International Journal of Electrical and Electronics Engineers
Vol. No. 9, Issue No. 01, January-June 2017
ISSN (O) 2321-2055
ISSN (P) 2321-2045

A REVIEW ON VEHICULAR POLLUTION MONITORING USING IOT

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ABSTRACT

The air quality in cities is degrading as a result of a complex interaction between natural and artificial environmental conditions. With the increase in urbanization and industrialization and lack of control on emissions and use of catalytic converters, a great amount of particulate and toxic gases are produced. The objective of this project is to monitor air pollution on roads and track vehicles which cause pollution over a specified limit. Increased use of automobiles is a serious problem that has been around for a very long time. This paper gives survey of different systems used to monitor vehicular pollution and proposes use of Internet of Things (IoT) to address this problem. Here, combination of Toxic Gas Sensors and Radio Frequency Identification (RFID) tagging system is used to monitor vehicular pollution records anytime anywhere.

Keywords: ***loT, WS, Arduino, RFlD, Gas Sensor***

I. INTRODUCTION

The environmental problems are growing now days. Air pollutants from cars, buses and trucks can worsen respiratory diseases and trigger asthma attacks. Transportation is responsible for more than 50 percent of carbon monoxide in the air. The air pollution may lead to Chronic obstructive pulmonary disease (COPD) and escalates risk of cancer. The public health is affected due to pollution from vehicles. One of the major reasons of air pollution is emission of polluting gases from vehicles which is responsible for almost 70% of the total air pollution. To control the air pollution, the amount of air pollution needs to be monitored and vehicles causing the pollution should be identified. Internet of Things can be helpful in cities for monitoring air pollution from vehicles and also pollution data on different roads of a city can be gathered and analyzed.

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The Internet of Things (loT) is a new concept which has attracted the attention of both academic and industry. The Internet of Things (loT) has a unique addressable devices and their virtual illustration on an internet like structure. These unique devices are connected to the web, and the data can be sent using the protocol that communicates computers to the internet. The devices can sense the environment and communicate with each other and may generally enable automatic reply to challenging scheme without human interference. This paper proposes use of loT for air pollution monitoring and identification of vehicles causing pollution.

Radio frequency identification (RFID) technology has been in use for decades. Only recently, lower cost and increased capabilities made RFID technology to be a commercially viable one. RFID emerges as one of the converging technologies and key catalyst playing a significant role in this research work. This paper aims to understand the usefulness of RFID technology to detect.

Gas sensor technologies are still developing and have yet to reach their full potential in capabilities and usage. Some technologies are very accurate but also very expensive for large-scale deployment. On the other hand, with the use of sensor network, low cost technologies can be used and the problem of false positives can potentially be reduced with the help of multiplicity in data. Large number of outputs collected from individual sensors can be compared for a more accurate analysis. Thus, wireless sensor networks offer powerful new ways to monitor air quality.

II. LITERATURE REVIEW

Few locations, with usually high volume of traffic, may be identified to be monitored. In this framework, for each monitored location, the RFID readers are placed on the either side of a road with a fixed short distance in between them. Each vehicle passing through the road is equipped with a passive RFID tag. Sensor nodes, composed of gas sensors, are placed on the roadside. The sensor nodes may be identified and addressed by unique IP address or a unique ID. These nodes gather sensor data continuously and send it wirelessly to the server. Whenever the sensor nodes sense abrupt rise in pollution, search is initiated for concerned RFID tags, i.e. vehicles causing pollution are identified using the RFID tag attached on them. Pollution data is printed on arduino terminal not sent on internet server.The RFID readers identify corresponding tag number and transmit the same via the GPRS modem to the server. This framework also generates alert when pollution level increases. Authorities may take appropriate actions accordingly. All the gathered data may be monitored and analyzed by authorities concerned.

The system has a significant meaning in terms of cost and effectiveness in comparison to other non-RFID based vehicle detection system as image processing solution, GPS and satellites solution requires a large number of expensive and powerful equipment for processing.

Also Wireless sensor along with active RFID can be used in the wireless sensor system to monitor the vehicular pollution based on IoT. At monitor location, the RFID reader, wireless gas sensors are integrated along with microcontroller. This entire system is placed in either of the road. Whenever the vehicles equipped with RFID tags

passed through the sensor node, RFID reader presented in the monitoring system detects the vehicles and the sensors measures quality of the air produced by that vehicle. The sensed continuous data is sent to the microcontroller for verification of the pollution level of the vehicle. The microcontroller verifies the levels of the pollutants of the air produced by the vehicle. If the pollutants levels are beyond the threshold levels, then it sends the warning message to the vehicle owner. The same data is displayed on the Liquid Crystal Display (LCD). The information about the levels of CO2 and SOx, vehicular number, RFID of the vehicle and time and date of vehicle are also sent to the server of the authorized agencies. This information is stored in the server database for future analysis. In this system using wireless sensor network that provides a framework for collecting the sensor data at any place using IoT. Wireless sensor along with active RFID is used in the proposed wireless sensor system to monitor the vehicular pollution based on IoT. Pollution data is displayed on LCD & Message alert sent to vehicle owner for exceeding pollution level.

Another proposed system consists of two modules vehicle unit and remote monitoring unit. Vehicle units, which resides in a vehicle consists of CO2, LPG GAS sensors, RFID tags and GSM modem. Remote monitoring server area holds the server unit, GSM modem and Laptop. XAMPP is used as local host server to view the Arduino contents in the remote area of server.

From the proposed system, a low cost RFID based application can be designed using Arduino and the applications of Home automation, Industrial control, Transportation can be achieved easily. The vehicle unit periodic monitoring of the sensor values are noted and send to the laptop via GSM modem. Along with the Sensor values, Vehicle FC details, Insurance Details, Periodic Service details are viewed on the laptop using VB. If any increase in the sensor readings/Date expired of any insurance, FC, Service an alert will be send to the owner, also the Transport service regarding vehicle insurance.

A compact system can be developed to detect the pollutants in the vehicle which could be assembled in the vehicle itself. Tremendous innovations have been made in the technology and manufacturing of cars as well as in the pollution control department but still nothing significant achieved of it. This idea employs an MQ7 sensor which is economical and capable of detecting Carbon Monoxide gas emitted from the vehicle. An initial warning is given to the driver regarding the amount of CO gas with the help of LCD display and later the same information is transferred to the Pollution Control Board in case of negligence. This is done with the help of GSM system incorporated in the vehicle. The AVR Microcontroller is used to transfer the information to the GSM system from the MQ7 sensor. This paper is capable to measure the value of pollutants emitted by the vehicle continuously and display it on 16x2 alphanumeric LCD display. Also if the pollutant level exceeds the prescribed value, then a SMS will be sent to the respective authority to take necessary disciplinary action.

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III. SUMMARY OF LITERATURE REVIEW

From the above literature survey following table can be summarized:

Sr. No.	Title	Author	Year	Remarks
1	Vehicular Pollution Monitoring Using loT	Souvik Manna, Suman Sankar Bhunia, Nandini Mukherjee	2014	Pollution data is printed on arduino terminal not sent on internet server
2	Development of IoT based Vehicular Pollution Monitoring System	Ramagiri Rushikesh, Chandra Mohan Reddy, Sivappagari	2014	Pollution data is displayed on LCD & Message alert sent to vehicle owner for exceeding pollution level
3	Vehicular Pollution and Status Monitoring Using RFID	A.Rajalakshmi, S.Karthick, Dr.S.Valarmathy	2015	Data is viewed on local host server .
4	Online Vehicle Pollutants Monitoring System using GSM	Prof. Vishal V. Pande, Rupesh A. Kale, Rupali S. Shirke,Jigar V. Chitroda, Aakash P. Panchal	2015	This paper is capable to measure the value of pollutants emitted by the vehicle continuously and display it on 16x2 alphanumeric LCD display. Also if the pollutant level exceeds the prescribed value, then a SMS will be sent to the respective authority.
5	Vehicular pollution monitoring using IoT	S.SMRUTHIE, G.SUGANYA, S.GOWRI, A.SIVANESHKUMAR	2015	Monitors air pollution shows on LCD as well as provides alerts in cases of drastic change in quality of air. It uses GSM modem connection for transferring data to a central computer

IV. CONCLUSION

Thus, this paper gives review of techniques for vehicular pollution monitoring using IoT. There are number of systems to accomplish this work. This paper is very much helpful to study the existing systems and development of new system for monitoring vehicular pollution using IoT.

VI. ACKNOWLEDGEMENTS

I express my sincere thanks to my guide Prof. S. B. Wagh for guiding me at every step in making of this Dissertation. She motivated me and boosted my confidence and I must admit that the work would not have been accomplished without his guidance and encouragement.

I would like to extend my special thanks to HOD **Dr. G. S. Sable** and Principal **Dr. S. P. Bhosle** for spending their valuable time to go through my report and providing many helpful suggestions. Lastly I would like to thank all the staff member of Electronics & Telecommunication Engineering department and my friends without whom the Dissertation report would not have been completed.

Final and heartfelt thanks go to my parents.

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