Automated Vehicle Safety System to Avoid Accidents

T.Anuradha*, CH.S.Charan Teja, V.S.LB Pravaali, CH.Mounika and K.Sonica

Department of Electronics and Computer Science Engineering, KL University, Vaddeswaram, Guntur 522502, Andhra Pradesh; India; anuradha_ecm@kluniversity.in, ccharanteja123@gmail.com, pravaali.1@gmail.com, mouni.cherukuri.1995@gmail.com, sonicasonu13@gmail.com

Keywords: Alcohol Detection, Automated Accident Detection, Drowsiness Detection, MEMS, Vehicle Safety System

Abstract

**Background/objective:** To reduce the rate of accidents which is a major problem for increase in the death-rate by providing some basic security system to the vehicle. **Methods/statistical Analysis:** This paper deals with intimation to emergency services when accident occurs. To avoid accidents due to drowsiness - drowsiness alert system in case of drowsiness of the driver and an alcohol sensor in case of high intake of alcohol by the user are used. Along with these, a GSM is used to transmit the location to emergency numbers with the help of GPS. **Findings:** Compared to the existing system, the proposed system works much better due to the use of improved or latest sensors and equipment. A latch that provides protocols from the controller to all sensors at a time is also used. The death rate will be reduced with the usage of the proposed system when compared to existing system and proposed system occupies less space compared to using different sensors separately. **Improvements:** Better performance when compared to existing systems. Less time and complexity to design the system. Eventually death rate will be reduced with the use of this design.

1. Introduction

Today, the usage of vehicles is massive and so as the road accidents. The statistical results regarding number of accidents every day are collected and how they happen in most of times are gathered. The maximum accidents are due to faulty drivers, drunk and drive cases and the drowsiness of the drivers.

To reduce these problems, this paper introduces the automatic alert system. Whenever vehicles met with an accident, it has the special feature to inform the message to the required people and emergency services. To avoid drunk and drive, this system has the alcohol sensor to detect it and to avoid the accidents due to drowsiness, this system has an eye blink sensor. The eye blink sensor monitors the driver, it counts every eye blink of the driver. If the count is less than the average count, it recognizes that the driver is in sleepy mood. Then it triggers the micro controller. The micro controller activates the alert system to turn on and stops the vehicle. By using these techniques, this system decreases the rate of accidents.

This paper also proposes a system to improve the safety of the vehicles by detecting the stolen vehicles. The owner of the vehicle will receive the message regarding specified location through GSM with the usage of C8051F120 micro controller and vibration sensors.

2. Existing Approach

Currently the existing system can provide the security and emergency service, after the vehicle met with an accident. It helps and saves the lives of injured persons by giving intimation to required persons and emergency services by sending the exact location. It works with the help of GPS, GSM modules. It does not take any precaution to avoid the accidents.

3. Proposed System

This paper proposes Automatic vehicle safety system to avoid accidents using eye blink sensor, alcohol sensor and
Automated Vehicle Safety System to Avoid Accidents

MEMS interfaced with micro controller. There are six segments in this system - 3 sensors, 1GPS, 1GSM and LCD display. Each segment is interconnected. A 5V power will be given to the micro controller. One switch will be there to start the system. Figure 1 shows the block diagram of the system.

![Figure 1. Block diagram of AVSS.](image)

The proposed system is cost effective and uses the modern internet facility for networking. It uses Linux operating system along with General Packet Radio Service (GPRS). It gives more accurate location at all times to data transfers and it is free from the software monitoring. This system uses Arduino as a core, GPS and GSM modules to detection and alerting purpose.

### 4. Working of AVSS

The functional flow diagram in Figure 2 represents the step by step mechanism of the Automatic Vehicle Safety System to avoid accidents (AVSS).

This Automatic Vehicle Safety System to avoid accidents consists of the following modules.

#### 4.1 Power Supply

A step down transformer to convert 230v ac to 9v ac and a rectifier to rectify ac to dc are used. After rectification, the resultant dc is filtered by using a filter capacitor. To obtain dc voltage of 5v, a positive regulator is used.

#### 4.2 Micro Controller

Micro controller is the predominant unit of the whole project. It controls all the modules which are interfaced with it and communicates with all the devices with respect to the program being written.

![Figure 2. Functional diagram of AVSS.](image)

#### 4.3 Max 232

MAX 232 is the communication between microcontroller to the serial devices using serial single port. It is used to synchronize the data from the micro controller to the GSM module.

#### 4.4 LCD Display

LCD display is used to display the information and status of the project during initialization and working of all the modules. The command register stores the commands given to the LCD. A command is an instruction given to LCD to do a predefined task like initialization, clearing its screen, setting the cursor position, controlling the display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD.

**Features:**

- 5 x 8 dots with cursor
- Built-in controller (KS 0066 or Equivalent)
- +5V power supply (Also available for +3V)
- 1/16 duty cycle
- B/L to be driven by pin 1, pin 2 or pin 15, pin 16 or A.K (LED)
- N.V. optional for +3V power supply

#### 4.5 MEMS

MEMS are used to detect the vibrations. These are known as acceleration sensors. It generates loud sound when the
vehicle met with an accident. It exploits the piezoelectric crystals. The piezoelectric effect may be direct in which the electric charge develops as a result of the mechanical stressor. This generated electric field causes vibrations and will be detected by MEMS. Figure 3 represents the MEMS activated state.

4.6 Eyeblink Sensor

Eye blink sensor is used to detect the drowsiness of the driver. If the driver is having drowsiness, the eye blink sensor gives an indication by making LED on. The instant output is directly given to the microcontroller. It is having compact size and works with +5 v dc. Figure 4 shows the display when the eye blink sensor is in active state.

4.7 Alcohol Sensor

Alcohol sensor is used to detect the alcohol amount present inside the vehicle. If it founds any alcohol content, the alarm will turn on. It is used to avoid the drunk and drive situation. This is very helpful in this project to take precaution to avoid road accidents.

4.8 Buzzer

Buzzer is used for alerting if any mistake is happened in the system. It is also used to wake up the driver from the sleep mood.

4.9 Global Positioning System

GPS is a navigational system to find out the exact position of any object on earth. It uses a network of 24-34 satellites. From the earth surface the satellites are positioned in orbits at an altitude of 12000 miles. Satellites send microwave signals to make the GPS receivers infer the distance using velocity and the time. Figure 5 explains the activation of GPS module to identify the location when the accident occurred.

4.10 GSM (GLOBAL SYSTEM FOR MOBILE COMMUNICATION):

For communication purpose, most of the modern cellular networks use the GSM technology. In this system, RS232 modem is used. The modem works at 850-1900 MHZ. It is directly connected to pc serial port. It has inbuilt RS232 level converter circuitry. It has fixed baud rate. It helps to transfer the data and SMS. It also supports extended set of AT commands which helps in editing SMS message.

5. Conclusion

The proposed system deals with accident detection, drunk and drive situation and the drowsiness of the driver at the time of driving. It also makes an information regarding location with the help of GPS and sends the message to related persons and emergency services with pre assigned numbers with the help of GSM module. This system will definitely reduce the road accidents that happen at night times in highways by introducing automatic alerting.
system and gives a good service to save the lives during accidents by intimating immediately to the emergency services.

6. References