

## Air Pollution Monitoring System: Engineering College Prospective

**Prof. Sujit Kumar Panda**-Faculty at Gandhi Institute For Technology, CSE Dept.  
(Affiliated to Biju Patnaik University of Technology)

**Sailinkan Mohanty** – Student at Gandhi Institute For Technology, CSE Dept.  
(Affiliated to Biju Patnaik University of Technology)

**Mahammad Sahil Khan**– Student at Gandhi Institute For Technology, CSE Dept.  
(Affiliated to Biju Patnaik University of Technology)

**Gaurav Singh** – Student at Gandhi Institute For Technology, CSE Dept. (Affiliated to  
Biju Patnaik University of Technology)

### ABSTRACT

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 effects on human wellbeing by directly affecting health of population exposed to it. In IOT Based Air Pollution Monitoring System the Air Quality is measured over a web server using internet and will trigger an alarm when the air quality goes down beyond a certain level, means when there are sufficient amount of harmful gases are present in the air like CO<sub>2</sub>, smoke, alcohol, benzene and NH<sub>3</sub>. The sewage workers are not aware of sudden attack of poisonous gases. Since these gases are odorless, if exposed for a long time that may cause a serious health issues. It will show the air quality in PPM on the LCD and as well as on webpage so that we can monitor it very easily. MQ135 sensor which is the best choice for monitoring Air Quality as it can detects most harmful gases and can measure their amount accurately. The pollution level can be monitored anywhere using computer or mobile. Install this system anywhere and can also trigger some device when pollution goes beyond some level, like it can switch on the Exhaust fan or can send alert. This project gives a prior notification to the workers to ensure their safety. A gas sensor is used to detect the level of the gas. When the threshold value is lesser than the sensed value and it may send an alert through the buzzer to the workers and if heart beat gets low or high it may send alert through SMS along with its location by the GSM and the live location can be tracked through GPS.

**Keywords:** — *Internet of Things, Global System for Mobile communication, Global Positioning System, Smart Gas Sensor, Air Pollution, MQ135 Sensor, IOT, PPT*

### 1.INTRODUN

The Air Excellence Guide (AEG) may be a common indicator of air quality. The Air Quality Indicator (AQI) is calculated and supported on air pollutants like CO<sub>2</sub> and NO<sub>2</sub> compounds that consume opposing possessions happening the atmosphere and human health. The Air Quality Indicator may be a range that represents the very finest meditation of a specific air unused matter at a particular time. We proposed an air quality as well as air pollution monitoring system that allows us to monitor and check live air quality as well as air pollution in an area and under sewage through Internet of Things (IoT). It uses air sensors (Gas Sensor MQ135) to sense presence of harmful gases/compounds in the air and constantly transmit this data. In addition, system keeps measuring air level and reports it. The sensors interact with ESP8266

module (Microcontroller) which processes this data and transmits it over the application. This allows authorities to monitor air pollution in different areas and act against it. In this project we are going to make an IoT based Air Pollution Detection Monitoring System in which we would monitor the Air Quality over a web server using ESP8266 Wi-Fi device and a trigger alarm when the air quality goes down a certain level means when there is amount of harmful gases is present in the air like CO<sub>2</sub>. It shows the air quality in PPM (Parts Per Million) on LCD and webpage so that we monitor it very easily.

## II. PURPOSE OF THE PROJECT

The project is an implementation of IoT (Internet of Things) Based Air Pollution Monitoring System Using ESP8266. Air pollution in our surrounding and also under sewage is a growing issue and it is necessary to monitor air quality for a better future and healthy living for all. IoT is getting popular day-by-day and standards are on its way. Therefore, collection of air quality information is easier. Along these lines, there is a requirement for checking air quality in the environment and also under the sewage for man lives and to monitor it.

## III. LITERATURE SURVEY

- 1) 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 effects on human wellbeing by directly affecting health of population exposed to it.
- 2) 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 a alarm when the air quality goes down beyond a certain level, means when there are sufficient amount of harmful gases are present in the air like CO<sub>2</sub>, smoke, alcohol, benzene and NH<sub>3</sub>.
- 3) The problem in this paper is they haven't calibrated the sensor and not even converted the sensor output value into PPM. As per the guidelines by UN Data, 0-50 is SAFE value and 51-100 is moderate. Delhi is the most polluted city in the world recorded 350PPM. While using two sensors, as both sensors have internal heat element, it draws more power( $P = V \times I$ ), so though the both sensors are turned ON, its output voltage levels varies and shows unpredicted values due to insufficient drive. So we used a 9V battery and a 7805 family REGULATOR for the CO sensor MQ7. For MQ135 we have given the power from Arduino only.
- 4) 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 CO<sub>2</sub>, smoke, alcohol, benzene, NH<sub>3</sub>, LPG and NO<sub>x</sub>. 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.
- 5) It will show the air quality in PPM on the LCD and as well as on webpage so that we can monitor it very easily. In this IOT project, you can monitor the pollution level from anywhere using your computer or mobile.

#### IV. IMPORTANCE OF AIR POLLUTION MONITORING SYSTEM

Air is one of the most basic and important elements for human being to survive. Clean and Sound air is the key to a good and healthy life. But now days in city life it has become the most threatened factor. Pollution of air has become the most concerned and affected issue now for us. A diversity of air pollutants has known or suspected injurious effects on human health and the atmosphere. In most areas, these toxins are principally the products of combustion from space warming, power generation or from motor vehicle traffic flow. Pollutants from these sources may not only prove a problem in the immediate locality of these sources but can travel long distances. Generally, if someone is young and in a good state of health, moderate air pollution levels are unlikely to have any serious short term effects. However, higher levels and long term exposure to air pollution can lead to more serious symptoms and conditions causing human health.

#### V. ADVANTAGES OF PROPOSED SYSTEM

##### 1. Portability

It is a compact device which consists of many sensors including cloud which are all combined by using internet of things (IoT)

##### 2. Safety

One can avoid from going to particular location by redirecting themselves or by taking safety protections such as wearing mask and can reduce over dumped wastages in a particular locality area.

##### 3. Cost

Compared to others it's efficient and low cost because sensor is clubbed by using internet of things (IoT) and ESP8266 microcontroller.

##### 4. Simple Maintenance

As the Project deals with the software embedded C & C++, so maintenance will be easy and this can also be installed in ESP8266 (ESP8266-1.8.10-windows.exe).

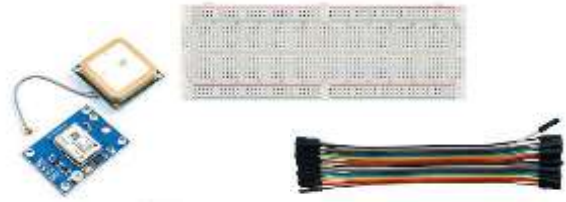
#### VI. IMPLEMENTATION TECHNOLOGIES WITH RELATED DEVICE IMAGES

It's a device that takes data from the environment that has been selected for our research purpose. The device is built with various hardware & software requirements and they take data by sensing from the environment. The sensors take analog data from the environment which later is converted into digital with the help of ESP8266 and then sent to the server where all the data are stored. This device is consisting of the following components:

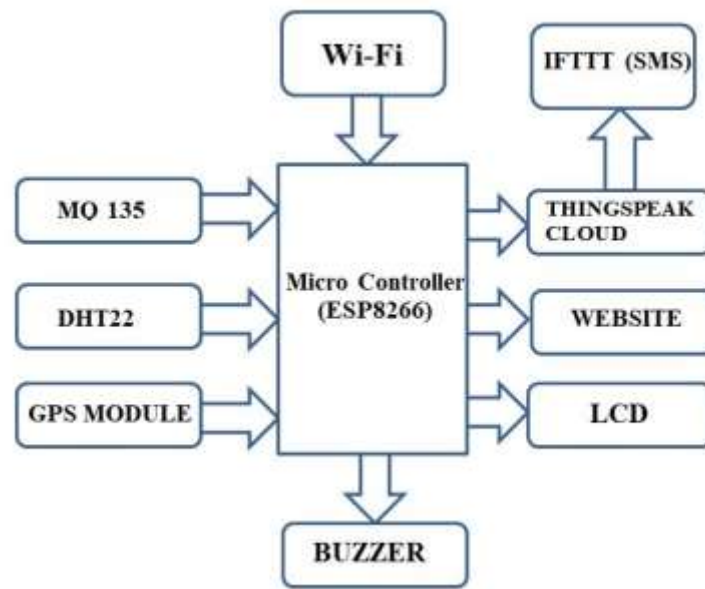
- i. Processor -i3 or Higher
- ii. RAM - 2GB or Higher
- iii. Arduino IDE
- iv. Hard disk - 500 GB
- v. MQ135 Gas Sensor
- vi. ESP8266 Wifi Module
- vii. Bread board
- viii. 16x2 LCD display
- ix. LED: RED & GREEN
- x. DHT22



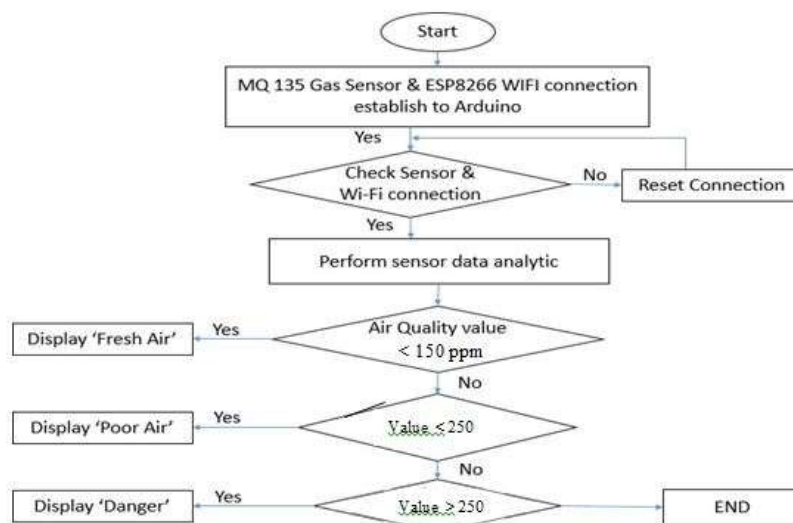
- xi. Neo 6M GPS Module
- xii. I2C
- xiii. Buzzer
- xiv. ThingSpeak
- xv. IFTTT
- xvi. WebHooks
- xvii. Android SMS



## VII. PROPOSED SYSTEM ARCHITECTURE DIAGRAM



## VIII. FLOW CHART REPRESENTATION

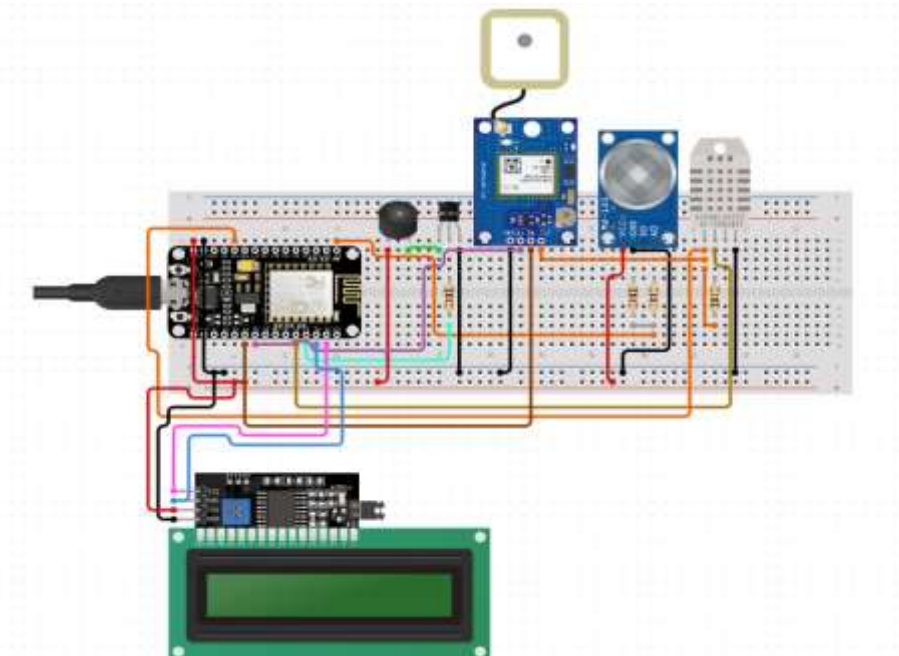


## IX. CIRCUIT DIAGRAM

ESP8266 runs on 3.3V and connect the VCC to the 3.3V pin of ESP8266. The RX pin of ESP8266 works on 3.3V and it communicate with the ESP8266 when we

connect it directly to the ESP8266. So, we have made a voltage divider for it which convert the 5V into 3.3V. Connect the TX pin of the ESP8266 to the pin 8 of the ESP8266 and the RX pin of the esp8266 to the pin 9 of ESP8266. ESP8266 Wi-Fi module gives my projects access to Wi-Fi or internet. Then I connect the MQ135 sensor with the ESP8266. Connect the VCC and the ground pin of the sensor to the 5V and ground of the ESP8266 and the Analog pin of sensor to the A0 of the ESP8266. Connect a buzzer to the pin 7 of the ESP8266 which start to beep when the condition becomes true. In last, we have connected LCD with the ESP8266. The connections of the LCD are as follows

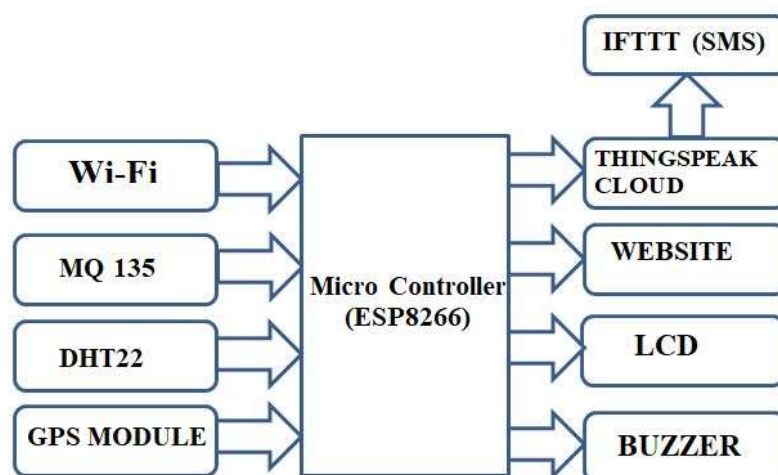
Connect pin VCC to the 5V of the ESP8266; Connect pin GND to the GND of the ESP8266; Connect pin RS to the pin 12 of the ESP8266; Connect pin RW & GND (Read/Write) to used Jumper pin; Connect pin E to the pin 11 of the ESP8266; The following four pins are data pins which are used to communicate with the ESP8266; Connect pin D4 to pin 5 of ESP8266; Connect pin D5 to pin 4 of ESP8266; Connect pin D6 to pin 3 of ESP8266; Connect pin D7 to pin 2 of ESP8266.



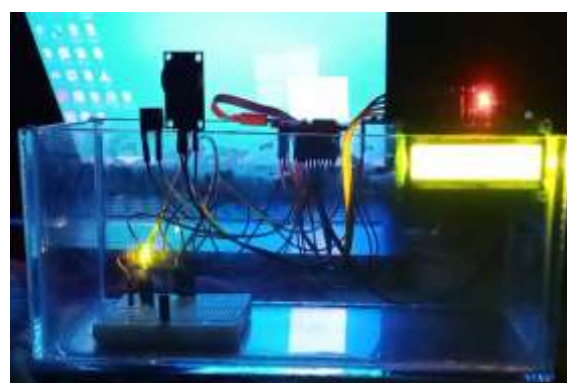
## X. BLOCK DIAGRAM

The major components of my project have been mentioned in the above section. Here I explain the architecture. Gas sensor & Wi-Fi Device are connected to the ESP8266 board. Also LCD connected to the ESP8266 board for displaying information. I am monitor the Air Quality over a serial monitor & LCD using Gas sensor and trigger an alarm when the air quality goes down beyond a certain level, means when there is sufficient amount of harmful gases are present in the air like CO<sub>2</sub>, smoke, alcohol, benzene and NH<sub>3</sub>. It is shown the air quality in PPM on the LCD as well as serial monitor so that I can monitor it very easily [9]. I have used MQ135 sensor which is the best choice for monitoring Air Quality as it can detect most harmful gases and can measure their amount accurately. In this Internet of Things (IoT) project, I can monitor the pollution level from anywhere using computer.





## XI. HARWARE SETUP & WEBDATA VISUALIZATION





## XII. CONCLUSION

The system to monitor the air of environment using ESP8266 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, using the MQ135 gives the sense of different type of dangerous gas and ESP8266 is the heart of this project. Which control the entire process, ESP8266 module connects the whole process to LCD and serial monitor is used for the visual Output.

## XIII. REFERENCES

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