

## TACKLING DRUNKEN DRIVING BY EFFICIENT METHODS THROUGH IR SPECTROSCOPY AND SENSORS

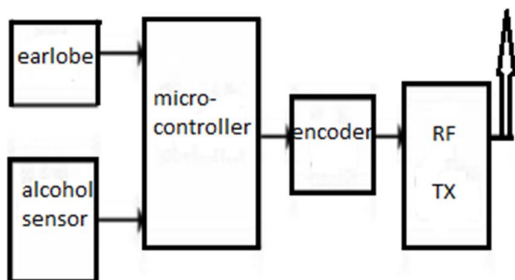
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**Abstract** - Now a day's road accident is a major problem all over the world. The recent report says [1] that annual average of 700,000 road accidents, 10 percentages occur in India which has overtaken China. The latest annual statistics revealed by the (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 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. From these data, we can easily come to the conclusion that designing an efficient system to prevent drunk driving is of paramount importance. Till date, there are no systems, which are practically implementable. This new system can be easily fixed in existing vehicles and is very cost effective.

### 1. 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 en- try area respectively. The system will send short message ser- vice 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



### 2. 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

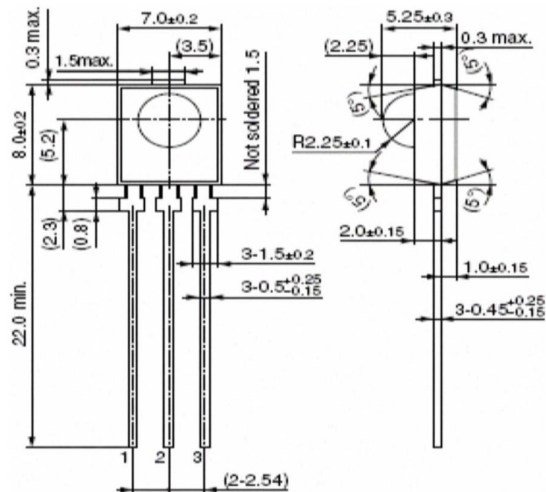
face protection. The surface of the sensor is sensitive to various alcoholic concentrations. It detects the alcohol from the rider's breath; the resistance value drops leads to change in voltage (Temperature variation occurs). Generally the illegal consumption of alcohol during driving is 0.08mg/L as 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 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. ACCIDENT INTIMATION AND THEFT DETECTION

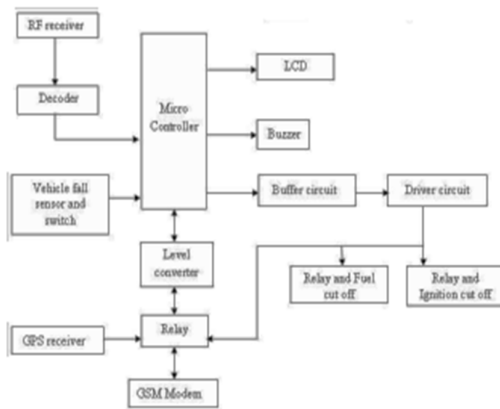
GSM is used in the case of accident detection and theft detection application. In case of any accident the alarm will get activated, if the rider is in conscious stage he would suppress the alarm; if not a short message service will be sent to the friend's mobile number. Various mobile numbers can be 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 receives the SMS and communicates with GPS regarding the cur- rent 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.

### 4. INFRARED SPECTROSCOPY

The Infrared portion of the electromagnetic spectrum is divided into three regions; the near-, mid- and far-infrared, named for their relation to the visible spectrum [3]. The far-infrared, approximately 400-10 cm-1(1000-30



microm), lying adjacent to the microwave region, has low energy and may be used for rotational spectroscopy. The mid-infrared, approximately  $4000\text{-}400\text{ cm}^{-1}$  ( $30\text{-}1.4\ \mu\text{m}$ ) may be used to study the fundamental vibrations and associated rotational-vibration structure.



Infrared spectroscopy exploits the fact that molecules have specific frequencies at which they rotate or vibrate corresponding to discrete energy levels. These resonant frequencies are determined by the shape of the molecular potential energy surfaces, the masses of the atoms and, by the associated vibronic coupling. In order for a vibration mode in a molecule to be IR active, it must be associated with changes in the permanent dipole. In particular, in the Born-Oppenheimer and harmonic approximations, i.e. when a harmonic oscillator in the neighbourhood of the equilibrium molecular geometry can approximate the molecular Hamiltonian corresponding to the electronic ground state, the resonant frequencies are determined by the normal modes corresponding to the molecular electronic ground state potential energy surface. Nevertheless, the resonant frequencies can be in a first approach related to the strength of the bond, and the mass of the atoms at either end of it. Thus, the frequency of the vibrations can be associated with a particular bond type.

## 5. IR TRANSMITTER AND RECEIVER

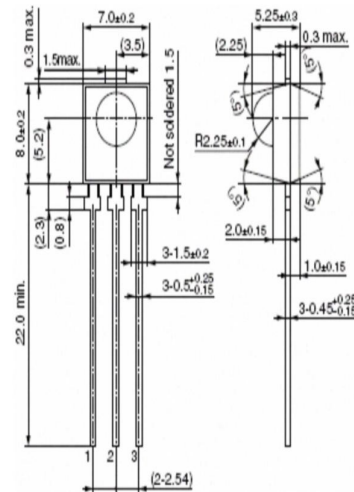
The infrared transmitter LD271H is a GaAs infrared emitting diode, fabricated in a liquid phase epitaxial

process [4]. It is highly reliable and has a capability of high pulse handling.

The receiver used here is PNA4602M. It is usually used to absorb the equivalent amount of infrared rays emitted by the transmitter LD271H[4]. The maximum extension distance is 8m or more.

## 6. THE ALTERNATIVE METHOD

Some may argue that cutting off the fuel supply may pose a safety threat. That is because in this case the driver of the vehicle is compelled to bring his vehicle to a stop. So as an alternative, we propose another strategy. In this method, once the alcohol content is detected to be above a particular level, then an alarm is automatically triggered. This alerts the authorities and the passerby and the driver is forced to bring his vehicle to a stop. Ideally, for the normal



vehicles, the second alternative is sufficient. In the case of repeat offenders who are more prone to drunk driving, the more stringent alternative of cutting the fuel supply may be used.

ehicles, the second alternative is sufficient. In the case of repeat offenders who are more prone to drunk driving, the more stringent alternative of cutting the fuel supply may be used.

## 7. THE BIGGEST ADVANTAGE

The advantage of the system is that the driver cannot even tamper with it. Because the fuel supply valve is open only when all the components are working properly and the IR light detected is comparable to the standard value. So, if anyone tampers with it or if the alcohol content is above a particular limit, fuel is not supplied and the vehicle cannot be started.

## 8. FURTHER APPLICATIONS

- 1) To develop a system for speed control and to integrate it with this system.
- 2) To connect a GPS puller so that the position of the vehicle can be monitored round the clock and can be taken as and when needed.
- 3) To integrate it with a biometrics based anti-theft system.
- 4) To implement urban traffic assistant (UTA).

## CONCLUSIONS

The virtues of this project include various features like

- 1) Ingenuity
- 2) Simplicity of design
- 3) Easy implementation

It is completely integrated so that once it is implemented in all vehicles, then it will be impossible for drunk people to drive vehicles without being traced immediately.

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