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IOT Based Air Pollution Monitoring System

Problem Statement Understanding-

Air is getting polluted because of release of toxic gases by industries, emission of vehicles and increase in the concentration of harmful gases in the atmosphere. Particulate matter is one of the most important parameter having the significant contribution to the increase in air pollution [2]. Internet of Things (IOT) is nowadays finding use in each and every sector, plays a very important role in our air quality monitoring system too. The setup will show the air quality in PPM in webpage so that we can monitor it very easily. In this IOT project, you can monitor the pollution level from anywhere by using your computer or mobile over the internet [1].

From the Table 1 cited at [3], it explains about the Air Quality Index. Firstly, 0-50 PPM can be considered as Good. Then 51-100 PPM can be considered as Moderate where this could be usually observed at traffic areas. Then 100 - 150 PPM can be considered as Unhealthy but only for sensitive groups. And above 151 PPM [3] is Unhealthy where Capital of India New Delhi falls in this range. It is very rare to record 300 PPM and above which can considered Hazardous, possibly in Coal gas in the mines. And if PPM ranges above 500 PPM then it will show Danger which is an indication that it should be moved to save place.

Sr.No	Range (PPM)	Status
1	0-50	Good
2	51-100	Moderate
3	101-150	Unhealthy for sensitive groups
4	151-200	Unhealthy
5	201-300	Very Unhealthy
6	301-500	Hazardous

7	500 and above	Danger

Table 1

So this project will show these status when air quality falls in these above ranges based on PPM (Parts per millions)

Software and Hardware Requirement-

1) Hardware components:
- MQ-135 - This sensor has range of 10-1000 PPM and used to detect CO_2, NH_3, Benzene
- ESP-8266 Wifi module – This will help to connect to the Arduino over the internet
- Arduino Uno – It will collect data from the sensor
- 200 ohm and 1kohm resistors
- 10 kohm potentiometer
- LCD Display – The 16X2 LCD display is used to monitor the sensor values read by the Arduino board from MQ-135.

2) Software components:
- Proteus – It is a software toolset used for creating a schematic of the circuit, stimulating an embedded circuit, and designing a PCB Layout. It is additionally used for designing testing codes for different microcontrollers. In this project I have used Proteus to design and stimulate an IOT System.
- Arduino IDE (Integrated Development Environment) – It is an open source software tool used to compile code in the Arduino module.

Additions and Updates-

- The problem with MQ-135 sensor is specifically it can't tell exact value of the CO (Carbon Monoxide) or CO_2 (Carbon Dioxide) level in the atmosphere that is it tells approximate value. So we can add MQ-7 sensor to measure the CO (Carbon Monoxide) in the atmosphere.

- Also we can add LM-35 as the temperature sensor to measure the temp of the surrounding air.

Application, Advantages, Challenges-

Apllication:

- It can be used in indoor and outdoor location.
- It can be placed at traffic signals so that officials will come to know that there is traffic jam at particular location.
- It makes data available to users.
- Site selection for reference monitoring stations.

Advantages:

- Less power consumption and connections are very easy.
- The amount of harmful gasses in the environment can be easily measured.
- Can be connected to battery or laptop.
- The amount of harmful gases can be easily monitored.

Conclusions-

From this project we are able to calculate Air Quality in PPM. The MQ-135 sensor is able to detect smoke, CO, CO2, NH4. This project can be used both for indoor as well as outdoor purpose. For indoor, we can make this kit as a compact device such that if every home started using the device, we can monitor the indoor air quality of a particular targeted area. Due to increasing air pollution, there is necessity to keep an eye on Indoor air quality too. But for outdoor purpose, certainly one sensor is not sufficient because one sensor has a sensitivity range of around 1 meter, so a network of sensors has to be deployed to monitor the outdoor air quality.

Reference-

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