REMOTE SENSING TECHNIQUE FOR MONITORING AND REDUCING HARMFUL GAS EMISSIONS FROM VEHICLES.

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Abstract— The main source of atmospheric taint happens due to automobiles. Using empirical scrutiny, ritual mechanized air monitoring system has high rigor, but uneconomical and single datum class make it unfeasible for large-scale furnishing. In order to eject the issues in ritual systems we have introduced Internet of Things (IoT) into the field of environmental barrier. This paper is to introduce vehicle emission monitoring system using Internet of Things (IoT) which is a green thumb for tracking down vehicle causing taint on the city roads and measures multifarious genres of toxic wastes, and its level in air. This paper puts forward a kind of real-time air pollution monitoring system at any time anywhere using Gas Sensor. The measured data is shared to vehicle proprietor via text message, and agencies of national environment. This assay shows that the system runs abiding, an economical and can be controlled tractably, it can smell out the vehicle exhaust in real-time, and can improve the detecting level and accuracy of the exhaust monitoring system. This system provides good outcomes in monitoring the air pollution exclusively in the urban areas.

***Keywords*: Internet of Things, Wireless Technology, Gas Sensors, OpenCV, Machine Learning.**

I. INTRODUCTION

Air pollution is one of the serious environmental concerns of the urban Asian cities including India, where majority of the population are exposed to poor air quality. The main source of pollution in cities is due to vehicles .The increase in use of vehicles in cities results in vital increase in the emission load of various toxins into air. In addition human activities also affect the environment directly or indirectly. Common gaseous pollutant include carbon monoxide, hydrocarbons and other harmful gases produced by motor vehicle.

Transportation can be responsible for more than 50 percentage of carbon monoxide in the air. This carbon monoxide can play havoc on human health. And may also lead to chronic obstructive pulmonary disease (COPD) and escalates risk of cancer. Certain changes to the climate are unavoidable. Carbon dioxide can stay in the atmosphere for nearly a century, so Earth will continue to warm in the coming decades. The warmer it gets, the greater the risk for more severe changes to the climate and Earth's system. Greenhouse Gas Emissions council has done a survey in 2017 says CO2 has a major contribution of 82% of the total green gases emitted and the statistics also says 27% of the green gases is due to transportation and 31% is from industries. India is at fourth position and contributing 8.95% of the total CO2 emissions in the entire world. The survey of CO2 emissions from vehicles in India reveals that major vehicle contributor of CO2 are cars, taxis and MUV's. The proposed design is hence based on the cars and taxis. Although it's difficult to predict the exact impact of climate change. It is clear that the climate we are accustomed to be no longer a reliable guide for what to expect in the future. These risks from climate change to the human race can be reduce to a large extent. By making choices that reduce greenhouse gas pollution, and preparing for the changes that are already underway, we can reduce risks by continuous monitoring of CO2 emissions.

The new concept of the Cognitive Internet of Things (CIOT) brings an opportunity for the creation of innovative applications that integrate the all too familiar traditional digital technologies. The CIOT is about interfacing these autonomous devices to communicate without human intervention and generate integrated data. Intelligence is then required to process this integrated data and make it available to the humans for decision-making. This concept of CIOT has been applied to monitor greenhouse gases released by the vehicles. CO2 sensors are available but no system is available for real time monitoring and thus controlling the CO2 emission levels with the help of the control centre. The model developed monitors CO2 and CO emissions with the help of sensor MQ135. The decision making is done using the abstracted data and sent to the webserver for further evaluation.

The amount of CO2 emissions have to be reduced by having a check on the transport system or industries with the help of governing bodies. The proposed model helps in real time monitoring of CO2 emissions and reducing it on a daily basis. CO2 can be controlled and thus helps in reducing global warming.

II. LITERATURE REVIEW

Rende Wang, October (2016) proposed a paper for Real-Time Monitoring of Inherent System loss to improves the accuracy of FLRDS-based gas sensors. An important factor restricting the development of fiber-loop ring-down spectroscopy (FLRDS) is that real-time continuous monitoring of the inherent system loss is inconvenient and time-consuming.

Wamadeva Balachandran (MAY/JUNE 2016) proposed a paper on Non-thermal plasma System for Marine Diesel Engine Emission Control, used in two 2.45_GHz microwave (MW) generators for the abatement of nitrogen oxides (NOx) and sulphur (SOx) contained in the exhaust gas of a 200_kW marine diesel engine and tested. It was founded that generating required MW plasma is a challenging task and requires further investigation.[2]Vijay Sivaraman and James carrapetta (2013) proposed a paper in which several low cost mobile sensor units attached to vehicles to measure air pollution concentrations, and users mobile phones to tag and upload the data in real time. But the potential

of a low-cost crowd-sourced pollution monitoring system has been demonstrated, and might provide a more viable alternative to waiting for governments of the world to act on this important but ignored problem.[3]

Joseph A. shaw and Rick L. Lawrence (may 2014) proposed a paper of comparison of long-wave Infrared Imaging and Visible/Near-Infrared imaging of vegetation for Detecting Leaking Co2 gas. In this paper controlled Co2 release experiment was conducting in Bozeman, Montana as study of method for monitoring carbon sequestration facilities, reflective or emissive imaging alone can distinguish between regions with and without Co2 leak.[4].J.H.Visser(December 2001)proposed a paper on Automotive Exhaust Gas Sensing Systems.Gas sensors have become an integral component of control systems for internal combustion engine to provide information for feedback control of air-to-fuel economy as well as decreased levels of emission. The different sensing requirements, testing procedures, environmental parameters, and need for Microsystems-based realizations are discussed.

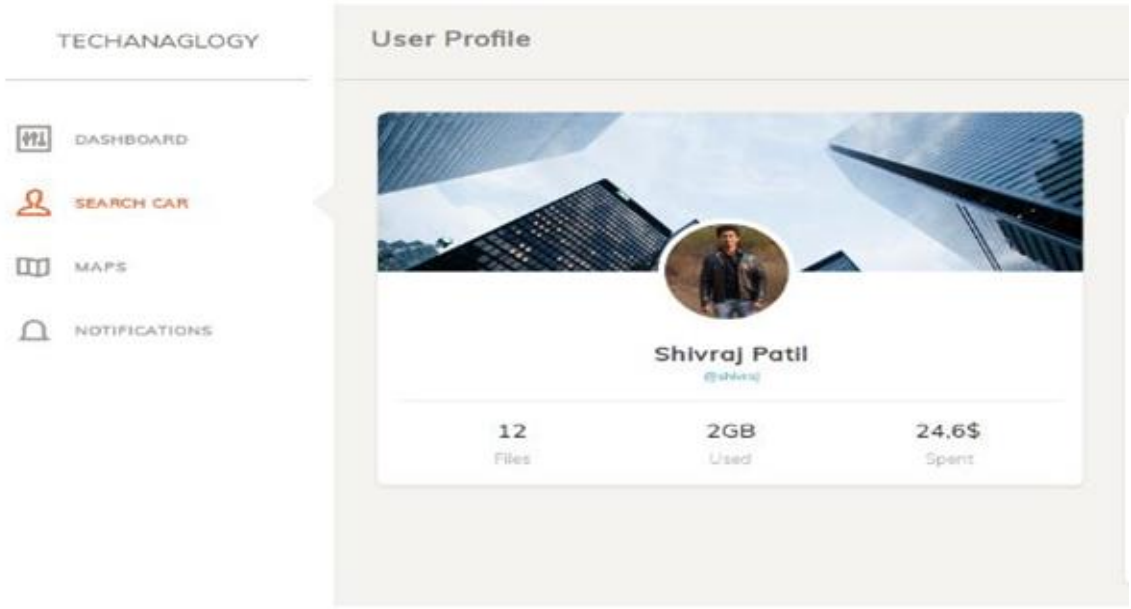
Souvik manna (May 2014) proposed a paper on vehicular Pollution Monitoring Using IoT. This paper is to monitor the air pollution on roads and track vehicles which cause pollution. Here IoT is used to address this problem. Then combination of wireless Sensor Network and Electrochemical Toxic Gas Sensors and the use of a Radio Frequency Identification (RFID) tagging system is used to monitor the car pollution records anytime anywhere but RFID reads only at the LOS.[4]

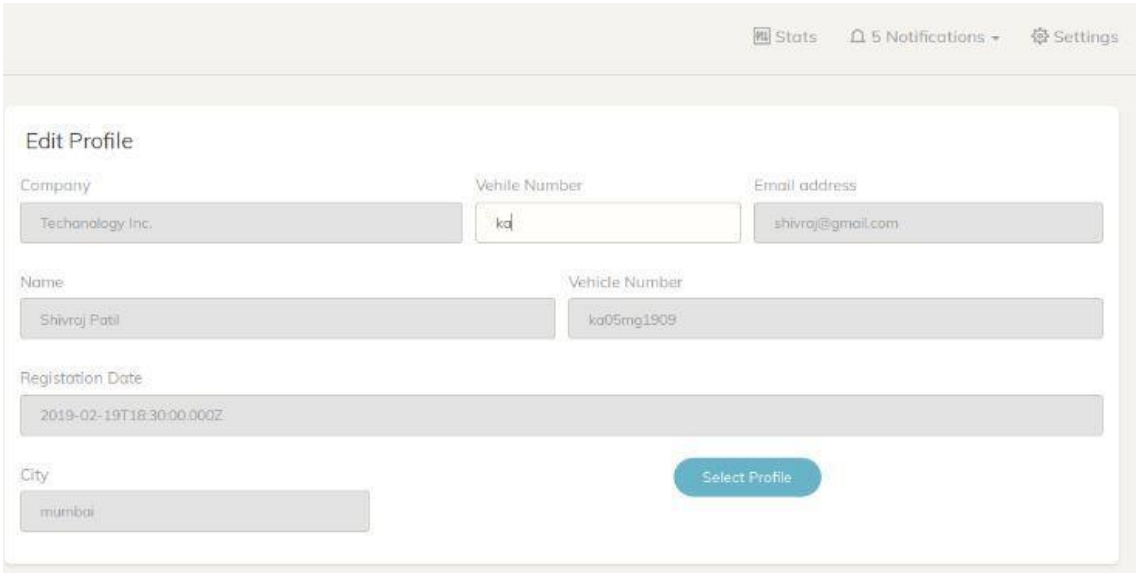
III. SYSTEM REQUIREMENTS

The proposed system is a multimodal biometric system, fingerprint is the biometric traits under consideration. The hardware requirements for the remote enrolment node are listed below: In this research, Raspberry Pi 2 Model B is used which costs US $35. It has 4 USB ports, a HDMI port for connection with the display, micro SD card slot for booting and data storage as RPi doesn't have on-board storage. Also it has 10/100 Mbit/s Ethernet port for internet connection. To make RPi portable in this paper wireless USB Wi-Fi adapter is used. The OS used is Raspbian (Debian). RPi needs power supply of 5V-800mA (4.0 W) [2]. In order to make the proposed portable, RPi is supplied power through power bank. RPi 2 has 1GB RAM and CPU speed is 900 MHz quad core ARM Cortex-A7. It is a Broadcom2835 System-on-chip hardware. One powerful features of the Raspberry Pi is the row of GPIO pins along the edge of the board. These pins are a physical interface between the Pi and the outside world. Mobile having fingerprint scanner and application installed.

IV. IMPLEMENTATION

The dashboard of the proposed system is displayed below where you are able to get the information about the fine allotted, warnings given and number of times the record was updated for a particular vehicle user. The graph below shows the behaviour performance of the user's vehicle.

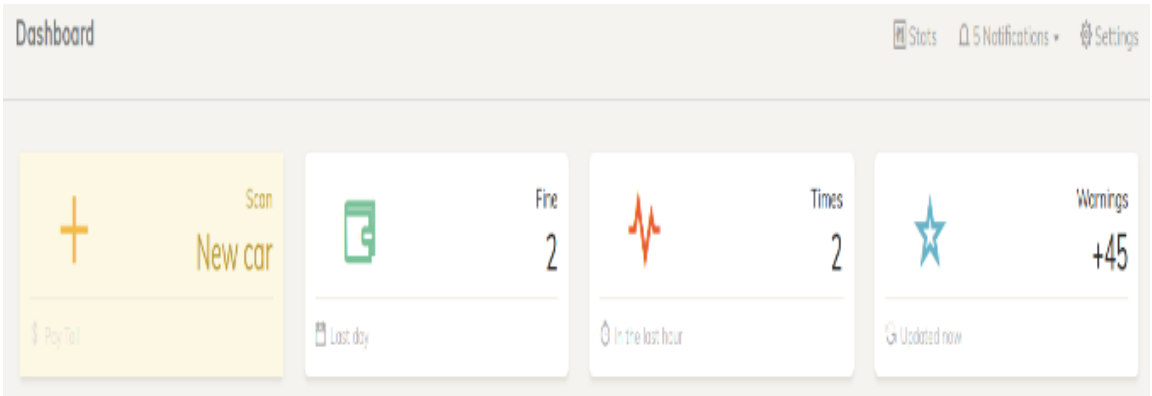


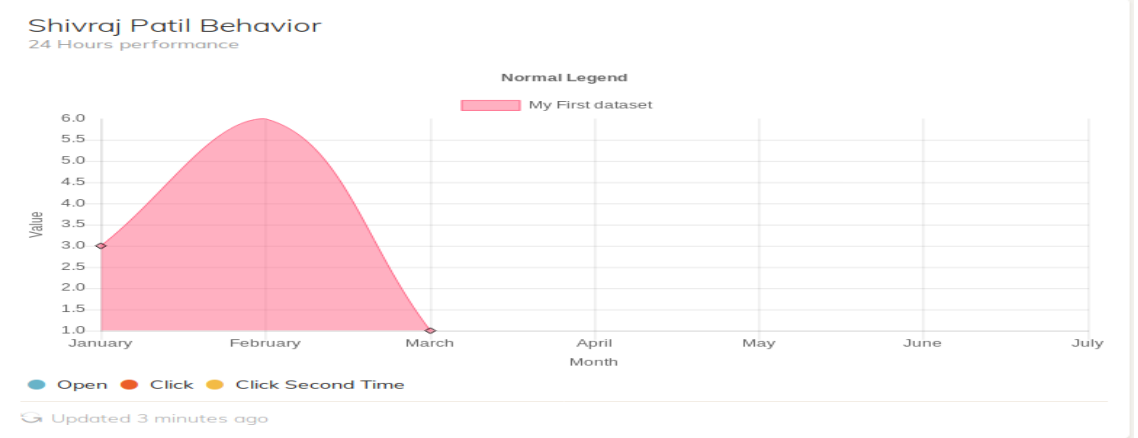


Shivraj Patil Table

Here is the subhed data

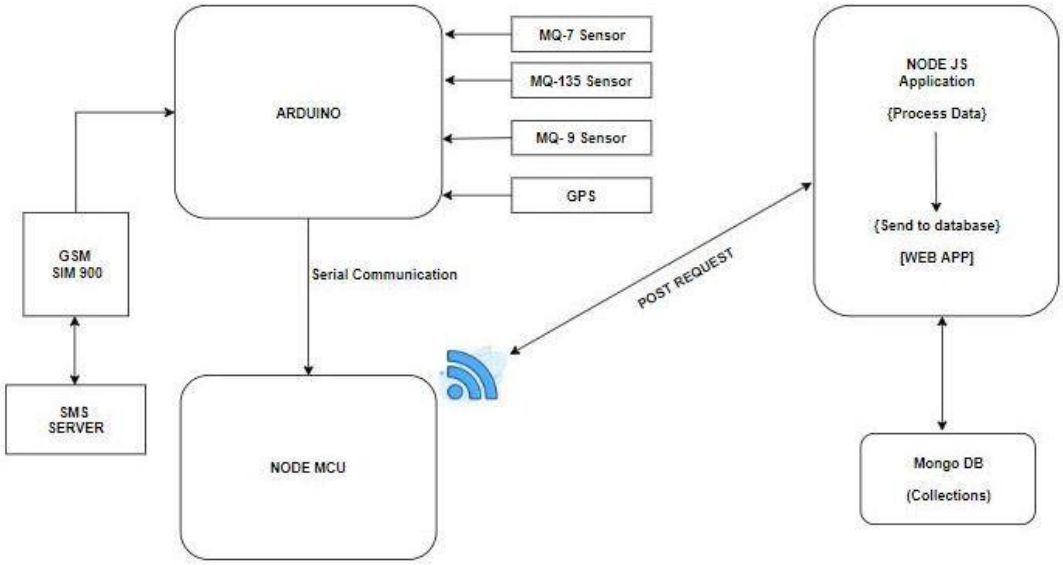
No.	Level	Air Quality	Date	City
1	3.0	2.0	Wed Feb 20 2019 00:00:00 GMT+0530 (IST)	Vashi
2	6.0	2.0	Tue Feb 19 2019 00:00:00 GMT+0530 (IST)	nerul
3	1.0	2.0	Tue Feb 19 2019 00:00:00 GMT+0530 (IST)	Panvel



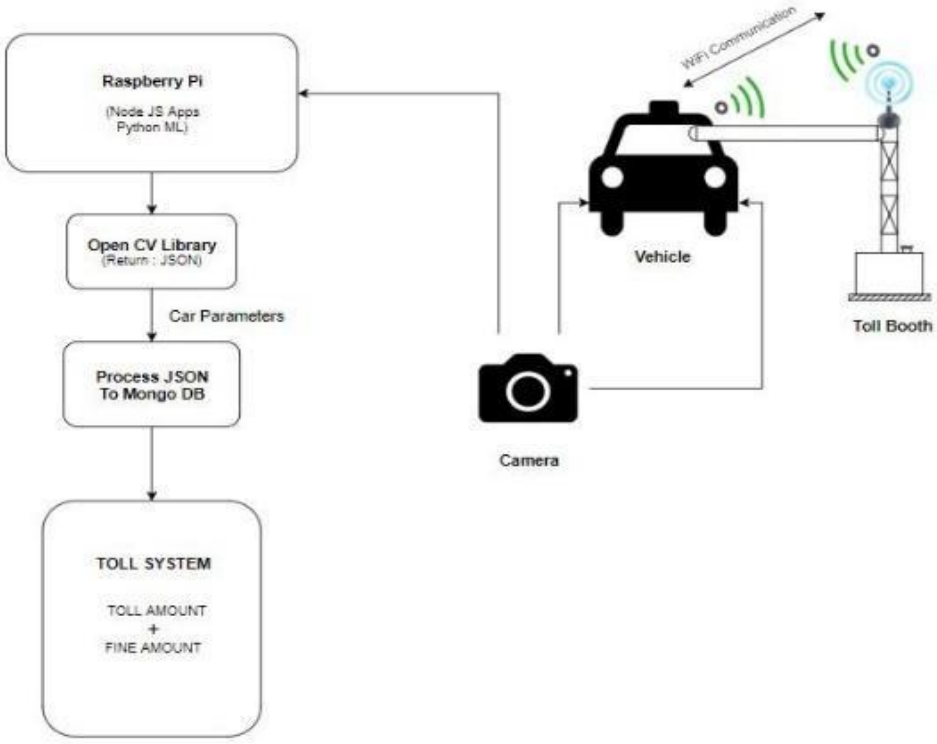


V. PROPOSED SYSTEM

The proposed model detects only emission of carbon dioxide. But, there are many harmful gases which pollute the environment like carbon monoxide, hydrocarbons, nitrous oxide etc. The prototype can be extended to detect these gases which cause damage to earth. Air pollution has significant influence on the concentration of constituents in the atmosphere leading to effects like global warming and acid rains. To avoid such adverse imbalances in the nature, an air pollution monitoring system is utmost important. Commercially available discrete gas sensors for sensing concentration of gases like CO2, NO2, CO and HC are calibrated using appropriate calibration technologies. The sensor currently used is MG811 for detection of CO2 emissions. It can withstand a temperature up to 70 degrees. A high grade sensor can be used instead of MG811 to withstand higher temperatures, so that the entire system can be installed in the exhaust of the vehicle. A light weight middleware and a web interface to view the live pollution data in the form of numbers and charts will be developed. Other parameters like temperature and humidity are also sensed along with gas concentrations to enable data analysis through data fusion techniques. Experimentation carried out using the developed wireless air pollution monitoring system under different physical conditions show that the system collects reliable source of real time fine-grain pollution data. The objective of this work is to come up with cost effective, reliable, scalable and accurate real-time air pollution monitoring system with wireless sensor networks.



HARDWARE MODEL



TOLL BOOTH MODEL

Commercially available electrochemical and resistive heating type sensors were used to sense the gases like CO2, HC, CO and NO2. Appropriate calibration technologies were developed to calibrate these sensors, which are then interfaced to wireless sensor motes. Zig bee based wireless sensor networks with multichip data aggregation algorithm will be implemented to extend the range of monitoring area.
The prototype can not only be used in vehicles for controlling CO2 emission but also in many industries to measure the harmful gases to reduce air pollution caused due to these gases. Apart from this there will a proper payment of PUC without the use of paper and in a digital payment way. This would lead to the emergence of "Pillars of Digital India: The Road of Smart Governance" as the payment of dues of the PUC is done in a digital way rather than using paper. Database of the particular vehicle will be updated in the "Government Vehicle Guide" database system as soon as a particular vehicle pass the toll-booth. Gas emissions would be recorded and proper actions would be taken .By this there would be a good percentage of decrease in the emission of gases from vehicles and gas emissions could be controlled.

VI. CONCLUSION

The main objective of smart emission monitoring system is to make it more innovative, user friendly, time saving and also more efficient than the existing system. Using smart systems not only efficiently takes a advance in environmental quality, but it also helps vehicle owner to save a lot of unnecessary troubles compared to the traditional emission test.

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