Automated System for Air Pollution Detection and Control in Vehicles

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Abstract: **This paper represents an automated system for air pollution detection and control in vehicles. We see that the emission from motor vehicle is one of the main sources of air pollution and this is due to the improper maintenance or checkup of the vehicle. Therefore I proposed a system in which I'll control the air pollution with the help of detection from the motor vehicle. Detection and control is the main area on which we have to work if we really want to control air pollution. In my system there is a smoke sensor which is placed at the vehicle's silencer from where the smoke is flown or released in the atmosphere. Smoke sensor is used to measure the percentage of carbon pollutants present in the smoke which is the cause of the air pollution. The output of the smoke sensor comes in the form of analog voltage so there is need of ADC to convert in to form of digital voltage. The output of the smoke sensor is checked by the microcontroller. In this system I am using ATMEGA 8 microcontroller. As the vehicle attains the maximum threshold pollution level, the system will be trigged and engine goes to the off state.**

Keywords: **Microcontroller, Smoke sensor, DC motor, LCD, Relay.**

I.   INTRODUCTION

Now a day's we easily see that vehicle becomes an important requirement of everyone's life may be indirectly or directly. Vehicle is the prime source of the air pollution The emission from motor vehicle produce polluted air which cause human's life in terms of health and environmental issues also. The internal combustion of fuel in the engine approaches to the environmental problems. All the types of the motor vehicles produce some level of air pollution but the problem stands when the value of the emission is greater than the value of the maximum threshold level. According the survey the two by third of air pollution is caused by the internal combustion in the fuel of the motor vehicles. In such cases rules and the constitution made by the government of India and most of them was not successful just because of people don't follow them seriously and they don't checkup their vehicle's pollution level at the regulated interval. There is no alternative if the people don't follow these constitution and regulation made by the government. Therefore we should have such a system by which emission from the vehicles can be controlled easily and automatically too. Through which people have to have the proper maintenance of their vehicle and we can easily regulate the output of the emission level of the motor vehicle. Air pollution is reasonable for the environment issues like climate change, global warming and so on and human's life in terms of diseases like lung cancer, asthma etc. Motor vehicles are the main source of transportation but also the main source of air pollution. We can't completely avoid the emission from the vehicle but we can control this emission. In small city most of the people don't checkup their vehicle pollution level at regular interval will cause of air pollution. So I have an aim to control the air pollution through smoke sensor.

II.   PROBLEM FACED

We see that there is no alternative if the people don't check their vehicle's pollution level. During the period of checking some people are caught by the traffic police and some are not. But during the period of no checking people ride their vehicle which causes the emission beyond the maximum threshold pollution level on the road with any fear. According to the survey in cities like Delhi and Gurgaon the quality of the air is very poor means to take a breath in these cities regularly will be a cause of serious threats to the human's health. Emission from the motor vehicle is reasonable for the

two by third of air pollution which causes of many environmental issues like climate change, global warming etc. and affects human's health in terms of diseases. Therefore there is a need of system which can detect the level of percentage of carbon present in the smoke and control automatically and easily without any need of hard work. Population of India is increasing day by day and definitely the number of vehicles are also increasing in correspond too. If we don't give our efforts to reduce the emission from motor vehicle right from today, it will be a very serious threat to human's life and nature. So I proposed system to detect and control the emission level from the motor vehicle.

III.   PROPOSED SYSTEM

As the name indicates that it is an automatically system which detects the percentage of carbon present in the smoke this process is called detection and with the help of detection the pollution can be controlled easily. I proposed this system because it will detect and control the emission which any difficulty and definitely the emission from the motor vehicle will be controlled. The output will be displayed on the LCD in the form of percentage. I proposed this system because the air pollution increasing day by day and major source is emission from motor vehicle.

System description:
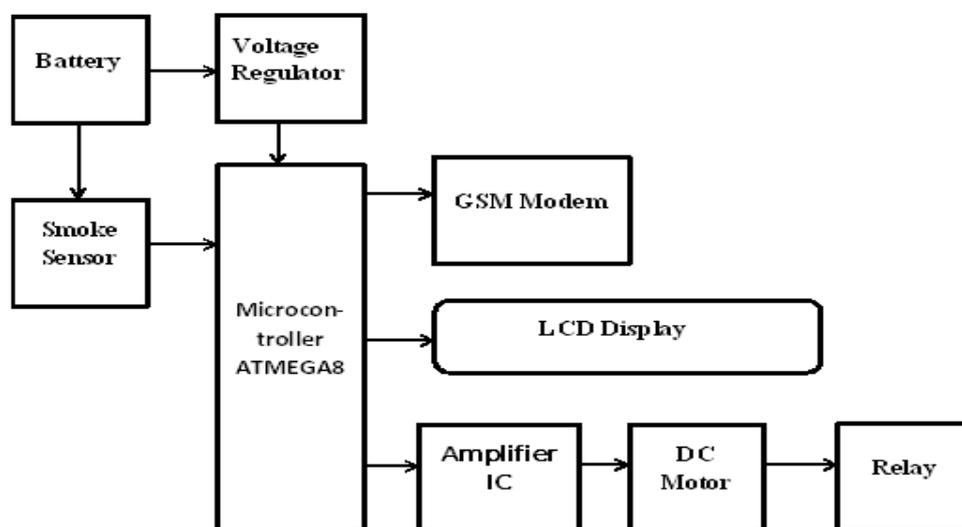
A. *Block Diagram***:**

Fig.1 Block diagram of pollution control system

Firstly I would like to describe about the power supply. 12 V power supply is taken to operate the whole system. The supply takes from the batteries of the motor vehicle. For the section of detection there is 7805 IC I used to down the voltage from 12 V. There is smoke sensor placed at the silencers of the motor vehicle from where the smoke is released into the environment to detect the percentage of carbon pollutants present into the smoke. Smoke sensor is basically a gas sensor. Microcontroller usages only pulsating DC so to provide a DC of pulsating nature voltage regulator is used. The output of the smoke sensor comes in the analog and microcontroller understand only digital form so to convert analog to digital form an ADC is used. LCD is used to see the output of the emission level in terms of percentage. GSM modem is used to notify the owner of the motor vehicle that the level of pollution is exceeding via SMS. Amplifier IC is used to enhance the enough power to operate DC motor easily. Relay is connected between the ignition wire and the lock as the motor vehicle achieves the value greater than the maximum threshold pollution level, relay will be activated and there is close path form between the ignition wire and the lock through which system will be trigged and engine goes to off state.

B. *Microcontroller ATMEGA 8:*

Here I used a microcontroller ATMEGA 8 in the system. It is an AVR 8 bit microcontroller. AVR stands for auxiliary voltage regulator. It is used to provide a protection from the probability of damage of equipment from over voltage or under voltage. It automatically cut off the power supply which is connected to the equipment for the protection. When I talk about the configuration it is low power and high performance microcontroller. It has 28 ports 23 ports is used for the I/O 4 ports is used for VCC and Ground and last port is used for Aref. It has advance RISC architecture in which 130

important powerful instruction and most of them single clock cycle execution. It has 32*8 general purpose register. It has 8 kilobyte flash memory, 512 bytes EEPROM (Electrically Erasable Programmable Read Only Memory) and 1 kilobyte of internal SRAM (Static random Access Memory).

C. *Smoke sensor:*

Smoke sensor is a sensor which is used to detect the concentration of the carbon present in the smoke. It has three pin one is grounded and two others pins can call A and B both can be used as either an input and output simultaneously. Input is given across the heating pin to work correctly. A resistance is connected between output pin and ground pin to provide sensitivity to the sensor. When I talk about the inner part of the smoke sensor it contains heater and transducer. Smoke contains some molecule of water when it released in to the environment so to vaporize the water molecule heater is used. Transducer is basically a transformer of one energy level to another. It converts the ppm (parts per million) into the voltage form.

IV. WORKING OF THE SYSTEM

A. *Flow chart:*

From the flow chart we can easily understand the working of the project. A voltage regulator is used to provide the pulsating nature of DC to the microcontroller because microcontroller doesn't work on variable DC. Smoke sensor detects the carbon pollutants which are exhausted or released from the vehicle into the environment. The smoke contains carbon polltants which affects the quality of the air and cause the air pollution. The output of the smoke sensor is in the form of analog voltage so there is need of analog to digital convertor to convert analog voltage into the digital voltage. The process of the system is very simple. The output of the smoke sensor then will go to the microcontroller. Microcontroller checks the condition if vehicle attains the maximize threshold level , DC motor will go to on state and relay which is connected between ignition wire and lock of vehicle will be activated by which engine go to the off state and a SMS through GSM modem go to registered mobile no by which we can get an alert notification.

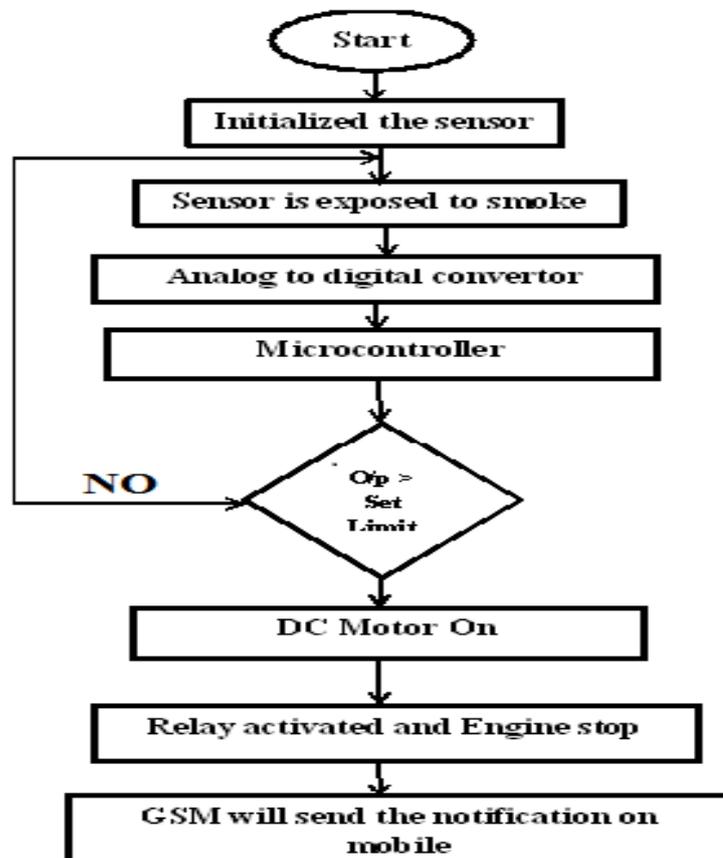The flow chart of the pollution control system is given below.

Fig.2 Flow chart of pollution control system

V.   CIRCUIT DIAGRAM

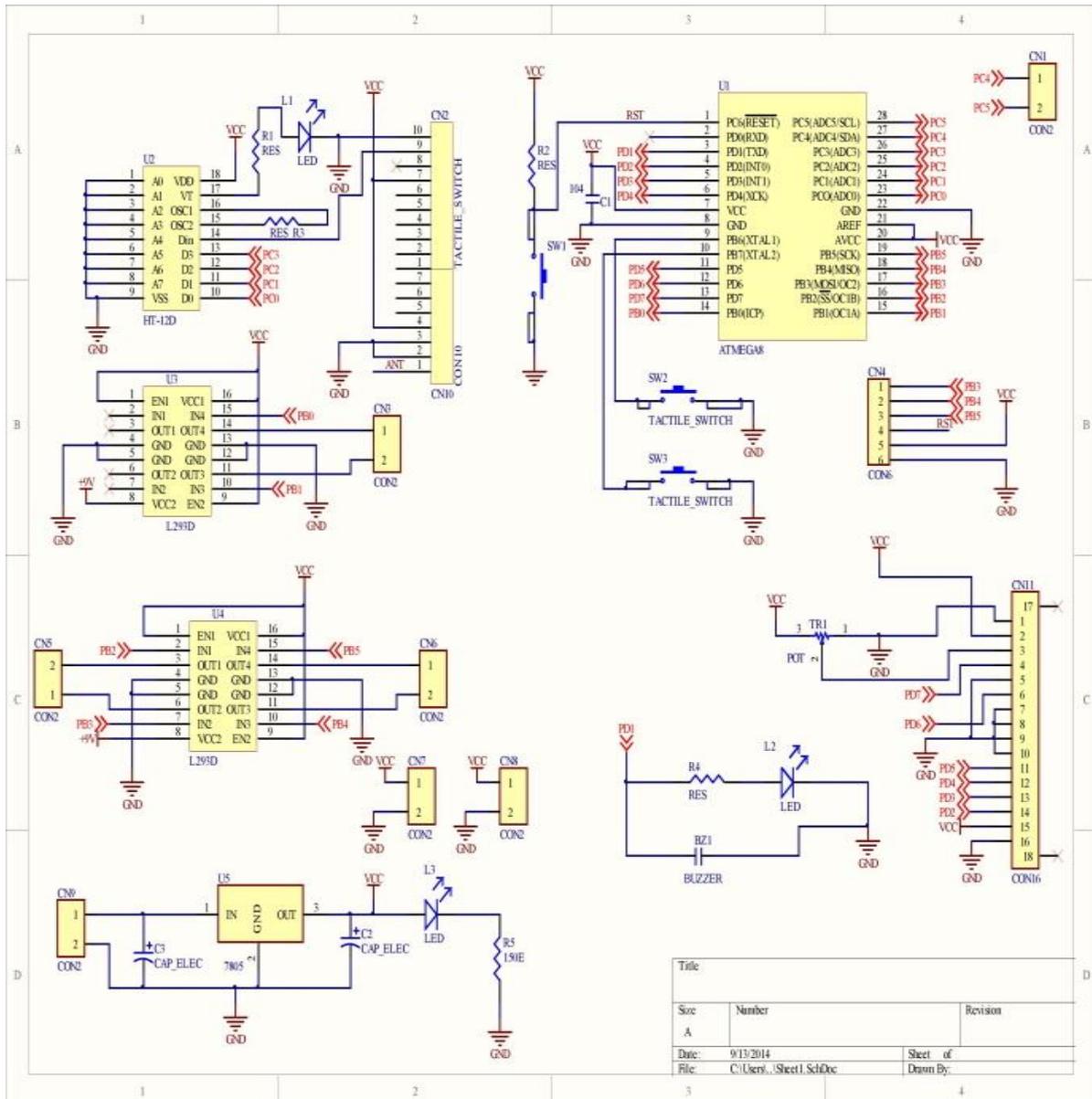The Circuit diagram of pollution control system is given below:

Fig.3 Circuit diagram of pollution control system

VI.   RESULT

The signal received from the smoke sensor is now compared with the pre-defined threshold pollution level in the smoke released from the vehicle. As the microcontroller attains the value of the output greater than the value of maximum level of carbon present in the smoke the microcontroller triggers the system, as the system triggers the relay which is connected between the lock and the spark plug is activated due to this the close path is formed between lock and spark plug. As the close path is formed the engine goes to the off state. The main motive of the system to control the emission from the vehicle is now achieved.

There are three level of indicator in which there LED is used to indicate the level of emission. The LEDs are Green, Yellow and Red. Green led indicates that the level of emission from the motor vehicle is in under. The yellow LED is used to indicate that the level of emission is now increasing. The Red LED is used to indicate that the level of emission is now beyond the standardized value. As the Red LED glows the system is trigged and the engine goes to off state.

Level 1

We can see that at the level 1 green LED is glowing..

Level 2

We can see that at the level 2 yellow LED is glowing..

Level 3

We can see that at the level 3 red LED is glowing.

Fig.4 Output of the pollution control system

As the vehicle achieved the value of emission greater than the value of the maximum threshold pollution level GSM modem send the notification alert to the owner's registered mobile no via SMS. There are three levels Level 0, Level 1, Level 2. At level 0 no notification will send to the owner. At level 1 the notification will send to the owner that the emission level of the vehicle is increasing so there is a need to check your vehicle's pollution level as soon as possible via message on to the mobile. If the owner doesn't check vehicle's pollution level yet the notification will send to the owner that you didn't check your vehicle's pollution level so the vehicle is stopped due to the improper maintenance of the vehicle.
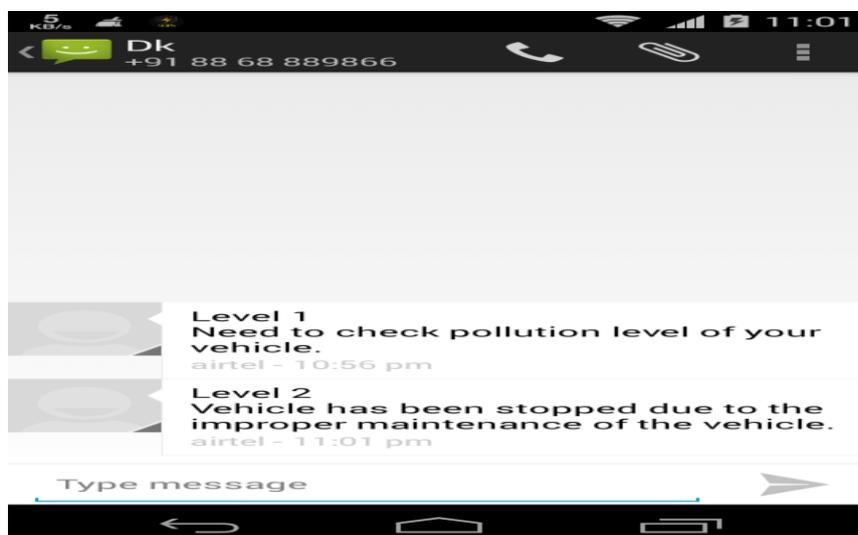

Fig.5 SMS on the mobile through GSM modem

Table below shows the sample of results obtained from the system

TABLE 1MONITORING THE POLLUTION LEVELS

Pollution level	Output Voltage	Motor Condition
300ppm	0V	ON
350ppm	0.5 V	ON
400ppm	0.95 V	ON
450ppm	1.35 V	ON
500ppm	1.79 V	ON
550ppm	2.30 V	ON
600ppm	3 V	ON
650ppm	3.45 V	ON
700ppm	3.88 V	ON
750ppm	4.4 V	ON
800ppm	4.98 V	OFF
850ppm	5.38 V	OFF
900ppm	5.98 V	OFF
950ppm	6.45 V	OFF
1000ppm	7.0 V	OFF

VII.   ADVANTAGES

We see that the air pollution from motor vehicle is one of the main causes of the pullulated air. In Delhi the quality of air is not good means the air contains carbon pollutants is much higher than the standardized vale of air quality. To have a breath in the air of Delhi approximately equal to the smokes 30 cigarettes per day. If we regulate or control the output of the emission from motor vehicle then the quality of the air will be improved. Environmental issues like climate changes, global warning and human health's are affected by the internal combustion of fuel in the engine of the motor vehicle. Therefore reduce in the emission of the motor vehicle will reduce the number of diseases due to poor quality of air and the environmental problems will be reduced. If we check up our motor vehicle pollution level at regular period of time then the internal combustion will be decreased and the mileage of the vehicle will be increased definitely.

VIII.   CONCLUSIONS

The concept of detecting and controlling the emission level of the motor vehicle is implemented. The emission level from the vehicle can be controlled at the commercial level if it is implemented due to this the air pollution from the motor vehicle definitely be controlled with the help of detection process. If we talk about the air pollution from motor vehicle, motor vehicles are reasonable for the two third of air pollution in the urban area so we have to control the level of emission from the motor vehicle we have to control. Give our best efforts to control so from our prospective there is need of this system at the commercial level to control air pollution.

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