Automatic Generation of PUC Certificate For Vehicles Using IoT

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Abstract- Internet of things conceptualizes the idea of remotely connecting and monitoring real world objects through the internet.It is an upcoming technology that allows us to control hardware devices through the internet. This project presents automated control system for air pollution detection in vehicles. As the usage of vehicles are more these days, so pollution is increasing drastically. As a solution to the above problem an embedded system can be built for controlling the pollution in vehicles. This system uses CO and Smoke sensors connected to the Arduino-uno for tracking the pollution level. The signals acquired from the smoke sensor are compared with the user defined set point crossing the threshold limit. The pollution level gets displayed in the LCD and when it exceeds the set point ,the system sends the alert message to the user.

Keywords- Air Pollution, Sensors, threshold level,Micro Controller.

I. INTRODUCTION

In begun distinct period of history air pollution is major problem in society which causes the human health & environment. This is the problem faced in the urban area. The air pollution are extremely serious when it comes to health risks of humans. It creates disease like asthma and bronchitis, heightens the risk of life-threatening conditions like cancer, and burdens our health care system with substantial medical costs. There are over 30,000 deaths that occur due to the cause of high pollution.

Our transportation choices have a huge impact on air quality. What we drive and how we drive affects the environment. Motor vehicles produce carbon monoxide and hydrocarbon emissions. Pollutants emitted directly from the vehicles are not the only concern for cause. On warm, sunny days, hydrocarbons react with oxides of nitrogen to create a secondary pollutant, and it affects the ozone. Motor vehicles are the primary reason to cause the ozone which is a common component of smog. It causes coughing, wheezing and shortness of breath, and can bring on permanent lung damage, making it a cause of crucial public health problems.

The Internet of Things extends internet connectivity beyond to the devices like desktop and laptop computers, smart phones and tablets to a diverse range of devices. Everyday things that utilize embedded technology to communicate and interact with the external environment, all via the internet.

II. LITERATURE SURVEY

Siva Shankar Chandrasekaran [1], says that in today's world vehicles have become an integral part of every one's life. This has its own effects, one of the main side effects are air pollution. Every vehicle will have emission but the problem occurs when it crosses the standardized values. Their paper describes about how to detect the pollution levels in vehicles and control system. They aims to use the semi-conductor sensors at the emission outlets of vehicles which detects the level of pollutants and also indicates this level with a meter. When the pollution/ emission level crosses beyond the already set threshold level, there will be a buzzer in the vehicle to indicate that the limit has been crossed and the vehicle will stop after a certain period of time , a time given for the driver to park his/her vehicle. The execution of the entire process is monitored and controlled by a micro controller.

Prof.D.DMondal et al [2],designed a system for pollution monitoring based on the amount of pollution released from vehicles. They use real time operating system for their project, First they will find out the pollution levels that will be done using MQ7 sensor. If the pollution level detected strikes beyond the pre – defined value, then it automatically sends a message containing vehicle number using GSM and its location using GPS. Three different sensors are used such as Temperature sensor, CO sensor, Alcohol sensor. Alcohol sensing and tracking system are the additional future of this circuit ,which makes the drive more secure thereby informing the all real time values to base station. This pollution levels may causes the world setting severely , when it is not controlled in the right manner. This method is especially designed for dominant pollution.

Vasanaprathyusha et al [3], says that usage of vehicles is more in these days, pollution is increasing drastically. As a solution to the above problem they aim to build an embedded system for controlling the pollution in vehicles. This paper mainly focuses on two operations. The first is they developed an embedded system to detect and control pollution from the vehicles. In this project, they used LPC2148 micro controller, CO and temperature sensors for detecting the pollutants. The system is tested in environmental condition. So their embedded system will be highly beneficial in curbing this problem. The second reason is that the system will be one of the greatest improvements in technology to keep the Environment free from vehicular emission and bring it to half , when the Pollution level is more than the Standards mentioned by the Government. Their system will not change the configuration of the engine by any means, and it is employed in the existing vehicles.

Rajneesh Kumar Dubey et al [4], developed an application to reduce pollution and make the environment ecofriendly,an Active Vehicle Air Pollution-control System (activAPS) can prove to be a revolutionary idea to counter affect the negative aspects of the vehicular pollution.The idea of ActivAPS is being presented that collects real-time data on the emission level of vehicle pollutants and stores them in systematic profiles of individual users on an online utility platform. Their proposed system, namely, activAPS ensures that the pollution levels of all mobile vehicles remain under check individually because it does not measure the a traffic population emissions as a whole instead it measures the pollution levels of vehicles individually and sends the recorded data to a single database system. which can be accessed through real time via web.

SharmilaGowri et al [5], designed an Automated License Controlled Vehicle with Air Pollution Monitor and Control System. In their paper Every License holder is provided with the RFID smart card collection of data extracted from License. They develop a compact system to detect and control the pollutants in the vehicle which could be assembled in the vehicle itself. They use gas sensors which is economical and capable of detecting Carbon Monoxide and other toxic gases emitted from the vehicle. Amount of toxic gases continuously display in Lcd. Warning is given to the driver about the amount of toxic gases. In case of any negligence, then the particular License details(Lno) is extracted from the RFID smart card and SMS was sent to RTO for cancellation and with their Proper intimation the vehicle is automatically halted. Once license canceled by rto,then the license isn't valid to start out the vehicle. To monitor and control the system PIC micro controller is used.

Prashanna rangan [6], says that One of the major concerns regarding the environment is air pollution. To overcome these problem, they developed an Vehicle Speed Sensing and Smoke Detection System. The system consists of GPS, an IoT module and a GSM board. The gas sensor used to detects the gas produced by the vehicle and the micro-controller board determines the proportion and if it is higher than the standard limit ,the GPS system sends the message to the nearby RTO. The received warnings will be saved and if the warnings exceed more than three times or if the pollution level raises drastically the vehicle automatically provides navigation to a nearby safe zone. With the help of IoT and GPS technology ,the safe zones are automatically detected . A vehicle speed monitoring sensor is used to reduce the speed of the vehicle at specific places, say school zones, hospitals, accident prone zones etc,. The main motive of their project is to detect the over polluting vehicles at a rate faster than any other.

Anita kulkarni et al [7], presents a work. The aim of their work is to develop an Automated System for Air Pollution Detection and Control in Vehicles. The aim of their project is to monitor and control the pollutants in the vehicle by using the pollution control circuit. This circuit consists of various sensors like smoke sensor, temperature sensor and GSM, GPS kind of devices. They are integrated and connected to a Controller. It is a real time work where a demo application has been made using ARM 7 processor and a controller board is used to integrate all the devices and work. The vehicle is controlled by this circuit. When the crosses the threshold pollution level then the engine gets automatically switched off and an SMS is generated and sent to the pre-defined number stored in the memory through the GSM module. The GPS module is used to find the vehicle position. Their paper demonstrates an effective utilization of technology by which we save our environment by controlling the pollution of vehicles.

Galatsis et al [8], discusses the concept such as Investigation of gas sensors for vehicle cabin air quality monitoring. Car cabin air quality monitoring can effective, they analysed using metal oxide semiconducting (MOS) gas sensors. In their paper, commercially available gas sensors are compared with fabricated Mo03-Ti02 and Moo3- WO3 thin films. Their laboratory tests showed that the Moo3 based sensors possessed comparable gas sensing properties. They use different sensors for comparision and it shows 74% of result.

George F. Fine et al [9], says that, metal oxide semiconductor gas sensors are utilised in a variety of different roles and industries. They are inexpensive when compared to

other sensing technologies, robust, lightweight, long lasting and benefit from high material sensitivity and quick response times. They have been used to measure and monitor the amount of gases such as carbon monoxide and nitrogen dioxide. In this review, they describes the nature of the gas response and how it is fundamentally linked to surface structure is explained.   An overview of important contributions and recent advances are discussed for the use of metal oxide semiconductor sensors for the detection of a variety of gases—CO, NOx, NH3 and the particularly challenging case of CO2.

Ramya et al [10], proposed an Embedded System for Vehicle Cabin Toxic Gas Detection and Alerting. They designed an embedded system for a vehicle cabin, which senses the gases like carbon-monoxide and oxygen and displayed at each and every second. If the level of the CO increases or decreases than the normal level , then an alarm is generated automatically and also ventilation is provided immediately. A warning message is sent to the authorized user through GSM. The advantage of this system is proper detection and faster response time leading to faster diffusion of the situation, compared manual method.

III. EXISTING SYSTEM

In existing system, there are systems for monitoring pollution caused by each vehicle and the owner is alerted with the message.

IV. PROPOSED SYSTEM

The architecture of the proposed system as shown in fig, consists of Arduino Uno as a main source and it receives input signal from the smoke sensor, where thereby the sensor receives the input signals from a vehicle.The smoke sensor is used to monitor the smoke levels in the vehicle. When the sensor is activated, the signal moves to Arduino circuit and it displays on LCD display. When it crosses above the threshold value, using Wi-fi module, an alert message is sent to the user's mail. Incase no pollution where detected in users vehicle ,it will send the pollution under control certificate to the user in a fixed date.The system can be used in RTO office from where PUC certificate can be generate to the vehicle owner's e-mail.
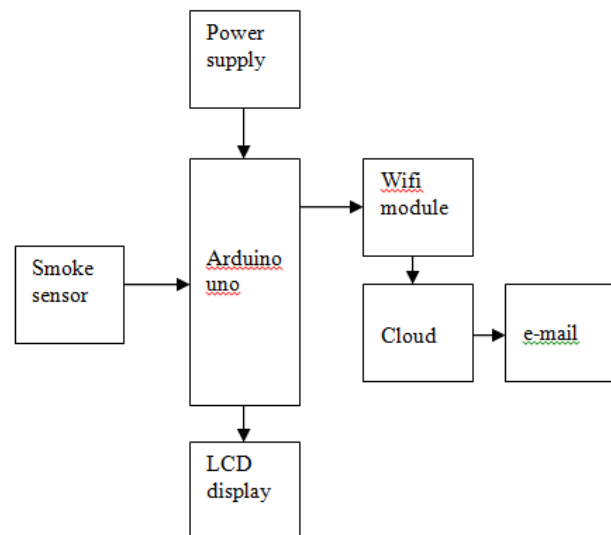
Architecture of the proposed system

MODULE DESCRIPTION:

i. Module 1- Gas Monitoring

The system monitors the poisonous gases including carbon monoxide(CO) emitted from each vehicle.

ii. Module2 - Alert Message

It sends an alert message to individual user, if the level crosses the threshold value.

iii. Module3 - Certificate Generation

The system can be used in RTO office from where PUC certificate can be generate to the vehicle owner's e-mail, incase of no pollution being caused by the specified vehicle. Using this automated system there is no need for the user to receive the certificate from the RTO office manually.

HARDWARE COMPONENTS:

LCD:

A liquid crystal display (LCD) is the combination solid and the liquid, they are two states of matter. To produce a visible image, it uses a liquid crystal. Liquid crystal displays are super-thin technology. It has an display screen that are generally used in laptop computer screen, TVs, cell phones and portable video games. LCD's technologies allow displays to be much thinner when compared to cathode ray tube (CRT) technology.
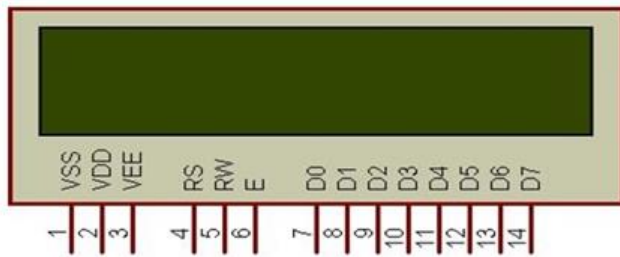
Liquid crystal display is composed of several layers, which includes two polarized panel filters and electrodes. This technology is used for displaying the image in notebook or some other electronic devices like mini computers. The light is projected from a lens on a layer of liquid crystal. This combination of colored light with the grayscale image of the crystal (formed as electric current flows through the crystal) forms the colored image. This image is then displayed on the screen.

SMOKE SENSOR:

A smoke sensor is a device ,that is used to sense smoke from the vehicles. Typically as an indicator of fire.Commercial and residential security devices sends a signal to a fire alarm control panel as part of a fire alarm system. The household detectors known as smoke alarms, it issues an local audible or visual alarm from the detector itself.

The Analog Smoke sensor module utilizes an MQ-2 as the sensitive component and has a protection resistor and an adjustable resistor on board. The MQ-2 gas sensor is sensitive to some gases like LPG, i-butane, propane, methane, alcohol, Hydrogen and smoke. It is used in gas leakage detecting equipments. The resistance of the sensitive component changes as the concentration of the target gas changes.

Node MCU:

Node MCU is an open source LUA based firmware developed for ESP8266 wifi chip. By exploring functionality with ESP8266 chip, Node MCU firmware comes with ESP8266 Development board/kit i.e. Node MCU

Development board. It is open source platform, their hardware design is used for edit/modify/build.

Node MCU Dev Kit/board consist of ESP8266 wifi enabled chip. The ESP8266 is a low-cost Wi-Fi chip developed by Es press if Systems with TCP/IP protocol. There is Version2 (V2) available for Node MCU Dev Kit i.e. Node MCU Development Board v1.0 (Version2), which usually comes in black colored PCB.

It supports serial communication protocols i.e. UART, SPI, I2C etc. Using such serial protocols we can connect it with serial devices like I2C enabled LCD display, Magnetometer HMC5883, MPU-6050 Gyro meter + Accelerometer, RTC chips, GPS modules, touch screen displays, SD cards etc.

V. CONCLUSION

This whole paper mainly focuses on two things. The First thing is detecting the level of Pollution and indicating it to the driver. The second reason, it keeps the environment free from vehicular emission and this system will be one of the greatest improvements in technology. The system can be used in RTO office from where PUC certificate can be generate to the vehicle owner's e-mail, incase of no pollution being caused by the specified vehicle. Using this automated system there is no need for the user to receive the certificate from the RTO office manually. This system does not change the configuration of the engine by any means, and it is employed in the existing vehicles. It is designed with low cost and low power, yielding high accuracy.

VI. ACKNOWLEDGEMENT

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