

A SURVEY PAPER ON AIR POLLUTION MONITORING USING IOT

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ABSTRACT

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 webpage 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.

Keyword: - Internet of things, air pollution, buzzer, sensors, monitoring system, Arduino, relay.

1. INTRODUCTION

Air pollution has become major problem for every nation, whether it is developed country or developing country. Health issue have been growing rapidly especially in urban areas of developing countries where industrialization and growing number of vehicles leads to release of lot of air pollutants. Adverse effects of pollution can cause allergic reactions such as irritation of the throat, eyes and nose as well as some serious problems like bronchitis, heart diseases, pneumonia, lung and aggravated asthma. According to a survey, due to air pollution 50,000 to 100,000 premature deaths per year occur in the U.S. alone. Whereas in EU number reaches to 300,000 and over 3,000,000 worldwide.

Air Pollution Monitoring System monitors the Air quality over a web server using Internet and will activate an alarm when the air quality goes down beyond a certain threshold level, means when there is sufficient amount of toxic gases present in the air like CO₂, smoke, alcohol, benzene, NH₃, LPG and NO_x. It will show the air quality in PPM (Parts Per Million) on the LCD and as well as on web page so that it can monitor it very easily.

It is necessary to supervise air quality and keep it under control for a superior future and healthy living for all. Due to resilience and low cost Internet of things (IoT) is getting popular day by day. With the Industrialization and with the increase in the vehicles on road the atmospheric conditions have considerably affected. Adverse effects of pollution include mild allergic reactions such as irritation of the throat, eyes and nose as well as some serious problems like bronchitis, heart diseases, pneumonia, lung and aggravated asthma. Monitoring gives measurements of air pollutant and sound pollution concentrations, which can then be resolved interpreted and presented. This information can then be applicable in many ways. Testing of monitoring data allows us to assess how bad air pollution and sound pollution is from day to day.

1.1 Objective and Aim of Work

The primary objective of this project is to create a system when the industry does lot of pollution which is to be monitored by IoT system over web. It also informs industries about the pollution caused and give warning to the owner of the industry. If still the pollution is not reduced, power of industry will be cut through the relay.

2. LITERATURE SURVEY

The difficulty of the conventional monitoring instruments is their large size, heavy weight and extraordinary costlier. These lead to inadequate deployment of the monitoring stations. In order to be effective, the locations of the monitoring stations need careful placement because the air pollution situation in urban areas is highly related to human activities (e.g. construction activities) and location-dependent (e.g., the traffic choke-points have much worse air quality than average).

IoT Based Air Pollution Monitoring System monitors the Air Quality over a webserver using internet and will activate an alarm when the air quality goes down beyond a certain level, means when there is amount of harmful gases present in the air like CO₂, smoke, alcohol, benzene, NH₃, NO_x and LPG. The system will show the air quality in PPM on the LCD and as well as on webpage so that it can be monitored very easily. Temperature and Humidity is detected and supervised in the system.

An Air Pollution Monitoring System for monitoring the combination of major air pollutant gases has been designed, developed, and observed with the wireless standard. This system measures combination of gases such as CO, NO₂ and SO₂, and using semiconductor sensors. The hardware unit integrates a single-chip microcontroller, air pollution sensors array, a GSM-Module and a GPS-Module. The Central-Server is a high-end personal computer application server with internet connectivity. The hardware unit gathers air pollutants levels (CO, NO₂, and SO₂), and packs them in a frame with the GPS physical location, time, and date. The frame is finally uploaded to the GSM-Modem and transmitted to the Central-Server via wireless network. The Environmental air pollution has significant influence on the combination of constituents in the atmosphere leading to effects like global warming and acid rains. To avoid such harmful imbalances in the nature, an air pollution measuring system is utmost important. The traditional air quality monitoring system, controlled by the Pollution Control Department, is extremely costlier. Wireless Sensor Networks are a new and very challenging research field for embedded system design automation, as their design must enforce stringent constraints in terms of power and cost. This attempts to develop an effective solution for pollution measuring using wireless sensor networks (WSN). It focuses on development of a prototype for a Wireless Sensor Network (WSN) that supervises various environmental guidelines of interest in urban areas based on ZigBee protocol.

This is observed through a small device that can be placed anywhere in a city. First, it is studied the operation of ZigBee protocol. Second, it was chosen and tested a ZigBee module and sensors from the market. Then, it was developed a module that supervises: humidity, temperature, light, carbon monoxide, carbon dioxide and oxygen. These data are measured and sent regularly to a base station connected to a computer. These data are stored and processed for presentation on the Internet in this Environment Observation and Forecasting System (EOFS) is an application for supervising and providing a forecasting about environmental circumstances. The air pollution Monitoring system which involves a context model and a flexible data acquisition policy. The context model is used for understanding the status of air pollution on the remote Place. It can provide an alarm and safety guideline depending on the condition of the context model. It also supports the flexible sampling interval change for effective the tradeoff between sampling rates and battery lifetimes. In this Pollution Map is a new automated system that monitors the air quality of urban cities and displays the information using a web service. The system collects pollution data using mobile hardware modules, transmits the data regularly using GPRS to a back-end server, and integrates the data to generate a pollution map of the city using its geographical information system. The pollution map is available at any time from an easy-to-view website. The proposed system consists of a Mobile Data-Acquisition Unit (Mobile DAQ) and a fixed Internet-Enabled Pollution Monitoring Server (Pollution-Server). The Mobile-DAQ unit combines a single-chip microcontroller, air pollution sensors array, a General Packet Radio Service Modem (GPRS-Modem), and a Global Positioning System Module (GPS-Module). The Pollution-Server is a high-end personal computer application server with Internet connectivity. The Mobile-DAQ unit gathers air pollutants levels (CO, NO₂, and SO₂), and packs them in a frame with the GPS physical location, time, and date.

The frame is finally uploaded to the GPRS Modem and transmitted to the Pollution-Server via the public mobile network.

Some of the current technique for the air pollution monitoring are described as below, in plug and sense device method, it uses multiple sensors with location co-ordinate, and AQI LED indicator is induced as per pollution level and the Real time pollution level visualized using line graph. In distributed sensor data computing, it uses distributed intelligence for the sensor nodes and uses spatial database for locations. In Arduino based method it uses sensor devices for data, Uses ESP8266 Wi-Fi module for connection to server, Uses Node.js and Node RED for displaying data on the server side. In personal assessment methods, Biochemical dose assessment methods are used ex. Biomarkers. In ZigBee technology, ZigBee transmitters and receivers are used, GPS module is used for locations for pollution level on map.

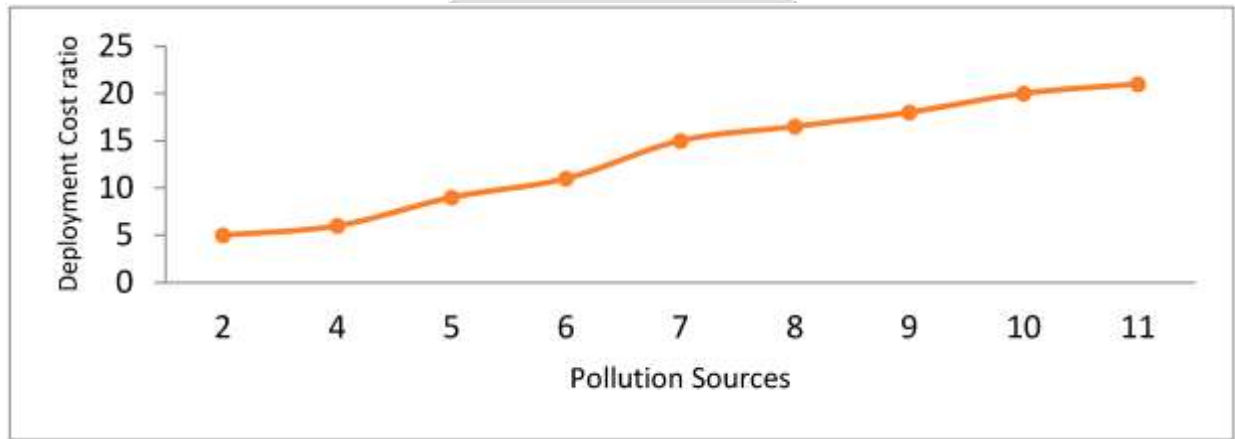


Fig. Pollution Increasing Graph

Non Toxic Air Pollution Control Graph (Using Monitoring System under IoT)

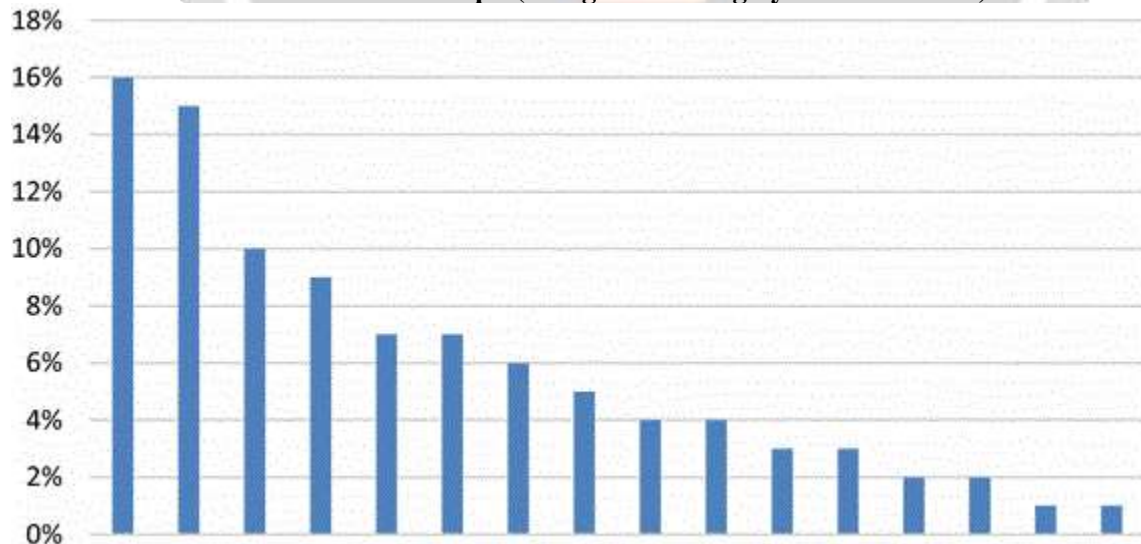


Fig. Pollution Control Using Monitoring System

3. CONCLUSION

A low-cost, high-fidelity air quality monitoring device was designed, built and tested. The device can gather data at every second and transmit data via Wi-Fi and notify the organization depending on the threshold level. The device is low cost.

The device provides a big humanitarian needs near schools near playgrounds in monitoring the quality of air the children breath, in factories or high traffic area where the emission is higher and affect many people, in developing countries and in places where the air quality is very poor and can be a health hazard by alerting the people to threatening levels of these realized pollutants. Also, this prototype can be continued as low cost mobile device that anyone can use and it monitors the air along once path.

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