

# Drowsy and Drunken Drive Control, Automatic Accident Detection and Rescue System Using Arduino

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**Abstract:** In many cases, drivers who are drowsy make no effort to apply brake or avoid an accident. So, a system is designed which senses the condition of the driver (his/her health) and stops the vehicle immediately if an abnormal condition of the driver is sensed to avoid accidents. Truck drivers, company car drivers and shift workers are the most at risk of falling asleep while driving. Majority of the accidents occur due to the drunkenness of the driver. The burden of which lies on the company owner as they are made liable. It can lead to economic loss. In this presentation we present an adaptive driver and company owner alert system and an application that provides driving behaviour to the company owner. In this system a heartbeat sensor, an eye blink sensor, an alcohol sensor are interfaced to an Arduino. If any of these sensors senses an abnormal condition of the driver, the vehicle automatically slows down and stops. A buzzer is placed in the vehicle which alerts the surrounding vehicles or the passengers inside the vehicle. At the same time an SMS alert consisting of the location and condition of the driver is sent to the registered mobile number.

**Keywords:** GSM, GPS, DC Motors, Alcohol Sensor, Eye blink sensor, Arduino

## I. INTRODUCTION

The high demand of automobiles has also increased the traffic hazards and the road accidents. Life of the people is under high risk. This is because of the lack of best emergency facilities available in our country. An automatic alarm device for vehicle accidents is introduced in this paper. This design is a system which can detect accidents in significantly less time and sends the basic information to first aid centre within a few seconds covering geographical coordinates, the time and angle in which a vehicle accident had occurred. This alert message is sent to the rescue team in a short time, which will help in saving the valuable lives. A Switch is also provided in order to terminate the sending of a message in rare case where there is no casualty, this can save the precious time of the medical rescue team. When the accident occurs the alert message is sent automatically to the rescue team and to the police station. The message is sent through the GSM module and the location of the accident is detected with the help of the GPS module. The accident can be detected precisely with the help of both Micro electro mechanical system (MEMS) sensor and vibration sensor. The Angle of the rolls over of the car can also be known by the message through the MEMS sensor. This application provides the optimum solution to poor emergency facilities provided to the roads accidents in the most feasible way. The usage of auto mobiles has improved linearly over the past decade, which increased in the risk of human life. This is because due to the insufficient emergency facilities.

The usage of auto mobiles has improved linearly over the past decade, which increased in the risk of human life. This is because due to the insufficient emergency facilities. In this paper we are using a alarm system which helps in improving the emergency system of the accident system. This system detects the accident occurrence and the co-ordinated of the accident are messaged to the rescue team. A switching system is used switch off in case there are no causality. The Accident is detected with the help of MEMS Sensor and Vibration Sensor. The Angle in which the car has rolled off is indicated through a message. This Application helps in providing feasible solution to the poor emergency facilities.

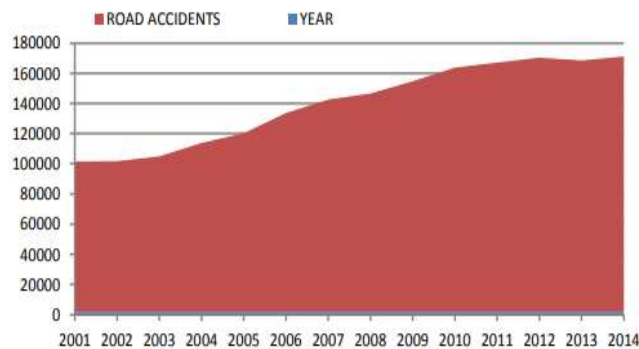


Fig 1 : Road Accidents Year-wise 2001 – 2014

These accidents are most common late at night and early in the morning. This is the body's natural sleep period. Accidents due to drowsy driver most often occur at high speeds on highways and other major roadways. Oftentimes, in this case at least one vehicle may change its direction suddenly which may lead to an accident situation. Heartbeat, respiration rate & the body status of the driver are the most important factors to be considered for a safe driving. This system expects to reduce the number of accidents

caused by drunken driving, which is very essential element for a prosperous life tomorrow. It alerts the driver and the surroundings with which we can save many lives. In this project we use sensors to measure all these factors. If the values measured do not match with the reference values then the microcontroller will send a warning sign in the LCD display thereby preventing accidents. The Accident is detected with the help of MEMS Sensor and Vibration Sensor. The Angle in which the car has rolled off is indicated through a message. This Application helps in providing feasible solution to the poor emergency facilitates.

The main objective of our project is to reduce the accident ratio of the truck driver. Major accident occurs because of the driver's fault the owner compensates, hence to reduce the burden of the owner we are making this project.

## II. LITERATURE REVIEW

### A. Driver Drowsiness Detection System and Techniques

According to the experts it has been observed that when the drivers do not take break they tend to run a high risk of becoming drowsy. Study shows that accidents occur due to sleepy drivers in need of a rest, which means that road accidents occurs more due to drowsiness rather than drink-driving. Attention assist can warn of inattentiveness and drowsiness in an extended speed range and notify drivers of their current state of fatigue and the driving time since the last break, offers adjustable sensitivity and, if a warning is emitted, indicates nearby service areas in the COMAND navigation system.

### B. Implementation of the Driver Drowsiness Detection System

This paper is about making cars more intelligent and interactive which may notify or resist user under unacceptable conditions, they may provide critical information of real time situations to rescue or police or owner himself [2]. Driver fatigue resulting from sleep disorders is an important factor in the increasing number of accidents on today's roads. In this paper, we describe a real-time safety prototype that controls the vehicle speed under driver fatigue [2]. To advance a system to detect fatigue symptoms in drivers and control the speed of vehicle to avoid accidents is the purpose of such a mode. In this paper, we propose a driver drowsiness detection system in which sensor like eye blink sensor are used for detecting drowsiness of driver .If the driver is found to have sleep, buzzer will start buzzing and then turns the vehicle ignition off[2] .

### C. Detecting Driver Drowsiness Based on Sensors

Researchers have attempted to determine driver drowsiness using the following measures: (1) vehicle-based measures; (2) behavioural measures and (3) physiological measures [3]. A detailed review on these measures will provide insight on the present systems, issues associated with them and the enhancements that need to be done to make a robust system [3]. This paper reviews the three measures as to the sensors used and discuss the advantages and limitations of each. The various ways through which drowsiness has been experimentally manipulated is also discussed [3]. It is concluded that by designing a hybrid drowsiness detection system that combines non-intrusive physiological measures with other measures one would accurately determine the drowsiness level of a driver. A number of road accidents might then be avoided if an alert is sent to a driver that is deemed drowsy [3].

### D. Eye Tracking Based Driver Drowsiness Monitoring And Warning System

This project represents a way of developing an interface to detect driver drowsiness based on continuously monitoring eyes and DIP algorithms [4]. Micro sleeps are the short period of sleeps lasting 2 to 3 seconds, are good indicator of fatigue state. Thus by monitoring continuously the eyes of the driver by using camera one can detect the sleepy state of driver and timely warning is issued. Aim of the project is to develop the hardware which is very advanced product related to driver safety on the roads using controller and image processing [4]. This product detects driver drowsiness and gives warning in form of alarm and it also decreases the speed of vehicle. Along with the drowsiness detection process there is continuous monitoring of the distance done by the Ultrasonic sensor [4]. The ultrasonic sensor detects the obstacle and accordingly warns the driver as well as decreases speed of vehicle [4].

### E. Driver Drowsiness Detection System:

One of the major cause of traffic accident is Driver's drowsiness. It is a serious highway safety problem. If drivers could be warned before they became too drowsy to drive safely, some of these crashes could be prevented. In order to reliably detect the drowsiness, it depends on the presentation of timely warnings of drowsiness [5]. To date, the effectiveness of drowsiness detection methods has been limited by their failure to consider individual differences. Based on the type of data used, drowsiness detection can be conveniently separated into the two categories of intrusive and non-intrusive methods [5]. During the survey, non-intrusive methods detect drowsiness by measuring driving behaviour and sometimes eye features, through which camera based detection system is the best method and so are useful for real world driving situations [5]. This paper presents the review of existed drowsiness detection techniques that will be used in this system like Circular Hough Transform, FCM, Lab Color Space etc [5].

## III. METHODOLOGY

Each year there are thousands of truck accidents, leading to injuries and fatalities, expensive insurance claims and lengthy traffic jams as wreckage is cleared. When a commercial truck is involved in a serious accident, the driver is usually the spotlight. Usually size and weights of trucks requires the driver to be both highly skilled & focused on controlling these multi-ton behemoths. Due to severity of injuries and property damage commercial truck accidents often produce large claim amounts. One of the most common fault of the truck driver is their failure in checking blind spots, known in the trucking industries as "no zones", before turning or changing lanes. They are on the all four sides of the semi, and many accidents happen when the trucker manoeuvres into the spots without carefully checking for clearance first. They are operating a dangerous vehicle, driving the rig defensively is part of truckers' "expanded duty" to protect us.

Other truck driver errors are similar to those that anyone can make, such as not paying attention to surrounding, speeding, not knowing routes, exhaustion and driving under the influence of alcohol or drug. This project involves controlling accident and saving driver's life as well as owner's problem of compensating every time even if it's the fault of the driver.

The Driver Drowsiness Alert and Automatic Vehicle Control System (DDAAVCS) consists of Arduino, Alcohol sensor (MQ3), GSM (SIM900), GPS (UBLOX6MNEO), Eye blink sensor (eye gerber), relay, DC motor (12v 10 rpm), Lcd, Buzzer.

#### A. Block Diagram:

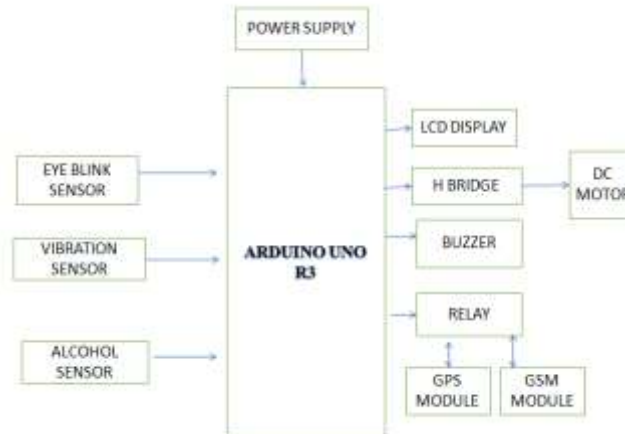


Fig 2: Block Diagram for Proposed System

## IV. REQUIREMENTS

#### A. Arduino UNO

The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by arduino. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9 volt battery, though it accepts voltages between 7 and 20 volts. It is also similar to the Arduino Nano and Leonardo. The hardware reference design is distributed under Common Creative Attribution Share-Alike 2.5 license and is available on the arduino website. Layout and production files for some versions of the hardware are also available. "UNO" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The UNO board and version 1.0 of arduino Software (IDE) were the reference versions of arduino, now evolved to newer releases. The UNO board is the first in a series of USB arduino boards, and the reference model for the arduino platform. The ATmega328P on the arduino UNO comes pre programmed with a boot loader that allows uploading new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol. The UNO also differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it uses the ATmega16U (ATmega8U2 up to version R2) programmed as a USB-to-serial converter.



Fig -3: Arduino Board

#### B. EYE BLINK SENSOR

Eye blink sensor is the sensor which is used to detect whether the eye is closed or open. There are different ways to detect a drowsy driver. Here we are using an eye blink sensor. It is an IR based eye blink sensor. Its working principle is same as IR sensor. If there is any obstacle detected, the output of sensor changes. In the same way, the output varies based on blink of eye. In this project we are using an eye blink sensor to know whether the driver is drowsy or alert. If the blinking of eye is repeated for certain period of time then we consider that the driver is drowsy. This drowsiness can be due to lack of The eye blink sensor used in this project is Eye Gerber eye blink sensor. It has 3 pins –Vcc (supply) pin, ground pin and a signal pin. The output of this eye blink sensor is a digital output.

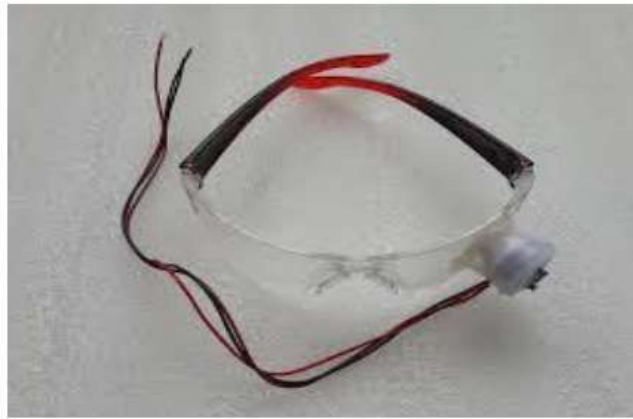


Figure 4. Eye Blink Sensor

### C. GLOBAL POSITIONING SYSTEM

Global Positioning System or GPS is a satellite navigation system that provides location. GPS is used for tracking or navigation of ships, vehicles, planes etc. the system gives critical abilities to military and civilian people around the globe. GPS provides continuous real time, 3- dimensional positioning, navigation and timing worldwide. The working of GPS is based on “trilateration” principle. The location of user is determined from the distance measured from the satellites. The target location is confirmed by fourth satellite and the other three satellites are used to trace the location. A GPS system basically consists of satellite, control station, monitor station and receiver. The GPS receiver takes the information from the satellite and uses this method to determine the user’s exact location. In this project the GPS module is used to send the location of the driver or vehicle to any of their relatives through an SMS if any abnormal condition is detected.



Figure 5. GPS Module

### D. MQ3 GAS SENSOR:

MQ3 alcohol sensor is a sensor used for estimating blood alcohol content(BAC) from a breath sample. This sensor is sensitive to alcohol concentration on one’s breath. This sensor is similar to a common breathalyzer. Mq3 alcohol sensor has high sensitivity and fast response time. The output of this mq3 alcohol sensor is an analog resistive output based on alcohol concentration. This sensor module has four pins. They are ground, Vcc, digital output pin and an analog output pin. The input voltage required for this sensor is 3.3-5V.



Figure 6. MQ3 Alcohol Sensor



### E. GSM MODULE

GSM stands for Global System for Mobile Communications. It is a standard set that was developed by the European Telecommunications Standards Institute (ETSI) to describe protocols for second generation (2G) digital cellular networks used by mobile phones. The technology made it very easy to send and receive messages using GSM module that works on a simple AT commands which can be implemented by interfacing it to the microcontroller Rx and Tx pins. It requires very less memory to send and receive text messages and operates on a simple 12 Volt adapter. Sim900 is used in many projects and hence many modifications of development boards for this have been developed. These development boards are facilitated with various features to make it easy to communicate with the SIM900 module.



Figure 7. GSM Module

### F. MOTOR DRIVER

L293D is a Motor Driver IC which allows the DC motor to rotate in both clockwise and anti-clockwise direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously. This IC works on the concept of the H-bridge circuit. When a positive voltage is applied across the motor driver the motor starts rotating in one of the directions and by reversing the voltage the motor starts rotating in the opposite direction. Hence H-bridge ICs are used for driving a DC motor. In a single L293D chip there are two H-Bridge circuit inside the IC which can rotate two dc motors independently. Due its size it is used in robotic applications for controlling DC motors.



Figure 8. Motor Driver

### G. 16X2 LCD

16 X 2 LCD is used to display the operating instructions and status of the output. HD44780U is used in the project. The HD44780U dot-matrix liquid crystal display controller and driver LSI displays alphanumeric, Japanese kana characters, and symbols. It can be configured to drive a dot-matrix liquid crystal display under the control of a 4- or 8-bit microprocessor. Since all the functions such as display RAM, character generator, and liquid crystal driver, required for driving a dot-matrix liquid crystal display are internally provided on one chip, a minimal system can be interfaced with this controller/driver. A single HD44780U can display up to one 8-character line or two 8-character lines. The HD44780U has pin function compatibility with the HD44780S which allows the user to easily replace an LCD-II with an HD44780U.

## V. RESULTS

This system is designed to senses the condition of the driver (his/her health) and stops the vehicle immediately if an abnormal condition of the driver is sensed to avoid accidents. In this system a heartbeat sensor, an eye blink sensor, an alcohol sensor and a respiratory rate sensor are interfaced to an Arduino. If any of these sensors senses an abnormal condition of the driver, the vehicle automatically slows down and stops. A buzzer is placed in the vehicle which alerts the surrounding vehicles or the passengers inside the vehicle. At the same time an SMS alert consisting of the location and condition of the driver is sent to the driver's relatives.



Figure 9. Flow Chart

The system detects accident from vehicle and send message through GSM module. The message is received by another GSM module. Google Map Module It displays Google map show u exact location of accident and it details. It gets detail SMS from accident location. Hence there is small variation in the coordinates, initial value of latitude and longitude are same but fractional value changes with small difference.

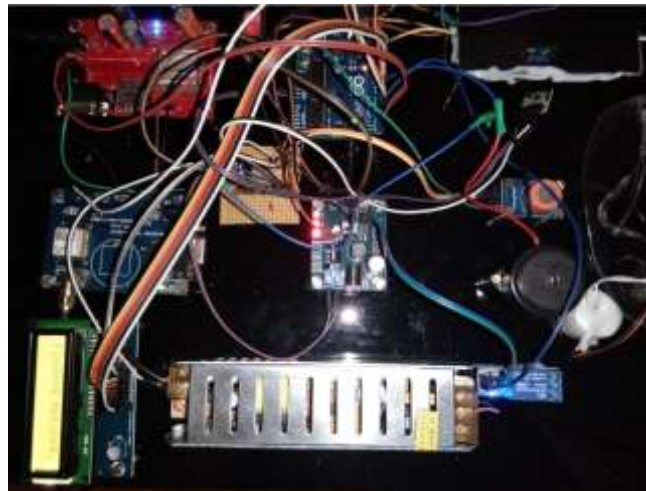


Figure 10. Prototype

## VI. CONCLUSION

In this paper we have seen the system designed to reduce accidents caused due to a drowsy driver or drunken driver. So it helps in saving many lives and as the status of the driver is being updated in a local server, it can be verified from time to time to know the status or condition of the driver. Purpose of our project is to help solving real life problem in very cost effect way. It alerts the truck driver as well as the owner of the company. Whenever the driver feels drowsy and closes his eyes for more than a second, the buzzer is blown. As a result, it alerts the driver. Drowsy driver alert system can be implemented in aeroplanes to alert the pilot if he faces any abnormal condition is detected. In future they developed android application system will ensure the safety of the old aged people and reduce risk of physically challenged people by alerting the user fall detection and the abnormal health condition.

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