TASK 1

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IoT Based Air Pollution Monitoring System.

1] Problem Statement Understanding:

In this project we are going to make an IoT Based Air PollutionMonitoring System which will monitor the Air Quality over a webserver using internet and also will predict air quality by using Machine Learning. We can use various sensors for monitoring air quality but for our project it would be better to use MQ135 gas sensor which is best choice for monitoring Air Quality as it can detects most harmful gases and can measure their amount accurately, and also a carbon monoxide sensor (MQ7).

The system we will be developing is Arduino UNO based. We will place sensors on Arduino uno, these sensors will detect harmful gases of environment and corresponding shows the voltage difference. This voltage difference is passed to Arduino and then it will further pass to webserver using Wi-Fi module and by writing code in Arduino IDE from Arduino. The output of Arduino is displayed and monitoring graphically on webapp with the help of html, CSS and JavaScript. At last, for predicting air quality we will have to collect all the past data from sensors simultaneously into the excel sheet through data stream and then will train the data by using ML algorithm to predict air quality.

Air Quality is measured with the help of AQI (Air Quality Index). AQI is a number which represents the air pollution and corresponding concentration of pollutants. AQI number represent various categories of air. Higher the value of AQI, greater the air is polluted.

Predicting Air Quality became a complex task due to dynamic nature, large number of pollutant gases present in air and various factors. But at the same time, if we have the data or model which monitor air pollution, we can train or analyse it to predict future air quality using different Machine Learning Algorithms.

* Literature Review:

1)The IRJET pdf deals with monitoring air pollution using IoT based air pollution monitoring system. It uses 4 sensors which are Temperature, Humidity, MQ135 and MQ 6 LPG sensors for monitoring air pollution. It uses buzzer as an alarm when sensors detect harmful gases and pollutants in the environment.

2)The ResearchGate article deals with IOT based Air Quality Monitoring System Using MQ135 and MQ7 with Machine Learning Analysis. It uses ThingSpeak IoT platform for monitoring and displaying output of Arduino on webpage. For predicting air quality in this project, it uses Linear Regression Algorithm analysis on dataset collected by ThingSpeak.

2] Software and Hardware Requirements:

a) Software:

* Arduino IDE
* Jupyter Notebook
* Embedded C
* Proteus
* Python

b) Hardware:

* MQ135 Gas Sensor
* The MQ135 gas sensor can detect harmful gases such as ammonia gas, toluene, Hydrogen, and smoke in the range of 10 – 1000ppm.
* MQ7 Sensor
* MQ7 sensor is a Carbon monoxide sensor. It can detect CO gas concentrations in the range of 10 – 500ppm.
* Arduino UNO
* Wi-Fi ESP-01 ESP8266 module
* It gives access to Wi-Fi to your system.
* Breadboard
* USB cable
* Voltage Regulator
* Connecting Wires as required

3] Addition and Updates:

No updates as of now.

4] Applications, Advantages, Challenges:

a) Applications:

* Industrial perimeter monitoring.
* Indoor air quality monitoring.
* It’s makes data available to users.

b) Advantages:

* System is easy to Install.
* Updates are directly given on mobile phone or any digital system.
* Accurate Pollution is monitored and graphically represented.
* System can be used also in remote areas for monitoring.
* Data can be easily collected and store in excel sheet.
* As it makes data available to users, it can be used by a common man to predict air quality and monitor air pollution.

c) Challenges:

* As we are using software platform for circuit, therefore are no challenges in making circuit.
* Which ML algorithm to be used for obtaining maximum accuracy in prediction of future air quality.

5] Conclusion:

From the above project, we can conclude that, the system is based on IoT, is used to monitor air quality with the help of Arduino UNO. IoT technology is processed to improve quality of air, and by using IoT technology it enhances the process of monitoring various environmental factors, in our case it is air quality. In this project we are using 2 sensors for detecting various harmful gases in environment. And that we are monitoring on a webapp using html, CSS and JavaScript. At last, we also use Machine Learning analysis on the data collected from sensors to predict future air quality.

6] References:

[1] 5 Students of Diploma in Computer Engineering, BGIT, & Assistant Professor, BGIT. IOT Based Air Pollution Monitoring System, International Journal of Scientific & Engineering Research Volume 9, Issue 2, February-2018.Retrieved from <https://www.irjet.net/archives/V7/i3/IRJET-V7I309.pdf>

[2] Bharath Kumar Sai Kinnera, Somula Rama- Subbareddy, Ashish Kr Luhach. IOT based Air Quality Monitoring System Using MQ135 and MQ7 with Machine Learning Analysis, Scalable Computing December 2019.Retrieved from <https://www.researchgate.net/publication/337780520_IOT_based_Air_Quality_Monitoring_System_Using_MQ135_and_MQ7_with_Machine_Learning_Analysis>