



CLOUD BASED VEHICLE POLLUTION DETECTION AND MONITORING SYSTEM

DR.L.SURENDRAN	A.SURESH KUMAR	S.VANMATHI	S.SOWBHARRANIGA
Associate Professor	Assistant Professor	U.G Scholar	U.G Scholar
Sri Krishna College of Engineering Kovaipudur Coimbatore-641042	Sri Krishna College of Technology Kovaipudur Coimbatore-641042 a.sureshkumar@skct.edu.in	Sri Krishna College of Technology Kovaipudur Coimbatore-641042 14n240@skct.edu.in	Sri Krishna College of Technology Kovaipudur Coimbatore-641042 14n230@skct.edu.in

ABSTRACT

In the present day modern world vehicles have become a part and parcel of every one's life. The main reason behind this violation of emission level being the expurgated combustion of fuel supplied to engine, which is due to the improper maintenance of vehicles. This emission from vehicles cannot be completely avoided but, it definitely can be controlled. With the unfolding of semi-conductor sensors for detecting the various gases, this project aims at using those semiconductor sensors at emission outlets of vehicles which detects the pollution. When the pollution/emission level shoots beyond the already set threshold level, there will be a voice message from the warned list and collects fine from fined list .

The pollution detector is connected to the cloud storage through a IOT device and the cloud technology is used to store the database and retrieve data using hadoop tool . GPS and GSM is used as an 3G networking devices.

Keywords: IOT, MQ7 carbon monoxide sensor, hadoop tool, GPS,GSM.

I. INTRODUCTION

Along with health concerns, pollution is being greatly considerable in environmental matters. One of the major concerns regarding the environment is air pollution. Air pollution contributes to the greenhouse gases, which affects the ozone layer. Air pollution is not only baleful to the environment but also to all other living beings on earth [1]. Air pollutants that are inhaled have far-reaching impact on human health affecting the lungs and the respiratory system. Vehicles and Industries are the major sources of Environmental Pollution. Every vehicle will have emission but the problem occurs due to the improper maintenance of vehicles. This emission from vehicles cannot be completely avoided but it definitely be controlled. The advent of the Internet of Things and cloud computing brings a new approach, enabling to collect, transfer, store and share information on the logistics



flow for better cooperation and interoperability among devices. IOT is an evolution in computer technology and communication that aims to connect objects together via the Internet.

For that, we have designed an excellent system which controls the pollution in vehicles. The main pollutants from vehicles are the oxides of carbon and nitrogen, which can be easily spotted these days with the help of semiconductor gas sensors [2]. Therefore, in this paper we prepared a system useful in reducing the amount of pollution from vehicles. The proposed automated control system uses GSM & GPRS. We use CO and temperature sensors to detect the pollutants [3]. This tracking network will retrieve the database from the IOT device using hadoop tool. GSM technology is used to send the voice message to the mobile and GPRS technology is used to post the same on the database [4]. After the voice message is sent to that particular vehicle it is stored in the list of vehicles which cross the setted threshold level. Now this database gets stored inside the cloud, weekly once this database gets changed and the two databases were compared. If the vehicle priests to be polluting the society even after sending the message while comparing that vehicle will be listed inside the warned list. The vehicles inside the warned list will be monitored carefully. If it rectifies the problem that vehicle will be removed from the warned list and no further actions will be taken. If it does not rectifies it's definitely legal actions will be taken by the organization.

II. SYSTEM ARCHITECTURE

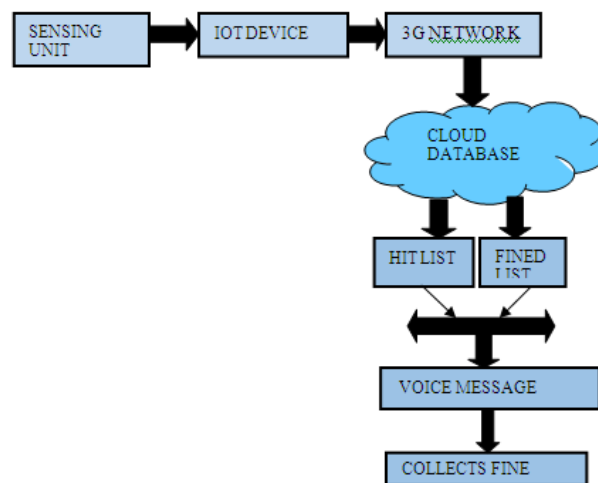


Figure 1 Block diagram

Initially the voltage required for this process is provided by a step down transformer which will reduce the incoming voltage into a amount required to proceed. The next unit which consist of the MQ7 carbon monoxide sensor (figure 2.1.1) will detect the incoming gas and checks its level which is from 20 to 200ppm anywhere inside the vehicles. It requires a heater voltage that cycles between 5v(60s) and 1.4v(90s), drawing approximately 150mA at 5v which exceeds the power capacity of the Uno., [5] discussed about a system, GSM based AMR has low infrastructure cost and it reduces man power. The system is fully automatic, hence the probability of error is reduced. The level of the gas which is emitted is stored in the cloud database. A cloud computing is a type of Internet based computing that provides shared computer processing aid and data to computers and other devices



on demand (figure 2.1.3). It is a model for enabling ubiquitous, on-demand access to a shared pool of configurable computing resources. The information's that are needed to be sent to the database takes place through two mediums. They are IOT device and the 3G mobile network. The mobile network acts as a bridge between the IOT device and the cloud database (figure 2.1.2). The information's stored in the cloud is retrieved using the Hadoop tool by the required organizations. Hadoop is an open source, Java based programming framework that supports the processing and storage of extremely large data sets in a distributed computing environment. It is a part of Apache project sponsored by the Apache Software Foundation. It makes it possible to run applications in terabytes of data. Its distributed file system facilitates rapid data transfer rates among forks and allows the system to continue operating in case of a node failure. This approach in this system lowers the risk of catastrophic system failure and unexpected data loss, even if a significant number of nodes become inoperative. It emerges a foundation for big data processing tasks.

The details of the vehicles which crossed the level is prepared as a list and stored. The system will take this survey once a week. After a week both the lists are compared with the older one. If the same user's name is repeated then a warning message is sent to that particular user through a voice message again. The next week if the user fails to respond then their names are put in another list known as a warned list. The users in that list will be fined. If the user still fails to respond message about the legal actions that are about to be taken are informed.

III. COMPONENTS

A. Sensing unit:

Here the sensing unit consists of MQ7 carbon monoxide sensor which is used to detect the pollutants which come out of vehicles under the concentrations anywhere from 20 to 200ppm and consists of a step down transformer. The step down transformer steps down the voltage and corrects the level of voltage applicable to proceed. This unit is the main area for pollutant detection.



Figure 2 shows MQ7 sensor.

B. IOT device:

IOT device acts as an inter-networking of physical devices, here the device is the vehicle. It enables the object to collect and exchange data. It stores the data and retrieves the data by using Hadoop tool. Aptness to store and process huge amounts of any kind of data, rapidly. With data volumes and varieties constantly increasing, overall from social media and the Internet of Things (IoT), that's a key consideration.

- **Computing power.**
- **Fault tolerance.**
- **Flexibility.**
- **Low cost.**



- **Scalability.**

The major dare associated with big data are as follows:

- **Capturing data**
- **Cu-ration**
- **Store house**
- **Searching**
- **Sharing**
- **Transfer**
- **Analysis**
- **Presentation**

To fulfill the above challenges, organizations normally take the help of enterprise servers.



Figure 3 shows IOT device module.

C.3G Network:

This unit consists of two main 3G networks namely GSM and GPS. Where GSM uses variation of time division multiple access (TDMA). It digitizes and compresses the data. WhereGSP (Global Positioning System) that provides geolocation and time information to a GPS receiver in all weather conditions, anywhere on or near the earth.

D. Database:

The databases of the vehicles were stored in the cloud. Cloud computing is a general term for the delivery of hosted services over the internet. It is used to store huge or vast amount of data.



Figure 4

shows cloud structure.

Hit list:

This unit consists of the vehicles which crosses the particular threshold level. This list is maintained until the next lists of record gets updated. The information's of this list gets stored in the cloud database.

Voice message:

This unit is a user interface unit. After finding the polluted vehicles by using the database a voice message is sent to the phone by the help of GPS and GSM.

Fines list:

After sending the message to that particular user if the user does not rectifies the mistakes then the user will be fined. The fined list will be maintained and it will be stored inside the database for further process.

IV. FUTURE SCOPE

The future enhancement includes a technology called **rf safe stop**. If the user does not respond for any of the warning messages sent then this rf safe stop technology can be used to disable the vehicle's engine. This technology is introduced by the e2v. e2v has extensive experience in the designing and



manufacturing of technologies related to engine stopping, this includes high power RF and microwave devices as well as the alike subsystems that are assembled to provide a self-contained unit. It can be triggered within a distance of 650 feet. It has been successfully tested on unmanned vehicles and boats.

V. CONCLUSION

Through this project the amount of air pollution will be considerably reduced. This method uses the transformer and the sensor to detect the pollutants. It will detect the presence of the pollutants only when it reaches a particular level. There is a frequency tuner present next to the smoke sensor where the threshold level can be set before giving the smoke input. It uses very cost effective parts hence it is affordable and user friendly. This model can be fit at the mouth of the silencer in the two wheelers hence when it gets the smoke input it gives an alarm by checking the threshold level according to the frequency tuner. This model will be a great use for the government in order to maintain the transport laws across the country.

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