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IOT AIR AND SOUND POLLUTION MONITORING SYSTEM

P.Sai Chandana , K.Sreelekha , A.Muni Likith Reddy , M.Anil Kumar Reddy , R.Senthamilselvan ,

Abstract— Pollution is a growing issue for these days. It is very necessary to monitor air quality and keep it under control for a better future and healthy living for all. Here we propose an air quality as well as sound pollution monitoring system that allows us to monitor and check live air quality as well as sound pollution in a particular area through IOT. System uses air sensors to sense presence of harmful gases/compounds in the air and constantly transmit this data to microcontroller. Also system keeps measuring sound level and reports it to the online server over IOT. The sensors interact with microcontroller which processes this data and transmits it over internet. This allows authorities to monitor air pollution in different areas and take action against it. Also authorities can keep a watch on the noise pollution near schools, hospitals and no honking areas, and if system detects air quality and noise issues it alerts authorities so they can take measures to control the issue.

Keywords — Wireless Sensor Networks (WSN) , carboxyhaemoglobin (HbCo) , IOT

I. INTRODUCTION

Present innovations in technology mainly focus on controlling and monitoring of different activities. These are increasingly emerging to reach the human needs. When the objects like environment equipped with sensor devices, microcontroller and various software applications becomes a self-protecting and self monitoring environment and it is also called as smart environment [1].

The effects due to the environmental changes on animals, plants and human beings can be monitored and controlled by smart environmental monitoring system. By using embedded intelligence into the environment makes the environment interactive with other objectives, this is one of the application that smart environment targets.

The main aim of the this paper is to design and implement an efficient monitoring system through which the required parameters are monitored remotely using internet and the data gathered from the sensors are stored in the cloud and to project the estimated trend on the web browser. A solution for monitoring the noise and CO levels i.e., any parameter value crossing its threshold value ranges, for example CO levels in air in a particular area exceeding the normal levels etc., in the environment using wireless embedded computing system is proposed in this paper [2].

A solution for monitoring the noise and CO levels i.e., any parameter value crossing its threshold value ranges, for example CO levels in air in a particular area exceeding the normal levels etc., in the environment using wireless embedded computing system is proposed in this paper. The solution also provides an intelligent remote monitoring for a particular area of interest. In this paper we also present a trending results of collected or sensed data with respect to the normal or specified ranges of particular parameters [3]. The embedded system is an integration of sensor devices, wireless communication which enables the user to remotely access the various parameters and store the data in cloud.

II. LITERATURE SURVEY

The goal of building a smart city is to improve quality of life by using technology to improve the efficiency of services and meet residents' needs. Information and Communication Technology allows city officials to interact directly with the public to tell what is happening in the city, how the city is evolving, and how to enable a better quality of life. A Smart City is one with at least one initiative addressing one or more of the following six characteristics: Smart Governance, Smart People, Smart Living, Smart Mobility, Smart Economy and Smart Environment [4]. In this system, an application was developed that is going to bear a hand in this campaign. An area that is being surveyed for estimating how much the area is affected by pollution.

P.Sai Chandana , UG Scholar , Chadalawada Ramanamma Engineering College , Tirupati.
K.Sreelekha , UG Scholar , Chadalawada Ramanamma Engineering College , Tirupati.
A.Muni Likith Reddy , UG Scholar , Chadalawada Ramanamma Engineering College , Tirupati.
M.Anil Kumar Reddy , UG Scholar , Chadalawada Ramanamma Engineering College , Tirupati.
R.Senthamilselvan , Research Scholar , Bharat University , Chennai.

The constituents of air along with its proportion are calculated and if it is higher than normal then the officials are intimated about it. Then the people are evacuated to a safe place. The description about the integrated network architecture and the interconnecting mechanisms for the reliable measurement of parameters by smart sensors and transmission of data via internet is being presented [5]. The longitudinal learning system could provide a self-control mechanism for better operation of the devices in monitoring stage. The framework of the monitoring system was based on a combination of pervasive distributed sensing units, information system for data aggregation, and reasoning and context awareness. Results are encouraging as the reliability of sensing information transmission through the proposed integrated network architecture is 97%. The prototype was tested to generate real-time graphical information rather than a test bed scenario [6].

In this simulation, these three gases are successfully tested in four areas. Then extended the simulated results to update in web. As the technology increase, the degree of automation (minimizing the man power) in the almost all sectors are also increases. Wireless Sensor Networks (WSN) are gaining the ground in all sectors of life; from homes to factories, from traffic control to environmental monitoring. The air pollution monitoring system contains sensors to monitor the interested pollution parameter in environment. They simulated the three air pollutants gases including carbon monoxide, carbon dioxide & sulphur dioxide in air because these gases decide the degree of pollution level. They also applied the approach in various applications like leaking cooking gas in our homes, to alert the workers in oil & gas industry to detect the leakage etc. This simulation creates the awareness in people in cities [7]. Due to recent technological advances, the construction material for small and low cost sensors became technically and economically feasible. Even though, Industrialization increase the degree of automation and at the same time it increases the air pollution by releasing the unwanted gases in environment especially in industrial areas like Visakhapatnam. To implement the project, they selected four areas to deploy the application in Visakhapatnam. To detect percentage of pollution, we used the array of sensor to measure gas quantity in the physical environment in surrounding the sensor and convert them into an electrical signal for processing. Such a signal reveals some properties about interested gas molecule. A huge number of these sensors nodes can be networked in many applications that require unattended operations create a wireless sensor network. Wireless sensors are devices that range in size from a piece of glitter to a deck of cards. Integration of various components creates the air pollution monitoring system [8-12].

III. DESCRIPTION

Carbon monoxide gas CO is odourless, colourless, tasteless and highly poisonous gas. It is released when fuel in engine does not burn properly and road traffic is the primary source of 91% of all CO emissions [1]. In addition, after combining with the hemoglobin of blood, it forms carboxyhaemoglobin (HbCo) which leads to reduction in oxygen carrying capacity of blood thus causes hypoxia. Human health is largely in danger with the exposure to 100ppm or more [16]. Continuous exposure of CO even at low levels can cause depression, confusion, and memory loss. Carboxyhemoglobin can be reverted to hemoglobin but the recovery process is slow because of the stability of HbCo complex. The optimum treatment for CO poisoning although remains controversial, but providing hyperbaric oxygen therapy is considered as a treatment whether or not it provides necessary results.

IV. PROPOSED MODEL

The proposed embedded device is for monitoring noise and CO levels in the atmosphere to make the environment intelligent or interactive with the objects through wireless communication. The proposed model is shown in figure 2 which is more adaptable and distributive in nature to monitor the environmental parameters. The proposed architecture is discussed in a 4- tier model with the functions of each individual modules developed for noise and air pollution monitoring. The proposed model consists of 4-tiers. The tier 1 is the environment, sensor devices in tier 2, sensor data acquisition and decision making in tier 3 and intelligent environment in tier 4.The proposed architecture is shown in figure 2.

Every vehicle is equipped with a wireless device, which allows it to communicate with other vehicles and stationary devices within its communication range.

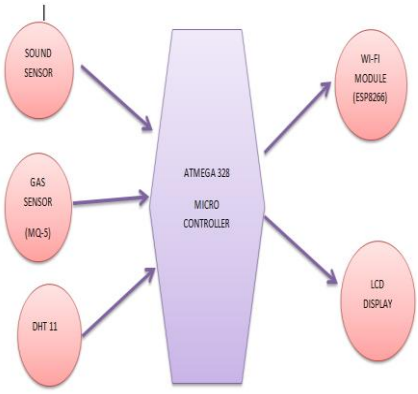

Fig.1 Block Diagram

The main objective of IOT Air & Sound Monitoring System is that the Air and sound pollution is a growing issue these days. It is necessary to monitor air quality and keep it under control for a better future and healthy living for all. Here we propose an air quality as well as sound pollution monitoring system that allows us to monitor and check live air quality as well as sound pollution in an area through IOT. System uses air sensors to sense presence of harmful Gases/compounds in the air and constantly transmit this data. Also, system keeps measuring sound level and reports it.

The sensors interact with Arduino and raspberry pi which processes this data and transmits it over the cloud then to the application. This allows authorities to monitor air and sound pollution in different areas and act against it.

V. WORKING OF MODULE

Here we propose an air quality as well as sound pollution monitoring system that allows us to monitor and check live air quality as well as sound pollution in an area through IOT. System uses air sensors to sense presence of harmful gases/compounds in the air and constantly transmit this data. Also, system keeps measuring sound level and reports it. The sensors interact with raspberry pi which processes this data and transmits it over the application. This allows authorities to monitor air pollution in different areas and act against it. Also, authorities can keep a watch on the noise pollution near schools, hospitals and no honking areas. Network Devices and the Internet of Things All kinds of ordinary household gadgets can be modified to work in an IoT system. Wi-Fi network adapters, motion sensors, cameras, microphones and other instrumentation can be embedded in these devices to enable them for work in the Internet of Things.

Simultaneous broadcasts from neighboring nodes will lead to collisions, resulting in loss of encoded blocks. Further, since MAC layer broadcasts are not acknowledged it may not always be possible for a node to determine if the block it transmitted was received correctly without collision by its neighbors. However, since none of the encoded blocks are critical, this is not a deterrent to the correct operation of VANET CODE. A node can always receive more encoded blocks from subsequent broadcasts in its neighborhood. However, a nave broadcast mechanism has the potential of generating unnecessary data traffic and the collisions can have a deleterious effect on network performance. To reduce the probability of collisions, the nodes wait for a random interval after the creation of the encoded block before broadcasting it. Alternately, we can use more sophisticated broadcast mechanisms such as the ones presented in improved performance.

VI. SIMULAITON RESULT

The inputs are sensed by the sensors and then given to the Arduino atmega328 microcontroller board. In this board the microcontroller process the data and then the output can be shown in LCD display and WI-FI module. the output waveforms can be varied is as shown in the below figure:

Simulation Setup

The air and sound pollution monitoring system monitors air and noise pollution using a mobile application. It shows the digital value of air and sound pollution and user can analyze it with a graph. It becomes very easy for us to rectify the levels and air and noise pollution around and plan for a healthy living and surrounding. The figures that are included in our paper shows the way the system works and how the output is obtained from the input after processing. After the successful connection of the server the data of sensor are sent to the web server for the monitoring of the system. The figure 5 shows the web server page which will allow us to monitor and control the system. By typing the assigned IP address in the web browser we will get this

web server page. The web server gives the information about the temperature, intensity of sound, and the gas level variations in the particular region, where the embedded environmental monitoring system is placed.

VII. CONCLUSIONS

The Automatic Air & Sound management system is a step forward to contribute a solution to the biggest threat. The air & sound monitoring system overcomes the problem of the highly-polluted areas which is a major issue. It supports the new technology and effectively supports the healthy life concept. This system has features for the people to monitor the amount of pollution on their mobile phones using the application. To implement this need to deploy the sensor devices in the environment for collecting the data and analysis. By deploying sensor devices in the environment, we can bring the environment into real life i.e. it can interact with other objects through the network. Then the collected data and analysis results will be available to the end user through the Wi-Fi. The data can be an important source when addressing the issue of the impacts of motorcycles at idles (e.g. waiting for a green light) on air quality. Moreover, to achieve real-time monitoring, the data of CO concentration in a particular place could be reviewed from mobile communication devices, such as PDAs, smart phones, and tablet PCs to help keep air quality in check.

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