

Intelligent Detection of Pollution System

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Abstract: Every vehicle has its own emission of gases, but the problem occurs when the emission is beyond the standardized values. The primary reason for this breach of emission level being the incomplete combustion of fuel supplied to the engine which is due to the improper maintenance of vehicles and also with low Quality Fuel or Kerosene mixed Fuel. This emission from vehicles cannot be completely avoided, but it definitely can be controlled. The aim of the project is to monitor and control the pollutants in the vehicle by using the pollution control system. This pollution control system consists of sensors like MQ2 sensor and Nodemcu controller with inbuilt wi-fi module; all of them are integrated and connected to a Controller. When a vehicle attains certain threshold pollution level then the engine gets automatically switched off and an SMS is generated. This paper demonstrates an effective utilization of technology by which we save our environment by controlling the pollution of vehicles. This paper presents automated control system for air pollution detection in vehicles. As the usage of vehicles is more in these days, pollution is increasing. As a solution to the above problem we aim to build an embedded system for controlling the pollution in vehicles. When the pollution/ emission level shoots beyond the already set threshold level, there will be a LED and buzzer in the vehicle to indicate that the limit has been exceeded and this information will be send to the registered mobile number using Nodemcu module.

Keywords: MQ2 sensor, nodemcu controller with inbuilt Wi-Fi module, vehicle emission.

1. INTRODUCTION

The incomplete combustion in the engine of a vehicle leads to emission of different gases contributing to increase in the pollution and affecting the environment. Detection and control of these gases is an important aspect. This emission from vehicles cannot be completely avoided but, it can be controlled. These are critical things to control so here we come up with a concept to reduce pollution. As a solution to the above problems we aim to build an automated control system for emission level control of vehicle .Smoke detector is used to detect the carbon percentage in the smoke released by the vehicle due to combustion of fuel in it. Smoke detector is fixed at the end of the exhaust of vehicle from where smoke is released into the environment. The smoke detector detects carbon and converts the value from analog to digital gives it to the nodemcu to check the maximum percentage of carbon content in the smoke released by vehicles. So, the controller checks the percentage of carbon and it's oxides, if it exceeds the threshold level, the system gets triggered and the engine comes to halt state and then it sends SMS about this to the nearby pollution control office through wi-fi module. Along with health concerns, pollution is being greatly considerable in environmental matters. One of the major concerns regarding the environment is air pollution. Air pollution contributes to the greenhouse gases, which affects the ozone layers. Air pollution is not only harmful to the environment but also to all other living beings on earth. Air pollutants that are inhaled have serious impact on

human health affecting the lungs and the respiratory system. Vehicles and Industries are the major sources of Environmental Pollution. Every vehicle will have emission but the problem occurs due to the improper maintenance of vehicles. This emission from vehicles cannot be completely avoided but it can be controlled. For that, we have designed an intelligent system which controls the pollution in vehicles. The main pollutants from vehicles are the oxides of carbon and nitrogen. Therefore, in this paper we prepare a system useful in reducing the amount of pollution from vehicles. The proposed intelligent automated control system uses nodemcu controller with inbuilt wi-fi module. By this controller the sensed values can be notified to the vehicle user by mobile.

2. BLOCKDIAGRAM AND DESCRIPTION

MQ2 Sensor: The Gas Sensor(MQ2) module is useful for detecting gas leakage. It is suitable for detecting H₂, LPG, CH₄, CO, Alcohol, Smoke or Propane. Measurement can be taken as soon as possible, due to its high sensitivity and fast response time, Using potentiometer the sensitivity of the sensor can be adjusted. It can sense carbon oxides in PPM ranging 100-1000 PPM and it operates on 5Volts, having long life, available at low cost. It can sense Hydrogen, propane in PPM ranging 300-5000 PPM.

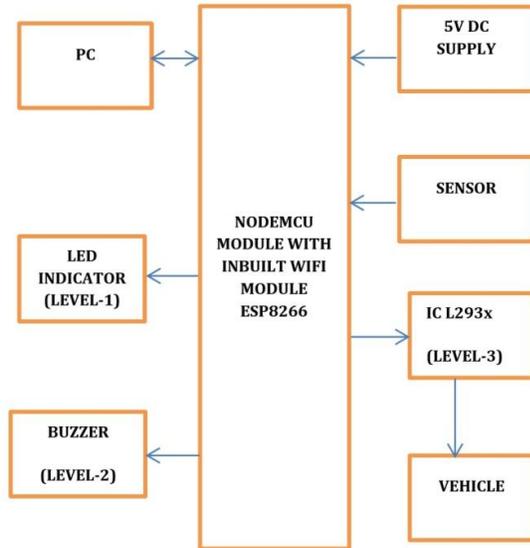


Figure 1: Pollution control system

BUZZER: The Buzzer or Beeper is an audio based signalling device, the buzzer module is used for alters when the emission level excess beyond the standard level, it is mainly designed as mechanical ,electromechanical or piezoelectric. Here we are using CUI audio indicator buzzer, this buzzer are designed with a built-in driving circuit to ease implementation during the development process. Models range from 9.6 mm to 50 mm in diameter with sound pressure levels over 100 decibels

NODEMCU:

NodeMCU is an open source IOT platform. NodeMCU is an eLua based firmware for the ESP8266 Wi-Fi SOC from Espressif. The firmware is based on the Espressif NON-OS SDK 2.2.0 and uses a file system based on spiffs. The code repository consists of 98.1% C-code that glues the thin Lua veneer to the SDK. The NodeMCU firmware is a companion project to the popular NodeMCU dev kits, ready-made open source development boards with ESP8266-12E chips.

When ESP8266EX hosts the application, it boots up directly from an external flash. System performance can be improved by integrated cache. The nodeMCU Dev board supports directly flashing from USB port. It combines features of WIFI accesspoint and station +

microcontroller. These features make the NodeMCU extremely powerful tool for Wi-Fi networking.

ESP8266EX is among the most integrated Wi-Fi chip in the industry; it integrates the antenna switches, RF balun, power amplifier, low noise receive amplifier, filters, power management module, it requires minimal external circuitry, and the entire solution, including front end module, is designed to occupy minimal PCB area.

3. EFFICIENT COMMUNICATION

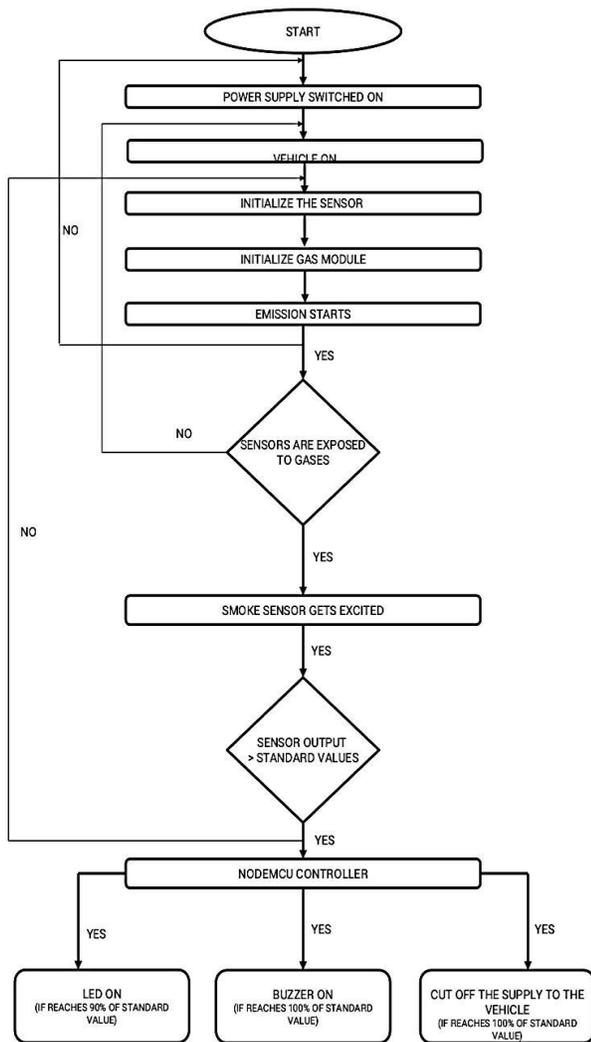
The nodemcu controller is programmed to perform mainly three functions namely: Comparison, timer and triggering. It takes two inputs one from the smoke sensor and the other being the pre-defined threshold value specified by the government. When output of smoke sensor is more than the standard value(threshold value), the microcontroller triggers the timer circuit and an alarm which is fixed on the vehicle start's to ring intimating that the emission level is excited beyond the standard value(threshold value). Semiconductor sensor MQ-2 is used to sense the smoke up to the range of 300ppm to 10000ppm. When this sensor is exposed to the pollutants its conductivity increases generates a signal in the circuit which disables operation of the motor. An automatic SMS is sent by a nodemcu module which is connected in the circuit.

4. WORKING OF THE PROPOSED SYSTEM

With the help of sensor the carbon and its oxides are sensed. After sensing, the sensed values are converted into analog to digital and the digital values are sent to NodeMCU controller. This controller checks the sensed value and standard value, if the sensed gas value is 90% of the standard value then the controller trigger the LED by glowing. So that driver comes to know that vehicle reached 90% of standard value. Then immediately the driver should service his vehicle. If gas value is increased to 100% of standard value then the controller triggers the Buzzer to ring and also it will sends an E-mail to the pollution controll board informing that this person is polluting the environment more than the standard value. If gas value is increased more than 100% then with the help of NodeMCU controller the supply to the battery is cut-off and automatically the vehicle stop's. After this if the the person services the vehicle, then only the vehicle will starts to move and as usual the sensor starts to sense.

In this paper, the semiconductor sensors have been used to detect the pollutant level of the vehicles. This Paper concentrates mainly on three blocks; smoke detector, nodemcu controller and supply to the vehicle. The smoke detector detects the pollutants (CO, NO_x, etc.) continuously. The nodemcu controller compares the level of pollutants with the stipulated level allowed by the government. When the pollutant level exceeds the standardized limit, it sends a signal to the controller. On receiving a signal from the controller, the vehicle stops its motion by cut off the supply.

5. PROJECT OVERVIEW



VI. RESULT AND DISCUSSION

The values acquired from the sensor are compared with the standard values prescribed by the government. If the values are crossed the threshold limit, then the pollution level get displayed in the mobile and when it exceeds the set point it gives a LED indication and then followed by buzzer indication and sms notification to the user and pollution control board. After that vehicle will off.

7. CONCLUSION

There is an increase in the level of Pollution over the last couple of decades, leading to several Environmental problems. This paper mainly focus on developing an embedded system to detect and control pollution from the vehicles. It will bring the vehicle to a halt, if the Pollution level is more than the Standards mentioned by the Government. The concept of detecting the level of Pollution and indicating it to the driver is implemented. Also our system is designed with low cost and low power, yielding high accuracy, this can be extended to home, transport and industrial applications.

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