NOVATEUR PUBLICATIONS
International Journal of Research Publications in Engineering and Technology [IJRPET]
ISSN: 2454-7875
VOLUME 3, ISSUE 2, Feb.-2017

AN EMBEDDED BASED SYSTEM FOR EMISSION LEVEL DETECTION AND RASH DRIVING PREVENTION IN VEHICLES

PIYUSH R. TAPAR
PG Student, Department of Electronics & Telecommunication, DIEMS, Aurangabad, MS, India

A. K. PATHRIKAR
Assistant Professor, Department of Electronics & Telecommunication, DIEMS, Aurangabad, MS, India

ABSTRACT:

Now a day's air pollution caused by vehicles is rising very fast. To deal with this major problem many countries & regions have already presented a progression of emission standards. In mean time some methods has been developed, includes update of motor engine or get better quality of the gasoline. These actions have not enough to bring about a prominent effect as expected. Along with air pollution one more major problem is rash driving. Now a day's rash driving is common feature of accidents. Rash driving is a nature of driver which causes panic in the traffic & finally leads to accidents. These are critical things to control.

In this paper, an automated control system along with notification system is designed with the help of this system it will be easy to overcome vehicular emission & rash driving problems. In this system semi-conductor sensors are used, which gives the emission values & ethanol level in driver's breath. The microcontroller compares sensor values with pre-defined threshold values. If the sensors values are beyond threshold values, microcontroller triggers a buzzer & timer circuitry which indicate driver about the current situation. The driver have to solve current problem in pre-defined time interval if it not the timer run out and fuel supply to engine get cutoff due to this vehicle comes to stop. Simultaneously microcontroller triggers the GSM & GPS modules to send a notification massage along with vehicle current location in the latitude and longitude values to the owner of vehicle.

KEYWORDS: LPC2148 Development Board, Semiconductor Sensors, GSM & GPS Modules, LCD Display, LED, Buzzer etc.

I. INTRODUCTION:

The unprecedented growth of industries & vehicular traffic has seriously affected the purity of clean air & environment. Now a day's we easily see vehicle becomes an important requirement of everyone. The quantity of vehicle is increasing because of which air pollution is increasing rapidly having serious impact on human health & environment issues also the rash driving becoming a main cause of road accidents. To overcome or deal with such problems this embedded system is developed with the help of which each vehicle can guaranteed for examining the emission level continuously. So that it will be easy to realize air pollution & driver status of each vehicle.

An embedded based system is developed in this paper with the help of semi-conductor sensors it will easy to measure the percentage of pollutant gases. The system uses CO sensor & Smoke sensor to measure percentage of pollutant gases like carbon, nitrogen, hydrogen, & different oxides release into environment at exhaust of vehicle. The Alcohol sensor is used to measure the percentage of ethanol contain in driver's breath. The microcontroller checks the sensors values with predefined standard values. If the any respective sensors values more than the threshold the microcontroller triggers the buzzer to inform the respective sensor values goes beyond the threshold set. At the same time microcontroller gives trigger pulse to timer having pre-defined time. The driver has to solve corresponding problem in defined time. After timer run out fuel supply to engine get stop & vehicle comes to stop state. The GSM & GPS module sends the notification SMS with vehicle current location.

II. LITERATURE SURVEY:

Over the years, the Government of India presented a series of emission standards to control the emission from vehicles but these emission standards have not brought about a prominent effect as expected. Bharat stage emission standards are emission standards that made by the Indian Government to regulate the Pollutants gases generated from internal combustion of fuel in engine [7]. There are many authors who work on emission level detection in vehicles. In 2010, George F. Fine, Leon M. Cavanagh, Ayo Afonja and Russell Binions [1] said that the metal oxide semiconductor gas sensors are utilized in automobile industries to measure the pollutents gases. They are relatively inexpensive compared to other sensing technologies, robust, lightweight, long lasting and benefit from high material sensitivity and quick response times. In 2011, Dan Stefan Tudose, Traian Alexandru Patrascu, Andrei Voinescu, Razvan Tataroiu, Nicolae Tapus [2] proposed an environmental air pollution monitoring system that measures CO2, NO2, CO, & HC concentration

using mobile sensors in urban environment. The acquired information about air pollution in surroundings is then stored on central on-line repository system periodically. In 2012, Amnesh Goel, Sukanya Ray, Prateek Agrawal, Nidhi Chandra [3] proposed a wireless sensor network to monitor air pollution levels of various pollutants due to environment changes. In 2013, the author G. Anuradha [4] gives the idea of self automated tool in vehicular system that identifies the air pollution along with the future of e-governs.

According to a survey done by W.H.O Almost every 90 seconds, a person is injured in a drunken driving crash. One in three people will be involved in an alcohol-related crash in their lifetime. In America on average, nearly 12,000 people die every year in drunken driving related accidents. 900,000 are arrested each year for drunk & drive. And a full 1/3 of those are repeat offenders. Because of drunk and drive the people are highly injured or sometimes dead. Now a day's road accident is a major problem all over the world. According to a survey done by W.H.O (world health organization) in its first Global status report on road safety, 80,000 people are killed on the Indian roads due to the speeding, drunken & driving. Almost every 90 seconds, a person is injured in a drunken rash driving crash.

This survey makes it an important to target the root cause of road accidents in order to avoid them. "Road Accident Prevention Unit" is a step design to monitors 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. If any caution situation occurs the system alerts to driver to avoid any type of harm.

III. SYSTEM DEVELOPMENT:

The design of the proposed system is explained as follows. The block diagram shown in fig.1 is for pollution detection along with rash driving prevention. The system consists of different modules such as Semi-conductor sensors, GSM module, GPS module, LCD, Buzzer, Relay circuitry etc. In this system total three semi-conductor sensors are used. Which are interfaced to the microcontroller. Those are CO sensor, Smoke sensor and Alcohol sensor. Through which we can measures amount of percentage of different pollutant gases released from the vehicle and the ethanol contain in drivers breath respectively.

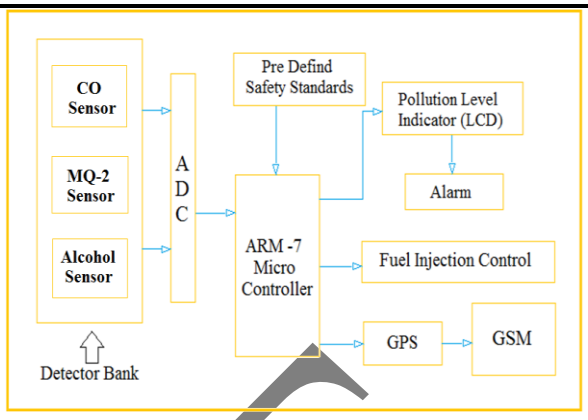

Figure 1: Block Diagram of System

Microcontroller plays a vital role in this embedded system. The microcontroller is used to perform four functions. First one is, compare the values coming from the semiconductor sensors with pre-defined threshold values. Second one is, activates the timer and alerts the buzzer to indicate vehicle will be stopped after sometime due to the violation of pre-defined threshold values. Third one is, microcontroller activate the GPS to find location of vehicle and display in terms of latitude and longitude. Fourth one is, GSM module is activated by microcontroller to send vehicle current location along with text notification message to the registered mobile number.

IV. DATAFLOW OF SYSTEM:

The flow chart in the fig.2 is representing the flow of execution for the automated system. From the flow chart we can easily understand the working of the system. The system is designed in such a way to execute in the following steps as, initially start the vehicle it will on the proposed system. The system activates all semi-conductor sensors along with GSM & GPS modules. The microcontroller takes sensors analog values as input values & converts it in digital values then compares these values with pre-defined threshold values. Initially sensors values are below the threshold set. The vehicle is in normal running stage indicating with ON of green LED light. When any sensor value beyond the threshold set microcontroller activates the timer & trigger buzzer to indicate driver that respective sensor value crosses threshold & shows the respective sensor value on LCD with ON of yellow LED light. If vehicle is not serviced in pre-defined time interval the fuel supply to engine get cut-off through relay circuit & vehicle comes to stop. At the same time microcontroller sends the notification with vehicle location using the GSM & GPS module.

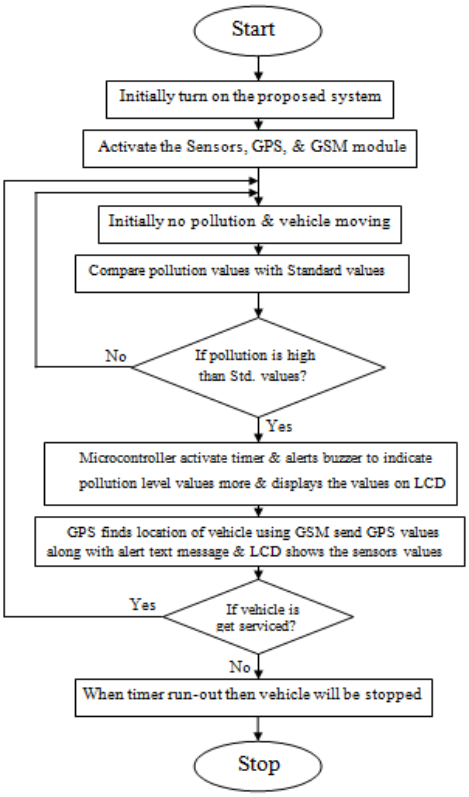

Figure 2: Dataflow of System

V. RESULTS:

The values received from the semi-conductor sensors are compared with the pre-defined threshold values. As the microcontroller attains the value of the sensors are greater than the value of maximum level of threshold the microcontroller activates timer & trigger buzzer to indicate driver the respective sensor value crosses threshold set. The driver has to take appropriate action in pre-defined time to avoid stop of vehicle. In case, if driver does not solve the problem the vehicle comes to stop due to fuel supply cut-off when timer runs out. For the fuel supply cutoff a relay circuit is used. At the same time microcontroller triggers the GSM & GPS module to send the notification SMS with vehicle current location in latitude & longitude values to the owner mobile number. The following fig.3 shows the complete setup of system.

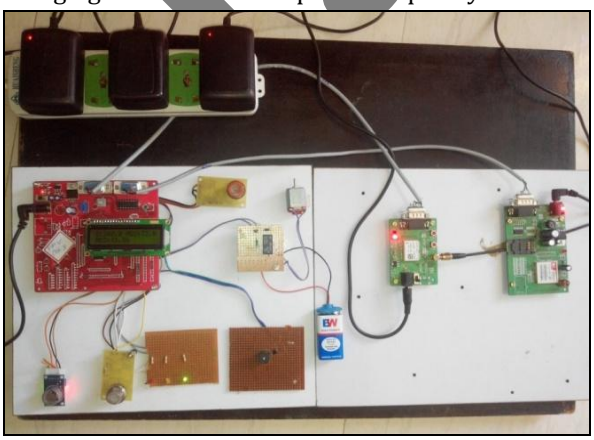

Figure 3: Photograph of Developed System

There are three levels of indicator in which three LED light are used to indicate the current situation. The used LEDs are Green, Yellow and Red. Green LED indicates that the values of sensors are in under threshold set & normally vehicle is in running state. The yellow LED is used to indicate that the respective sensor value just crosses the threshold value & there is need to solve problem. The Red LED is used to indicate that the timer run out due to fuel supply to engine gets cutoff & vehicle goes to stop state. The following fig.4 shows snapshot of notification text SMS send to the owner's mobile number when respective sensors values crosses the pre-defined threshold after timer run out.

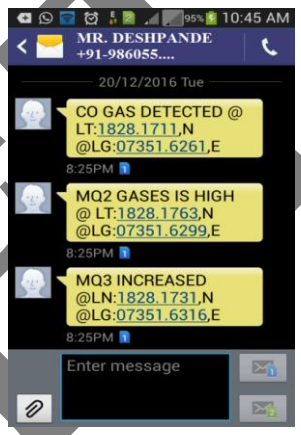

Figure 4: Schematic of Notification Messages

VI. CONCLUSION:

In this paper, an automated control and notification system is designed with the help of which it will easy to deal with air pollution cause by vehicles. The system helps user to maintain vehicle in good condition & alerts user when pollutant gases exceeds the threshold set. The concept of detecting the level of ethanol in driver breath and indicating it to the driver is implemented which is helps to control the cause of rash driving & provide more public safety.

REFERENCES:

1) George F. Fine, Leon M. Cavanagh, Ayo Afonja and Russell Binions *"Metal Oxide Semi-Conductor Gas Sensors in Environmental Monitoring*", Sensors Vol 10, Issue 6, pp. 5469-5502, June 2010. DOI: 10.3390/s100605469.
2) Dan Stefan Tudose, Traian Alexandru Patrascu, Andrei Voinescu, Razvan Tataroiu, Nicolae Tap us¸ *"Mobile Sensors in Air Pollution Measurement"*, 2011 8th Workshop on Positioning Navigation and Comm., pp. 166-170, Apr. 2011.
3) Amnesh Goel, Sukanya Ray, Prateek Agrawal, Nidhi Chandra, *—Air Pollution Detection Based On Head Selection Clustering and Average Method from Wireless Sensor Network*||, 2012 Second International

Conference on Advanced Computing & Communication Technologies, pp. 434-438, Jan. 2012.

4) G. Anuradha, "*Self Automated Tool in Vehicular System That Identifies the Air Pollution and the Future of E-Governs*", IJIES, Volume, Iissue 12, November 2013.
5) Diego Mendez, Alfredo J. Perez, Miguel A. Labrador, Juan Jose Marron, P-Sense: *A Participatory Sensing System for Air Pollution Monitoring and Control*||, IEEE International Conference on PERCOM Workshops, pp. 344-347, Mar. 2011.
6) Siva Shankar Chandrasekaran, Sudharshan Muthukumar and Sabeshkumar Rajendran, "*Automated Control System for Air Pollution Detection in Vehicles,*" 2013 4th International Conference on Intelligent Systems, Modelling and Simulation, IEEE 2166-0662, 2013.
7) M.H Mohamad, Mohd Amin Bin Hasanuddin, Mohd Hafizzie Bin Ramli "*Vehicle Accident Prevention System Embedded with Alcohol Detector*", International Journal of Review in Electronics & Communication Engineering (IJRECE) Vol 1, Issue 4 October 2013.
8) *Emission Standards For different Vehicles in India* available from the URL: http:// wikipedia.org/ wiki/ Bharat_ Stage_emission_standards.