International Journal on Science and Technology (IJSAT)
E-ISSN: 2229-7677 ● Website: www.ijsat.org ● Email: editor@ijsat.org

Air Pollution Monitoring System

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Abstract

Nowadays air pollution has turned out to be one of the significant issues because of increment in the quantity of vehicles and during the time spent industrialization and urbanization. This expansion in the level of contamination brings about destructive consequences for prosperity. This project explains the depiction and execution of an Air Pollution detection system. The innovation grasped here, is a hands-on execution of the idea of Internet of Things. This detailed work is an exploration of the possibilities of consumption of this innovation, in this world, where natural well-being is turning into a genuine risk. The work is actualized utilizing microcontroller board of Arduino. In this project we going to make an IOT based Air Pollution Detection Monitoring System in which we will monitor the Air Quality over a web server using ESP8266 Wi-Fi device and will a trigger alarm when the air quality goes down acertain level means when there is amount of harmful gases is present in the air like CO2. It will show the air quality in PPM (Parts Per Million) as like "Fresh Air", "Poor Air", "Danger Air" on LCD and webpage so that we can monitor it very easily.

CONTENT

INTRODUCTION

The Air Excellence Guide(AEG)may be a common indicator of air quality. The Air Quality Indicator (AQI) is calculated and supported on air pollutants like CO and NO2 compounds that consume opposing possessions happening the atmosphere and human health. The Air Quality Indicator may be a range that represents the very finest meditation of a specific air unused matter at a particular time. We propose an air quality as well as air pollution monitoring system that allows us to monitor and check live air quality as well as air pollution in an area through Internet of Things (IOT). It uses air sensors (Gas Sensor MQ135) to sense presence of harmful gases/compounds in the air and constantly transmit this data. In addition, system keeps measuring air level and reports it. The sensors interact with Arduino Uno (Microcontroller) which processes this data and transmits it over the application. This allows authorities to monitor air pollution in different areas and act against it . In addition, authorities can keep a watch on the air pollution near schools, and hospitals areas. Normally, little concentrations area unit measured exploitation ppb (parts per billion), that represents units of mass of a material per one billion units of total mass. Parts per million (ppm) may be similar and unremarkable used unit to measure concentrations of pollutants. It determines the requirements of a new system and analyze on product and resource requirement, which is required for the successful system. The product requirement contains input and output requirements it gives the wants in term of input to produce the required productivity. The resource requirements define in brief about the hardware that are needed to achieve the required

functionality. In this project we going to make an IOT based Air Pollution Detection Monitoring System in which we monitor the Air Quality over a web server using ESP8266 Wi-Fi device and a triggeralarm when the air quality goes down a certain level means when there is amount of harmful gases is present in the air like CO2.It shows the air quality in PPM (Parts Per Million) on LCD and webpage so that we monitor it very easily.

LITERATURE REVIEW

IOT BASED AIR POLLUTION MONITORING SYSTEM USING ARDIANO

[1] National Air Quality Index Awareness of daily levels of air pollution is important to the citizens, especially for those who suffer from illnesses caused by exposure to air pollution. Further, success of a nation to improve air quality depends on the support of its citizens who are well-informed about local and national air pollution problems and about the progress of mitigation efforts. Thus, a simple yet effective communication of air quality is important. The concept of an air quality index (AQI) that transforms weighted values of individual air pollution related parameters (e.g. SO2, CO, visibility, etc.) into a single number or set of numbers is widely used for air quality communication and decision making in many countries.

A SMART AIR POLLUTION MONITORING SYSTEM

[2] Identification and Characterization of Particulate Matter Concentrations at Construction Jobsites The identification and characterization of particulate matter (PM) concentrations from construction site activities pose major challenges due to the diverse characteristics related to different aspects, such as concentration, particle size and particle composition. Moreover, the characterization of particulate matter is influenced by meteorological conditions, including temperature, humidity, rain fall and wind speed. This paper is part of a broader investigation that aims to develop a methodology for assessing the environmental impacts caused by the PM emissions that arise from construction activities. The objective of this paper is to identify and characterize the PM emissions on a construction site with different aerodynamic diameters (PM2.5,PM10,total suspended particulates (TSP)), based on an exploratory study. Initially, a protocol was developed to standardize the construction site selection criteria, laboratory procedures, field sample collection and laboratory analysis.

A MBIENT AIR QUALITY MON ITORING SYSTEM

[3] Atomization concept and theory Atomization refers to the process of breaking up bulk liquids into droplets. Common home atomizers you may be familiar with include shower heads, perfume sprays, garden hoses, and deodorant or hair sprays. A spray is a collection of moving droplets that usually are the result of atomization; they are moving in a controlled fashion. Naturally occurring sprays are rain and ocean sprays. A droplet is a small particle of liquid having a more or less spherical shape. Droplets are also known as particles

DESIGNOFALOW-COSTAIRQUALITYMONITORINGSYSTEM USING ARDUINO AND THINGSPEAK

[4] The level of pollution has increased with times by lot of factors like the increase in population, increased vehicle use, industrialization and urbanization which results in harmful effects on human wellbeing by directly affecting health of population exposed to it. In order to monitor in this project, we

are going to make an IOT Based Air Pollution Monitoring System in which we will monitor the Air Quality over a web server using internet and will activate an alarm when the air quality goes down beyond a certain level, means when there is sufficient amount of harmful gases are present in the air like CO2, smoke, alcohol, benzene and NH3. It will show the air elements in PPM on the LCD and as well as on web page so that we can monitor it very easily. In this IOT project, you can monitor the pollution level from anywhere using your computer or mobile.

[5] **IOT ENABLED PROACTIVE INDOOR AIR QUALITY MONITORING SYSTEM FOR SUSTAINABLE HEALTH MANAGEMENT**

[6] Internet of Things(IOT) maybe a worldwide system of "smart devices" which will sense and connect with their surroundings and interact with users and other systems. Global air pollution is one of the major concerns of our era. The level of pollution has increased with times by lot of things like the increase in population, increased vehicle use, industrialization and urbanization which ends up in harmful effects on human well being by directly affecting health of population exposed to it. Air quality goes down when enough amount of harmful gases present in the air like carbon dioxide, smoke, alcohol, benzene, NH3, and NO2.

A WIRELESSSYSTEMFORINDOORAIRQUALITY MONITORING

[7] Monika Singh Et al. in August 2019 proposed an Air Pollution Monitoring System. This system uses an Arduino microcontroller connected withMQ135 and MQ6 gas sensor which senses the different types of gases present in the environment. It was then connected to the Wi-Fi module which connects to the internet and LCD is used to display the output to the user and buzzer alerts when the ppm crosses certain limit. Their applications were industrial perimeter monitoring, indoor air quality monitoring, site selection for reference monitoring stations, making data available to users.

POLLUTION: AN EFFICIENT CLOUD-BASED MANAGEMENT OF IOT DEVICES FOR AIR QUALITY MONITORING

[8] Yamunathangam Et al. in November 2018 used IOT by measuring the concentration of gas using various sensors which were observed through serial monitor of arduino. This data is collected in Things peak channels by means of Ethernet shield which is available in live for further processing. These analyzed results were viewed through thing speakin a graphical format. Then the average pollution level was calculated using mat lab analysis and the time controlled results were viewed through an android app. Further based on the location ,the air quality index value was obtained through the android app. Along with this, the health effects were also displayed in this app, so that the user canstay aware of the pollution levels.

ANEMBEDDEDSYSTEMMODELFORAIR QUALITYMONITORING

[9] Nitin Sadashiv Desai Et al. in 2017 proposed a system that consists of Beagle bone Interfaced with air pollution measure sensors such as carbondioxide [CO2], carbon monoxide [CO] and noise sensor. Analog output from sensor was read from Analog pin of Beagle bone black which reads the input signal in the range 0 v to 1.8v. Data from sensor was uploaded on Azure Cloud with the help of python SQL. Reserved data base was created in the beagle bone it self in the for m of. CSV file. At the end of each day,same data present in the CSV file is uploaded in the cloud data base. Old data in the beagle bone have been deleted with the help of automated shell script. Data from different sensor was stored in the

Azure data base. This data from data base has been fetched as input for machine learning service. Machine learning service was used to train the module with the help of previous data. Power BI have been used to represent sensor data fetched by beagle bone black.

AMBIENT AIR QUALITY MONITORING WIRELESS SENSOR NETWORK FOR SCHOOLS IN SMART CITIES

[10] Harsh GuptaEtal.in 2019presented an IOT based Air Pollution Monitoring System which consists of sensors that were to constantly monitor the Temperature, Humidity, Carbon Monoxide, Smoke, LPG, PM2.5 andPM10 levels in the atmosphere. In their work, a one-way communication between Thing Speak, an open source cloud platform, and an Android Application has been developed. Raspberry Pi has been used as a gateway to interface the hardware system. Once the firebase API was included in Android or IOS App, fire base features like Analytics, Authentication, Storage, Messaging, Hosting, Crash reporting, Real-time Data base etc. were used. The Graphs were plotted in Thing Speak according to the sensors data received and the same were visualized in an Android App in a tabular format.

A SMART SENSOR SYSTEM FOR AIR QUALITY MONITORING AND MASSIVE DATA COLLECTION

Rajat Sankhe Et al. in 2017 used carbon sensor for sensing the pollutants or the carbon particles in the air and it also detects the level of pollutants in air and gives the output in form of analog signal. The microcontroller takes in put in digital form so ADC was used to convert the analog output of the sensor into digital form and gives it as input to the micro controller. These values are continuously displayed on the LCD. A switch pad was used for entering the critical value. If the value of pollutants in air exceeds the critical value entered then the buzzer beeps and also a notification will be sent to the web page on the mobile phone by the micro controller through the GPRS module. This in formation is continuously being updated on the web page which can be accessed globally. A notification was also received on the web page when the level of pollutants rises above critical

PROPOSED METHODOLOGY

We have connected the MQ135 gas sensor and ESP8266 Wi-Fi device with the Arduino. Connected the VCC and the ground pin of the sensor to the 5V and ground of the Arduino and the Analog pin of sensor to the A0 of the Arduino. Connected a buzzer to the pin 7 of the Arduino which is start to beep when the condition becomes true. The MQ135 sensor can sense NH3, NOx, alcohol, Benzene, smoke, CO2 and some other gases, so it is faultless gas sensor for our Air Quality Observing Detection Project. The model was designed using an Arduino Uno microcontroller, Wi-Fi module 8266, MQ135 Gas Sensor anda 16by 2liquidcrystaldisplay (LCD)Screen. Figure shows the proposed system overview and the functional block diagram is depicted in figure . The proposed flow chart is presented in figure .The system overview procedure was classified into Five (5) layers . The first layer was the environmental parameters which are obtained by measurement. The second layer was the study of the characteristics and features of the sensors. The third layer was the decision making, sensing, measuring, fixing of the threshold valve, periodicity of sensitivity, timing and space. The fourth layer was the sensor data acquisition. The fifth layer was the ambient intelligence environment. The sensor collected data when operated by the microcontroller and forwarded it over the internet for analysis via the Wi-Fi module. Users were ableto monitor measured parameters on their smart phones.

FUTURESTIC SCOPES

The future scope is that device which we are having can be done in a compact way by reducing the size of the device for further implementation or the modifications which can be is that detecting the vehicles amount of pollution which can be determined. In future the range can be made increased according to the bandwidth for the high range frequencies. Further research can be made by making the people in the right direction for their welfare. Therefore, there is another beneficiary by using this device in an app so the all can be used in an GSM mobile phones for their daily updates by increasing their range.

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 gives the sense of different type of dangerous gas and Arduino is the heart of this project. Which control the entire process, Arduino module connects the whole process to LCD and serial monitor is used for the visual Output.

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