Online Vehicle Pollutants Monitoring System using GSM

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ABSTRACT: This paper is to develop a compact system to detect the pollutants in the vehicle which could be assembled in the vehicle itself. Tremendous innovations have been made in the technology and manufacturing of cars as well as in the pollution control department but still nothing significant achieved of it. This idea employs an MQ7 sensor which is economical and capable of detecting Carbon Monoxide gas emitted from the vehicle. An initial warning is given to the driver regarding the amount of CO gas with the help of LCD display and later the same information is transferred to the Pollution Control Board in case of negligence. This is done with the help of GSM system incorporated in the vehicle. The AVR Microcontroller is used to transfer the information to the GSM system from the MQ7 sensor. The aim of this paper is to develop a mobile PUC checking system.

KEYWORDS: Carbon Monoxide gas (CO),Global System for Mobile Communication (GSM)

I.INTRODUCTION

Pollution has always been a major concern on Earth. Several measures have been adopted in ancient times until now to reduce the impact of this pollution. But none of the methods has proven to be fully efficient to eradicate this problem completely. This paper proposes an integral approach to real time detection of pollutants from the vehicle especially CO gas. It deals with the same issue (Air pollution) as it tries to take some advance steps to solve the problem. It includes utilization of Gas Analyzer to detect the pollution of Motor Vehicles. The effluents from the combustion engine of a vehicle are detected to obtain an idea of the amount of pollution caused by the Vehicles.This is nowhere different from the general P.U.C checks carried out by the concerned Pollution Control Board. But an extra feature is added itself in the vehicle which allows the vehicle to examine the amount of pollutants in its engine by itself without going for any scheduled P.U.C checks.In order to limit pollution caused by road vehicles, this Regulation introduces common requirements for emissions from motor vehicles and their specific replacement parts. It also lays down measures improving access to information on vehicle repairs and promoting the rapid production of vehicles in compliance with the provisions of the Regulation. In order to limit as much as possible the negative impact of road vehicles on the environment and health, the Regulation covers a wide range of pollutant emissions:carbon monoxide (CO), non-methane hydrocarbons and total hydrocarbons, nitrogen oxides (NO) and particulates (PM). It covers tailpipe emissions, evaporative emissions and crankcase emissions. There are emission limits for each category of pollutant emissions. The above discussion describes the advantage of this paper. Hence with this paper we can truly reduce the affect of AIR POLLUTION on the environment. This paper enables the driver to individually look after his/her vehicle, its pros and cons without any help from the Pollution Control Department.

II.NEED OF PROJECT

Pollution and especially air pollution has always been a serious threat to the environment. One of the very important factors responsible for air pollution is the emission of gases from the vehicles such as CO which degrades the environment. A really important need here is to curtail the amount of harmful gases which are emitted from the vehicles. This can be done with the help of regular PUC checks of the vehicles but this method has proved to be a failure when undertaken by government authorities.Nowadays we see that the regular PUC checking system is not that

accurate. Except at the petrol pumps, PUC checks at all other places are done at random basis. Sometimes PUCs are issued merely on the basis of number of the vehicle without actual diagnostics of the vehicle. Besides this nowadays the tendency of keeping the vehicles maintained by regular services has disappeared. Everything cannot be left for government. Every vehicle needs to diagnose its pollutants on its own and that is where the idea of this paper resides. This paper will help to achieve this aim as the whole PUC system will be assembled in the car itself.

III.TECHNOLOGY

The basic element concerned here is the MQ7 sensor which detects the Carbon Monoxide gas. This sensor is capable of detecting the gas by sensing the heat of the gas. It ranges the output in the range of 20-20000 ppm. The sensor is economical and quite accurate. It provides an analog output to the AVR. The AVR has got an inbuilt analog to digital converter which converts the acquired signal into digital form as needed by the Microcontroller system. The Microcontroller used here is Atmel's 8535 microcontroller and this microcontroller acts as the brain of the process.It calculates the exact amount of Carbon Monoxide (CO) and display it on a 16x2 Alphanumerical Display with the unit of ppm (parts per million).Alphanumeric LCD display displays works as a screen to give continues output of the data which it receives from Microcontroller. It is considered as a passive device and in other words it helps in monitoring the exact position of the effluents from the vehicle.A USB to TTL Logic is placed between the microcontroller and PC. This logic converts the signal into a desired one which can be given to the PC to pass it to the GSM system.GSM (Global System for Mobile Communication) is the one which is responsible to transfer the data to the concerned authorities. GSM is an excused step which occurs only if the ever increasing amount of pollutants is neglected. It helps to take a step in reducing air pollution which is a major issue to the environment.

IV.LITERATURE SURVEY

Discussions about air pollution often begin with the composition of the atmosphere. In particular, the discussion often focuses on how a particular part of the troposphere or stratosphere deviates in quality from a norm.Popular perceptions of air pollution are driven largely by fear.Inspection and maintenance measures to control emissions from in-use vehicles are an essential complement to emission standard for new vehicles. Although difficult to implement, an effective inspection and maintenance program can significantly reduce emissions from uncontrolled vehicles I/M programs are also needed to ensure that the benefits of new vehicle controlled technologies are not lost through poor maintenance and tampering with emission controls. I/M programs for Gasoline Vehicles, commonly include measurement of hydrocarbon and carbon monoxide concentrations in the exhaust.Here this paper comes to picture as it focuses on the idea of eradicating the existing PUC system totally and the above discussed are some of the research papers relating to the area of interest of our paper.
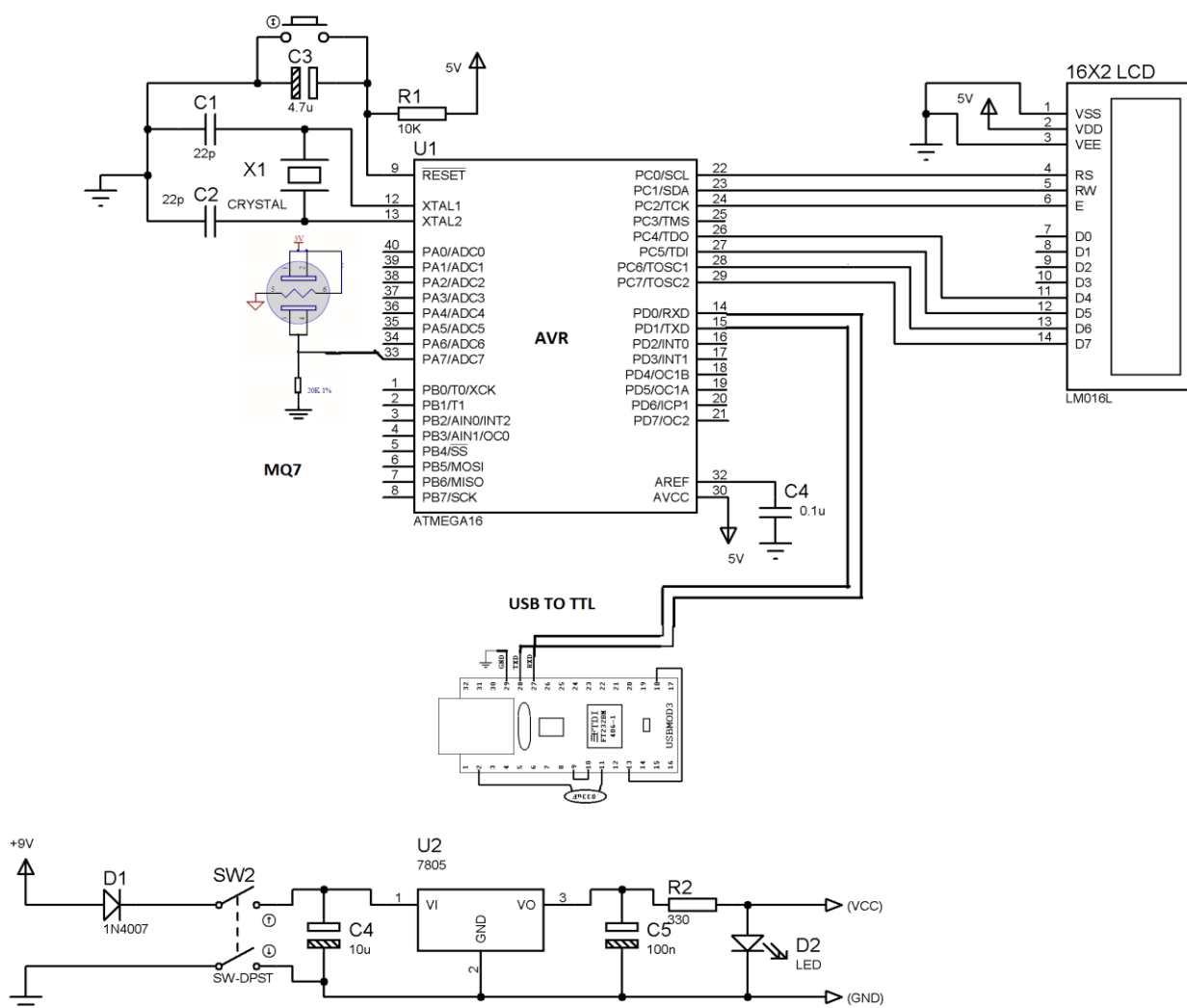
V.HARDWARE

Fig. 1 Circuit Diagram of Project

5.1 MQ-7 SENSOR

The Sensitive Material of MQ-7 gas sensor is SnO_2 which with lower conductivity in clean air. It make detection by method of cycle high and low temperature, and detect CO when low temperature (heated by 1.5V). The sensor's conductivity is more higher along with the gas concentration rising. When high temperature (heated by 5.0V), it cleans the other gases adsorbed under low temperature. The sensor could be used to detect different gases contains CO, it is with low cost and suitable for
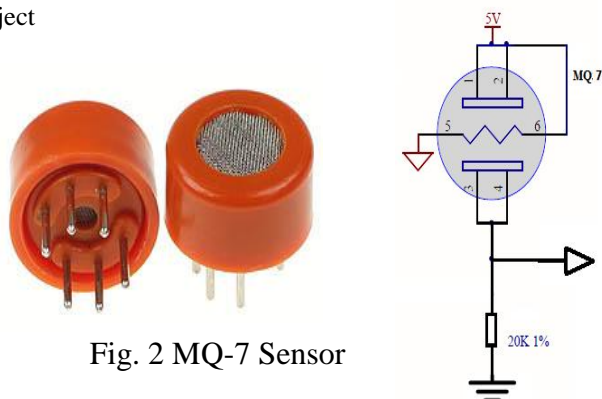

Fig. 2 MQ-7 Sensor

different application. Good sensitivity to Combustible gas in wide range. This Sensor detects the presence of Carbon Monoxide at concentrations from 20 to 20,000 ppm. The sensor can operate at temperature from -10 to 50 C and consumes less than 150 mA at 5V.

5.2 AVR MICROCONTROLLER

The AVR Microcontroller are low-power CMOS 8-bit controller based on the RISC architecture. The AVR core combines a rich instruction set with general purpose working registers. All the registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in one single instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC microcontrollers. The **AVR** is a modified Harvard architecture 8-bit RISC single chip microcontroller which was developed by Atmel in 1996. It was one of the first microcontroller families to use on-chip flash memory for program storage. In this Project we are using **Atmel's AT90S8535 Microcontroller.**

5.3 16x2 ALPHANUMERIC LCD DISPLAY

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.
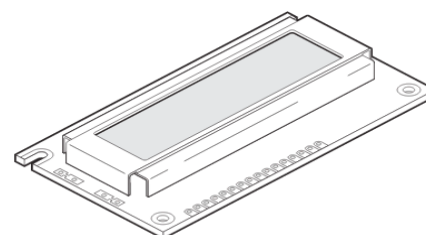
5.4 GSM MODULE: SIM 300

SIM300 is a Tri-band GSM/GPRS engine whose working frequencies are EGSM 900 MHz, DCS 1800 MHz and PCS1900 MHz. SIM300 provides GPRS multi-slot class 10 capability and support the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4.
This GSM Modem is compatible with any GSM network operator SIM card and behaves just like a mobile phone with its own unique phone number. Applications like SMS Control, remote control and data transfer can be developed easily using SIM300.
The physical interface to the mobile application is made through a 60 pins board-to-board connector that provides all hardware interfaces between the GSM and customer's boards.
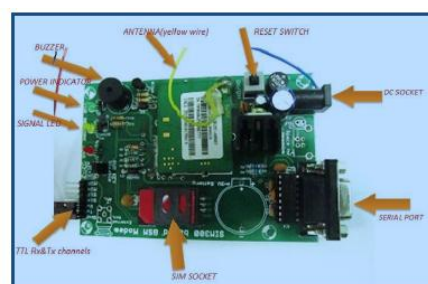
Fig. 3. Overview Of SIM 300

VI. APPLICATIONS

In Vehicles and Industries (To Control Air Pollution):
Nowadays the main source of air pollution is the pollutants emitted by the vehicle, generated during combustion of fuel. The application of this paper lies in this area where the vehicle is enabled to monitor its pollutant level on its own. This paper empowers the idea of curtailing the amount of CO gas to allowable limits. Also existing incompetent PUC system can be discarded as the whole compact assembly is incorporated in the car itself.

EXPERIMENTAL SETUP

FIG 4. EXPERIMENTAL SETUP

VII. RESULTS

COMPONENTS	VOLTAGE RATINGS (In Volts)
Adapter's Output Voltage	12.36
LM 7809 Output Voltage	9.16
LM 7805 Output Voltage	5.12

Table 1 Voltage Ratings From the Power Supply Components

Readings of MQ-7 Sensor in ppm(parts per million)
Minimum Distance to sense the pollutants = 65 cm

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(An ISO 3297: 2007 Certified Organization)
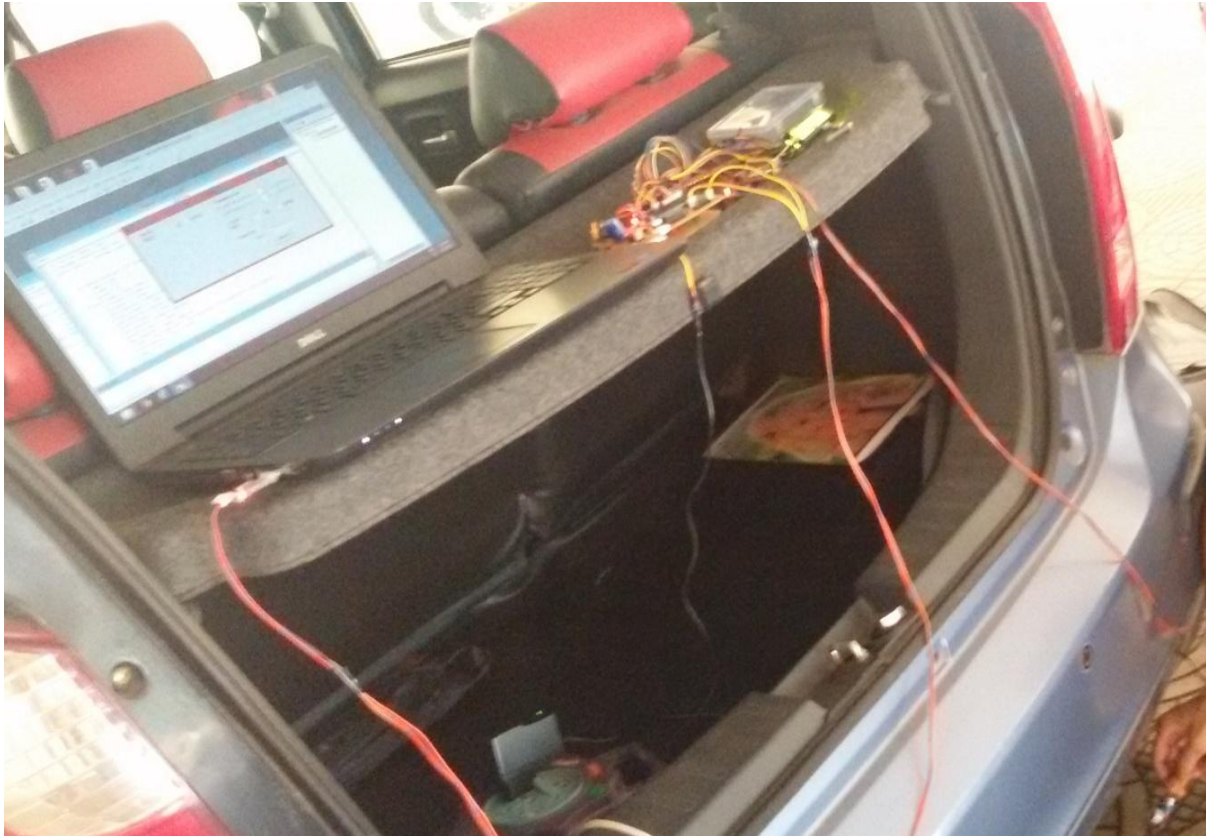
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	Sensor's Position	Average Readings in ppm
	In Atmosphere	18-19
For Bike:	10 cm from the source(perpendicular)	35
	15 cm from the source(perpendicular)	32
	30 cm from the source(perpendicular)	24
	10 cm above from the source	26
	10 cm below from the source	25
	10 cm left to the source	26
	10 cm right to the source	27
For Car:	10 cm from the source(perpendicular)	61
	10 cm above from the source	55
	10 cm below from the source	54
	10 cm left to the source	56
	10 cm right to the source	55

Table 2 Sensor'sReading for Different Condition

VIII. FUTURE SCOPE

The paper surely provides an innovative solution to control air pollution. In the near future every vehicle will have its own PUC system which will benefit both the owner as well as the pollution control department. A simple assembly in the vehicle itself will help to bring down the CO gas content or we can say the air pollution content to a minimum extent.

IX. CONCLUSION

This paper is capable to measure the value of pollutants emitted by the vehicle continuously and display it on 16x2 alphanumeric LCD display. Also if the pollutant level exceeds the prescribed value, then a SMS will be sent to the respective authority to take necessary disciplinary action.

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