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A Literature Survey on

**Effective prevention and prediction of air pollution caused by automobiles using IOT and Data Analytics techniques**

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**INTRODUCTION**

The aim of this project is to effectively prevent and predict the air pollution caused by the automobiles using Arduino board, two gas sensors (MQ-7 and MQ-135) and a Wi-Fi module.

These components serve the IOT part of the project. The remaining half of the project is all about data analytics on data collected from various sources primarily, Karnataka State Pollution Control Board. The sensors sense the gaseous levels present in the effluents and emissions coming out of the exhaust and based on the threshold value set, the processor board decides whether an alert is to be sent to the owner or not about the emission level exceeding. These values are also sent by Wi-Fi module from the board to a specific IP so as to collect and analyze the data from every specified owner. An android application is also built to support the most important feature of the data analytics part i.e. Routing based on pollution levels in the cities.

We propose this system as this idea was brainstormed by referring to few IEEE papers and by using ideas of our own about the prevention of air pollution and how it is to be controlled. This system has various features which on implementation will affect the strategy of curbing the air pollution to a huge extent. We have the feature in which the system chokes/cuts down the fuel supply once the vehicle is not serviced in the allotted time period. The android application is basically for the routing feature which is based on suggesting you route based on pollution levels.

IOT is an emerging field and is the technology which is helping in automating almost everything. Data analytics always provide clear insights out of humongous data sets and helps to derive conclusions out of it. We try to use the benefits of both these fields into one concept which in today’s world is a burning topic i.e. AIR POLLUTION. This system is going to bring a revolutionary change to the entire concept of prevention to the air pollution and its control measures.

The Android application also provides the history of the emission records and also provides tips which we call “Tip of the day/week”. This tip is a small fact which can help spread awareness about the air pollution prevention and how some preventive measures can prove effective in this regard. Routing of the areas are based on the ranks assigned to them after the data from that area is being analyzed. Arduino is a cheap and compact but highly effective board, and has an A-to-D convertor in-built which is not there in RasberryPi board also. Hence we have chosen this board. Internet connectivity is very important in this system as every communication is dependent on it.

**MAIN BODY**

As our concentration is on prevention and prediction of air pollution from automobiles, we use two gas sensors i.e. MQ-7 and MQ-135. MQ-7 is a basically as CO gas sensor as CO is one of the primary content in the vehicular exhaust. [1] It is a real time work where a demo application has been made in which Arduino processor is used and a controller board is made where all these devices get integrated and work accordingly. The vehicle is controlled by this circuit. When a vehicle attains certain threshold pollution level then an SMS is generated and sent to the pre-defined number stored in the memory through the GSM module about the time period which he has been allotted for the servicing of the vehicle. The GPS module is used to locate the vehicle position where it is halted. This paper demonstrates an effective utilization of technology by which we save our environment by controlling the pollution of vehicles.

The aim of [2] is that the system is based on a smart sensor microcontroller equipped with a network capable application processor that downloads the pollutants level to a personal computer for further processing. The system monitors and transmits parameters atmospheric environment to a command center (admin’s server). From this paper, we got the idea of transferring all the data collected from the sensors to the admin’s server, for further analysis and this would also help to keep track about the owner’s vehicular emissions. This data collected from the sensors will be helpful in data representations and rankings for the particular regions/areas.

Further [3] gives us insights about the power management for the system. Any sensor system must be highly effective in terms of power usage and management. The lesser the system uses power, the longer time it can serve its purpose. Also from this paper, we came up with the thought of having an android application which will provide you with routing between areas not based on traffic but based on pollution levels. This idea of having an android application not only provides an edge to this system but also will help the owner to have a record of his own vehicle’s emission records. This android application will also be the means of spreading the awareness about the control of air pollution by our “Tip of the day/week” feature of the system.

The system that we have proposed is shown in Figure1. It efficiently takes ideas from different papers and integrates them to achieve maximum benefit and also ensures that the design is cost effective but at the same time efficiently solves the problem at hand. Thus the tradeoff between performance and cost has been effectively managed.

**Figure 1.Proposed Architecture for the Air pollution control system (IOT and DA)**

Message alert

Google Maps API

Android Application

GSM Module

MQ-7

(CO sensor)

Arduino board

(Processor)

Wi-Fi module

Admin’s server and database

MQ-135

(NOx sensor)

Fuel

Injector

**CONCLUSION**

The system which we have proposed is lightweight and compact and hence can be implemented on the vehicles. This system on implementation will surely help in reduction of current rate of generation of air pollution due to vehicular emissions. This entire concept is new and will serve for a very big change in the prevention and control measures for air pollution. The system is provided with a UI in the form of an android application which is very easy to use and can be easily deployed in any smart phone. The sensors and the other components used in building this system cost very less and hence the system is cost effective. Apart from being cost effective, this system is high in performance as it uses low power consumption sensors and also for the fact that these sensors are highly precise in detection. The routing facility to be provided in the android application is a totally new feature which will make use of Google maps API and will suggest the best suited path between two stations based on the pollution levels. This app will serve also as a record for the owner of the vehicle for his vehicle’s emissions. Also awareness tips will be provided on this app itself.

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