

# Automated Control System for Air Pollution in Vehicle

Aleena Mary Anson<sup>1</sup>

Corresponding Author: Dr. Priti Singh<sup>2</sup>

Co-Author: Manish Kataria<sup>1</sup>, Sachin Dabas<sup>1</sup>, Mansi Bajaj<sup>1</sup>, Dr. Karamjit<sup>2</sup>

1: Ug Students, Department Of Ece, Amity University Haryana

2: *Psingh@Ggn.Amity.Edu* , Hod, Department Of Ece And Eee, Amity University Haryana, 122413.

*Karam\_Sekhon@Yahoo.Co.In* , Assistant Professor, Department Of Ece And Eee, Amity University Haryana,122413

**Abstract:** The main objective of this paper is to implement the concept of Automated Pollution Control Detection system in vehicles to indicate the owner of the vehicle that it is high time he/she should get the vehicle for the pollution test. In case the pollution level is beyond the defined threshold level then the owner shall get the vehicle serviced. This is done with the help of a smoke sensor, microcontroller, relay, tachometer, and IR sensor. Smoke sensor senses the smoke emitted from the vehicle and the output is given to microcontroller, which compares the output received with a standardized value and displays it on the LCD. If the emission is very high i.e. if it crosses the threshold value red led will glow and with the use of tachometer a certain kilometer limit will be given to the owner, after that the fuel supply to the engine will be cut off and the vehicle stops. A real time work is implemented where a demo application is made with the help of Atmega-8 controller. All the other devices get integrated and work accordingly. Comparing with the existing methods which indicates the owner to get his/her vehicle serviced done through a message using a GSM module, our method is effective because in this concept the vehicle will come to hold if the service is not done instead of just informing the owner, which will stop the emission of harmful pollutants at any cost.

**Keywords.** relay, led, controller, LCD, motors.

\*\*\*\*\*

## I. INTRODUCTION

In developed and developing nations, a large fraction of people travel daily for work, shopping and social reasons. In modern world, we cannot imagine a life without cars. In some ways, our life is depended on cars. Like, a coin has two sides vehicles also have negative effects. One of the main negative effect of vehicles is air pollution Every vehicle has its own emission of gases due to combustion of fuel. To a certain standard value this emission doesn't cause pollution. But the problem occurs when the emission is beyond the standardized values. The incomplete combustion of fuel supplied to the engine is the primary reason for this breach of emission level, which is due to the improper maintenance of vehicles. Avoiding this emission completely is not possible, but in a way we can control it.

The vehicle owner has to check the emission from the vehicle in authorized centers. Computerized facilities for checking of pollution levels and issue of PUC (Pollution Under Control) Certificates (to vehicles meeting emission standards) are available at many petrol pumps/workshops. These authorized Pollution Checking Centers are spread all over India. In case the vehicle is found polluting beyond prescribed norms, necessary repairs/ tuning in the vehicle would be required.

When vehicles emit excess levels of smoke, chances are that it is not properly tuned or maintained since long time. In case a vehicle is poorly tuned or maintained, the other parts on the vehicle may also not work properly. The Smoke emitted from petrol engine vehicles (most cars) is mainly due to excessive wear, form diesel vehicles (most trucks) it may from poor

injector maintenance, excessive fuel delivery rates or poor driving technique (for example, lugging which is labouring the engine in too high a gear). Emission of smoke means that the vehicle is wasting fuel and engine damage is getting damaged. Servicing according to company norms will eliminate many problems that cause smoke emissions and save the environment and your vehicle from getting damaged early.

The owner of the vehicle shall get his vehicle checked for emission in authorized centers that have computerized facilities for checking the pollution levels and issue of PUC (Pollution Under Control) Certificates (to vehicles meeting emission standards) are available at many petrol pumps/workshops. The pollution centers are spread all over India. In case the vehicle is found emitting pollution beyond defined standard values, the vehicle should get checked and serviced.

In this project, we use MQ2 sensor to sense the smoke and output in the form of analog signals is provided to microcontroller Atmega 8. The smoke detection is done using MQ2 sensor, depending upon the smoke emitted by the vehicle the output voltage of the sensor changes. Concentration of smoke is proportional to sensors output voltage. The smoke detected is displayed on the LCD in form of percentage. Glowing of green ,yellow and red LED's depend upon the intensity of smoke defined as:

- i) 0% - 40%: Green LED will glow which indicates that combustion is taking place properly.

- ii) 40% - 80%: Yellow LED will glow which indicates that the combustion is not taking place properly and the servicing of the vehicle should be done otherwise the vehicle will stop after a certain given limit.
- iii) 80% and above : Red LED will glow which indicates that now the limit is over and vehicle seriously needs to be serviced and the vehicle stops i.e. supply of fuel to the engine is cutoff.

Even if the PUC certification period and the time to get the vehicle serviced is over, owners continue to drive their vehicles resulting in air pollution. Even though they are aware of this, then also they do not get their vehicle serviced, until and unless this issue affects them. So if they get to know that their vehicle will come to a halt after a certain limit, they will definitely get the vehicle serviced. This is very effective compared to the existing methods.

## II. REVIEW

Automated System for Air Pollution Detection and Control of Speed in Vehicles published in 2016 by Chaitanya H P, H. Prasanna Kumar[1] this paper focuses on pollution control circuit which consists of sensor circuit containing sensors like gas sensor and temperature sensor, and GSM and pulse width modulation (PWM), altogether attached to the controller. The system slowdowns on vehicle touching certain predefined pollution level, and a fan automatically gets- on PWM is used for controlling the speed of DC motor[1]. A Novel Approach to Implement Self-Controlled Air Pollution Detection in Vehicles using Smoke Sensor by V V R Kishore Ch, Suman M [2] in this paper a gas sensor along with

GSM module and GPS is used which will send the signal of pollution level and car's location details to service station through a text message. Timer will be activated which will tell after how much time the vehicle will stop and within in that time interval GPS will find the location of vehicle and display it on LCD[2]. Metal Oxide Semi-Conductor Gas Sensors in Environmental Monitoring by Mohammad Akthar Ali, M.Venkata Sireesha [3] in this paper the gas sensor is metal oxide semiconductor gas sensors, which is faster and cheaper. In this project, nature of gas and the basic structure is being explored. It also tells about the effect of gases on the surface structure[3]. Automated Control System for Air Pollution Detection in Vehicles by Siva Shankar Chandrasekaran, Sudharshan Muthukumar, Sabeshkumar Rajendran [4] this model's objective is incorporating semiconductor sensors at the outlets of automobile, which spots the level of unwanted gases, by indicating it with meter. On the reaching the level above the predefined threshold, an alert will generate in the car and it will stop after some decided time, which has been decided by taking flexible time to park the car safely and then the supply of fuel to the engine cuts off. The model uses micro controller for monitoring and controlling.[4] Human Safety and Air Pollution Detection in Vehicles by Nishigandha Athare, Prof.P.R.Badadapure [5] This system will help in controlling the emission of pollution by telling us about the level of pollution and shows it on the LCD. If the level of the pollution is more than the standard value given by the government than it will give an alarm

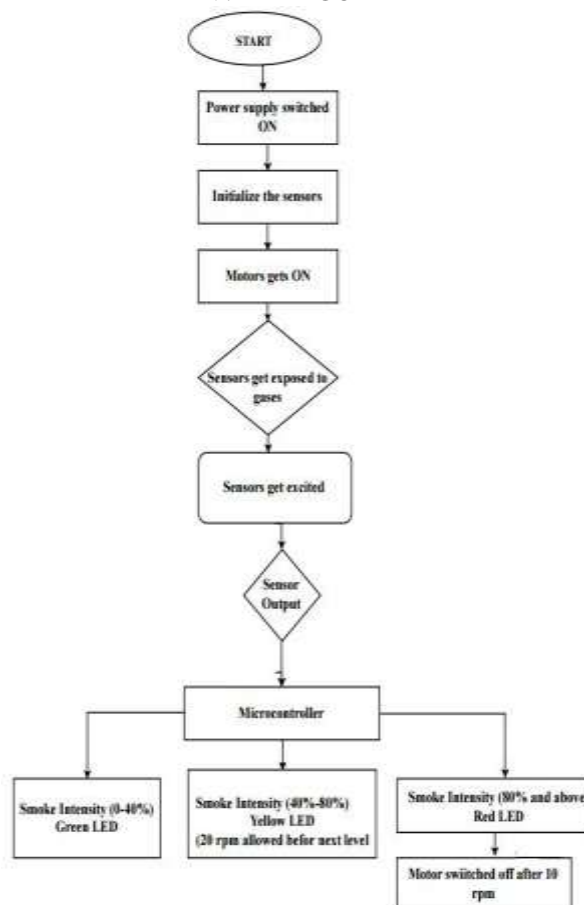
through LCD by using microcontroller and a certain time will be given to the driver to park the car.[5]

## III. PROPOSED

### Automated Control System for Air Pollution in Vehicle

In previous model, main motive is to just inform the owner regarding the pollution through a message using a GSM module. In some modules fuel supply is cut as soon as the message is received or after sometime. One of the main disadvantage of this is owner may get stuck on road if there are no service stations near by due to shortage of time. In this case it's difficult for the owner to get the halted vehicle to the service station. In our system, there are three levels of indications; first indication is of green light, which indicates that everything is going normal. Next indication is when there is a slight increase in smoke level then green light changes to yellow light. Yellow light indicates that within some time owner has to get the service done. So enough time is given to him to get the service done before more pollutants are emitted. Even after this, if he is not getting the service done yellow light changes to red light and after certain distance, the fuel supply is cut using a relay and the vehicle stops. The main advantage is unlike other methods, which informs the owner when the smoke is at its peak this method informs at the initial point.

## IV. ALGORITHM



V. BLOCK DIAGRAMS AND COMPONENTS

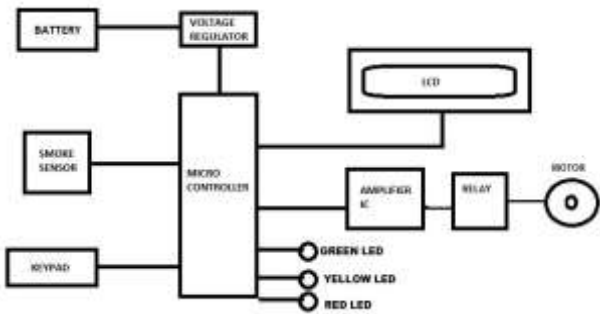


Figure: 1 Schematic diagram of pollution monitoring

The Grove - Gas Sensor (MQ2) module is helpful for gas spillage recognition (home and industry). It is appropriate for identifying H2, LPG, CH4, CO, Alcohol, Smoke or Propane. Because of its high affectability and quick reaction time, estimation can be taken at the earliest opportunity.

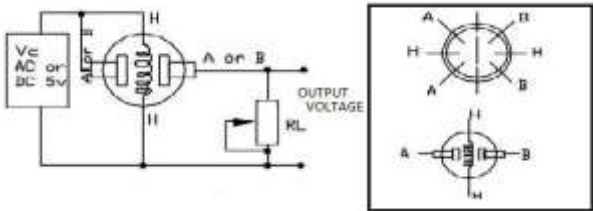


Figure: 2 MQ2 SENSOR Circuit diagram

**SPECIFICATIONS:**  
Wide range sensitivity to combustible gas.  
Better sensitivity to Propane, LPG and Hydrogen Low cost and better life  
Drive circuit is simple.  
Sensor Type : Semiconductor  
Concentration : 300-10000ppm ( Combustible gas)  
Supply voltage =5v

VI. RESULT AND DISCUSSION

The signals acquired from the smoke sensor are compared with the user-defined set point crossing the threshold limit the pollution level is displayed in the LCD and when it exceeds the set point, it gives a buzzer indication following the motor gets off.

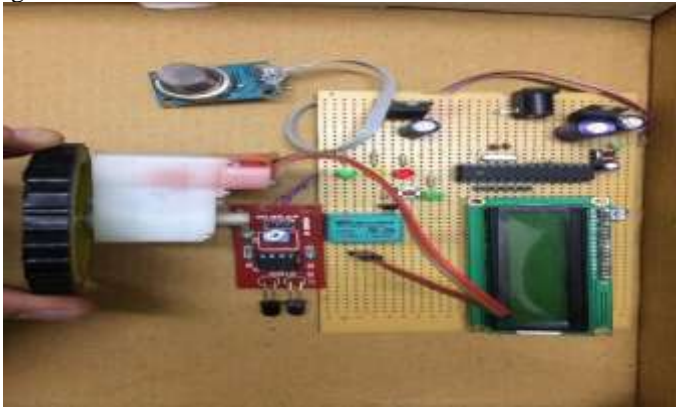


Figure: 6 Hardware

The table below shows the sample of results obtained from the system:

Smoke percentage	Voltage	LED	Motor
10%	0.8V	GREEN	ON
15%	0.9V	GREEN	ON
25%	1.4V	GREEN	ON
40%	1.4V	YELLOW	ON
50%	1.5V	YELLOW	ON
63%	1.6V	YELLOW	ON
72%	1.63V	YELLOW	ON
85%	1.7V	RED	OFF(after 10 rpm)
99%	1.71V	RED	OFF(after 10 rpm)
100%	1.72V	RED	OFF(after 10 rpm)
110%	1.72V	RED	OFF(after 10 rpm)

Table 1. Result

VII. CONCLUSION

Motor vehicles emit toxic and carcinogenic compounds, which causes air pollution. Exhaust fumes from cars contain carbon dioxide, carbon monoxide, sulphur dioxide, nitrogen oxides and hydrocarbons. The concept of detecting the level of Pollution and indicating it to the driver is implemented. This method gives the owner enough time to get the vehicle serviced. This not only solves the pollution problem but it also ensures that the owner is not stuck anywhere middle when the fuel supply is off.

## REFERENCES

- [1] Chaitanya H P, H. Prasanna Kumar, "Automated system for air pollution detection and control of speed in vehicles", International Journal of Advances in Engineering & Technology, 2016.
- [2] V V R Kishore Ch, Suman M, "A Novel Approach to Implement Self-Controlled Air Pollution Detection in Vehicles using Smoke Sensor", International Journal of Engineering Trends and Technology (IJETT) Volume 16 Number 6, 2014.
- [3] Mohammad Akthar Ali, M.Venkata Sireesha, "Automated Control System for Air Pollution Detection in Vehicles," International journal of scientific engineering and technology research vol.03, issue.32, 2014.
- [4] George F. Fine, Leon M. Cavanagh, Ayo Afonja, Russell Binions, "Metal Oxide Semi-Conductor Gas Sensors in Environmental Monitoring", MDPI volume 10, issue 6, 2010.
- [5] Nishigandha Athare, Prof.P.R.Badadapure, "Human safety and air pollution detection in vehicles", International Journal of Technical Research and Applications e-ISSN: 2320-8163, www.ijtra.com Volume 3, Issue 6, 2015.
- [6] [https://en.wikipedia.org/wiki/Bharat\\_Stage\\_emission](https://en.wikipedia.org/wiki/Bharat_Stage_emission)
- [7] Anita Kulkarni, Ravi Teja "Automated System for Air Pollution Detection and Control in Vehicles", IJAREEIE, vol 3, issue 9, September 2014.
- [8] S. Arun , Dr. J.L Mazher Iqbal, "Embedded System Based Air Pollution Detection in Vehicles V. Siva Krishna1"
- [9] K. Galatsis, W. Wlodarsla, K. Kalantar-Zadeh and A. Trinch, "Investigation of gas sensors for vehicle cabin air quality monitoring," vol. 42, pp. 167-175, 2002.
- [10] P.Vijnatha Raju, R.V.R.S.Aravind, B.Sangeeth Kumar, "Pollution Monitoring System Using Wireless Sensor Network In Visakhapatnam", IJETT, Volume4, Issue4, April-2013
- [11] Amarakanth, N.V.Uma Reddy, "Engine Self-Test With Air Pollution Detection and Remote
- [12] [http://en.wikipedia.org/wiki/Emission\\_standard](http://en.wikipedia.org/wiki/Emission_standard)
- [13] <http://www.cpcb.nic.in/Introduction.php>
- [14] V. Ramya, B.Palaniappan"Embedded Technology for vehicle cabin safety Monitoring and Alerting system, IJETT,Volume5,Issue5,May-2016
- [15] Kosmas Galatsis ,"Car Cabin air Quality sensors and Systems", Wojtek Wlodarski.