International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 06 Issue: 07 | July - 2022 Impact Factor: 7.185 ISSN: 2582-3930

IoT enabled Air quality Monitoring System

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Abstract

Air contamination is caused because of the nearness of unsafe materials and natural atoms in earth climate. It has unfriendly effect on living beings, for example, people, creatures, sustenance crops and can likewise harm the common habitat. It might result in sensitivities, destructive infections, for example, cardio vascular illnesses, lungs ailments and can likewise cause demise. The earth bunch Greenpeace in January discharged a report that has evaluated each year about 1.2 million Indian pass on as a result of air borne toxins. Particulate issue is fluid or strong issue which is tiny and suspended in Earth's climate. We are presented to this particulate issue which is ceaselessly influencing our heart and lungs. Till now a few investigations have been done in condition observing area utilizing IoT.

Scientists have checked ecological parameters like Temperature, Humidity, Barometric pneumatic force, carbon monoxide, and sulfur dioxide however the least consideration is paid to the estimation of particulate issue.

1.INTRODUCTION

Internet of Things and cloud computing are the most emerging technologies. Internet of Things is a concept or a paradigm in which without human interruption devices sense,identify, process and communicate with each other. Cloud computing is a practice of consuming the resource of remote servers such as storage, virtual machines, applications and utilities that are hosted on internet rather than building and maintaining infrastructure for computing in house. Internet of Things becomes very powerful when converges with Cloud computing. IoT cloud system provides a view on accessing IoT resources and capabilities in defined API, configuring and operating it on cloud. The data stored at the cloud can be retrieved any time and the scenarios can be analyzed in a better way leading to the solutions for controlling air pollution to some extent.

Role of IOT in this project

In the proposed project a gas sensor called MQ7 is used,the MQ7 is a simple-to-use Carbon Monoxide (CO) sensor suitable for sensing CO concentrations in the air. It can detect CO-gas concentrations anywhere from 20 to 2000ppm. MQ7 is a high sensitivity to carbon monoxide and stable and long-life span.

Sensitive material of MQ-7 gas sensor is SnO2, which with lower conductivity in clean air. It make detection by method of cycle high and low temperature, and detect CO when low temperature (heated by 1.5V) When high temperature (heated by 5.0V), it cleans the other gases adsorbed under low temperature.

MQ135 Gas Sensor module for Air Quality having Digital as well as Analog output.
Sensitive material of MQ135 gas sensor is SnO2, which with lower conductivity in clean air. When the target combustible gas exist, The sensors conductivity is more higher along with the gas concentration rising. MQ135 gas sensor has high sensitivity to Ammonia, Sulphide and Benze steam, also sensitive to smoke and other harmful gases. It is with low cost and suitable for different application.

ESP32 is a series of low-cost, low-power system on chip microcontrollers with integrated Wi-Fi and dual-mode Bluetooth. The ESP32 series employs a TensilicaXtensa LX6 microprocessor in both dual-core and single-core variations and includes built-in antenna switches, RF balun, power amplifier, low-noise receive amplifier, filters, and power-management modules. ESP32 is created and developed by Espressif Systems, a Shanghai-based Chinese company, and is manufactured by TSMC using their 40 nm process. It is a successor to the ESP8266 microcontroller.
In this project ESP32 kit plays important role, the gas sensor is connected to esp32 module via one of its GPIO, the kit reads the data from the sensor, this read data is sent to centralized server by invoking PHP script located at the webserver, for this purpose the Wi-Fi module of the ESP32 is used, the kit is configured to Wi-Fiwhich gets the data from esp32 as parameter is saved as a record in the table which is further used for analysis by machine learning algorithm.

2. LITERATURE SURVEY

1. Zigbee Based Wireless Air Pollution Monitoring System Using Low Cost and Energy Efficient Sensors.

Mr.Vasim K. Ustad, Prof.A.S.Mali, Mr.SuhasS.Kibile, PG Student, Department of Electronics Engineering, Tatyasaheb Kore Institute of Engineering & Technology, Warananagar, Maharashtra, India. Air pollution is not only natural medical matters impact on creating nations alike. The strong effect of air pollution on wellbeing are extremely mind blowing as there are a broad area of sources and their particular influence differ from one another. The synthetic substances reason an assortment of mankind and natural medical issues enlarge in air contamination impacts on condition also on human wellbeing.. The proposed framework comprises of a Unit of Mobile-DAQ and a fixed Internet-Enabled contamination observation System. The Mobile-DAQ unit incorporates a solitary chip microcontroller, air pollution sensors exhibit, and GPS Device. The Pollution-Server is a top of the line individual computer application server with Internet network. The Mobile-DAQ unit assembles air toxins levels (CO, NO2, andSO2), and packs them in a casing with the GPS physic distribution, time, and date. The reason is to send the Pollution-Server by means of zig bee device. The pivotal-Server is interact to Google Maps to show the area of equipment. It can associate database server to the Pollution-Server for putting away

the toxins range for future utilization by different user , for example, condition security offices, vehicles registration experts, and vacationer and insurance agencies.

2. Pollution Monitoring System utilizing WSN in Visakhapatnam

P.VijnathaRaju, M.Tech Student R.V.R.S.Aravind, Associate Professor Nova school of Engineering and Technology, Jangareddigudem, W.G District, AP, India, Department of ECE, Sanketika Institute of Technology and Management ,Visakhapatnam, India. As the technology increases, the level of robotic work (cutting the labor) in the practically all parts are likewise increments. WSN are grabbing up the ground in all divisions of life; from homes to industrial facilities, from traffic control to natural checking. The air pollution monitoring system contains sensors to screen the intrigued pollution parameter with regards to condition. It reenacted the three air contaminations gases including CO,CO2 and SO2 in air in light of the fact that these gases chooses the level of pollution. It can additionally apply the methodology in dissimilar house hold activities like spilling culinary gas in our homes, to caution the laborers in oil and gas sedulity to recognize the spillage and so on. This repetition makes the awareness in individuals in urban communities.

3. WSN Based On Air Contamination Monitoring System In Metropolitan Cities

The WSN based air contamination observing framework depends on AVR ATmega-32 Microcontroller. The sensor network is utilized to distinguish the sensor esteems from various detectors as MQ5, MQ7, temperature and dampness particularity. ID3 calculation is utilized to ascertain the qualities contemptible on likelihood. Bluetooth device is utilized to interface the control with customer and the customer associates with the server by means of web administrations. This framework not just computes the pollution present noticeable all around yet in addition can make a figure to stay away from future contamination in the specific dirtied zone. Here they consider essentially the substance Industry close Pune and I.T. zone like Hinjewadi

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3. TECHNOLOGY OVERVIEW

A Functional Requirement defines a function of a system or its component, where a function is described as a specification of behavior between outputs and inputs. Functional requirements may involve calculations, technical details, data manipulation and processing, and other specific functionality that define what a system is supposed to accomplish. It defines the basic functionalities that are carried out at the working of the task. The analysis of attributes and implementation is performed.

Following are the functional entities observed in the project

Sensors

Are the electronic devices which sense the soil moisture content and send to base station.

ESP32 KIT

This kit fetches the information form sensors and converts the analog data to digital; these data get processed using C language and uploaded to server using Wi-Fi configured network.

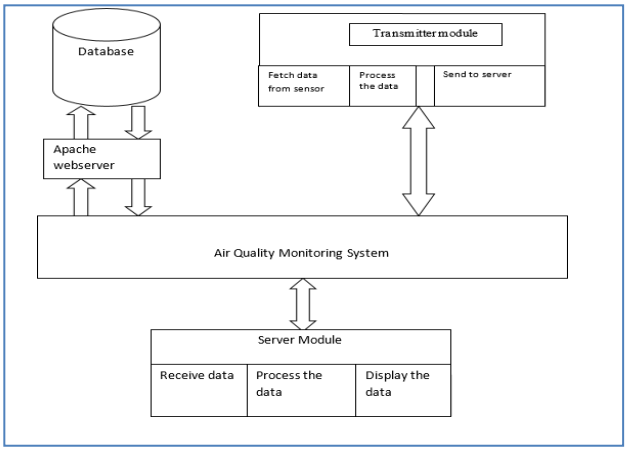
Breadboard

This device helps to connect various components and form circuit without soldering, it has grid of interconnected sockets with which we can connect various components required for project.

Wi-Fi network

Data collected from sensors needs to be uploaded to remote server; it is done using a Wi-Fi network, it is required to mention ssid and password in the code to establish communication.

4. METHODOLOGY



Above diagram shows functional elements present in the data acquisition module of the proposed prototype. Transmitter module represents the hardware components being used, the MQ7 sensor is used to fetch concentration of CO in the air,it is connected to one of the GPIO of the ESP32 kit,with the help of wifi module the kit is configured to establish connection with wifi access point using SSID and password,to the same accesspoint Web server too is connected,ESP32 kit sends data to server script (PHP) by means of URL having host address and parameters example http://192.168.43.122/iot/savedata.php?co=3.4 " , here savedata.php is the file saved at root directory of the server,tothis file parameter called co with value 3.4 (sensor data) is passed, this scripts fetches the parameter and saved value 3.4 in the column of a table by invoking sql insert statement. One more script is written to display the sensor data being populated in the table.

CONCLUSION

Monitoring the environmental parameters especially with respect air plays very important role to ensure healthy environment for living beings. We have seen various hazards being caused at Delhi due to air pollution. There are many reasons for causing air pollution but knowing their concentration at various locations helps to take decisions on prevention measures.

The proposed application works on the principle of IOT, data read from sensor are processed by the processor (ESP32) then uploaded to database, these data are analyzed and displayed to users, and user could fetch this information over phone or webserver and take proper action to prevent pollution.

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