ABSTRACT

Air Quality is increasing day by day and the inevitable increase in industries and urbanization would add up to make it worse. In a recent study conducted by AirVisual and Greenpeace it is showed to see that the cities in India occupy 22 positions in a list of top 30 polluted cities in the world.Since,air pollution is not visible to naked eyes it is important to regulate monitoring systems to actually aware the people of a city by measuring the pollutant parameters in real time and sending a notification whenever the air quality goes down beyond a certain level.In this project, we are going to make an IOT based Air Quality Monitoring System. This system measures the air quality in real time using MQ2 Gas Sensor with NodeMCU to send the data to ThingSpeak platform.ThingSpeak platform is connected with Twitter, so whenever the air quality goes below a certain level ,It will send the twitter notification to an authorized twitter account and thus warning people in that particular area.

INTRODUCTION

Now a days , Air pollution is increasing day by day in industrial areas. There is a need to minimize the pollution in order to avoid health problems. In industries the working hours of a person in general is about 8 – 10 hrs. we have found a problem such that if the level of ppm in air exceeds 300 then it causes drossiness to the person. So,we have proposed a solution that will measure the air quality and it will show the message saying whether person in that atmosphere is having good quality of air or not.

COMPONENTS REQUIRED -

The following hardware and software will be required to build this IoT based Air Quality Monitoring System.

HARDWARE

NodeMCU
MQ2 Gas Sensor
Jumper Wires

SOFTWARE

ThingSpeak
Arduino ID

NODE MCU

NodeMCU is an open source firmware developed for ESP8266 wifi chip. By exploring functionality with ESP8266 chip, NodeMCU firmware comes with ESP8266 Development board/kit i.e. NodeMCU Development board.

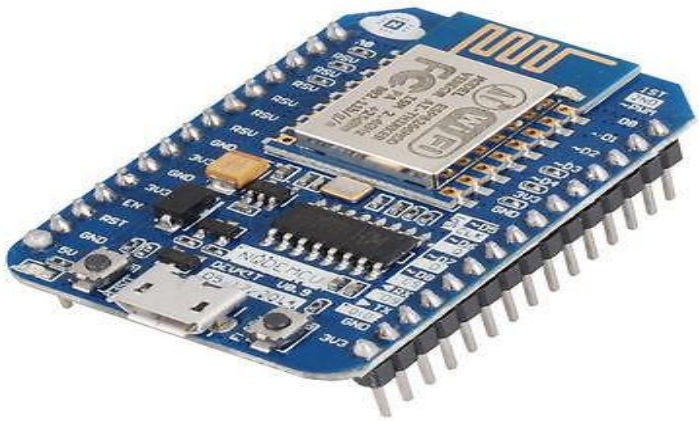


Fig 1.1 Node MCU

MQ2 SENSOR

The Grove - Gas Sensor(MQ2) module is useful for gas leakage detection (home and industry). It is suitable for detecting H2, LPG, CH4, CO, Alcohol, Smoke or Propane. Due to its high sensitivity and fast response time, measurement can be taken as soon as possible.

Fig 1.2. MQ2 sensor

JUMPER WIRES

Jumper wires classified as typically come in three versions: male-to-male, male-to-female and female-to-female.Male ends have a pin protruding and can plug into things, while female ends do not and are used to plug things into. Male-to-male jumper wires are the most common and what you likely will use most often.

Fig 1.3. Female Jumper wires

THINGSPEAK

ThingSpeak is an open source IoT platform that allows you to aggregate, visualize, and analyze live data in the cloud. You can control your devices using ThingSpeak, can send data to ThingSpeak from your devices, and even you can create instant visualizations of live data, and send alerts using web services like Twitter. ThingSpeak takes a minimum of 15 seconds to update your readings. In this project we will be using ThingSpeak to get the value from MQ2 sensor through NodeMCU and plot a graph with the obtained value against time. We will also tweet from ThingSpeak if the value from MQ2 reads critical.

ARDUINO IDE

The Arduino Integrated Development Environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in functions from C and C++. It is used to write and upload programs to Arduino compatible boards, but also, with the help of 3rd party cores, other vendor development boards. Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension .ino. The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors.

CIRCUIT DIAGRAM

The complete circuit diagram for NodeMCU Air quality meter is shown below. It is pretty simple as we only need to connect only the MQ2 sensor with our ESP NodeMCU board.

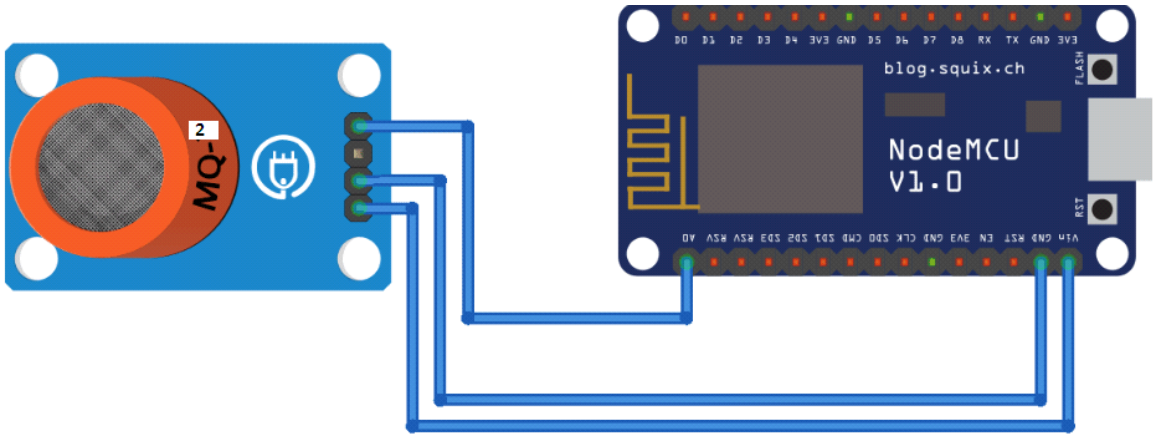


Fig 1.4 Nodemcu interfaced with MQ-2 sensor.

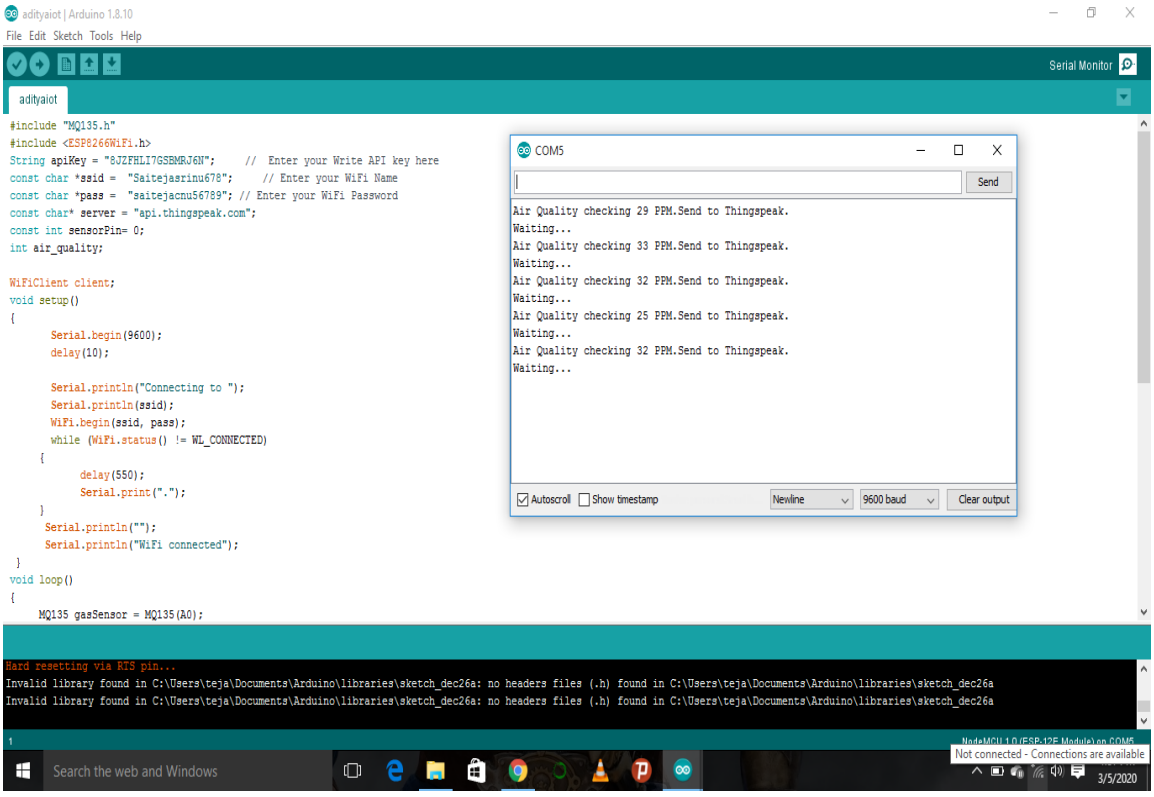
The Vcc pin of MQ2 sensor is connected with Vin pin of NodeMCU, and GND pin is connected with NodeMCU's GND pin. While the A0 pin is connected with A0 pin of NodeMCU as shown in the circuit diagram above. The complete set-up will be powered by the micro-usb port of Node-MCU through a USB cable.

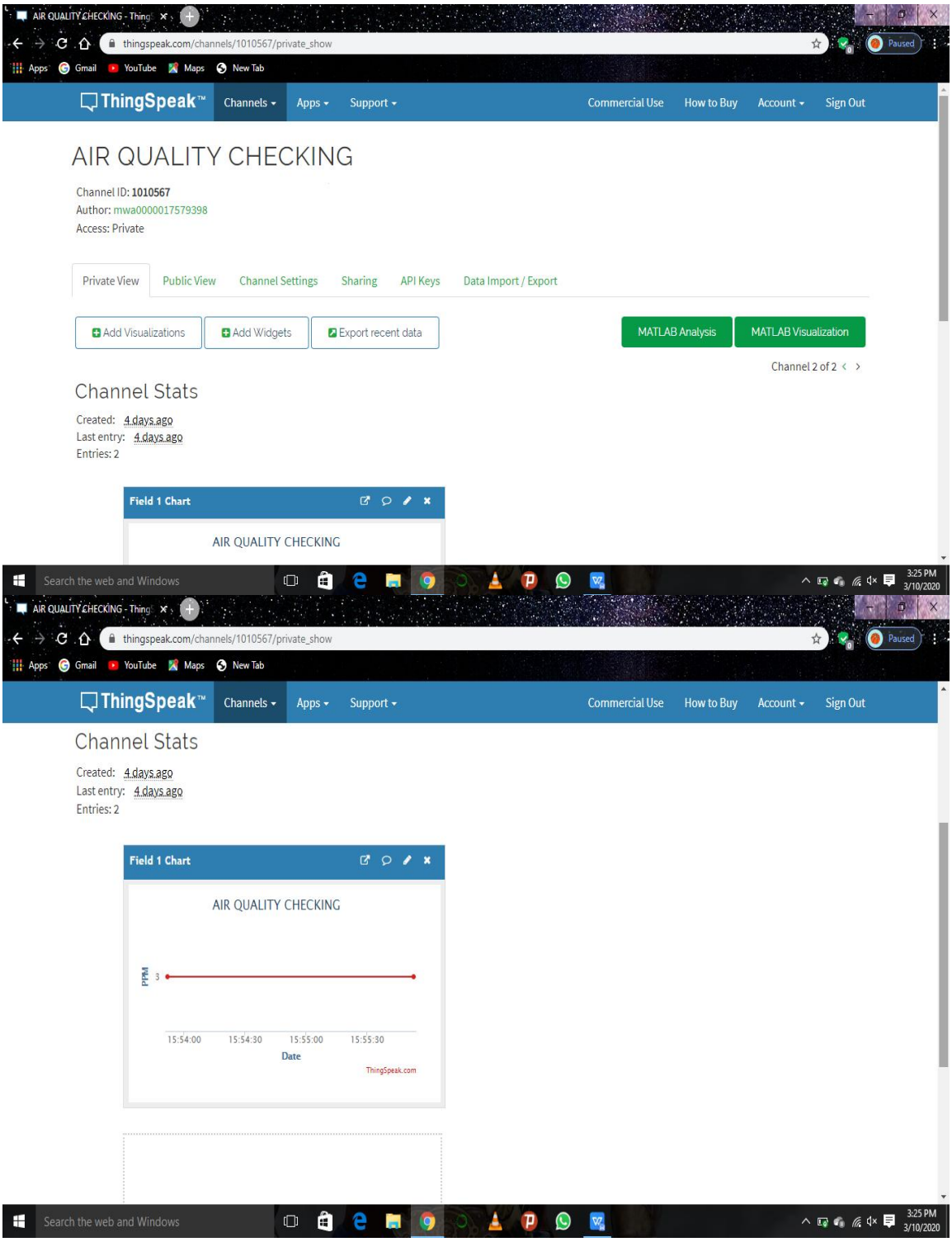
PROGRAM

```
#include "MQ135.h"
#include <ESP8266WiFi.h>
String apiKey = "API Key"; //Enter your Write API key here
const char *ssid =    "WiFI Name";        // Enter your WiFi Name
const char *pass =    "Password"; // Enter your WiFi Password
const char* server = "api.thingspeak.com";
const int sensorPin= 0;
int air_quality;

WiFiClient client;
void setup()
{
          Serial.begin(9600);
          delay(10);

          Serial.println("Connecting to ");
          Serial.println(ssid);
          WiFi.begin(ssid, pass);
          while (WiFi.status() != WL_CONNECTED)
       {
                delay(550);
                Serial.print(".");
       }
        Serial.println("");
        Serial.println("WiFi connected");
 }
void loop()
{
       MQ135 gasSensor = MQ135(A0);
       air_quality = gasSensor.getPPM();
                            if (client.connect(server,80))
                            {
                                    String postStr = apiKey;
                                    postStr +="&field1=";
                                    postStr += String(air_quality);
                                    postStr += "\r\n\r\n";

                                    client.print("POST /update HTTP/1.1\n");
```

```
                        client.print("Host: api.thingspeak.com\n");
                        client.print("Connection: close\n");
                        client.print("X-THINGSPEAKAPIKEY: "+apiKey+"\n");
                        client.print("Content-Type:
application/x-www-form-urlencoded\n");
                        client.print("Content-Length: ");
                        client.print(postStr.length());
                        client.print("\n\n");
                        client.print(postStr);
                        Serial.print("Air Quality: ");
                        Serial.print(air_quality);
                        Serial.println(" PPM.Send to Thingspeak.");
                    }
          client.stop();
          Serial.println("Waiting...");
    delay(10000);
```

Output :





CONCLUSION

Finally the AirQualityMonitoring will be done by using nodemcu ESP 8266 wifi module and mq2 gas sensor and those values sent to thingspeak account.