

# Carbon Footprint Monitoring in Automobile

Jonadab Theodore<sup>1</sup>, Hemant Kumar<sup>2</sup>, Nivetha A<sup>3</sup> and Dr. V Thulasi Bai<sup>4</sup>

<sup>1</sup>Student, Department of Electronics and Communication Engineering, KCG college of technology, Tamil Nadu, India.

<sup>2</sup>Student, Department of Electronics and Communication Engineering, KCG college of technology, Tamil Nadu, India.

<sup>3</sup>Student, Department of Electronics and Communication Engineering, KCG college of technology, Tamil Nadu, India.

<sup>4</sup>Professor, Department of Electronics and Communication Engineering, KCG college of technology, Tamil Nadu, India.

**Abstract:** Pollution is one in all the dominant causes for problems referring to health and wellbeing of not only people but also the environment together with the living organisms in it globally. India is one altogether the countries within the planet which is most concerned due to pollution. Matters is becoming dire in several parts of India because the pollution is rapidly increasing. This project aspires to look the carbon emissions of every automobile and cut-off emission by switching off the engine if it crosses a threshold value, thereby reducing the carbon footprint of people. This permits individual responsibility by ensuring that every vehicle's carbon footprint is reduced to profit the greater good, and further we are meaning to implement a static monitoring system in major public roads to amalgamate the carbon emissions from each road and institute a navigation application for the tiniest amount polluted path to reach the destination.

**Keywords:** carbon emission, automobile, monitoring system, threshold value, footprint.

## 1. INTRODUCTION

According to the statistics, pollution is one in all the dominant reasons for deaths in road accidents. The polluted air has become unhealthy for lungs and heart in human body.

Pollution in India has increased promptly over the years owing to population growth, emissions from vehicles, continuous destruction of forest land, hasty industrialization, inadequate environmental settlement, etc. When we are considering present day India, due to the rapid growth in economy for the past few decades the middle class has slowly broadened which resulted in the drastic increase of vehicular traffic on the roads coupled with the starve for energy resulting in the carbon emissions from various thermal power plants poses an enormous battle. The foremost common air pollutants found in air are shown in figure 1. Though these gases are in minor compositions, their rapid concentrations can cause serious health problems.

Sources of Air Pollution

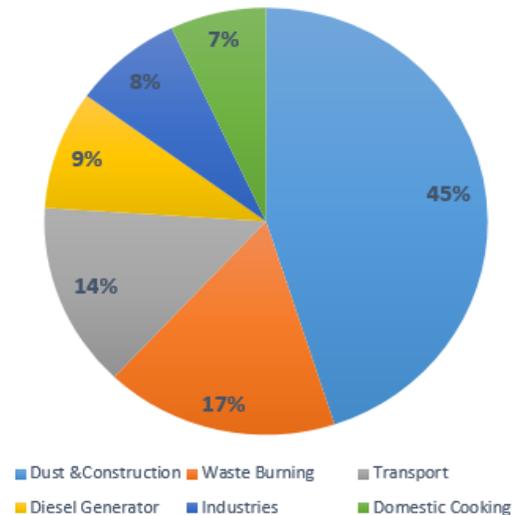


Figure 1

The exponential growth in terms of modernization in both the major cities and sub-urban areas with the increase in number of industries due to the influx of people to those areas also play an important role since they produce minute particles that are easy enough to enter the human system and pose a threat to the heart and lungs proving to be fatal. Hence the detection of air pollutants requires a system that detects major hazardous gases and particulate matters which cause pollution. While the detection system is efficient in estimating the amount of pollution, we require the abundance of such modules to accurately map the area and the carbon emissions of such locations. Therefore, this method monitors the pollution level of a region and then it uploads that data in the google maps. Also, there's another module which monitors the pollution emission level of the vehicle and if the pollution level exceeds the limit then the vehicle's engine will shut down. This method will help us to cut back the air pollution which is able to further reduce the road accidents.

## 2. RELATED WORKS

In [1], the analysis was conducted to develop out of doors air quality mensuration system to live API readings using Raspberry PI while not having to rely on a regular official unleash of API readings.

[2] Introduces associate in nursing innovative IIS (Integrated Information System) for earth science observation and management supported IoT (Internet of Things) that improves the effectiveness additional sophisticated and reticulated tasks.

[3] Paper is an assumption of a smart automobile to hold the indoor air quality observation system primarily based smart movable technology and indoor surroundings observation combining.

In [4], the mix of amperometry gas sensors for waste product and oxygen measurement with sensors for accurate measurement of basic physical parameters, such as gas pressure, temperature and humidness, make it possible to perform higher exactness measurements of gas concentrations

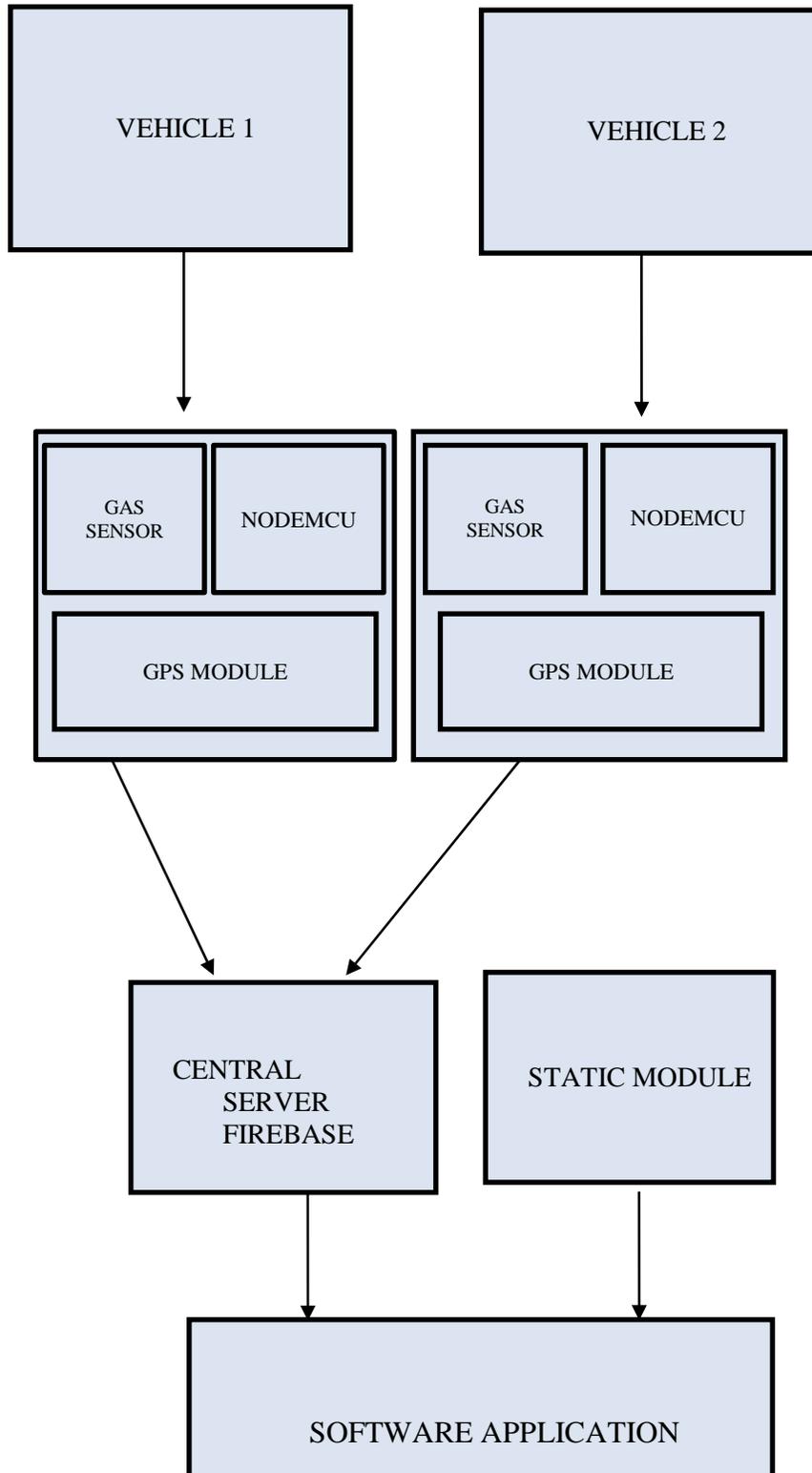
[5] was an entire sensor-based system that was accustomed to monitor a specific region using the gas sensors. It monitored on two gases- NO<sub>2</sub> and O<sub>3</sub>.

Wireless sensing element network (WSN) has been used at the side of Raspberry Pi, Arduino, and Zigbee to observe the surroundings [7]. 2 gas sensors, temperature, humidity, and atmospheric pressure sensors, were utilized in [8]. In [9], smartphone with additional device was used. Restricted environmental observation using Raspberry has additionally been planned in [10].

## 3. PROPOSED APPROACH

The proposed system is largely a software application which shows the carbon footprint of an automobile as well as for a locality or a city. The hardware is split into two modules. First module consists of gas sensors which monitors the carbon level in an exceedingly particular area, and this data will further be uploaded to google maps using the micro- controller (Node-MCU) and Firebase. This may help the user to search out the route which has smallest amount of pollution. The second module will be fitted within the vehicle that may estimate the carbon emission. According to the rules, every vehicle features a certain limit for carbon emission. If the vehicle exceeds that limit, then the driving force of that vehicle are warned. 3 such warnings are given and still if the carbon emission level isn't reduced then the engine of the vehicle will be shut down automatically. The data in this system gets updated every second, which makes sure that the accuracy is maintained and any change that occur gets uploaded within the software application.

#### 4. SYSTEM ARCHITECTURE



This section will elaborate the system components used in the project, divided broadly into Software and Hardware Designs.

#### 4.1 Hardware Design

The hardware part of the project is broadly classified into two parts- Individual Module and the Static Module. The individual module is fitted onto each vehicle and comprises of a MQ-135 Gas Sensor, Neo-6M GPS Module and ESP-8266 Wi-Fi module. The static module comprises of the ESP- 8266 and the MQ-135 sensor only. The gas sensor MQ135 measures the content of carbon di- oxide, carbon monoxide present in the air. Neo-6M gives the longitude and latitude values of the location. ESP-8266 Wi-Fi module transfers the data collected from the sensors to the cloud using IoT. This data is implemented in the maps and the required output is displayed in the software application.

#### 4.2 Software Design

The software consists of a mobile application and the database. The mobile application has two distinct parts, one involves the individual Modules essential information and the map containing the carbon emission data, while the other consists the data from the static module presenting the navigation front of this project. The database which will act as the central server is the Firebase real- time database, which will store all the from each module.

### 5. CONCLUSION

This paper has presented the monitoring of carbon footprint using gas sensor (MQ135), GPS module, Node-MCU. An app was created to display the data. The data quality provided by the sensor nodes depends significantly on the accuracy of the used low-cost sensors.

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