

# IOT BASED POLLUTION MONITORING SYSTEM WITH BLOCK CHAINS

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**ABSTRACT**--The level of pollution is increasing rapidly due to factors like industries, urbanization, increasing in population, vehicle use which can affect human health. IOT Based Air Pollution Monitoring System is used to monitor the Air Quality over a web server using Internet. It will trigger an alarm when the air quality goes down beyond a certain 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> and NO<sub>x</sub>. It will show the air quality in PPM on the LCD and as well as on webpage so that air pollution can be monitored very easily. The system uses MQ135 and MQ6 sensor for monitoring Air Quality as it detects most harmful gases and can measure their amount accurately.

**KEYWORDS**-- Air Pollution, MQ135 Sensor, IOT, Arduino Uno.

## I. INTRODUCTION

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 world wide. The present case of Delhi is the best example which is showing the importance to control the air pollution level. 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. 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 roads where gases are mostly to be found and gives an alert message when the system crosses threshold limit.

## II. LITERATURE REVIEW

The drawbacks of the conventional monitoring instruments are their large size, heavy weight and extraordinary expensiveness. These lead to sparse deployment of the monitoring stations. In order to be effective, the locations of the monitoring stations need careful placement because the air pollution situation in urban areas is highly related to human activities (e.g. construction activities) and location-dependent (e.g., the traffic choke-points have much worse air quality than average). IOT Based Air Pollution Monitoring System monitors the Air Quality over a

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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 CO<sub>2</sub>, smoke, alcohol, benzene, NH<sub>3</sub>, NO<sub>x</sub> 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.

### **III. REQUIREMENTS**

#### ***3.1 Hardware Requirement: -***

- 1) Gas sensor
- 2) Arduino Uno
- 3) Wi-Fi module
- 4) Power unit
- 5) Breadboard
- 6) Potentiometer
- 7) 1K ohm resistors
- 8) 220 ohm resistor
- 9) Buzzer
- 10) LPG gas sensor
- 11) Temperature sensor
- 12) Smoke sensor (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 is less than 1000 PPM, then the webpage will display "Fresh Air". When the value will increase from 1000 PPM, then the webpage will display "Poor Air, control is required". And when the air quality increase above 2000, the data passed through the Wi-Fi channel will continuously pop up and alert the authority. The same concept will be applicable for other harmful gasses measured through gas sensors. The module also measures the gas/air temperature also which will possibly show the current temperature of the air. For Temperature we have used LM35 sensor.

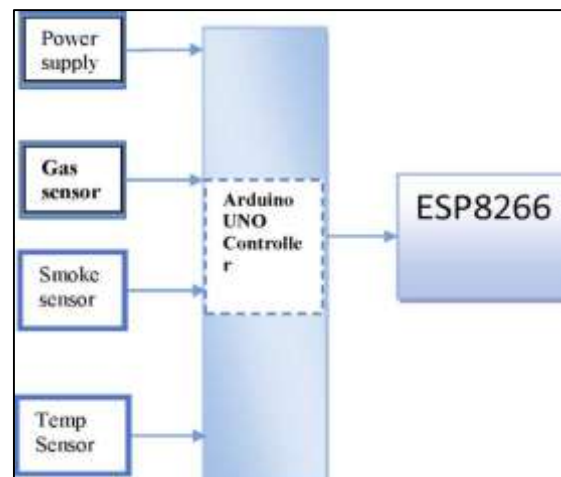
According to the model the 4 sensors works as input data, they transmit data for knowing which gas it is, what is the temperature and humidity. LCD and Buzzer are the output devices. LCD shows the data of the gases in ppm (parts per million) and Buzzer is used when ppm crosses above a threshold limit.

#### ***3.2 Software Requirement:-***

## IV. BLOCK DIAGRAM AND WORKING

### 4.1 Working:-

Proposed Air Pollution Monitoring System is based on the block diagram as shown in Fig. 1. The data of air is recognized by MQ135 gas sensor and MQ6 LPG gas sensor. The MQ135 sensor can sense NH<sub>3</sub>, NO<sub>x</sub>, alcohol, Benzene, smoke, CO<sub>2</sub>. So it is dynamic gas sensed 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



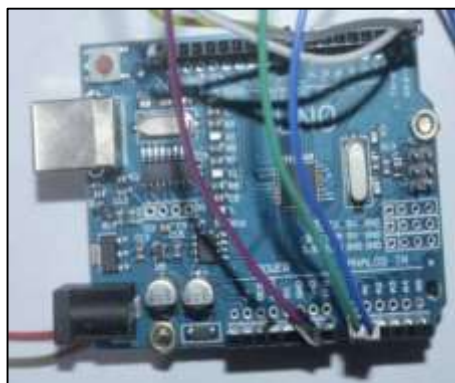
**Fig. 1: Block Diagram**

### 5. Components:-

#### 1) Arduino UNO:-

Arduino is an open-source platform used for building electronics projects.

It does not need a separate piece of hardware (called a programmer) in order to load new code onto the board - we can simply use a USB cable.



**Fig. 2: Arduino UNO**

#### 2) MQ135 Gas sensor:-

The MQ135 sensor can sense NH<sub>3</sub>, NO<sub>x</sub>, alcohol, Benzene, smoke, CO<sub>2</sub> and some other gases.

It gives the output in form of voltage levels. Fig.3 shows the sensor MQ135. The MQ135 gas sensor has high sensitivity in ammonia, sulfide, benzene steam, smoke and in other harmful gas. It is low cost and suitable for different applications.



**Fig. 3: MQ135 3)MQ2**

#### ***Smoke sensor:-***

MQ2 smoke sensor is an electronic sensor used for sensing the concentration of gases in the air such as LPG, propane, methane, hydrogen, alcohol, smoke and CO<sub>2</sub>. This sensor contains a sensing element, mainly aluminium-oxide based ceramic, coated with Tin dioxide, enclosed in a stainless-steel mesh. Fig.4 shows the sensor MQ2. It gives the output in form of voltage levels.



**Fig. 4: MQ2**

#### ***4)LM 35 Temperature sensor:-***

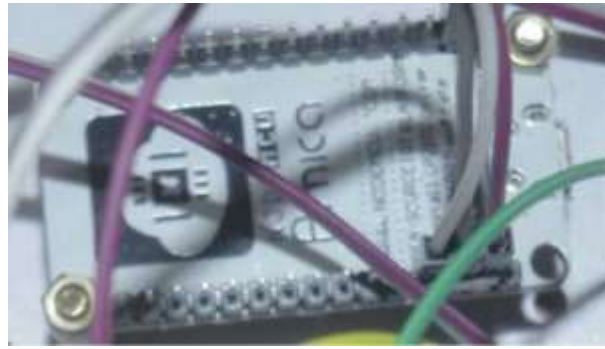
The LM35 can be connected easily in the same way as other integrated circuit temperature sensors. It can be calibrated directly in ° Celsius (Centigrade). It is a Low cost sensor due to wafer-level trimming.



**Fig. 5: LM35**

#### ***5) WIFI Module (ESP8266):-***

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. Fig.5 shows Wi-Fi Module (ESP8266).



**Fig. 6: WiFi Module**

## **V. 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, using the MQ135 and MQ6 gas sensor gives the sense of different type of harmful gases and arduino is the heart of this project. Which control the entire process. Wi-Fi module connects the whole process to internet for monitoring.

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