International Journal of Applied Engineering Research
ISSN 0973-4562 Volume 10, Number 6 (2015) pp. 14277-14284

http://www.ripublication.com

# Accident Reproduction System For The Identification of Human Factors Involved on Traffic Accidents

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## Abstract

Automotive vehicles are increasingly being equipped with accident avoidance and warning systems for avoiding the potential collision with an external object, such as another vehicle or a pedestrian. Upon detecting a potential factor, such systems typically initiate an action to avoid the collision and provide a warning to the vehicle operator. In this Server a complete accident avoidance system is proposed by determining the driver's behavior. As the main causes of vehicle accident were related to human factors, they could be labeled in one of the three main driver's distraction categories of Over Speed and Alcohol Consumption and Mobile usage and Drowsiness Detection. The aim of the proposed system is to help in analyzing the factors associated with driver's behavior for the development of accident avoidance systems. The main causes of the traffic accidents, discovered in the analysis of the driver behavior with the help of our system, will be used for the development of assistant devices and alarm systems that could help the driver to avoid risky situations. The Server also implementing to send an automatic SMS alert to the Owner's mobile number, when the driver rashly drives the vehicle, drunk and drive, feel sleepy and talk in mobile phone.

**Keywords:** Accident avoidance, Automotive vehicles

## Introduction

In novel accident reproduction system for the identification of the main human factors involved on traffic accidents is presented. The system is based on a wireless in-vehicle Electronic Data Recorder that could be easily installed in any vehicle's cabin

for the monitoring of the three basic elements of traffic safety: driver, road and vehicle. The system has been tested in a highly realistic truck simulator with a group of professional drivers. The data, collected with the system at the moments before traffic accidents, were used to generate a novel database that was carefully analyzed by a group of traffic safety experts. The validation process shows the reliability of the developed system as a tool for the identification of the main causes of the Monitored traffic accidents.

To avoid the Accident and decrease death rate due to accidents. In the existing system, there is no proper Predictive method to avoid the Traffic Accidents. In the proposed system implementation is to prevent the vehicle from accident by using proactive monitoring system by controlling the speed if the vehicle is not working, driver has drunken so that it can detect using Alcohol Sensor or when speaking in the mobile by using the device to control the speed using mobile detection Sensor. Also if the driver is feeling sleeping, it will also detect that using the Eyewink Sensor will detect. Also can monitor the speed of the vehicle and control the speed via Server. To also implementing to send an automatic SMS alert to the Owner's mobile number, when the driver rashly drives the vehicle, drunk and drive, feel sleepy and talk in mobile phone.

Roadway-Departure-Related crashes account for a great share of all traffic accidents. According to Sandin and Ljung, in industrialized countries, about half of all fatal and a third of all severe vehicle accidents are due to single vehicle crashes. Over the last three decades, research and technological advances have contributed to the reduction of fatal roadway departures.

In parallel to the advances in vehicle dynamics control, extensive research has focused on automated driving technologies that rely heavily on preview information on the surrounding environment. This has lead to a class of emerging advanced driver-assistance systems (ADASs) such as, e.g., lane guidance systems, which utilize such information. Lane guidance systems, in particular, can potentially contribute in the reduction of roadway departure crashes and are envisioned to be effective in situations where the vehicle is about to leave the lane due to, e.g., driver distraction. The literature on controllers for keeping a vehicle in the lane is rich, and a review on existing approaches can be found in, e.g., Road preview information has also been used for warning drivers of excessive speed (where a road departure warning unit is developed, which takes into account both the longitudinal and the lateral vehicle dynamics).

These ADAS and other In-Vehicle Information Systems (IVIS) were designed from laboratory tests as solutions to well-known situations that were found as the main causes of common traffic accidents. The application of these systems in real-life vehicles has successful reduced the number of fatalities given on traffic accidents before its apparition (see, for instance). Nevertheless, driver's distraction is still an alarming figure being involved in 25. 50% of the car accidents and is responsible of a lot of fatalities every year. Therefore, new studies are necessary to determine the main human factors involved in these accidents in order to develop novel tools that help on the reduction of these statistics. For this purpose it is necessary to consider the state of

the three main factors of traffic safety at the previous moments of an accident that are usually unknown: driver, road and vehicle.


**Figure 1:** Overview of Accident Prevention Architecture

In the Fig. 1. The overview of accident prevention architecture is given. For the monitoring of driver, vehicle and road on normal driving conditions, several Electronic Data Recorders have been presented and are being widely used for traffic accident and incident investigation. In, a recorder system focused on the vehicle speed is presented. The system includes a warning system developed on a programmable logic device with a pre-set speed limit indicator. Hence, no road nor driver information is considered, a recorder system developed on a commercial micro controller is presented. The system considers the measurement of some vehicle and road related variables (speed, brake, rain, belt, lights, and 8 push buttons as collision sensors). However, no driver information is considered. The most recent works contemplate the acquisition of several physical variables from the road and vehicle, taking advantages of emerging and existent in-vehicle technologies. However, as these works are not implemented, only the designs have been presented, a data collection vehicle for the measuring of driver's frustration is presented.

The vehicle was equipped to monitor pedal actuations, electro dermal activity, audio from the vehicle's cabin, and images from the road's frontal view and from the driver's face. After each driving session, the driver's frustration was measured through a self-reported evaluation. In this case, vehicle's data and experts' knowledge are not considered. In, an advanced in-vehicle data recorded (a massively sensor zed car) is presented. However, although a good range of data related to the driver, road, and vehicle were considered for its acquisition, the system is not feasible for its application in common cars due to its electrical and computational requirements. Most of the researches are centered on the recording of one or two out of the three basic elements of traffic safety variables. However, as established in, almost half of all vehicle crashes are caused by reasons inherent to the driver. Hence, a complete study of traffic accidents must consider driver behavior as one of its main causes.

## Framework

Among ADASs, it is possible to distinguish safety and assistance/comfort applications. ADASs such as adaptive cruise control systems, for example, control the vehicle's longitudinal motion only if requested by the driver and can be classified as

assistance/comfort applications. Collision avoidance systems on the other hand, fall in the category of safety applications and automatically take control of the vehicle's motion, if needed. The transition criteria, from manual to automated or semi-automated mode, are thus inherently different in safety and assistance/comfort applications. The architecture sketched in a general architecture that facilitates the implementation of the transition criteria used in safety applications.

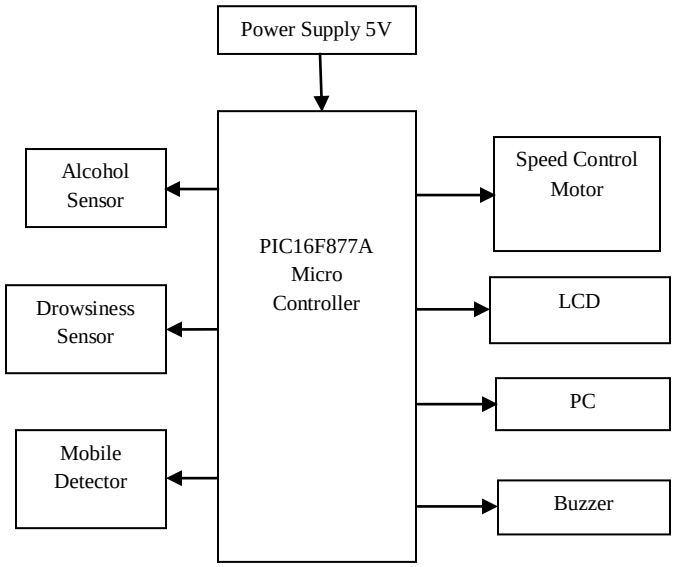


**Figure 2:** General Architecture Diagram showing Accident avoiding techniques and its transition

The proposed system consists of a PIC16F877A microcontroller, alcohol sensor, drowsiness sensor, mobile detector, and a PC. Alcohol sensor is used to detect the alcoholic consumption of the driver. Drowsiness sensor is used to detect the driver's drowsiness and to alert the driver. Mobile Detector is used to detect the mobile signals and to control the speed of the vehicle. These sensors will keeps monitors the parameters and if any abnormality or variation occurs immediately it will give alert to the driver by displaying in the LCD. The speed of the vehicle can be controlled automatically from the compact PC placed inside the vehicle. If any of the above mentioned detections are activated means the information is sent to the server. Then the server will check the driver's relation and friend number from the database and sent the SMS alert to the mobile numbers.

There is no proper Predictive method to avoid the Traffic Accidents. Due to this, accidents are occurs frequently. So that the death rate increases due to accidents. There is no preventive mechanism was implemented in the existing work to avoid accident.

In the implementation is to prevent the vehicle from accident by using proactive monitoring system by controlling the speed if the vehicle is not working, driver has drunken so that can detect using Alcohol Sensor or when speaking in the mobile by

using the device to control the speed using mobile detection Sensor. Also if the driver is feeling sleeping, it will also detect that using the Eyewink Sensor will detect. Also can monitor the speed of the vehicle and control the speed via Server. It also implementing to send an automatic SMS alert to the Owner's mobile number, when the driver rashly drives the vehicle, drunk and drive, feel sleepy and talk in mobile phone. These sensors will keeps monitors the parameters and if any abnormality or variation occurs immediately it will give alert to the driver by displaying in the LCD. The speed of the vehicle can be controlled automatically from the compact PC placed inside the vehicle.

## Modeling

### A. User/Driver

If the User/ Driver have to communicate with the server and avoid the accident, they have to create an account with the server. To create an account with the server, the user has to provide their details like username, password, date of birth, mobile number, and other vehicle information. All this information is stored in the server for future purpose.

### B. Server

The server is a computer program running to serve the requests of other programs, the "clients". Thus, the "server" performs some computational task on behalf of "clients". The clients either run on the same computer or connect through the network. Here the server will store the entire user's information in the database. In the server, the detection sensors are connected, so that they can control the vehicles. Also the server will monitor all the user access. The server will also store the user access details in the database.

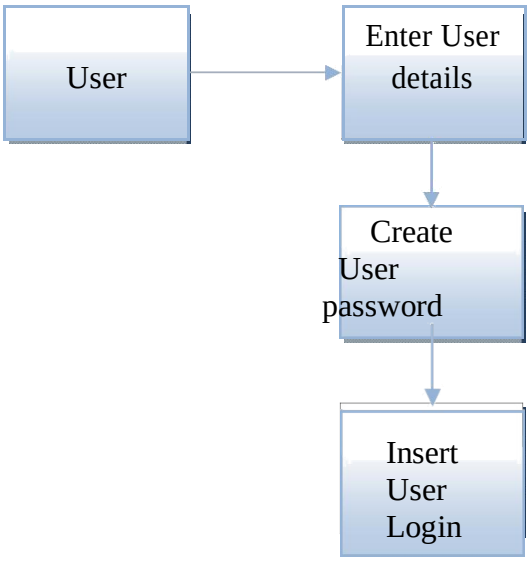


**Figure 3:** User and Driver

**C. Over Speed Controller**

When the vehicle is going in the road, the speed detection sensor will monitor that vehicle. If that Vehicle goes above the specified limit, a signal will be passed to the server via Speed detection sensor, so that the administrator in the server will reduce and control the vehicle's speed. So it can avoid the over speed of the vehicles.

**D. Buzzer**

A buzzer or beeper is an audio signaling device which may be a mechanical and electromechanical or electronic. Typical uses of buzzers and beepers include alarms, timers and confirmation of user input such as mouse click or keystroke. A piezoelectric element may be driven by an oscillating electronic circuit or other audio signal source. Sounds commonly used to indicate that a button has been pressed are a click, a ring or a beep. Electronic buzzers find many applications in modern days.

**E. DC Motor**

The DC Motor or Direct Current Motor to give it its full title, is the most commonly used actuator for producing continuous movement and whose speed of rotation can easily be controlled, making them ideal for use in applications were speed control, servo type control, and/or positioning is required. A DC motor consists of two parts, a "Stator" which is the stationary part and a "Rotor" which is the rotating part. The result is that there are basically three types of DC Motor available but now used brush motor.

Brush motor produces a magnetic field in a wound rotor (the part that rotates) by passing an electrical current through a commutated and carbon brush assembly, hence the term "Brushed". The stators (the stationary part) magnetic field is produced by using either a wound stator field winding or by permanent magnets. Generally brushed DC motors are cheap, small and easily controlled.

**F. Power Supply**

The LM780X series of three-terminal positive regulator are available in the TO-220/D-PAK package and with several fixed output voltages, making them useful in a wide range of applications. Each type employs internal current limiting, thermal shut down and safe operating area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents the controller used has an operating voltage of 5v hence we use LM7805 voltage regulator whose input voltage is 12 v and output voltage is 5v.

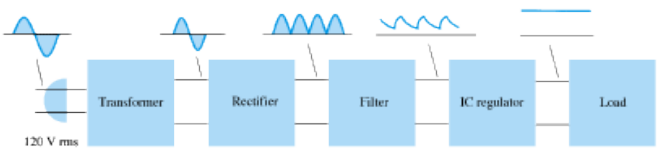


**Figure 4:** Power Supply

**G. Alcohol Sensor**

When the driver is driving the vehicle with alcohol consumption, alcohol sensor w ill sensor and passes the signal to the server. So that the server can control the vehicle and they will not be allowed to drive the vehicle above the certain speed. So that can avoid the drunk and drive accidents.

**H. Eye Wink Sensor**

Eye ball position is detected with reference to the Iris. This is achieved using IR transmitter and receiver. Transmitter and receiver are placed in such a way to sense the position of iris in various directions of eyeball movements. In this project, using the drowsiness sensor, the driver's active and sleeping state is monitored. If the driver seems to be sleepy, then this sensor will send the change in the voltage value to the microcontroller an d using ADC, it converts the value to digital form and uses for further control process.

**I. Mobile Detection**

This handy mobile bug or cell phone detector, pocket-size mobile transmission detector or sniffer can sense the presence of an activated mobile cell phone from a distance of one and-a-half meters. So it can be used to prevent use of mobile phones in examination hall s, confidential rooms, etc. It is also useful for detecting the use of mobile phone for spying and unauthorized video transmission.

The circuit can detect the incoming and outgoing calls, SMS and vide o transmission even if the mobile phone is kept in the silent mode. The moment the bug detects RF transmission signal from an activated mobile phone, it starts sounding a beep alarm and the LED blinks. The alarm continues until the signal transmission ceases.

## Goal

The implementation is to prevent the vehicle from accident by using proactive monitoring system by controlling the speed if the vehicle is not working, driver has drunken s o that can detect using Alcohol Sensor or when speaking in the mobile by using the device to control t he speed using mobile detection Sensor. Also if the driver is feeling sleeping, it will also detect that using the Eyewink Sensor will detect. Also can monitor the speed of the vehicle and control the speed via Server. It also implementing to send an automatic SMS alert to the Owner's mobile number, when the driver rashly drives the vehicle, drunk and drive, feel sleepy and talk in mobile phone. The sesensors will keeps monitors the parameters and if any abnormality or variation occurs immediately it will give alert to the driver by displaying in the L CD. The speed of the vehicle can be controlled automatically from the compact PC placed inside the vehicle.

## Discussion and Conclusion

A presented novel safety functions for predictive prevention of loss of vehicle control. The function exploits road preview capabilities to intervene earlier than traditional

ESC systems. PCLP has been implemented using a general accident avoidance framework that can be used for integrating different combinations of intervention strategies. Three different intervention strategies have been considered: full driver control, automatic deceleration, and a completely automated mode, where the steering and braking on individual wheels are coordinated.

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