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Automated Control System for Emission Level & Rash Driving Detection in Vehicles

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Abstract: **Vehicles have become an integral part of everyone's life. Situations and circumstances demand the usage of vehicles in this fast paced urban life. As a coin has two sides, this has its own effects, one of the main side effects being air pollution. Every vehicle will have emission but the problem occurs when it is beyond the standardized values. The primary reason for this breach of emission level being the incomplete combustion of fuel supplied to engine, which is due to the improper maintenance of vehicles. This emission from vehicles cannot be completely avoided but, it definitely can be controlled.**

Now a day accidents is a common feature of deaths. The common feature of accidents will be rash driving, signal jumping, drunk and driving, due to minor drivers etc. Rash driving and signal jumping is a nature of driver which causes panic in the traffic and finally leads to accidents. These are critical things to control so here we coming up with a concept to reduce rash driving.

As a solution to the above problems we aim to build an automated control system for emission level and rash driving detection in vehicles. Smoke detector is used to detect the carbon percentage in smoke released by vehicles due to combustion of fuel in it. Smoke detector is fixed at the end of exhaust of vehicle from where smoke is released into the environment. The smoke detector detects carbon and gives it to microcontroller to check the maximum percentage of carbon content in smoke released by vehicles. So the controller checks the percentage of carbon and if it is more than the threshold level of carbon the system module sends SMS about this to the nearby pollution control office through GSM.

Similarly, If driver is rash driving then it is done like applying and releasing of accelerator and brake frequently then it is taken as one point reduction and is intimated to control office by sending message through GSM, and it also sends location of vehicle through GPS system.

Keywords: **Accelerometer sensor, CO Sensor, GPS, GSM, Microcontroller.**

I. INTRODUCTION

Now a day's air pollution is the biggest problem to solve/manage due to heavy increase in number of vehicles in cities of the nation. This air pollution may impact severely on the global environment if it not controlled in right manner and This system is mainly designed for controlling of air pollution. This mainly consists of microcontroller, Analog to digital converter, smoke sensor, an ALCD, accelerometer, GSM, GPS and reset block. The heart of the project is micro controller unit.

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to reduce rash driving and signal jumping. Some points will be given to driver and if he is a victim of either rash driving then a point will be deducted from his quota. When the points become nil then he'll be charged. So this system reduces rash driving.

II. LITERATURE SURVEY

Over the years, there have been several regulations made by the Government to control the emission from vehicles; most of them being unsuccessful at the same.

The standards and the timeline for implementation are set by the Central Pollution Control Board under the Ministry of Environment & Forests. Bharat stage emission standards are emission standards instituted by the Government of India to regulate the output of air pollutants from internal combustion engine equipment, including motor vehicles. The first emission norms were introduced in India in 1991 for petrol and 1992 for diesel vehicles. These were followed by making the Catalytic converter mandatory for petrol vehicles and the introduction of unleaded petrol in the market. On April 29, 1999 the Supreme Court of India ruled that all vehicles in India have to meet Euro I or India 2000 norms by June 1, 19 99 and Euro II will be mandatory in the NCR by April 2000. Car makers were not prepared for this transition and in a subsequent judgment the implementation date for Euro II was not enforced. The standards, based on European regulations were first introduced in 2000. Progressively stringent norms have been rolled out since then. All new vehicles manufactured after the implementation of the norms have to be compliant with the regulations. Since October 2010, Bharat stage III norms have been enforced across the country. In 13 major cities, Bharat stage IV emission norms are in place since April 2010. The phasing out of 2 stroke engine for two wheelers, the stoppage of production of various old model cars & introduction of electronic controls have been due to the regulations related to vehicular emissions.

Road accidents claim a staggeringly high number of lives every year. From drunk driving, rash driving and driver distraction to visual impairment, over speeding and over-crowding of vehicles, the majority of road accidents occur because of some fault or the other of the driver/occupants of the vehicle. According to the report on "Road Accidents in India, 2011" by the Ministry of Transport and Highways, Government of India, approximately every 11th person out of 100,000 died in a road accident and further, every 37th person was injured in one, making it an alarming situation for a completely unnecessary cause of death.

The above survey also concluded that in 77.5 percent of the cases, the driver of the vehicle was at fault. The situation makes it a necessity to target the root cause of road accidents in order to avoid them. While car manufacturers include a system for avoiding damages to the driver and the vehicle, no real steps have been taken to actually avoid accidents. "Road Accident Prevention Unit" is a step forward in this stead. This design 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. When an alert situation is detected, the system informs the driver and tries to alert him. If the driver does not respond within a stipulated time, the system turns on a distress signal outside the vehicle to inform nearby drivers and sends a text message to the driver's next of kin about the situation. A marketable design would also shut down power to the vehicle, thus providing maximum probability for avoiding road accidents and extending a crucial window for preventive and mitigation measures to be taken.

III. PROPOSED SYSTEM

1. Accelerometer Sensor

The ADXL335 is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. The product measures acceleration with a minimum full-scale range of ±3 *g*. It can measure the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration.

This accelerometer sensor can detect the tilt in all three axes and accordingly generate a corresponding analog output voltage. The generated analog output is converted into 10 bit digital output which is compared with the reference voltage mentioned in the datasheet of accelerometer. It helps to detect the direction of the motion (+x,-x, +y,-y) and accordingly a 4 bit data from microcontroller is sent to encoder. At the receiving end the data received by the decoder is sent to microcontroller. The data received is compared and the direction is detected using the programmed logic.

They are typically used in mobile devices, gaming systems, disk drive protection, image stabilization, sports and health device applications

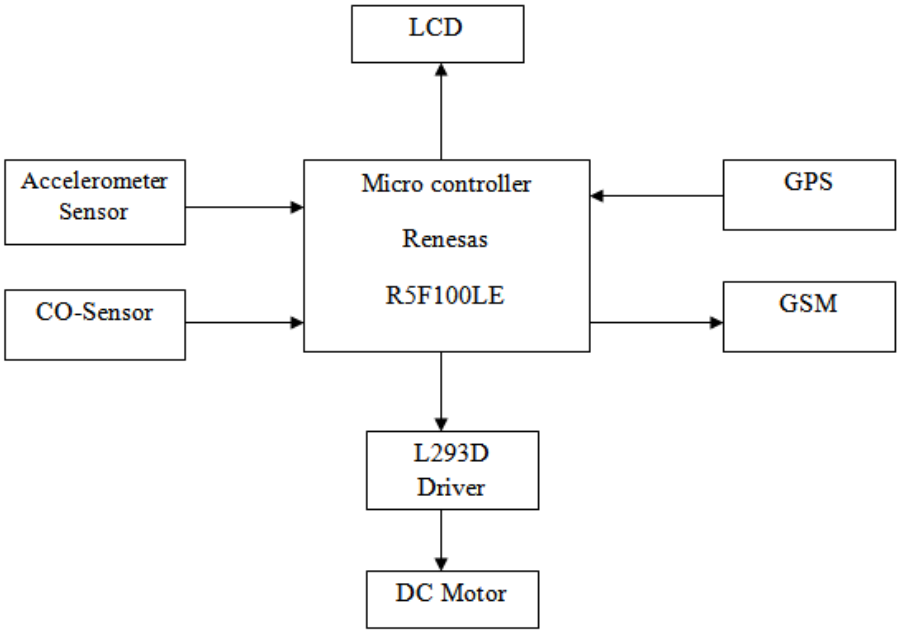

Fig 3.1 Bloch diagram

2. Alpha-numeric LCD display

A **liquid crystal display** (**LCD**) is a flat panel display, electronic visual display, based on on Liquid Crystal Technology. A liquid crystal display consists of an array of tiny segments (called pixels) that can be manipulated to present information. Liquid crystals do not emit light directly instead they use light modulating techniques.

3. Global Position System for Mobiles (GSM)

Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication. GSM is the name of a standardization group established in 1982 to create a common European mobile telephone standard that would formulate specifications for a pan-European mobile cellular radio system operating at 900 MHz. It is estimated that many countries outside of Europe will join the GSM partnership.

4. Global positioning system (GPS)

GPS-634R" is a highly integrated smart GPS module with a ceramic GPS patch antenna. The module is with 51 channel acquisition engine and 14 channel track engine, which is capable of receiving signals from up to 65 GPS satellites and transferring them into the precise position and timing information that can be read over either UART port or RS232 serial port. Small size and high end GPS functionality are at lower power consumption, both of the LVTTL-level and RS232 signal interface are provided on the interface connector.

5. Microcontroller

In this paper, Renesas R5F100LE controller is used, which is an 16 bit advanced microcontroller. Here microcontroller is programmed to do two functions. In first case to detect the emission level if the level exceeded beyond predefined valve, controller sends vehicle information through GSM. Smoke sensor is used to detect the emission level.

In second case controller detects the rash driving with the help of accelerometer sensor. These sensors are fixed to accelerator and brake of the vehicle. Here the speed of the vehicle is considered to detect rash driving. The variation of the accelerator and brake is sensed by the accelerometer sensors.

In first case; apply the accelerator to its maximum position & keep on continue in same position for some time, controller send a massage as rash driving through GSM. And also sends the location of the vehicles. In second case; if we apply the accelerator to its maximum position continuously for four times controller again send a message as rash driving through GSM

6. Smoke sensor

The detector consists of three sub-blocks namely smoke sensor, transducer and ADC. The smoke sensor is the main component of the detector block which is embedded onto the exhaust of the vehicle. The sensor senses the amount of emission from the vehicle and feeds the data to the microcontroller through the transducer and the analog to digital converter at regular intervals of time. The transducer is used to convert the output of the sensor into an electrical signal. The analog electrical signal is then converted into a digital signal using an ADC, so that, it can be compared with the predefined values, in the microcontroller.

In this paper, carbon monoxide sensor (MQ-7) which can measure CO concentrations ranging from 10 to 10,000 ppm is considered. This sensor, basically finds usage in sensing carbon monoxide concentrations (ppm), in the exhaust of cars as shown in figure.3.3 and gives an analog output. The MQ-7 gas sensor is mainly made up of SnO2, whose conductivity varies with the cleanliness of air i.e. it has a lower conductivity in clean air and vice versa.

IV. CONCLUSION

This whole paper mainly focuses on two things. The First thing is the concept of detecting the level of Pollution and indicating it to the driver. There is an increase in the level of Pollution over the last couple of decades, leading to several Environmental problems. There will be a huge population, who do not take the pollution from their vehicles seriously, which has already resulted in several environmental problems such Ozone layer depletion and so on. So, this system will be highly beneficial is curbing this problem. The second thing is the concept of avoiding rash driving by monitoring the driving status of the vehicle. As we know that rash driving is the main reason for accidents. So this system will be more helpful to provide public safety. This system will be one of the greatest improvements in technology to keep the Environment free from vehicular emission and bring it to a halt if the Pollution level is more than the Standards mentioned by the Government. This will make it easier to employ this system in the existing vehicles.

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