

# Air Quality Monitoring System

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**Abstract** - Humans can be adversely affected by exposure to air pollutants in ambient air. Hence, health-based standards and objectives for some pollutants in the air are set by each country detection and measurement of contents of the atmosphere are becoming increasingly important. Careful planning of measurements is essential. One of the major factors that influence the representativeness of data collected is the location of monitoring stations the planning and setting up of monitoring stations are complex and incurs a huge expenditure. An IoT-based real-time air pollution monitoring system is proposed to monitor the pollution levels of various pollutants. The geographical area is classified as industrial, Residential, and traffic zones this article proposes an IoT system that could be deployed at any location and store the measured values in a cloud database, perform pollution analysis, and display the pollution level at any given location.

**Key Words:** Internet of Things.

## I. INTRODUCTION

Nowadays the air condition is very polluted. In recent years, car emissions, chemicals from factories, smoke, and dust are everywhere. That is the reason why now air condition is very polluted. The effect of air pollution is very bad for our health, especially for a place where the air in our body is taken for breathing.

Air pollution cannot be detected by human feelings. Air pollution may contain a lot of dangerous substances such as ozone, particulate matter sulfur dioxide, nitrogen dioxide, carbon

monoxide, and lead. This proposed system uses a wireless sensor network with low-cost sensors and hardware components along the necessary software to effectively monitor the air pollution phenomenon. Air pollution is the worst environmental problem and it causes a multitude of adverse effects on human health, water bodies, and climate. The main source of air pollution in all major cities is due to vehicles and the second major source remains the industries. The air pollution monitoring system is installed in a particular locality where there are traces of acute air pollution to detect the constituent gases of air which may lead to harmful effects on human health and other leaving beings.

Substances in the polluted air are very dangerous. For example, if the carbon monoxide is above 100ppm, it makes humans feel dizzy, nauseous, and within minutes they could die. This research makes humans find out which content of the air is polluted. With module node MCU

esp8266, we can monitor the air pollution remotely, because there is a Wi-Fi module in node MCU esp8266. This makes the air condition can be monitored every time.

## II. LITERATURE SURVEY

### 1. Air quality using ZigBee

- This paper discusses a monitoring system that gives information about environmental conditions and briefly touches the technological advancements in monitoring the environment and bringing out the new scope in monitoring the current environmental problems
- The system is developed using Arduino, Raspberry Pi 3, and Zigbee which proves to be cost-ineffective and having low power consumption.
- The sensors will gather the data of various environmental parameters and provide that data to Raspberry Pi via Zigbee from the Arduino. The sensors will gather the data of various environmental parameters and provide it to the raspberry pi which acts as a base station. Realization of data gathered by sensors is displayed on Raspberry pi 3 based Webserver.
- Experimental results demonstrated that the system can accurately measure the concentrations of carbon monoxide, carbon dioxide, combustible gases, smoke, and air quality.

### 2. Air Quality Monitoring Using Raspberry Pi

- A prototype for an Environmental Air Pollution Monitoring System for monitoring the concentrations of major air pollutant gases has been developed.
- The system uses low-cost air-quality monitoring nodes comprised of a low-cost semiconductor gas sensor with a Wi-Fi module. This system measures concentrations of gases such as CO, CO<sub>2</sub>, SO<sub>2</sub>, and NO<sub>2</sub> using semiconductor sensors.
- A MEAN stack is developed to display data over a website.
- The fundamental aspect of the proposed work is to provide a low-cost infrastructure to enable data collection and dissemination to all stakeholders.

### III. PROPOSED SYSTEM

An IOT based air pollution monitoring system is proposed that uses an MQ135 gas sensor interfaced to node MCU; the system is connected through ESP8266 wifi module to the thinks Speak cloud to analyze the sensor data.

### IV. SYSTEM DESIGN

In the hardware part we are using Lcd, power supply, Jumper wires, MQ135 air quality sensor, and Node MCU this sensor is used to detect CO<sub>2</sub>, CO, Ammonia as well as smoke. Followed

by Node MCU also called as ESP8266 wifi chip why we are using means we need to push this data to the cloud because Arduino doesn't have wifi capacity so that we use this chip and connect this wifi to our mobile hotspot 5V Power supply is one of the most common power supply in use today. H44780 Character LCD is an industry-standard LCD Display device for interfacing with embedded systems. Here we are using 16X2 Configuration 4-bit write mode in this project. We use electromagnet inside the Buzzer In the software part we are using a platform called Things Speak. There is a MATLAB Option also available. we created the Twitter account also for observation of output.

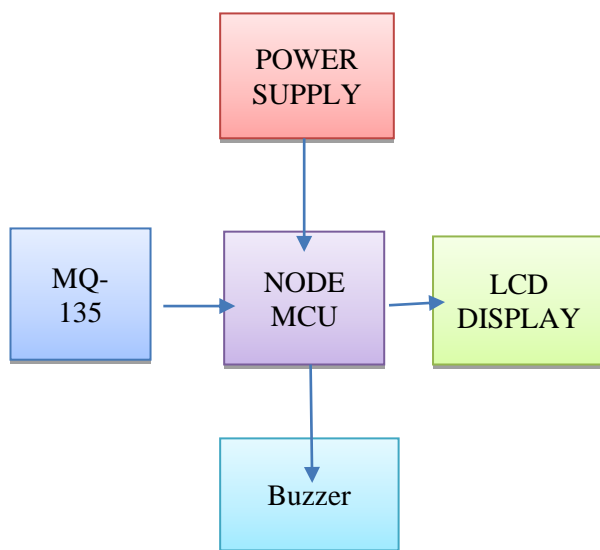


Figure: Block Diagram Air Quality Monitoring System

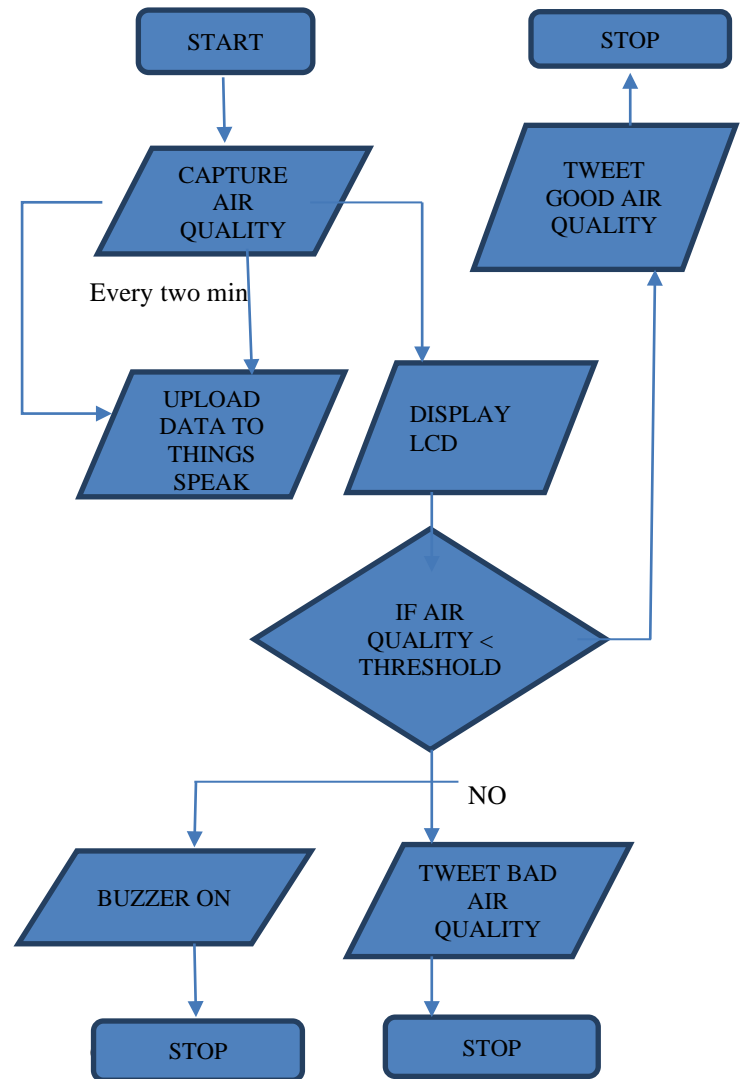


Figure: Flow Chart of Air Quality Monitoring System

### V. RESULT AND DISCUSSION

ESP8266 Wi-Fi module gives the project access to Wi-Fi or the internet. It is a very cheap device and makes your projects very powerful. It can communicate with any microcontroller and it is the most leading device in the IoT platform. Learn more about here. Then we will connect the MQ135 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 the sensor to the A0 of the Arduino. Connect a buzzer to pin 8 of the Arduino which will start to beep when the condition becomes true. The MQ135 sensor can sense NH<sub>3</sub>, NO<sub>x</sub>, alcohol, Benzene, smoke, CO<sub>2</sub>, and some other gases, so it is a 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. The sensor was giving us a value of 90 when there was no gas near it and

the safe level of air quality is 350 PPM and it should not exceed 1000 ppm. When it exceeds the limit of 1000 PPM, then it starts to cause headache, sleepiness, and stagnant, stale, stuffy air, and if exceeds 2000 PPM then it can cause increased heart rate and many other diseases. When the value will be less than 1000 PPM, then the LCD and webpage will display "Good Quality of Air". Whenever the value will increase 1000 PPM, then the buzzer will start beeping and the LCD and webpage will display "Bad quality of air".

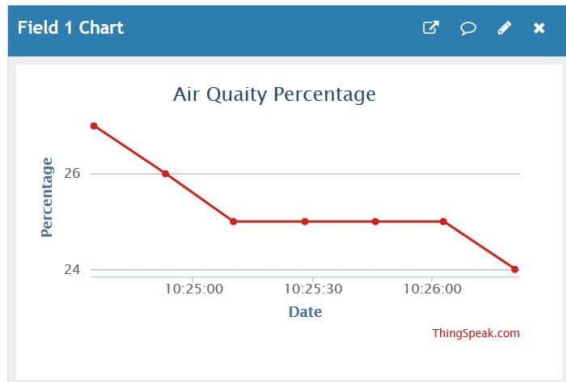


Figure 1: Thing speak Notification

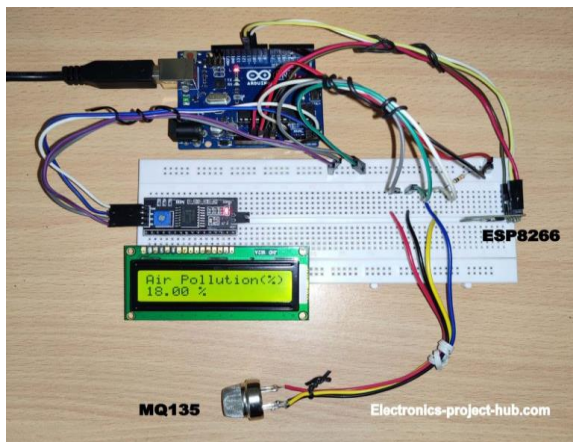


Figure 2: Display On LCD



Figure 3: Twitter Notification.

## VI. CONCLUSION

This system is used to send gas like benzene, alcohol, smoke, etc. using the MQ135 Gas Sensor.

to monitor the air of the environment using an Arduino microcontroller, IOT Technology is proposed to improve the quality of air. The use of Io technology enhances the process of monitoring various aspects of the environment such as the air quality monitoring issue proposed in this paper. The system This board has a Wi-Fi module that acts as the internet connector and informative access for the air quality. This measures the air quality in real-time using MQ135 Gas Sensor with Node MCU.

Node MCU will send the data to things peak platform which is connected with Twitter, so whenever the air quality goes below a certain level it will send the Twitter notification, thus warning people in that particular area.

Here the use of the MQ135 gas sensor gives the sense of the different types of dangerous gas and Arduino is the heart of this project which controls the entire process. Wi-Fi module connects the whole process to the internet and LCD is used for the visual Output It supports the new technology and effectively supports the healthy life concept. This system has features for people to monitor the amount of pollution on their mobile phones using the application.

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