

DESIGN AND DEVELOPMENT OF VEHICLE DRIVING SAFETY SYSTEM USING MICROCONTROLLER

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ABSTRACT

Roads are biggest source of interconnectivity within country and across and inter-county cooperation can give them international dimensions too. They are basis of providing connectivity to all. However, if safety is elapsd there individuals have face lethal costs. All should understand that while walking or driving on roads. With the increase in concerns on road safety, awareness programs, not only by Government but Non-Government organization are being carried out for increasing awareness among public to realize their responsibility in traffic. As is needless to say; a majority of accidents, which occur, are due to drunk driving. In the past decade, the number of motor vehicles in developing countries is increasing a lot. Official investigation reports of traffic accidents pointed out that dangerous driving behavior, such as drunk and drowsy driving, account for a high proportion among all the accident causes. In order to avoid these kinds of unexpected accidents, it is necessary to develop an appropriate in-vehicle system with warning modules that can directly improve driving safety.

Keywords: DDL, BAL

NATIONAL LEGISLATION

India has the second largest road networks in the world and accounts for 10% of worldwide road fatalities. Laws regulating the traffic on the road are provided under the Motor Vehicles Act, 1988 is an Act passed by the Parliament of India which came into force from July 1, 1989 and is applicable to whole of India. However lapses in traffic laws regulations, violations and accidents are glaring reality. India was having such enactment in place since the year 1914 but the menace of driving is still on and victims look upon the suitability of laws to curb such menace. Various important judgments are there reflecting upon concerns on road safety issue some of the important ones are discussed herein. Road accidents, traffic jams, road rage, under-age driving, driving under the influence of alcohol are some of the prime issues which essentially makes it important to reflect upon the current situations. Driving sensibly is a responsibility-legal, social and moral, however rarely seen. Omission of this duty can bring the irresponsible driver, owner of the vehicle, insurer and others not life only in a legal battle but huge pain and sufferings for victim and his family members suffering for.

POWER TO REVOKE LICENSE

Licensing authority has power to revoke the license of medically unfit person. Automatic suspension of license by a person who has caused death or grievous hurt of one or more persons. The person should not suffer from any disability. The Registering authority has power to cancel the registration of vehicle that is lost, destroyed or has been permanently rendered incapable for use. If the engine number or chassis number differ from RC, then also registering authority can cancel the registration.

CONDITIONS UNDER WHICH LICENSING AUTHORITY CAN REVOKE A LICENSE

1. Habitual Criminal
2. Drunkard
3. Addicted to Narcotic Drugs and Psychotropic substances
4. Has used or is using a motor vehicle in commissioning of offence
5. Any fraud or misrepresentation in obtaining the DL
6. Driving to cause danger to public on the basis of previous conduct
7. A person under the age of 18 years who has been granted the learner's license is at present not under the care of such guardian.

The Drunken Driving Law in India states that if a person while driving a motor vehicle, has a Blood Alcohol Level (BAL) exceeding 30 mg of intake per 100 ml of blood which is detected with the help of a Breathalyzer, that particular offender, whether he or she shall be punishable for the first offence with imprisonment for a term which may extend to six months, or with fine which may extend to two thousand rupees, or with both; and if the same offence is repeated within a time span of three years the a fine of three thousand or imprisonment for a period of two year, or both may be given.

The new rule makes it clear that no driver or passenger will consume alcohol or a prohibited substance while the vehicle is parked or in motion. Similarly, smoking in a vehicle in public place would be prohibited. For the first time, the rules have also fixed the accountability of pedestrians and cyclists and laid down that they too would have to adhere to the rules. Impairment by alcohol is an important factor in causing accidents and it has been found as per study reflected on different websites that alcohol was present in between 33% and 69% of fatally injured drivers, and in between 8% and 29% of drivers involved in crashes who were not fatally injured. Surveys carried out on the road accident reveal that risk on teenage driver is five times more compared with drivers aged above 30 years. Drivers consuming alcohol put not only their life but pedestrian and two wheelers at risk. India is committed in reduction of road accidents by 50% up to year 2020 as India is also a party in Brasilia Declaration.

As the driving regulations, formulated by the central government under Section 118 of the Motor Vehicles Act 1998, were framed way back in 1989, a need to amend them was felt since much has changed in the nature and composition of traffic, and the relevant infrastructure and technology.

MOTOR VEHICLE (AMENDMENT) BILL 2016

Cabinet approves Motor Vehicle (Amendment) Bill 2016 on 3rd August 2016, a historical step towards making roads safe and save lakhs of innocent lives. The important provisions include increase in compensation for Hit & Run cases from Rs. 25000/- to Rs. 2 lakhs. In case of accidents mortalities there is a provision for compensation up to Rs. 10 Lakh. In the area of road safety, bill proposes to increase penalties to act as deterrent against traffic violations. Stricter actions are being suggested for drunken driving, juvenile driving, rash driving etc. On violation of safety regulation provision of heavy penalty is proposed.

Alcohol sensors are the major devices which can be used in vehicles for safety which estimate the blood alcohol and shut down the engine if blood alcohol is found more than legal drinking limit, either breath based or touch based sensors can be deployed in automobiles. The breath based sensor measures quantity of alcohol molecules in breath whereas touch based sensor uses near-infrared tissue spectroscopy for alcohol in blood of person.

HOW DOES BREATHALYZER WORKS

The alcohol concentration is measured using air from the lungs or venous blood. They estimate BAC indirectly by measuring the amount of alcohol in one's breath in accordance to Henry's law fig. 1.1 shows schematic of the processes.

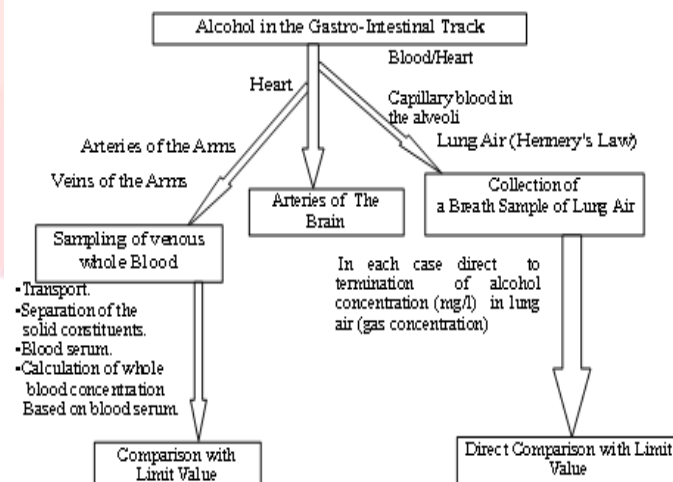


Figure 1 breath alcohol concentration

INFERENCES DRAWN OUT OF THE LITERATURE REVIEW

Following inference have been drawn after going through the numerous literatures:

- i. Monitoring and detecting the driver's behaviour to ensure road safety is important because road accidents take place very often. It is noteworthy that driver conduct must monitored which bring control over accidents due to drunken driving.
- ii. Driver seat belt usage assurance is very helpful in safe driving of vehicle.

- iii. In highly efficient mobile phone based drunk driving detection system, the mobile phone, which is placed in the vehicle, collects and analyses the data from its accelerometer and orientation sensor to detect any abnormal or dangerous driving manoeuvres typically related to driving under alcohol influence.
- iv. During the collision of vehicle, SMS to ambulance, police station and relative are best option to save the life of driver along with passenger in vehicle.
- v. Driver drowsiness detection system will be very much useful for the drivers, especially who are travelling long distances and another future concept is "Heart rate & BP Detection System" which will be an important safety system for diabetics or BP patients to get help in an emergency situation from the co passenger. It will be a lifesaving system in the future.

SCOPE OF WORK

Based on the exhaustive literature review and the inferences drawn out of the literature, following are the salient features which formulate the scope of the work:

- i. Microcontroller based system can be integrated into the automobile for security and safety of human resource and how human error can be overcome by the technology.
- ii. An efficient driver safety system can be designed that could ensure seat belt usage by the driver and keep a check on his blood alcohol level and inhibit the operation of the vehicle if the latter is above the threshold level.
- iii. "Driver Drowsiness Detection System" can be developed which will be very much useful for the drivers, especially who are travelling long distances and another future concept is "Heart rate & BP Detection System" which will be an important safety system for diabetics or BP patients to get help in an emergency situation from the co passenger. It will be a lifesaving system in the future.
- iv. Arduino can be used to implement different types of sensors to increase the Safety and Security in Automobiles and it will be cost effective also.

PROBLEM FORMULATION

- i. The System is integrated for safety of driver and vehicle.
- ii. Infrared breath analyser is used for sensing alcohol content in the body of driver
- iii. Infrared breath analyser is suitably placed on steering. Infrared energy passed through sample and unabsorbed energy is measured at other end. Higher absorption is noticed in case of high level of alcohol.
- iv. Constant monitoring level of blood alcohol is observed and when it exceeds a particular limit, then the fuel supply will be automatically cut off along with an alarm is sounded depending upon the requirement.
- v. Location of the vehicle is monitored by GPS and SMS is send in case required to neared police control room and alert messages can be sent of concerned persons.
- vi. Cases of drunk driving will be reduced by integrating such a system in vehicles.

OVERVIEW OF SYSTEM

- i. The system is proposed with intent to prevent accidents due to drunk driving and notify nearest official so that appropriate legal action may be taken.
- ii. In case of emergency or accident the system is helpful as messages are automatically sent to ambulance, police control room and family members.
- iii. Block diagram show overview of the proposed system.
- iv. System consist of microcontroller, sensors, GSM, GPS modules, LCD etc., which are integrated using embedded 'C'
- v. There are two different case which are addressed:

Case 1: When driver has drunk he tries to start vehicle alcohol is detected then signal is passed to microcontroller and car ignition will be stop immediately. As a consequence this averts driver from driving and vehicle is at zero speed.

Case 2: in the second case it is assumed that vehicle is running and driver consumes alcohol which is detected but it would not be possible to stop ignition as probabilities of accident are increase. In this case SMS to authorities will be sent and fuel supply will be cut so that driver has time to park the vehicle.

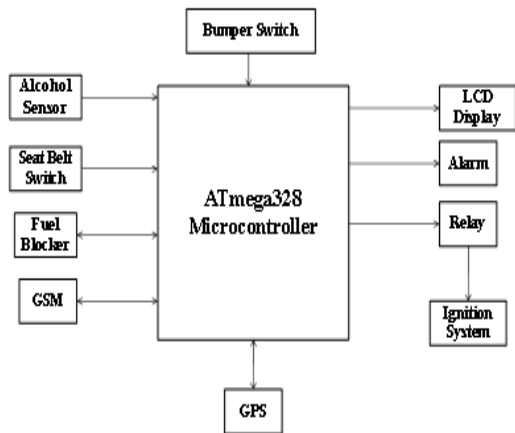


Figure 2. Proposed system

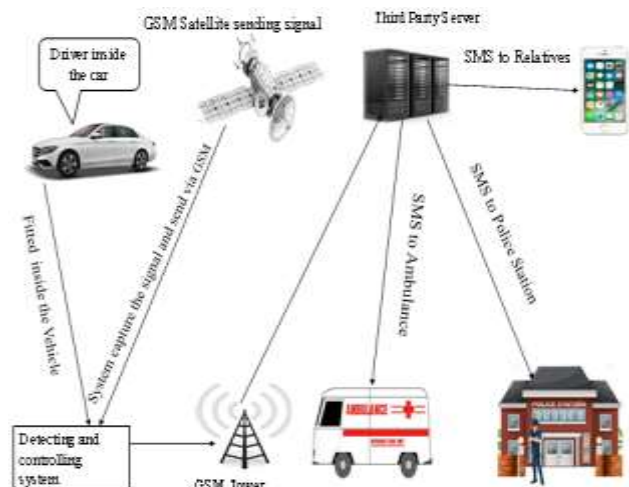


Figure 3. proposed system architecture

METHODOLOGY

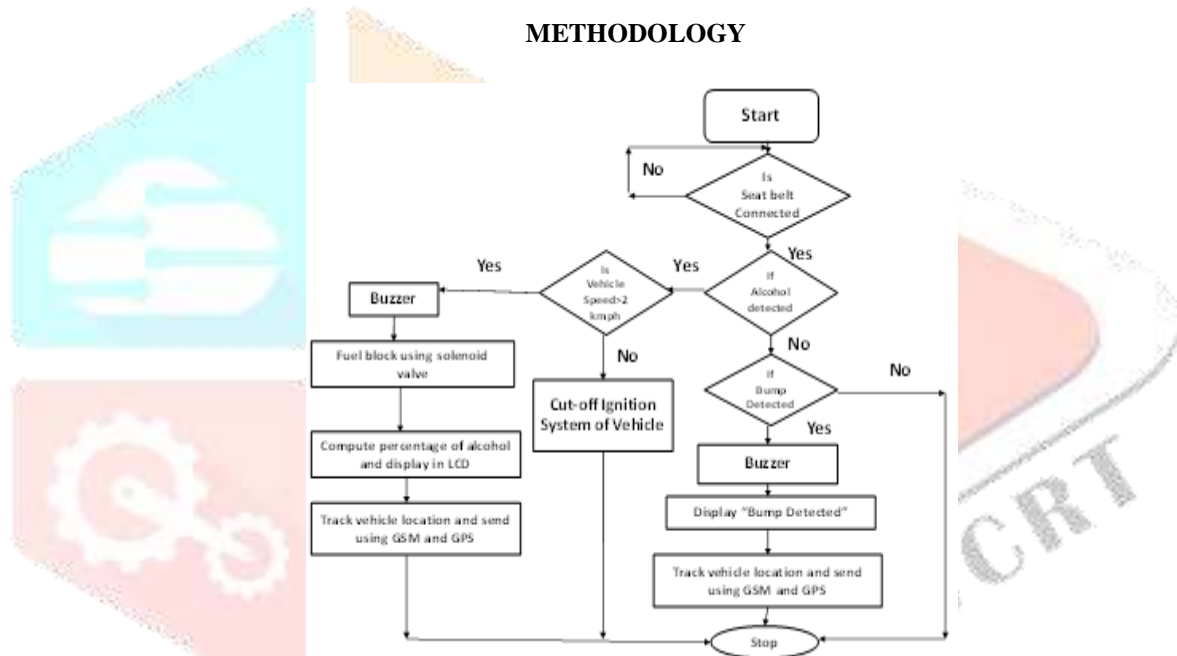


Figure 4.1 flow chart of methodology for carrying out the proposed work

STEPS INVOLVED IN METHODOLOGY

- Checking seat belt switch, if it is ON then power supply to system otherwise power supply is OFF.
- When driver starting car/vehicle then alcohol sensor start sensing at condition vehicle speed equal to zero.
- If alcoholic driver detected then immediately ignition system will turn off along with SMS about detection is send to relevant of driver for notification and notification will be displayed on LCD with alarm.
- A flag is set when first condition is passed without detection of alcohol.
- When speed of vehicle is greater than zero. i.e. vehicle started to driving then again along with alcohol sensor ,bumper sensor start to sense collected parameter values are send to microcontroller.
- If alcohol detected in this case then signal is send to fuel blocker by microcontroller for blocking fuel supply to ignition system. So driver feel's that vehicle is going to stop and then place car at appropriate location. At the same time SMS with current location of vehicle, vehicle number and detected information send to relative of driver and police station.
- If bumper switch is ON then it is detected as collision then signal is send to fuel blocker by microcontroller for blocking fuel supply to ignition system. At the same time SMS with current location of vehicle, vehicle number and detected information send to relative of driver, ambulance and police station.
- In other hand, when ambulance, police station received message then they will track car to identify driver.

ALGORITHM STRATEGIES TO BE USED FOR PROPOSED SYSTEM

Step1. Checking seat belt switch, if it is ON then power supply to system otherwise it is OFF.

Step 2. Starting vehicle by driver.

Step 3. Check speed of car.

Step 4. If it is zero then start sensing by various sensors & notifies their detection .In this case alcohol is mainly checked if it detected then stop ignition.

Step 5. If speed is greater than 2 kmph then again sensing started. Detection of various parameters will be sense by sensor & will be notify.

Step 6. At a same time if alcohol is detected then fuel supply will blocked. SMS is send to relative along with the location of vehicle.

Step 7.If bumper sensor is sensing impact then fuel supply will block. SMS is send to relative, police station and ambulance along with the location of vehicle.

CONCLUSION

After carrying out the proposed work, the investigator anticipates the following outcomes:

- A smart apparatus for ensuring seat belt usage will be designed.
- Alcoholic sensor will check blood alcohol concentration.
- Bumper sensor will help in saving driver life during vehicle collision along with designed system by sending SMS to ambulance, police station and relative.
- This system will control vehicle accident and make driving more safe which helps in saving the life.

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