeper for output
  pinMode(sensor,INPUT);                  //set sensor for input


  lcd.begin(16, 2);                       //initial LCD setup
  lcd.setCursor (0,0);                    //splash screen and warmup
  lcd.print("                ");
  lcd.setCursor (0,1);
```

Done uploading.

```
Sketch uses 4442 bytes (14%) of program storage space. Maximum is 30720 bytes.
Global variables use 366 bytes (17%) of dynamic memory, leaving 1682 bytes for local variables. Maxi
```


air_monitor
40
41 lcd.begin(16, 2);   //initial LCD setup
42 lcd.setCursor (0,0);   //splash screen and warmup
43 lcd.print("   ");
44 lcd.setCursor (0,1);
45 lcd.print("   ");
46 lcd.setCursor (0,0);
47 lcd.print(" Air Sensor   ");
48 lcd.setCursor (0,1);
49 lcd.print(" Warming Up   ");
50 delay(2000);   //set for at least 2 minutes
51
52 lcd.setCursor (0,0);   //clear screen
53 lcd.print("   ");
54 lcd.setCursor (0,1);
55 lcd.print("   ");
56
57 }
58
59 void loop() {
Done uploading.
Sketch uses 4442 bytes (14%) of program storage space. Maximum is 30720 bytes.
Global variables use 366 bytes (17%) of dynamic memory, leaving 1682 bytes for local variables. Maximum


air_monitor
49 lcd.print(" Warming Up   ");
50 delay(2000);   //set for at least 2 minutes
51
52 lcd.setCursor (0,0);   //clear screen
53 lcd.print("   ");
54 lcd.setCursor (0,1);
55 lcd.print("   ");
56
57 }
58
59 void loop() {
60 gasLevel = analogRead(sensor);
61
62 if(gasLevel<175){
63   quality = "GOOD!   ";
64 }
65 else if (gasLevel >175 && gasLevel<225){
66   quality = "Did you fart?   ";
67 }
68 else if (gasLevel >225 && gasLevel<300){
Done uploading.
Sketch uses 4442 bytes (14%) of program storage space. Maximum is 30720 bytes.
Global variables use 366 bytes (17%) of dynamic memory, leaving 1682 bytes for local variables. Maximum is 2048 bytes.
Activate Window
Go to Settings to activ



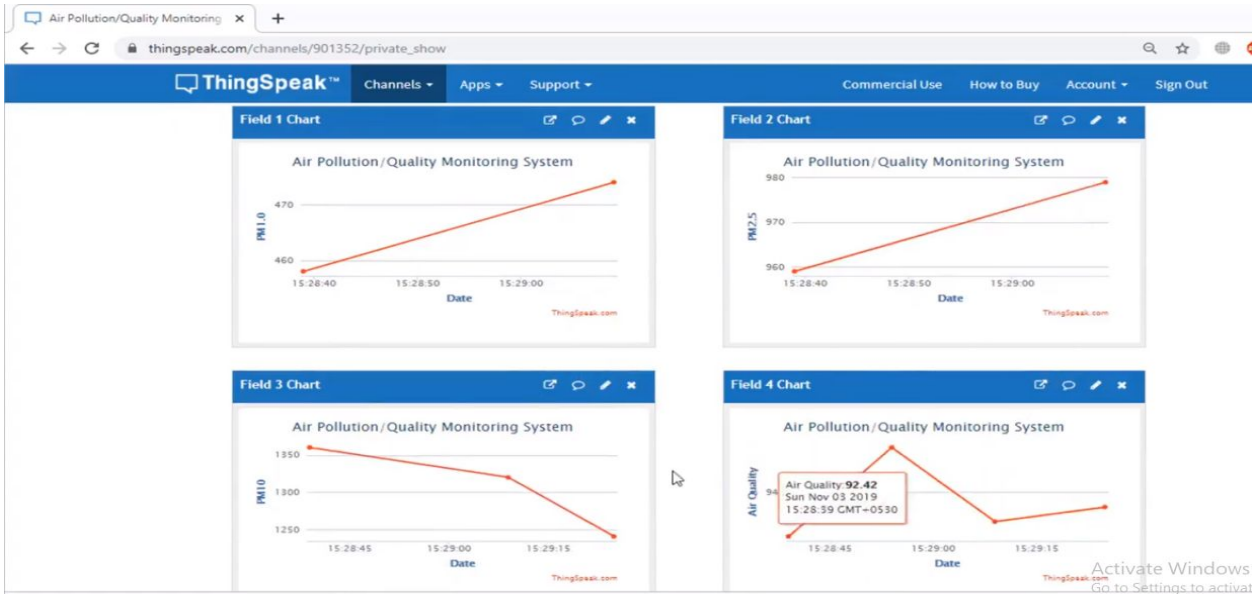
air_monitor

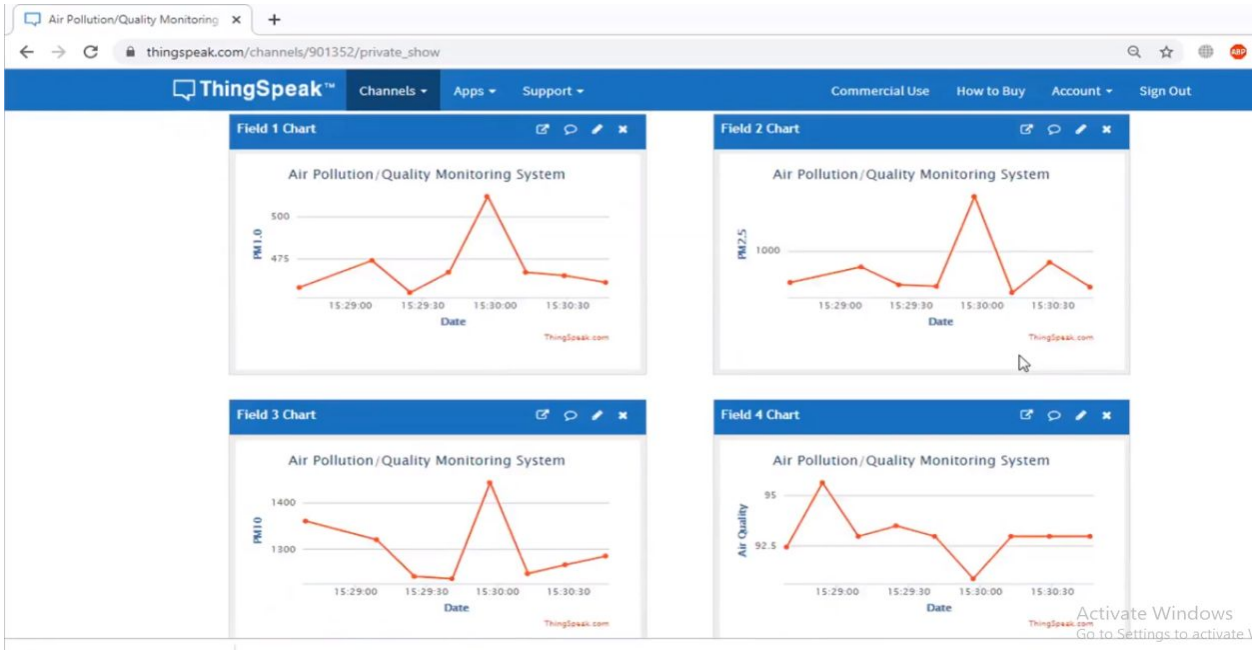
```
58
59 void loop() {
60   gasLevel = analogRead(sensor);
61
62   if(gasLevel<175){
63     quality = "GOOD!            ";
64   }
65   else if (gasLevel >175 && gasLevel<225){
66     quality = "Did you fart?    ";
67   }
68   else if (gasLevel >225 && gasLevel<300){
69     quality = "Something dead?";
70   }
71   else if (gasLevel >300){
72     quality = "Pretty fk'n bad!";
73   }
74 lcd.setCursor (0,0);
75 lcd.print("Air Quality is:");
76 lcd.setCursor(0,1);
77 lcd.print(quality);
```

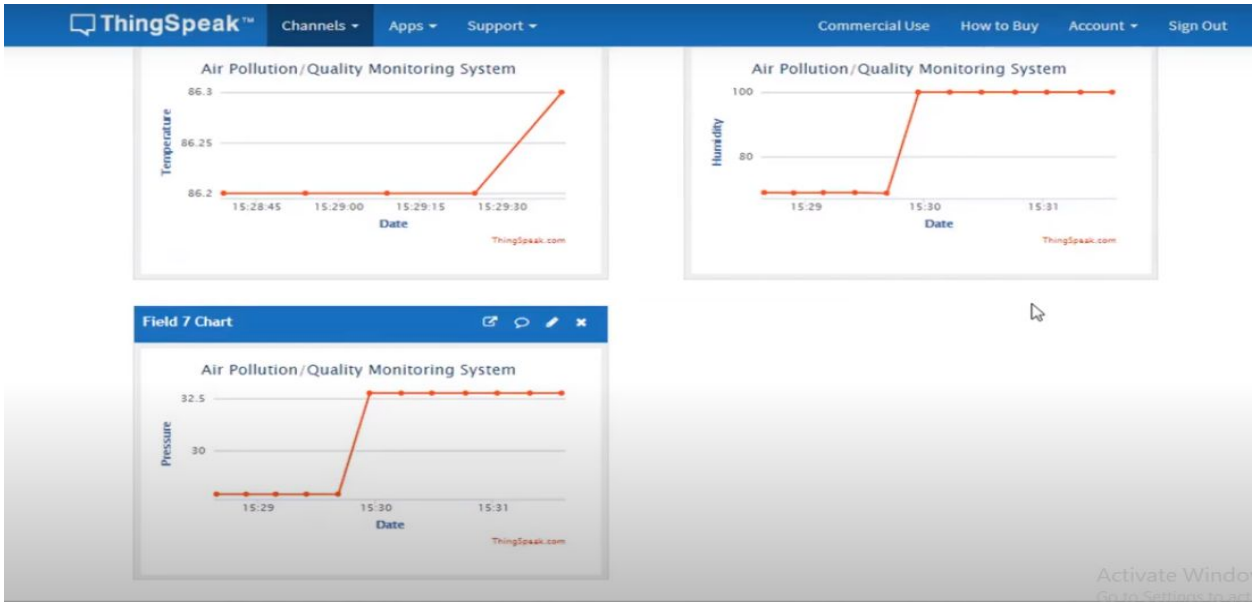
Done uploading

```
Sketch uses 4442 bytes (14%) of program storage space. Maximum is 30720 bytes.
Global variables use 366 bytes (17%) of dynamic memory, leaving 1682 bytes for local variables. Maximum is 2048 bytes.
```


```
Air Quality: 97.21  PPM

Temperature =  85.8
Humidity =  69.9
Pressure =  944.5
Pressure Inch = 27.89
Dew Point =  75.0
.............................................
PM1.0: 524  ug/m3
PM2.5: 1053  ug/m3
PM10 : 1373  ug/m3

Air Quality: 91.38  PPM

Temperature =  85.8
Humidity =  69.8
Pressure =  944.5
Pressure Inch = 27.89
```


Air Pollution/Quality Monitoring
thingspeak.com/channels/901352/private_show
ThingSpeak™
Channels
Apps
Support
Commercial Use
How to Buy
Account
Sign Out
Field 1 Chart
Air Pollution/Quality Monitoring System
PM1.0
470
460
15:28:40
15:28:50
15:29:00
Date
Field 2 Chart
Air Pollution/Quality Monitoring System
PM2.5
980
970
960
15:28:40
15:28:50
15:29:00
Date
Field 3 Chart
Air Pollution/Quality Monitoring System
PM10
1350
1300
1250
15:28:45
15:29:00
15:29:15
Date
Field 4 Chart
Air Pollution/Quality Monitoring System
Air Quality
Air Quality:92.42
Sun Nov 03 2019
15:28:39 GMT+0530
15:28:45
15:29:00
15:29:15
Date
Activate Windows


Air Pollution/Quality Monitoring
thingspeak.com/channels/901352/private_show
ThingSpeak™
Channels
Apps
Support
Commercial Use
How to Buy
Account
Sign Out
Field 1 Chart
Air Pollution/Quality Monitoring System
PM1.0
500
475
15:29:00
15:29:30
15:30:00
15:30:30
Date
Field 2 Chart
Air Pollution/Quality Monitoring System
PM2.5
1000
15:29:00
15:29:30
15:30:00
15:30:30
Date
Field 3 Chart
Air Pollution/Quality Monitoring System
PM10
1400
1300
15:29:00
15:29:30
15:30:00
15:30:30
Date
Field 4 Chart
Air Pollution/Quality Monitoring System
Air Quality
95
92.5
15:29:00
15:29:30
15:30:00
15:30:30
Date
Activate Windows



6. References

1]https://store.arduino.cc/arduino-uno-rev3

[2]https://www.arduino.cc/

[3] www.iotwebplanet.com

[4] content/uploads/2008/04/5v-r

Project Code

Since while performing the experiment/activity , my lcd display screen got damaged/burnt/short circuited .That's why now I am unable to show the output on the lcd display and thingspeak cloud server which I have mentioned earlier in my synopsis and project report.
Sorry, for writing this as I am not making any excuses. And writing a normal code.

```
#include <SimpleDHT.h>

// for DHT11,
//      VCC: 5V or 3V
//      GND: GND
//      DATA: 2

//Pin Definition

int pinDHT11 = 2;
SimpleDHT11 dht11(pinDHT11);
```

```
int led = 9;



void setup() {
   // start working...
  Serial.println(" Temperature and Humidity Data ");
  Serial.begin(9600);
}

void loop() {

  // read without samples.
  byte temperature = 0;
  byte humidity = 0;


 float sensorVoltage;                                  // Initialize Variable
for Sensor Voltage for MQ6
  float sensorValue;                                  // Initialize Variable
for Sensor Value for MQ6



   float sensorVoltage1;                                  // Initialize
Variable for Sensor Voltage for MQ135
```

```
  float sensorValue1;                                  // Initialize Variable
for Sensor Value for MQ135

  sensorValue = analogRead(A1);     // Read the Sensor Values
from Analog Pin A0

  sensorValue1 = analogRead(A0);     // Read the Sensor Values
from Analog Pin A0

  int err = SimpleDHTErrSuccess;
  if ((err = dht11.read(&temperature, &humidity, NULL)) !=
SimpleDHTErrSuccess) {
    Serial.print("Read DHT11 failed, err=");
Serial.println(err);delay(1000);
    return;
  }

 Serial.print("The temperature is ");
  Serial.print((int)temperature); Serial.println(" *C ");
   Serial.print("The Humidity is ");
  Serial.print((int)humidity); Serial.println(" H");

  Serial.print("Air quality measured from MQ6 is");
    Serial.print(sensorValue);
  Serial.println("PPM");
```

```
  Serial.print("Air quality measured from MQ135 is");
   Serial.print(sensorValue1);
 Serial.println("PPM");


 if (sensorValue>200||(sensorValue1>200))
 { Serial.print(" Air Quality Severe") ;
 digitalWrite(led,HIGH);
 }

 // DHT11 sampling rate is 1HZ.
 delay(1500);
 digitalWrite(led,LOW);
}
```

Project Conclusion

The system to monitor the air of environment using Arduino microcontroller, IOT Technology is proposed to improve quality of air. With the use of IOT technology enhances the process of monitoring various aspects of environment such as air quality monitoring issue proposed in this paper. Here the using of MQ135 gas sensor gives the sense of different type of dangerous gas and arduino is the heart of this project which controls the entire process. Wi-Fi module connects the whole process to internet and LCD is used for the visual Output. The Automatic Air & Sound management system is a step forward to contribute a solution to the biggest threat. The air & sound monitoring system overcomes the problem of the highly-polluted areas which is a major issue. It supports the new technology and effectively supports the healthy life concept. This system has features for the people to monitor the amount of pollution on their mobile phones using the application.

THANK YOU