IoT Based Vehicle Emission Monitoring System

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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.

Key words: Internet of Things, Wireless Technology, Gas Sensors

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 pollutants 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.

Recent approaches in sensing technology, especially in the area of Sensor Networks (SNs), it now empower environmental monitoring in real time at special and temporal scales. This paper specially designed to operate the system using sensor network and gather the information about pollutant levels discharged by the vehicles. IoT is a new technology which draws the consideration for both academia and industry. IoT is realized as a network of things, each of which can be label using unique ID and convey based on standard communication protocols. IoT accord objects to communicate with one other, to approach information on the web, to store and collect data, and to collaborate with users, thereby creating smart, ubiquitous and perpetually connected environment. To achieve such intelligence within the environments, big technological innovations methods and developments are needed. The researchers sense that it will be potential to detect a newly built shape to IoT, collect with the crack of pervasive devices in the future. The view of IoT is that of everyday life such as vehicles, roadways in public transport systems, wireless pill-shaped cameras in the system of digestive tracks for healthcare applications, air conditioner, or other household things can be attached with sensors, used to track data regarding these things.

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. [1]

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. refective 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. [5]

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.[6]

Daryl G.Beetner (NOVEMBER 2006) proposed a paper on Detection and Identification of Vehicles Based on Their Unintended Electromagnetic Emissions. It investigates a procedure for detecting and identifying vehicles based on their RF emissions. Artificial neural network (ANN) was trained to identify the vehicle that produces the emissions.[7]

III. PROPOSED SYSTEM

In the current scenario, one of the greatest problems that the world is facing today is pollution, increasing every year and causing grave and also irreparable damage to the Earth. In order to minimise these issues, smart emission monitoring system has been used. In this system sensors such as co, hydrogen and gas sensors are connected to the input pins of arduino and the values are sensed.

If the sensed value goes beyond threshold value set in the program then automatically an alert message will be sent to the vehicle owner by using ESP8266 Wi-Fi enabled module in addition a buzzer is used for drivers notice. At the same time the emitted level will be monitored by the agencies of national environment by uploading the data in the web page. By using this system the owner can monitor the details about the emission level of his own vehicle.

IV. HARDWARE

A. Block Diagram
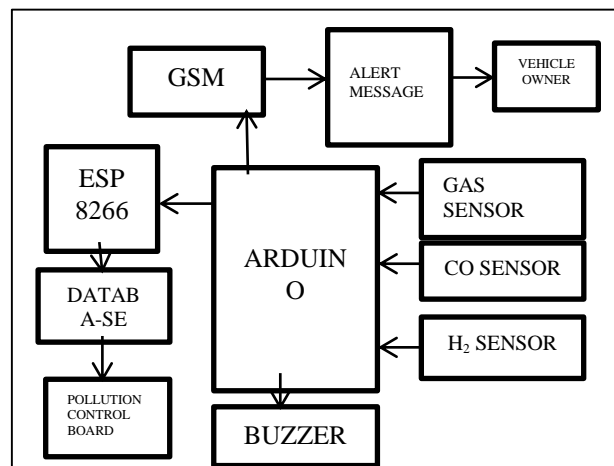
B. ARDUINO

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet).it has 14 digital input/output pins (of which can be used as PWM outputs), analog inputs, A 16MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB –to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB –to-serial converter.

C. WI-FI MODULE

The ESP8266 Wi-Fi Module is self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor.

This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors. Its high degree of on the chip integration allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area.
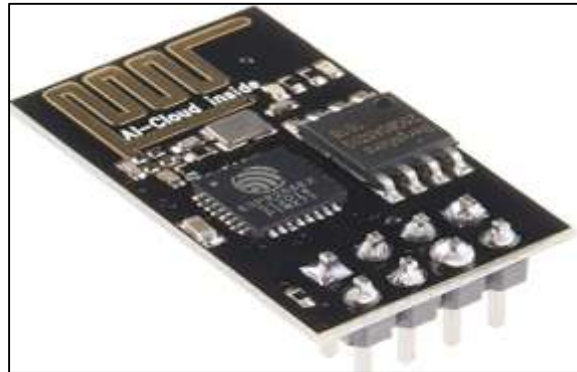
D. SENSORS

1) co sensor(carbon monoxide)

MQ-7 gas sensor composed by micro AL2O3 ceramic tube, Tin Dioxide (SnO2) sensitive layer, measuring electrode and heater are fixed into a crust made by plastic and stainless steel net. High sensitivity to carbon monoxide. Stable and longlife. They are used in gas detecting equipment for carbon monoxide (CO)in family and industry or car.

2) Gas sensor

Gas sensors are useful for gas leakage detection
(In home and industry). It is suitable for The Grove-Gas Sensor (MQ2) module is detecting LPG, CH4, CO, Alcohol, smoke or Propane. Due to its high sensitivity and fast response time, measurements can be taken as soon as possible. The sensitivity of the sensor can be adjusted by using the potentiometer.

3) Hydrogen sensor

This is a simple to use hydrogen gas sensor. They are used in gas leakage detecting equipment in home and industry applications. Avoid the noise of alcohol, cooking fumes, LPG, CO. The sensitivity can be adjusted by the potentiometer.
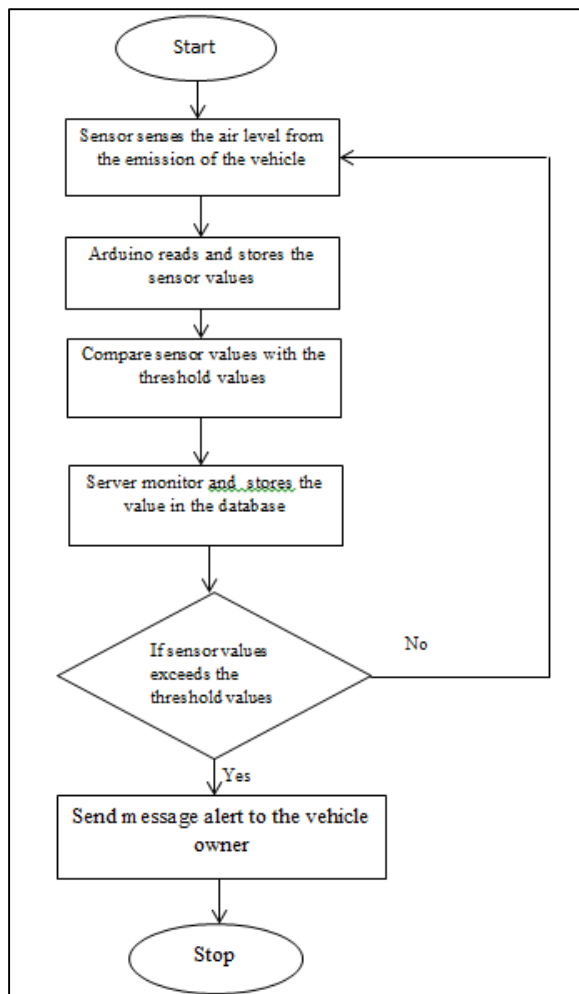
E. GSM MODULE

Global System for Mobile Communication uses as variety of TDMA and is the three digital wireless technology such as TDMA, CDMA. It digitizes and compresses data and operates at either 900MHz or 1800MHz frequency band.

V. SOFTWARE

A. FLOWCHART

B. RESULT

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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