



Implementation of Driver Drowsiness Detection and Accident Avoidance in Vehicles- A Review

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ABSTRACT: Drivers when driving long distances without regular breaks run a high risk of becoming drowsy, a state where even the experts fail to recognize it early enough. Survey tells that around one quarter of all serious motorway accidents occur due to sleepy drivers in need of a rest (drowsiness) which causes more road accidents 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. A low cost system is developed which provides solution to the existing automotive control issues. This system has two main principle components namely Vehicle to Vehicle Collision Avoidance Unit (VVCAU) is used to avoid crashing between vehicles and Black Box (BB) records the relevant details about a vehicle such as Engine Temperature, Distance from obstacle, Speed of vehicle, Brake status, CO2 Content, Alcohol content, Accident Direction, trip Time and Date. There are several works regarding pre-crash detection & avoidance system from obstacle at present. To priorities crash with human or animals compared to obstacles is lacking. Human lives can be saved from an accident by detecting an accident before it occurs. To solve this problem in this work we need advance accurate human or animal detection and also accident detection capabilities and then priorities human or animal first to obstacles. Car will avoid human or animal first then if possible it will try to avoid obstacles also. The system has accident detection technique with pin point location tracking using GSM if the system is unable to avoid accident.

KEYWORDS: Driver drowsiness detection, Accident avoidance, Black box, Collision avoidance.

1. INTRODUCTION

Sleep related accidents tend to be more severe, possibly because of the higher speeds involved and because the driver is unable to take any avoiding action, or even brake, prior to the collision. Horne describes typical sleep related accidents as ones where the driver runs off the road or collides with another vehicle or an object, without any sign of hard braking before the impact. In 2008, the National Highway Traffic Safety Administration (NHTSA) estimated that 30 percent of all traffic deaths occurred in crashes in which at least one driver or no occupant had a BAC (Blood Alcohol Content) of 0.08 percent or more and that any alcohol was present in 41 percent of all fatal crashes. Such statistics are sometimes cited as proof that a third to half of all fatal crashes are caused by "drunk driving" and that none of the crashes that involve alcohol would occur if the alcohol were not present. But this is incorrect and misleading because alcohol is only one of several factors that contribute to crashes involving drinking drivers. Furthermore, some fatally injured people in alcohol-related crashes are pedestrians with positive BACs, and these fatalities still would occur even if every driver were sober.

Distracted driving is a top danger behind the wheel. In fact, about eight out of 10 crashes involve some sort of driver inattention within three seconds of that crash. We've all seen it and likely even done it, driving distracted includes anything from talking on the phone, to messing with your music, to attending to your children or even pets. All of these actions can lead to serious consequences. Martha Meade with AAA Mid-Atlantic says, "People are dying because of a

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simple missed phone call, a dropped toy or some other event that is completely not important." Possible techniques for detecting drowsiness in drivers can be generally divided into the following categories: sensing of physiological characteristics, sensing of driver operation, sensing of vehicle response, monitoring the response of driver.

According to the WHO 2013 Global Status Report on Road Safety, road traffic deaths would become the fifth leading cause of death. The report showed that there had been no overall reduction in the number of people killed on the world's roads: about 1.24 million deaths occur annually. Among them cyclist, motorcyclists, car occupants & unspecified road users are high. In order to reduce the number of car crash the designed Pre-crash detection system using ultrasonic, laser range finder and radar sensors are used.

Many cases remain pending due to unknown reason of an accident. To avoid these problems, a design is proposed to enhance on-board recording device (i.e. Black Box). Car black box is a digital electronic device, which records and store vehicle speed, real time and vehicle's other status information. It helps to discover and to analyse the reason of an accident easily and to settle many disputes related to car accident such as crash litigation, insurance settlements.

Hence a combined system is essential to provide the solution for all the above problems.

II. FACTORS CAUSING DRIVING DROWSINESS

Driver Fatigue is often caused by four main factors: sleep, work, time of day, and physical. Often people try to do much in a day and they lose precious sleep due to this. The lack of sleep builds up over a number of days and the next thing that happens is that the body finally collapses and the person falls asleep. Time of day factors can often affect the body. The human brain is trained to think there are times the body should be asleep. These are often associated with seeing the sunrise and sunset. Between the hours of 2 AM and 6 AM, the brain tells the body it should be asleep.

Extending the time awake will eventually lead to the body crashing. The final factor is a person's physical condition. People sometimes are on medications that create drowsiness or have physical ailments that cause these issues. Being physically unfit, by being either under or overweight, will cause fatigue. In addition, being emotionally stressed will also cause the body to get fatigued quicker.

III. ARCHITECTURE

The system design contains 4 main parts, i.e., Fatigue Detection Unit, Obstacle Detection Unit, Control Unit and Alarm Unit.

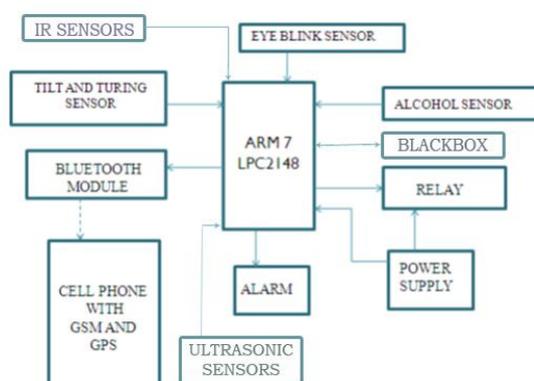


Fig 1. Architecture

- **Fatigue Detection Unit:** A Fatigue Detection Unit consists of camera, panel and alcohol sensor. Camera is a Device which is used to record the driver's facial/head postures and also to keep track of the eye blinking frequency. By the observation we can detect if the driver is fatigue or not. Alcohol sensor is used to detect if the driver has consumed



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alcohol and is not in stable state. Panel is used to store all the recordings from camera and sensors. In case of collision, we can extract the information from the panel and identify the reason behind the collision.

- **Obstacles Detection Unit:** IR and Ultrasonic Sensors and detectors are electronic devices which are designed so that they can detect/sense or quantitatively determine physical factors such as temperature and straight line factor over a measuring assortment. In the Sensors continuously send values, where the values are analyzed and a measurement of parameters such as temperature and straight line factor are obtained.
- **Control Unit:** Speed Sensors and detectors are electronic devices which are designed so that they can detect/sense Speed of the vehicle. Breaking Control System is used the control/decrease the speed of the vehicle in case of sensing danger. The amount of breaking applied is proportional to the speed of moving vehicle.
- **Alarm Unit:** It consist smart phone which is used to track the exact location of the vehicle and also to alert the friends or family in case of sensing any danger. The emergency lights are turned ON and the Voice Alert is provided to alert the driver.

IV. EXISTING SYSTEM

Due to the importance of early detection of driver fatigue and drowsiness to avoid accidents, any researches were done on this subject in the past decade. The researches on the methods for driver distraction detection are also being done, but are less developed than the methods of driver fatigue detection. However, fatigue and distraction can be considered as two separate concepts, since both of these factors reduce driver alertness; both categories are investigated in some studies. We can divide the most important approaches for fatigue/distraction detection into three categories: (1) approaches based on bioelectric signals (e.g., EEG and ECG), (2) approaches based on steering motion, and (3) approaches based on driver face monitoring.

V. LIMITATION OF EXISTING SYSTEM

Distraction detection is more difficult than fatigue detection, but the approaches based on steering motion and the approaches based on driver face monitoring can estimate the lack of the driver concentration in limited circumstances. The approaches based on bioelectric signals have a very good accuracy and speed at detecting fatigue, but they are usually intrusive. Additionally, the driver distraction cannot be identified from his/her bioelectric signals using current technology by now. The approaches based on driver face monitoring have lower accuracy than the approaches based on steering motion, but they can detect driver fatigue and distraction earlier.

VI. PROPOSED SYSTEM

The proposed system combines artificial intelligence with non-intrusive monitoring to detect driver fatigue and control the car using the accident statistics of road and current driver condition by behavioural measuring techniques have mainly focused on the analysis of eye closure and blinking of the driver and analysis of the driver's head behaviour leads to three moving components: nodding, shaking, and tilting.

In pre-crash detection humans and animals are prioritised first and then obstacles. If the system is unable to avoid accident then our system has accident detection technique with pin point location tracking using GSM only. Design and Implantation of car black box is to give the proof of accident occurrence and to overcome the drawbacks if any found.

IR Sensors used to detect the obstacles while travelling on car. It has some limited range of 10mtrs and it helps collect all the required results like engine temperature, alcohol content, speed, rpm, date and time of the collision in black box in case of any accident. To detect this obstacle which is more than a range of 10mtrs, we will use Ultrasonic sensor. Ultrasonic sensor is used to detect humans/animals with help of heat in the range more than the 10mtrs distances and warns the driver.

Based on the level of driver fatigues and collision detection, the vehicle braking and speed is controlled using Fuzzy Logic to have better control on the motion of car.



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Alarm system, put a red alert on car, and warns his families for assistance.

VI. CONCLUSION

The proposed system will overcome all the limitations of the existing system. The system consist of the following features which effectively helps in the accident avoidance in vehicles:

- Driver Fatigue Detection
- Vehicle Control Module
- Alarm Module
- GPS Module
- Pre-Crash detection with Humans
- Black Box

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