# Vehicle Security and Rescue Aided System
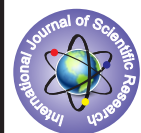
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**ABSTRACT**    Theft attempts and car accidents due to carelessness of drivers are common issues of the hour. Despite the development of many security systems, according to national crime information center loses are in billion because of stolen cars and road accidents. The vehicle security and accident prevention is more challenging. So in order to bring a solution to this problem, an intelligent car security system which include both vehicle security enhancement and accident prevention system can be developed through tracking, locking, and drowsiness and drunk detection. In this paper we review of compare various methods to protect the vehicle from unauthorized access, and develop a system which would contribute to vehicle as well as passenger security.

## 1. Introduction

Now a day's crime rate is increasing day by day and vehicle thefts are on the rise. The vehicle thefts involving mostly cars, which account nearly about a million cars, were reported in the United States of America alone in 2009. Stealing a car has become very simple for the criminals as owners do not bother to take necessary precautions. So, the need of the hour is a better anti-theft-control-system the one that can be implemented by using several technologies like GPS, GSM [3]. Many later models have developed vehicle security systems which provide a reasonable degree of protection. However, as they are mass-produced, a professional thief will know how they operate and how they can be overcome. So it's a known fact that there is an urgent need of developing a system which can reduce the theft in a more convenient manner [5].

During driving, carelessness of the drivers results in accidents. Through statistics it is being revealed that majority of the accidents are caused due to the inefficiency and carelessness of the vehicles. During celebrations, usage of alcohol is common. But driving while consuming alcohol turns celebration into a misfortune. Alcohol reduces concentration and decreases reaction time of a human body. Limbs take more to react to the instructions of brain and hampers vision due to dizziness. Alcohol dampens fear and incites humans to take risks. All these factors while driving cause accidents and many a times it proves fatal. Apart from alcohol many drugs, medicines also affect the skills and concentration necessary for driving. Regarding drowsiness, its really not a intentional doing, but still a person who is going to drive should understand the fact that sleepy Mode is not going to work. Under this context drowsiness detection too have prime importance. In present days most of the vehicles are designed with inbuilt anti-accidents and theft- security-systems. There are several security devices available in the market, which provides protection against thefts. But all these tools are really expensive. An urgent situation has been raised where the conventional methods of vehicle security system should be arranged in a more convenient manner.  So proposed system brings out a cost effective and reliable solution to protect the vehicles from thefts as well as accident control system [4]

## 2. Literature survey of existing systems :

### 2.1 Anti-Theft Systems

A car is always precious to its owner and considers it as a prestige symbol. People do not hesitate to put in their hard earned money to buy the best car. So it is important for the owner to protect and safeguard the car. Currently vehicle robbery cases are higher than any other time. The vehicle thefts involving mostly cars, which account nearly about a million cars, were reported in the United States of America alone in 2016. Stealing a car has become very simple for the criminals as owners do not bother to take necessary precautions. So, the need is a best anti theft system which can be implemented by using several technologies like GPS, GSM systems.

A lot of systems have been developed for recovering the vehicle once it is being stolen .There are mainly two methods of implementing vehicle security, Biometric and Non biometric ways. Non-biometric systems include the use of sensors, keypads and central locking systems for  security where as Biometric systems uses physiological and biological characteristics of an individual like face, voice, finger print for automotive security

Car central locking is one of the popular systems that ensures best guarantee to protect the vehicle from thefts. With the help of a car central locking system user can lock and unlock the car at the press of a button. There are two types of car central locking systems mainly used in automotive industry, automotive central locking system and manual central locking system. Even though it ensures smoother and secured operation, it doesn't prove complete security and accessibility of vehicle.[7]

Traditional automobile security  systems rely on sensors .In this system when thief makes an attempt to unlock the car ,IR sensors which is placed in the car door detects the motion .Micro controller will receive signal from IR sensor and send the triggering signal to GSM module which will make call on user mobile. Then user will press the key on his mobile keypad to activate the security systems. GSM module in car will receive DTMF tone. DTMF decoder will decode the tone and send signal to the controller  which will trigger the relay to activates counter measures such as ignition cutoff, electric shock wind spray etc .These systems are  usually costlier  and once the vehicle is really lost , no more description could be valid to help people to find it back[8]

V Deepika proposed a system to lock and unlock the car using passwords and thereby protecting the vehicle from thefts. The systems deal with protection of vehicle from unauthorized access by giving a secure password and controlling it using GSM technology. A

four digit password is set as default, using a 4x3 matrix keypad. If the entered password matches the default password an SMS is send to owners mobile. On receiving confirmation MCU starts the engine and vehicle move forward. The keypad is programmed in such a way that if the wrong password is detected more than three times the system will automatically immobilizes. [9]. Passwords remain the weakest component of many security systems and it provides lesser accuracy and security even though it is less expensive than other systems.

V.Vinaykumar introduces a two level security system to provide security to vehicle. The system is designed to retrieve the position of vehicle as well as the vehicle thief. The system uses two type of security systems, Face recognition and Radio frequency identification. The system captures the image using camera which will be hidden in the dashboard. A database is created by taking the pictures of all family members. Face detection algorithm is used to detect the face and captured image is compared with images in the database using PCA algorithm. Once the captured face matches with already present database controller will allow user to swipe the RFID card, after swiping if the card matches the person is recognized as authorized and a message is sent to owners mobile that match found otherwise the controller activates the GPS and GSM module and location of vehicle is found out through GPS. This location and image of driver is sent through MMS to the owner. Even though the system is more secure than other systems it has disadvantages of face being Hindered by glasses, long hair, masks; etc.Accuracy is less and user needs to keep the face neutral when picture is being taken.[10]

K Dineshkumar proposed the vehicle security using fingerprint GPS and GSM technology. Finger print technology has wide acceptance since it is highly reliable, Unique Processing speed is fast, and it is an economical biometric technology which requires less memory space, easy to use & user friendly. It is highly secured than other security systems. The proposed system deals with having a first layer of protection of fingerprint recognition with which the lock is opened. The finger print matching is done utilizing the minutiae based fingerprint recognition algorithm. The finger print is placed in a finger print sensor which captures the image of fingerprint .If the finger ridges match, solenoid valve will be opened for fuel supply and also a message is send to the user by using GSM. If finger matches failed, the vehicle gets immobilized and alert message is sent to the mobile number of owner. The seized vehicle is tracked using GPS system [11]

## 2.2. DROWSINESS DETECTION SYSTEMS
Nowadays human becomes so busy that they would not get proper hours sleep. As the number of working hour's increases, number of road accidents also increases. This leads to increasing in damages in properties.[1] EEG is a technique for measuring the electrical activity created by the nerve cells of brain of human. The EEG-action is available all the time and records periodically. Analyzing the behavior of waves drowsiness is detected as in [7] EEG signals are divided into the following frequency bands:

1. Delta (.5 to 4 Hz): Delta waves occur only once in every 2 or 3 seconds. These occurs in deep sleep
2. Theta (4 to 8 Hz): Theta waves occur during emotional stress.
3. Alpha (8 to 13 Hz): During sleep, these Alpha waves disappear
4. Beta (13 to 30 Hz): In case of beta waves There is an intense mental activity, So frequency increases.

Different stages sleeps are as follows:

Stage 1 Sleep
In this stage, Person will be in light sleep and easy to rouse. The EEG shows low and mixed frequency of 2-7 Hz range.

Stage 2 Sleep
In this stage, Person will be in deeper level of sleep. There will be more generation of theta waves .Waves can occur in the range of 12- 14 Hz.

Stage 3 Sleep
Delta waves increase. Person involves in deeper sleep. This contains waves with 2Hz.

Eye blink sensors have Infrared transmitter which emits infrared rays and IR Receiver which is used to receive the IR rays from IR transmitter. Both IR transmitter and receiver should be placed straight line. The IR receiver is then connected with comparator. When interrupt the IR rays between the IR transmitter and receiver, the comparator voltage is higher. This voltage is given to micro controller and buzzer produces alarm [6].

Steering Wheel Movement (SWM) measured using steering angle sensor mounted on the steering column. When drowsy, the number of micro-corrections on the steering wheel decreases when compared to normal driving. They can function only at particular environments. They also depend on the geometric characteristics of the road and the kinetic characteristics of the vehicle [7] .

Drowsiness detection using image processing involves the detection of face. One of the face detection algorithm is proposed by Viola and Jones can be used as it is effective [4]. The face detection algorithm extracts Haar features of a human face. When one of the features is found, the algorithm moves to next stage of detection. A rectangular section of image of the driver is called a sub-window. If eye blink is observed continuously drowsiness can be detected by the algorithm.[2].

### 2.3. Alcohol Detection Systems
India had earned the strange distinction of having more number of fatalities due to road accidents in the world. Road safety is emerging as a major social concern around the world especially in India. Drunken driving will emerge as one of the most significant problems in the near future [5]. The proposed system aims at reducing the road accidents in the near future due to drunken driving. The presence of alcohol in the vehicle is detected and immediately locks the engine of the vehicle. Hence the system reduces the quantum of road accidents and fatalities due to drunk driving in future.

### Technological Approaches
According to Ferguson (2010), there existed different technologies for the detection of alcohol in vehicles. Technology scan were undertaken through patent and literature survey. Based on these reviews four categories of technologies were identified with potential for measuring driver blood alcohol content within the vehicle environment [4].

Electrochemical systems are chemical reaction based such as trans dermal or breath based systems. Alcohol when come into contact with reactant chemical, it will produce calorimetric changes measured by spectrum analysis or semiconductor sensor. In fuel cell system (typically used in current technology alcohol system),the exhaled air will passed through platinum electrode and which oxidizes the alcohol and produce an electric current., more alcohol in the blood sample more electric current. The level of electric current permits accurate calculation of breath alcohol concentration which can be converted into blood alcohol concentration.

Tissue spectrometry system allows calculation of blood alcohol by measuring alcohol concentration in blood. This is achieved by detection of absorption of light at a particular wavelength from a beam of near infrared reflected from within the subject's tissue .They are touch based systems and require skin contact. Variations of tissue spectrometry systems include Michelson, Raman, Fabry_Perot, Laser Diode and LED based devices.

Distant Spectrometry Systems use an approach that is similar to Tissue Spectrometry, except that no skin contact is required. Infrared id transmitted towards the subject from a source that also has a sensor to receive and analyses the reflected and absorbed spectrum to assess alcohol concentration in the subject's exhaled breath.

Behavioral system detects impaired driving through objective behavioral measures. These include ocular indices such as gaze and eye movement, driving performance measures, as well as other performance measures believed to be related to driving performance

### 3.Proposed System

The proposed system describe a real-time safety prototype that protect the vehicle from unauthorised access ,controls the vehicle speed under driver fatigue and to develop vehicle accident prevention by method of alcohol detector in an effort to reduce traffic accident cases based on driving under the influence of alcohol.
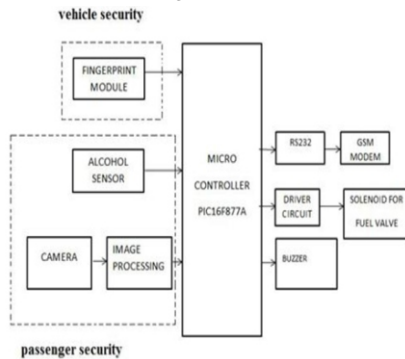


**Figure: Block Diagram**

### Fingerprint Module

Biometric identification technique from a print made by an impression of the ridges in the skin of a finger is used to implement a security system to enter the vehicles.

In today's secure world biometric safety is on the top. Unlike other techniques like passwords and numbers, which are needed to be remembered, biometric techniques make use of human body parts like fingerprints which are unique to all thus it makes biometric systems the most effective over others.

Finger print module comes preloaded with scanner as well as detection section and left with 4 pins for connections. These 4 pins are: VCC, GND, and Rx and TX. It communicates UART protocol with micro controller i.e. it makes use of Rx and Tx pin of micro controller to interact with it.

It works over 3.3 to 5V supply and its Rx and Tx pin is connected to Tx and Rx pin of the Micro controller respectively. The mode is semi duplex asynchronism serial communication and
The default baud rate is 57600bps.
.
The basic principle behind fingerprint detection is that there are two processes: Fingerprint Enrollment and fingerprint matching. When enrolling, user needs to enter the finger two times.

The system will process the two time finger images; generate a template of the finger based on processing results and stores the template.

When matching, user enters the finger through optical sensor and system will generate a template of the finger and compare it with templates of the Finger library. For 1:1 matching, system will compare the live finger with specific template designated in the Module; for 1: N matching, or searching, system will search the whole finger library for the matching finger. In both circumstances, system will return the matching result, success or

### Drowsiness detection through image processing

The drowsiness detection system firstly consists of a camera pointing at the driver. The camera is to be mounted on the dashboard inside the vehicle. The grabbed frames are represented in
RGB-space with 8-bit pixels (256 colors).The function of the system can be broadly divided into eye detection function, comprising the

first half of the preprocessing routine and second half comprising of drowsiness detection. After inputting a facial image, preprocessing is performed to binarize the image and removing noise, so that the image is accepted by the image processor. The maximum width of the face is then detected so that we can detect the left and right edges. After that we can detect the vertical position of each eye independently within an area defined by the center line of the face width. On that basis, the area in which each eye is present is determined then they can be updated where the movement of eyes can be tracked. The amount of eye openness is output simultaneously by establishing and updating the areas of eye presence and that value is used in judging whether the eyes are open or closed and also in judging whether the eyes is detected correctly or not. If the eyes have not been detected correctly, the routine returns to the Detection of the entire face. After that the processed image output is detected by high input to Micro controller.

### Mq3sensor

The alcohol gas sensor MQ-3 detects the concentration of alcohol gas in the air and outputs its reading as an analog voltage. Since, the output of the Analog MQ-3 Alcohol Sensor is analog in nature and these analog signals cannot be processed directly by the microcontroller. So, first This signal needs to be converted to digital value to be processed by the micro controller. The conversion can be done with the help of ADC of the micro controller.

### GSM module

Mobile communication is an emerging technology these days. GSM is the acronym for Global System for Mobile Communication. GSM module transmits data using radio waves. GSM architecture is same as that of mobile architecture. GSM modems are generally used in many electronic applications and they are required to interface with the micro controllers.

GSM has RS232 interface for serial communication. In between the GSM module and the micro controller MAX232 IC is connected.

MAX232 IC is used for conversion of logic levels. Using MAX232 IC, RS232 logic levels of GSM are converted to the TTL logic levels of the micro controller. MAX232 IC has 16 pins. This dual driver IC as it has two transmitters and receivers. But interfacing of GSM to AT89C51 micro controller uses only one transmitter and receiver.

The transmitter pin T1IN of max232 is connected to the transmitter pin of the micro controller and the receiver pin R1out of the max232 is connected to the receiver pin of the micro controller. TheT1out pin of the IC is connected to the transmitter pin of the GSM modem. When sudden accident occurs, the victim' relatives get the alert message regarding the accident so that emergency medical help can be given as fast as possible. The alert message includes the Geographical location of the spot where the accident has occurred. Now a day's accident cases become critical due to the belated medical help and this problem can be avoided to an extent in this case.

### Driver circuit

Driver circuits are most commonly used to amplify signals from controllers or micro controllers in order to control power switches in semiconductor devices. Functions of driver circuit include isolating the control circuit and the power circuit, detecting malfunctions, storing and reporting failures to the control system, serving as a precaution against failure, analyzing sensor signals, and creating auxiliary voltages. Here in this prototype, in order to amplify the signals from micro controller, they are major used.

### Buzzer

When possibility of accident or theft is to occur, Buzzer alarm is created for the safety of the Drivers and passengers. For the system we are developing, the camera is stationary and will not
Adjust its position or zoom during operation.

## Solenoid valve

A solenoid valve is an electromechanical controlled valve. The valve is like a solenoid, which is an electric coil with a movable ferromagnetic core in its center. The plunger closes off a small orifice in rest position. An electric current through the coil creates a magnetic field. The magnetic field will exert a force on the plunger. Now the plunger will be pulled towards the center of the coil so that the orifice opens. This is the basic principle that is used to open and close solenoid valves. Direct operated (direct acting) solenoid valves have the simple working principle. The medium flows through a small orifice which can be closed by a plunger. A small spring brings the plunger down to close the valve. An electric coil is positioned around the plunger. As soon as the coil is electrical energized, a magnetic field is created which pulls the plunger towards the center of the coil. This opens the orifice so that the medium can flow through.

## 4. Conclusion

Security of vehicles is of prime concern in the present day. Several techniques exist in practice, for regulating the dilemma of accidents. All these techniques are either intrusive or less accurate; hardware complications involved and hence are costly. Our proposed project is a cost effective system for people to acquire safety in vehicles. In the algorithm implemented, the methods used for fingerprint, eye blinking, and alcohol and so on produces promising results and achieves an appreciable speed. There are many ways exist to detect driver fatigue. This tries to look at the emerging technologies and determine the best approaches in trying to prevent the number one cause of fatal vehicle crashes. Currently, the number one selling product in the market is the market is nothing more than a reed switch to detect head angle tilt. This product is extremely limited and not very effective. The product made by BMW and integrated into their high end cars to detect driver fatigue behavior is detection but lack proper notification to warn a driver. The current market and technologies is in its infancy mode. New technologies keep emerging using different techniques

There are many technologies exist to detect driver fatigue or drowsiness. Here look at the emerging technologies and determines the best approach in trying to prevent the one of the major cause of fatal vehicle crashes. The system which localizes and tracks the eyes of the driver to detect drowsiness by thresholding the captured gray scale images as significantly shown in after which the noise removed image is used for further processing. The system follows viola Jones algorithm. This system also uses a combination of feature based matching to localize the eyes. Also during tracking, the system will be able to decide if the eyes are open or closed. When the eyes will be closed for too long, a warning signal will be given in the form of buzzer or alarm author customized message.

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