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Air Quality Monitoring System Within Campus by Using Wireless Sensor Networks

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ABSTRACT

The main objective of this project is to devise a simple low cost microcontroller based air pollution monitoring system using wireless technology which finds presence of various gases like CO2, SO, NO,etc and parameters like humidity ,temperature ,etc. , displays it on LCD and forwards it to remote user. This project is developed by using PIC 16F877A Microcontroller, SIM 900 GSM Module, JHD204A LCD display and gas sensors. The advantage of using GSM based technology is that GSM based communication network is distributed over a large area and have almost reached to every part of this 21st century world. GSM technology also do provide users with high quality signal and channels, giving them access to high quality digital communication at reasonable cost. This embedded system can prove to be useful for anyone who wish to monitor the quality of air at a location without being physically present there .The main advantages of the research are that the system may be able to collect the pollution levels throughout the 24 hours of the day and that the data so collected may serve as a data base which can be used for various analysis whenever required .The system may offer pollutant levels of a particular industry and this estimation may serve as an enchiridion to the government for allowing or disallowing a particular industry to be set up in a particular area.

Keywords : Air Pollution, Microcontroller, Embedded System, Pollutant Levels, GSM, Monitoring System

I. INTRODUCTION

Environmental pollution is a concomitant of industrialization and its hazardous effects are enhanced by meteorological factors; hence, large cities are usually the centers of acute pollution problems. Because industrialization will continue, it is therefore necessary to determine as afe pollution level and to operate all industrial concerns in such a way that the pollution concentration is continually kept below this level despite the stochastic variation of the atmospheric conditions. Air quality monitoring and analysis is the need of the hour. Air quality measurements can also be processed and presented in

real-time to end users to spread environmental awareness. The monitoring of pollution level in the atmosphere is of significance especially to those residents living in a city. Reasonable sitting air quality monitoring stations is an important task for environmental protection authorities and department, involving: (1) Ensuring that the air quality standard is achieved; (2) planning and implementing air quality protection and air pollution control strategies; and (3) preventing or responding quickly to air quality deterioration. Therefore, the environmental protection department need to site air quality monitoring stations effectively. Bulky air quality monitoring stations are traditionally used for measuring the concentrations of certain pollutants of interest. These stations are large in size, costly, require frequent maintenance and calibration and have high power requirement. They are also powered by the mains power grid. Researchers have devised pollution models based on emission distribution and have also developed an auto calibration method for air quality sensor networks based on mobile sensors. Such wireless network has been put to use to assess air pollution problems. The specific objective of the research is to develop an air pollution monitoring system which is able to measure the level of different gases in atmosphere and forward that information wirelessly to base station, where this information can be stored, processed, and analysed and presented to the end.

II. RELATED WORK

In [6], an actual deployment of a wireless sensor network is described. The purpose of the sensor network is to monitor and analyze air quality in Doha. Small scale wireless sensor stations communicate with a backend server to relay their measurements in real-time. Data stored on the server is subjected to intelligent processing and analysis in order to present it in different formats for different categories of end users. This paper describes a user friendly computation of an air quality index to disseminate the data to the general public. In addition, it describes data presentation for environmental experts using dedicated software tools, e.g. the R software system and its Open Air package. Analysis and assessment of real measurement data is also performed in the paper. In [8] an Environmental Air Pollution Monitoring System (EAPMS) for monitoring the concentrations of major air pollutant gases has been developed, complying with the IEEE 1451.2 standard. This system measures concentrations of gases such as CO, NO2, SO2, and O3 using semiconductor sensors. The smart transducer interface module (STIM) was implemented using the analog devices ADuC812 micro converter. Network Capable Application Processor (NCAP) was developed using a personal computer and connected to the STIM via the transducer independent interface. Three gas sensors were calibrated using the standard calibration methods. Gas concentration levels and information regarding the STIM can be seen on the graphical user interface of the NCAP. Further, the EAPMS is capable of warning when the pollutant levels exceed predetermined maxima and the system can be developed into a low cost version for developing countries.

III. PROPOSED SYSTEM

In the existing system wireless sensor network to monitor the temperature , humidity and also the gas leakage of industrial applications .Our propose the air quality monitored system based on the Arduino microcontroller with different Sensors and IOT module board. Based on the sensed value of the sensor, if there is each value is high then the alert message will be send to the corresponding mobile using Global System for Mobile communication. By introducing this we can monitor the sensor parameter values in wireless communication and also we can upload the sensor parameter values in web portal. For Wireless

communication we are using here is WSN, which helps to collect all nodes data's and can be monitored in PC and can also upload in web portal so that for anywhere in this world we can monitor these conditions.

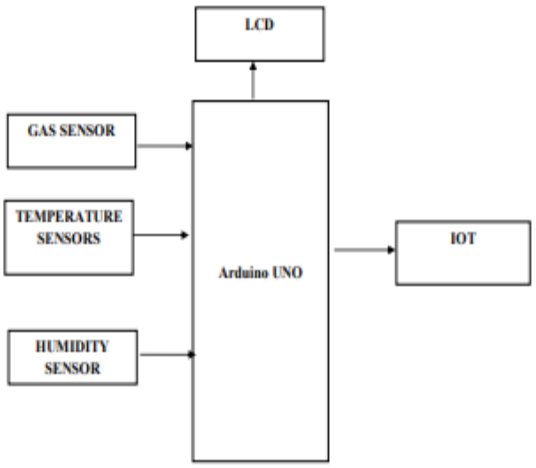

Fig 1: System Architecture

IV. RESULTS

Fig 2: Values of CO and NO2 gases through IOT server

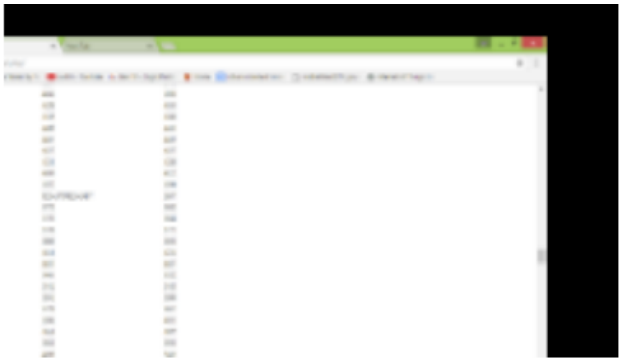

Fig 3: Values of CO and NO2 gases through IOT server in another place

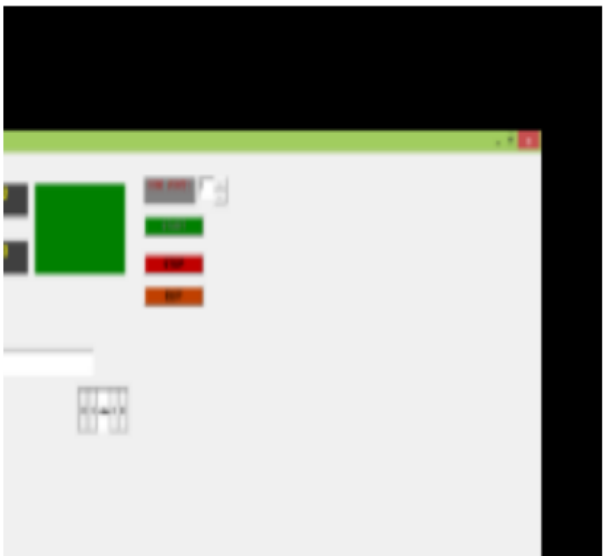

Fig 4: Values of CO and NO2 gases in personal computer without IOT

Fig 5: Values of CO and NO2 gases in personal computer without IOT.

V. CONCLUSION AND FUTURE WORK

This paper introduces a Wireless Sensor Network (WSN)- based air quality monitoring system using IOT central server and gases sensors. This system is very simple as compared to the existing air quality monitoring systems. This project is also used for pollution monitoring purpose in cites. In future, this prototype can be extended in real time implementations of urban cities.

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