Drunken Drive Protection System

J.Vijay, B.Saritha, B.Priyadharshini, S.Deepeka, R.Laxmi

Abstract— Nowadays almost most of the countries are forcing the motor riders to wear the helmet and not to use the vehicles when the person is in drunken condition. But still in many places, the rules are being violated by the users. In order to overcome this problem, an intelligent system has been embedded in the helmet itself. The signal detected by IR sensor from the earlobe region and an alcohol sensor will be transmitted to the vehicle control circuit. It will not turn on the vehicle, when the user is without helmet or in drunken condition. The system containing the GPS receiver will provide the geometric coordinates to the control unit. Based on this coordinates the user cannot drive the vehicle into no entry or no parking areas. If he enters into the restricted area, buzzer will get activated and vehicle speed also gets controlled. In addition to the above, when an accident occurs the system will start alarm and if the user tries to suppress the warning alarm then SMS will not be sent else it will be sent to the user's relatives/friends. This contact information coded in the system can also be modified as per the users need. During the theft, the current location of the vehicle can be identified by sending the message from the user to the intelligent incorporated system. By this way the recovery of the vehicle is also possible by GPS-GSM communication.

Index Terms— Accident, Drunken Driving, Helmet, Intelligent system, Safety, Sensor, Vehicle

1 INTRODUCTION

Now a day's road accident is a major problem all over the world. The recent report says [1] that annual average of 700,000 road accidents, 10 percentages occur in India which has overtaken China. The latest annual statistics revealed by the World Health organisation (WHO) in its first Global status report on road safety, 80,000 people are killed on Indian roads due to speeding, drunken driving, less usage of helmets, seat belts and child restraints in vehicles. Another latest report of National Crime Records Bureau or NCRB [2] says that 40 people under the age of 25 die in road accidents all around the world. It states that the drunken driving is a major factor for the rising of death on roads. The drunk driving fatalities in the year 2009, till the 27th November were 11,769. The numbers for 2007 and 2008 were 12,998 and 11,773 respectively. It shows that the problem of drunk driving is far from over. In the 2009 DUI national statistics released by the NHTSA (National Highway Traffic Safety Administration) 11,773 people died in alcohol-related crashes. Most of the accidents occur outside the cities are due to drunken driving and no testing methodology is adopted to avoid these fatalities in highways. Motorists parking their vehicles in "No-parking" areas increase the rate of traffic in the metropolitan cities. In Indian road system, widening of the road is not an alternative solution to avoid traffic in such a cities [3]. The Statistics of law breakers is depicted below in Table1.

Table 1
Statistics of lawbreakers

Law breakers	Two wheelers	Four wheelers
Signal jumping	2,20,859	1,46,945
Drunken Driving	36,727	17,237

2. EXISTING METHODOLOGY

Sweat sensors [4], Saab Alco Key [5], straw like tube on the driver seat [6] are used to check drunken condition of the drivers in cars. But these devices lead to misreading, inaccurate testing and circuit complexity is high. Hongjie Leng and Yingzi Lin [7] developed a novel carbon nanotube (CNT)-based alcohol sensor with a particular focus on the response delay problem presented in CNT based sensors. William R. Reagen [8] developed a system for locating missing vehicles. Shegeyuki Kojima et al [9] designed a new algorithm to distinguish between the normal and intoxicated state of a person which is proposed as the basic theory of the sensing system. The entire solution requires only a mobile phone placed in vehicle and with accelerometer and orientation sensor. A program installed on the mobile phone computes accelerations based on sensor readings, and compares them with typical drunk driving patterns extracted from real driving tests. Jiangpeng Dai et al [10] focused on drunken driving, or officially driving under the Influence (DUI) of alcohol, which is a major cause of traffic accidents throughout the world. Lei Wang et al [11] suggested that the integrity of PPG signal and accuracy of heart rate detection were evaluated and the results showed that with adequate optical shielding and the proposed passive motion cancellation, the device was able to reliably detect heart rate both during rest and moderate exercise. Aditya et al [12] suggested that biometrics can be used in the security mechanism for the motor vehicles, as an anti theft device.

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Darnell et al [13] invention comprises a portable locating unit to provide location information signals. Heng et al [14] suggested compulsory helmet laws for bicyclists and expanding anti-drunk driving campaigns to target alcohol-intoxicated bicyclists. Alex Tay et al [15] presented a path-planning algorithm and a novel global navigation strategy for autonomous unmanned ground vehicles in an unstructured terrain. It is able to chart a path along roadways and off-road terrain. From this review, each and every paper gives only a particular application to provide a safety to the drivers. To overcome the major problems on road accidents and drunken driving, we designed an intelligent system in the vehicle to avoid drunken driving. In addition to this, we have adopted few more applicatoins to avoid parking of vehicles in No parking/ No entry area The features incorporated in our system are 1) Confirmation of helmet wearing 2) Alcohol detection 3) No entry/ No parking indication 4) Accident intimation and 5) Theft detection

3. MATERIALS AND METHODS

This paper mainly focuses on avoidance of drunken driving. Hence this system will not turn on the vehicle, when the user is in drunken condition. In addition to this, it will not allow the user to park/ drive the vehicle in the no parking or no entry area respectively. The system will send short message service to the friends/relatives when an accident occurs. It also employs theft detection. Our system consists of two major parts. They are 1) Helmet unit and 2) Vehicle unit as shown in fig.1 & 2.

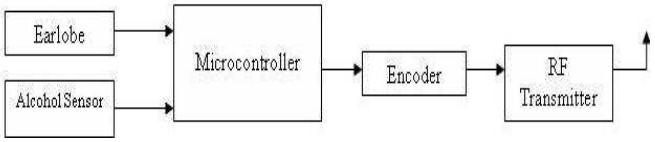

Fig.1 Helmet Unit

3.1 Confirmation of helmet wearing & alcohol detection

MQ-3 gas sensor (alcohol sensor) is suitable for detecting alcohol content from the breath. So it can be placed just below the face shield and above the additional face protection. The surface of the sensor is sensitve to various alcoholic concentrations. It detects the alcohol from the rider's breath; the resistance value drops leads to change in voltage (Temperature variation occurs).Generally the illegal consumption of alcohol during driving is 0.08mg/L as per the government act. But for demonstration purpose, we programmed the threshold limit as 0.04 mg/L. Threshold can be adjusted using variable resistor. Earlobe detector senses which is fitted with the helmet unit senses the blood flow in the earlobe region. So that the wearing of helmet is confirmed by our system and similarly alcohol sensor fitted in the mouth piece of the helmet detects the alcohol in the breath and sends the level of alcohol to the

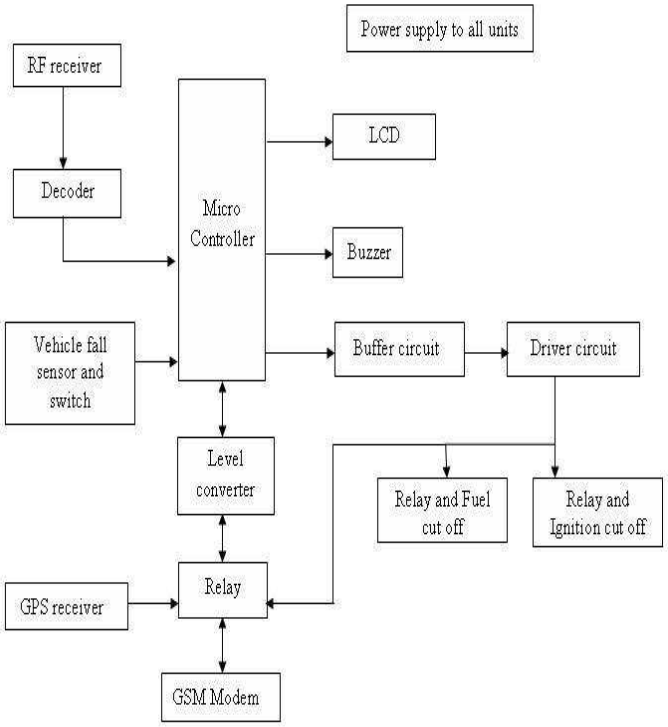

Fig. 2 Vehicle Unit

controller. If both of the criteria's are met in an acceptable manner then the two control signals are sent from the helmet unit to the vehicle control unit. The decoded RF signal is sent to the controller in the vehicle unit shown in fig. 2 to start / stop the vehicle. If the signal from the earlobe region and no control signal from alcohol sensor is detected then the vehicle will start, otherwise the vehicle will not start.

3.2 No entry/No parking indication

The Global Positioning System (GPS) is a space-based global navigation satellite system that provides reliable location and time information in all weather and at all times and anywhere on or near the Earth. For each and every location in the world, the coordinates are unique. Co-ordinates are measured using GPS receiver which consists of an antenna array. Our system uses GPS for accident detection and theft detection applications. For our system convenience, we have considered some locations as "No entry & No parking" area in our college is depicted in the fig.3. After placing the receiver in a particular position where we need to take co-ordinates, the satellite begins transmitting a long, digital pattern called a pseudo-random code. The receiver begins running the same digital pattern. When the satellite's signal reaches the receiver, its transmission of the pattern will lag a bit behind the receiver's playing of the pattern. The length of the delay is equal to the

signal's travel time. The receiver multiplies this time by the speed of light to determine how far the signal is traveled. In order to make this measurement, the receiver and satellite clocks need to be synchronized down to the nanosecond. To make a satellite positioning system using only synchronized

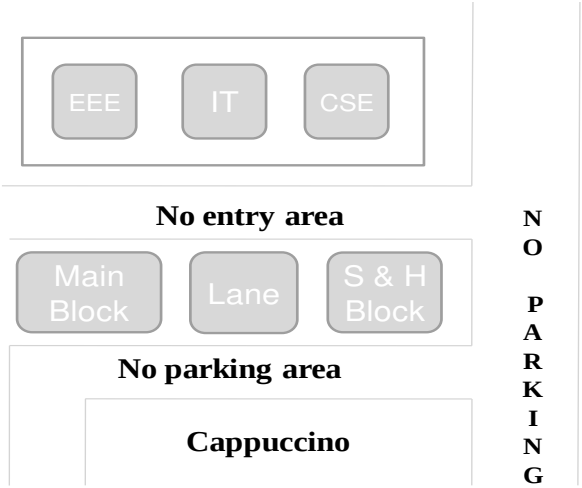

Fig. 3 Layout considered in our college

clocks, you would need to have atomic clocks not only on all the satellites, but also in the receiver side. Thus every satellite contains an expensive atomic clock, but the receiver itself uses an ordinary quartz clock, which it constantly resets. Coordinates vary for every 6 feet, but there is no much difference between them. Hence we have considered a particular distance of about 24feet in each road periodically and the coordinates are measured. The following tables represent the GPS Readings taken in our college campus for the "No entry & No parking" area.

Table 2
No parking area coordinates (Ground road)

Feet (24ft)	North	Equator
1	1024.9373t	7754.09
2	1024.9451t	7754.09
3	1024.9482t	7754.09
4	1024.9501t	7754.09
5	1024.9545t	7754.09
6	1024.9573t	7754.09
7	1024.9674t	7754.10
8	1024 .9677t	7754.10
9	1024.9755t	7754.10
10	1024.9760t	7754.10

Table 3
No entry area coordinates (CS-IT block)

Feet (24ft)	North	Equator
1	1024.9878t	7754.10
2	1024.9880t	7754.09
3	1024.9882t	7754.09
4	1024.9898t	7754.09
5	1024.9899t	7754.08
6	1024.9888t	7754.08
7	1024.9877t	7754.08
8	1024.9849t	7754.07
9	1024.9840t	7754.07
10	1024 .9863t	7754.07

For making this application globally acceptable, we can use geographical software which contains unique coordinates and it can be used for various applications. These coordinates can be programmed in the microcontroller. When the vehicle enters the no parking and no entry area, coordinates will be calibrated. In the case of similar result, buzzer will be activated and if he/she continues to move so, fuel and ignition cut-off takes place.

Table 4
No parking area coordinates (Canteen road)

Feet (24ft)	North	Equator
1	1024.9377t	7754.09
2	1024.9376t	7754.08
3	1024.9373t	7754.08
4	1024.9378t	7754.08
5	1024.9387t	7754.08
6	1024.9391t	7754.08
7	1024.9407t	7754.07
8	1024.9406t	7754.07
9	1024.9413t	7754.07
10	1024 .9414t	7754.06

3.3 Accident intimation & Theft detection

GSM is used in the case of accident detection and theft detection application. In case of any accident the alarm will get activated, if the rider is in conscious stage he would suppress the alarm; if not a short message service will be sent to the friend's mobile number. Various mobile numbers can be programmed in the microcontroller.GSM and GPS do not communicate directly with each other. Microcontroller acts as an intermediate between them. To know the location of the vehicle soon after the theft, rider has to send an SMS to the modem present in the vehicle unit. GSM set up in the vehicle unit consists of subscribers identity module (SIM) whereby it rece

ives the SMS and communicates with GPS regarding the current location of the vehicle position and sends the message to the pre defined mobile number(s) programmed in the microcontroller. For the detection of accident, the sensor is attached to the body of the vehicle. When the vehicle meets any crashes, the buzzer will get activated due to activation / damage of the sensor. If the rider is in conscious condition, he/ she can suppress the buzzer. Otherwise the message will be sent to the friends/relatives continuously till the help reaches the rider.The overall performance of the system is shown in fig. 4.

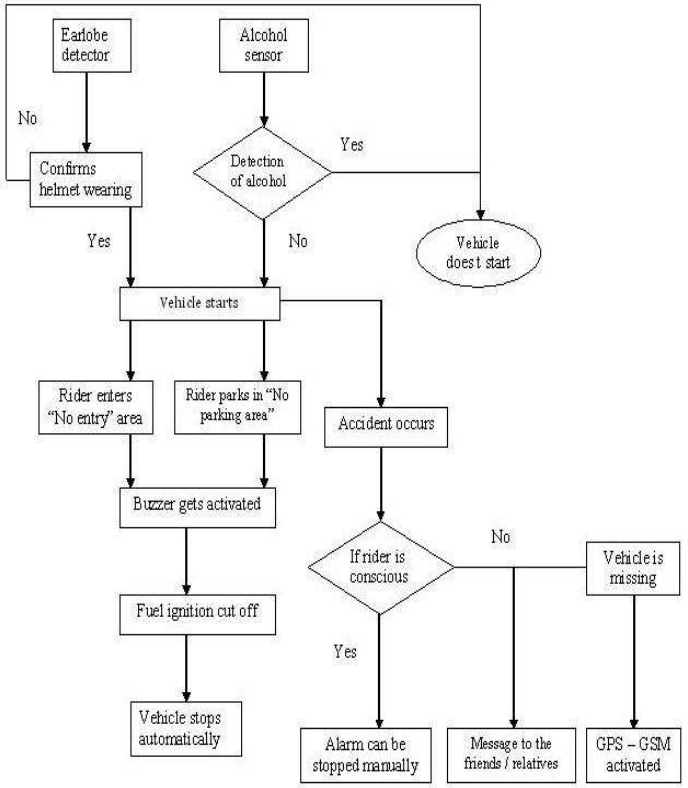

Fig. 4 Overall Sytem performance

4. Conclusion & Future work

Our system efficiently checks the wearing of helmet and drunken driving. By implementing this system a safe two wheeler journey is possible which would decrease the head injuries during accidents and also reduce the accident rate due to drunken driving. This system also indicates No parking area which would reduce the crowd of the vehicle in those areas. No entry area is mainly allocated during the construction or repairing of the road, if the rider enters in such area this system would immediately intimate as "No entry area" and vehicle will stop automatically. In case of any accident it would send the messages to the friends continuously about the location of the accident happened till the first aid reaches the rider. Our system helps to know the location of the vehicle for rescuing in the case of theft incidents.

In future we planned to fabricate our intelligent system in a compact size and as well as globally acceptable to notify the No entry and No parking areas. Government must enforce laws to install such system in every two wheeler. By implementing such mechanism in two wheelers, the deaths due to drunken driving and other road fatalities can be brought to zero percent.

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