Automated Drunk, Drive and Pollution Detection System

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Abstract - Vehicles have become an integral part of everyone's life. As we know that a coin has two sides that have their effects, one of the side effects is air & noise pollution and the other one is drunk & drive. Every vehicle has emission, but the problem occurs when it is beyond the standardized level. This emission and sound may it be high decibels cannot be avoided but, it is controlled. To overcome this issue, we are introducing a system through which the level of sound and the emission of hazards gases can be controlled by the evolvement of the sensor system. Sensors in the system detect the level of pollution gases, and noise occurred along with the level of ethanol in driver's breath & indicates it on display. If the pollution level goes beyond the level it alerts the buzzer. At the same time, the vehicle will be stopped after the predefined time, if appropriate action is not taken by the driver.

Keyword - Sensor, Buzzer, Drunk and Drive Detection, Pollution Detection, Arduino Applications.

I. INTRODUCTION

Now a day's, air and noise pollution is one of the major problem to manage due to increase in the number of vehicles. The emission from the vehicle will produce polluted air having a serious impact on human health affecting the respiratory system and lungs. The pollutants from vehicles are different oxides of carbon and nitrogen and can be detected with the help of the gas sensor. Therefore, this paper proposes a system that is useful in reducing the amount of pollution from vehicles. The proposed automated control system uses the MQ6 sensor to measure the percentage of pollutants like carbon, nitrogen, hydrogen, & different oxides. These sensors can be fixed at the end of exhaust vehicle from where smoke will be released into the environment. The MQ-6 sensor detects the percentage of pollutant gases and gives it to the microcontroller to check the maximum percentage of pollutants content in smoke released by vehicles. So the controller checks the noise pollution using sound sensor and if it is more than the threshold level, triggers the buzzer to inform the driver, the percentage of pollutant exceeds the threshold. The same system implementation is used for rash driving prevention. Now a day's rash driving is a common feature of accidents, to avoid those accidents have to control it by the MQ-3 sensor to check the ethanol level contained in drivers breath. If it is more than the threshold value, the vehicle gets stop.

II. RELATED WORK

The government of India made several regulations to control the pollution levels from vehicles. The Central Pollution Control Board under the Ministry of Environment & Forests set standards and timeline for implementation to control emission level. The duty of this board is air quality monitoring. The government of India created the Bharat Stage Emission Standards for air pollution control from motor vehicles. Bharat stage emission standards are emission standards that used to regulate the output of air pollutants from internal combustion engine equipment, including motor vehicles. Several emission norms were come to control the emission levels from vehicles since last two decades. There are many people who research on the air pollution detection in vehicles. In 2002, the authors K. Galatsis, W. Wlodarsla, K. Kalantar-Zadeh and A. Trinchi, has chosen the commercially available gas sensors for the toxic gases detection which are compared with the fabricated MOO3-TiO2 and MOO3- WO3 thin films [1]. In 2010, George F. Fine, LeonM. Cavanagh, Ayo Afonja, and Russell Binions said that the metal oxide semiconductor gas sensors that are utilized in variety of different roles in industries. [2]. These are relatively inexpensive compared to other sensing technologies, robust, light-weight, long-lasting and quick response times. In 2012, Siva Shankar Chandrasekaran, Sudharshan Muthukumar and SabeshkumarRajendran described an embedded system for vehicle cabin toxic Gas detection and alerting. The system is developed using GSM and GPS modules for detecting pollutant gases with vehicle location [3].In 2013 Anitha Kulkarni, T. Ravi Teja developed an automated control system for air pollution

detection for vehicles.In this system, a relay circuit is used for the control of ON and OFF position of the fuel pump. GSM and GPS system are used for sending data and locating nearest work station for vehicle servicing [4]. “Road Accident Prevention Unit” is a step design to monitor the driver's state using multiple sensors and looks for triggers that can cause accidents, such as alcohol in the driver's breath and driver fatigue or distraction. When an alert situation occurs, the system informs the driver and tries to alert him.

III. BLOCK DIAGRAM OF THE PROPOSED METHOD

The overall block diagram of the system mainly consists of following blocks shown in the Figure 1. Here, Arduino UNO is the heart of the system followed by the MQ-3 sensor, MQ-6 sensor, Sound sensor, Buzzer, Motor driver, Power supply unit, etc.

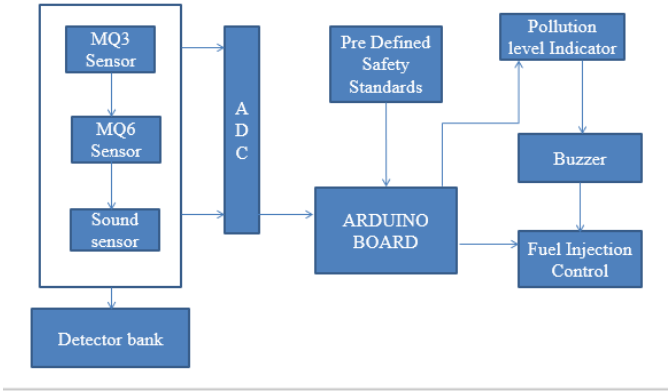

Fig. 1 Block Diagram of Proposed System

A. Detector Bank

The semiconductor sensors are the main component of detector bank which are located into a different location in the vehicle. The sensors sense the values & feed to the microcontroller through transducer & ADC. The transducer is used to convert O/P of the sensor into an electrical signal. It is compared with pre-defined standard values.

B. MQ-3 Sensor

This module is made using Alcohol Gas Sensor MQ3. It is a low cost semiconductor sensor which can detect the presence of alcohol gases at concentrations from 0.05 mg/L to 10 mg/L. Figure 2 shows the MQ-3 alcohol sensor.

Fig. 2 MQ-3 Alcohol sensor

C. MQ-6 Sensor

Sensitive material of MQ-6 gas sensor is SnO2, which with lower conductivity in clean air. When the target combustible gas exists, the sensor’s conductivity is higher along with the gas concentration rising. The MQ-6 gas sensor has high sensitivity to Propane, Butane, and LPG, also the response to Natural gas. The sensor could be used to detect different combustible gas, especially Methane, it is with low cost and suitable for different application. The MQ-6 can detect gas concentrations anywhere from 200 to 10000ppm. The sensor’s output is an analog resistance. Figure 3 shows the MQ-6 Gas sensor.

Fig. 3 MQ-6 Gas sensor

D. Sound Sensor

Sound Sensor can detect the sound intensity of the environment. The main component of the module is a simple microphone, which is based on the LM386 amplifier and an electret microphone. This module's output is analog. This is a multipurpose sound sensor which can be used to sense sound and audio. The sensor outputs a logic one (+5V) at the digital output when it detects sound and a logic zero(0V), when there is no sound detected. Effective signal output for low level. Default output is low and is high only when sound is detected. Figure 4 shows the sound sensor.

Fig 4 Sound sensor

E. Fuel Injection Control

The function of the fuel injector is to cut the supply of fuel to the engine when sensors values are more than threshold values. A relay circuit is used to control the ON/OFF position of the fuel pump. Here microcontroller is programmed in such way that when microcontroller sends a trigger pulse after the timer runs out relay should get back to its original position, which cutoffs fuel supply to the engine.

F. Buzzer

The buzzer module is used for audible alerts when the emission level shoots beyond the set threshold level. The buzzer or beeper is an audio-based signaling device. It is mainly designed as mechanical, electro-mechanical, or piezoelectric.

IV. SYSTEM IMPLEMENTATION

Figure 5 shows the implementation of the proposed method with all the required sensors connected together.

V. PERFORMANCE ANALYSIS

The developed system is mainly used for controlling the air pollution from motor vehicles along with rash driving prevention when the values of sensors reach its maximum threshold value. The working starts with the sensing of the sensor in this system there are three sensors which are MQ3, MQ6 and Sound sensor. They sense carbon monoxide, methane, hydrogen, butane & alcohol (ethanol) respectively. They give analog output as per the concentration of gas present nearby the environment and gives analog output to microcontroller. Thermo-controller takes the analog input and converts it into digital output using ADC. In recent years, comfort has become an important factor when evaluating the performance of modern automobiles. One important aspect that has negative ramifications on the perception of the quality is the generated noise, which mainly contributes to

the disturbing noise level of urban regions. Therefore, an important goal in current research is the attenuation of the noise level of car engines. This paper presents two main approaches, an active and a passive one, to reduce the noise radiation of combustion engines, which is the main noise source of automobiles. In the active approach, thin piezoelectric wafers are attached to the structure as sensors and actuators. With an appropriate controller the structural vibrations are reduced, which result in an attenuation of the sound pressure in the environment. The passive approach utilizes a full engine encapsulation, which is also designed to reduce the sound radiation of the engine.

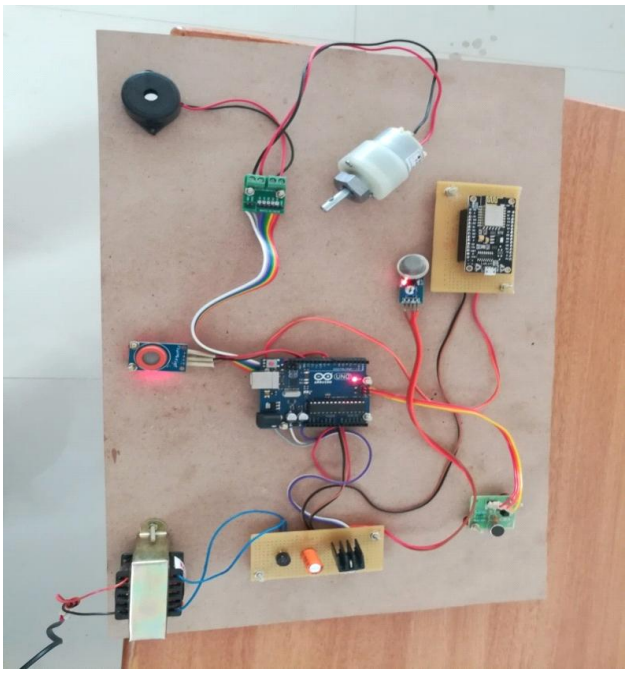

Fig. 5 Implementation of Proposed System

VI. CONCLUSION

The increase in the level of air pollution and noise pollution over last couple of decades, leads to several environmental problems, which results in Ozone layer depletion leading to green house effect. Air pollution also affects the human health, causing lungs and respiratory system problems. So, the developed system will be highly beneficial in curbing this problem. The second thing is the rash driving prevention, as we know rash driving is the main reason of accident. So the system will be helpful to provide more public safety. The system helps to keep the environment free from vehicular emission. This system is just add-on, it does not need to change configuration of engine, will make easier to employ this system in existing vehicles.

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