# Mobile Based Drowsiness Detection System

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***Abstract***

Drowsiness is called as the state between when a person is awake and sleep. The Drowsiness condition is the reason of so many accidents which are happening on the roads. When the driver is in the drowsiness condition his/her reaction time is always a slower his/her attentiveness is almost reduced and his/her brain is not functioning properly. The purpose of such a system is to perform detection of driver's eye when the driver is fatigue. By placing the camera inside the car, we can monitor the face of the driver and look for the eye-movements which indicate that the driver is no longer in condition to drive. In this paper, we propose a driver drowsiness detection system in which Android application continuelously monitors the eye of a driver through the inbuilt camera. If the driver is found to have sleep, the inbuilt alarm will start buzzing and it will also send the message to owner of the car letting him/her know that the driver is in the sleeping mode and then turns the vehicle ignition off ultimately stopping the car.

## INTRODUCTION

### Overview

Sleep-divested driving is the process of functioning a motor vehicle while being continuously messed up by lack of sleep. It is a key trigger of many motor vehicle catastrophes, and it can blight the human brain as much as alcohol can. Drowsiness influence mental alertness, intensifying the risk of can be triggered by numerous causes such as fatigue, lack of sleep and the use of medication. In addition, an alternative reason that can be contemplated is the dullness of driving on expressways or in jam-packed traffic. The persistent construction of highways and upgrading of vehicle operation have made it feasible for drivers to benefit from enjoyable and rest full driving. Conversely, drivers are more pertinent to maneuvers their vehicles under tedious driving circumstances.

### Motivation

The innovations in the automobile industry over the last hundred years have made our vehicles more powerful, easier to drive and control safer more energy efficient, and more environmentally friendly. Majority of the accidents caused today by cars are mainly due to the driver tiredness. Driving for a long period of time causes excessive tiredness which in turn makes the driver sleepy or loose awareness. With the rapid increase in the number of accidents seems to be increasing day to day. Therefore a need arises to design a system that keeps the driver focused on the road. Data on road accidents in India are collected by Transport Research Wing of Ministry of Road Transport Highways. The aim of this system is to develop a prototype of drowsy driver warning system. Our whole focus and concentration will be placed on designing the system that will accurately monitor the open and closed state of the drivers eye in real time. By constantly monitoring the eyes, it can be seen that the symptoms of driver fatigue can be detected early enough to avoid an accident. This detection can be done using a sequence of images of eyes as well as face and head movement. The observation of eye movements and its edges for the detection will be used. Devices to detect when drivers are falling asleep and to provide warnings to alert them of the risk, or even control the vehicles movement, have been the subject to much research and development. Driver fatigue is a serious problem resulting in many thousands of road accidents each year. It is not currently possible to calculate the exact number of sleep related accidents because of the difficulties in detecting whether fatigue was a factor and in assessing the level of fatigue. However research suggests that up to 25 percentages of accidents on monotonous roads in India are fatigue related.

 

Research in other countries also indicates that driver fatigue is a serious problem. Young male drivers, truck drivers, company car drivers and shift workers are the most at risk of falling asleep while driving. However any driver travelling long distances or when they are tired, it is at the risk of a sleep related accidents. The early hours of the morning and the middle of the afternoon are the peak times for fatigue accidents and long journeys on monotonous roads, particularly motor-ways, are the most likely to result in a driver falling asleep

## LITERATURE SURVEY

A [1] survey was done among different proposals and this survey paper includes survey among different methods for preventing accidents while driving. Describe about the road accidents. The road accidents happen due to the lack of attention of the driver. In this system describes a real time system for analyzing video sequences of a driver and determining the level of attention. For this purpose, uses the computation of percent of eyelid closure. The eye closure acts as an indicator to detect drowsiness. Drivers fatigue and drowsiness are the major causes of traffic accidents on road. It is very necessary to monitor the drivers vigilance level and to issuing an alert when he is not paying enough attention to the road is a promising way to reduce the accidents caused by driver factors. The fatigue monitoring can be starts with extracting visual parameters. This can be done via a computer vision system in the system a real time robust methods for eye tracking under variable lighting conditions and facial orientations. In this paper the latest technologies in pattern classification recognition and in object tracking are employed for eye detection.

The [2] addresses the development of a system that is able to deal with a large set of different traffic situations. The input to the system comes from cameras, which are supplemented by active sensors (such as radar and laser scanners) and vehicle dynamic data, digital road maps, and precise vehicle-positioning data. The system is structured on a model-based approach with the use of vehicle-side technologies. Its decomposition is made in three layers: the perception layer, the decision layer, and the action layer. The perception layer consists of a sensor system and image processing. The basic input comes from cameras that are monitoring the road in front of the vehicle. The cameras are supplemented by vehicle controller area network (CAN) bus data, digital road maps, and precise vehicle positioning (GPS). Radar provides supplementary information that is integrated in the data-fusion module. the action layer comprises all system reactions in critical lane Most people are aware of the dangers of drinking and driving. The people dont realize that drowsy driving can be just as fatal, for example: alcohol, sleepiness slows reaction time, decreases awareness, impairs judgment and increases your risk of crashing. There are many underlying causes of sleepiness, fatigue and drowsy driving. It includes the sleep loss from the restriction, interruption or fragmented sleep; chronic sleep debt; circadian factors associated with driving patterns or work schedules; undiagnosed or untreated sleep disorders; time spent on a task; the use of sedating medications; and the consumption of alcohol when already tired. These factors have cumulative effects and a combination of any of these can greatly increase ones risk for a fatigue-related crash. Signs Of Drowsy Driving There are many signs of the drivers drowsiness: Driver may be yawn frequently. Driver is unable to keep eyes open. Driver catches him nodding off and has trouble keeping head up. The thoughts of the person wander and take focus off from the road. The driver can’t remember driving the last few miles. Driver is impatient, in a hurry, and grouchy. The person ends up too close to cars in front of you. The person misses road signs or drive past your turn. Drift into the other lane or onto the shoulder of the road.

The [3] Describe about the road accidents. The road accidents happen due to the lack of attention of the driver. In this paper author describes a real time system for analyzing video sequences of a driver and determining the level of attention. For this purpose, author uses the computation of percent of eyelid closure. The eye closure acts as an indicator to detect drowsiness. Drivers fatigue and drowsiness are the major causes of traffic accidents on road. It is very necessary to monitor the drivers vigilance level and to issuing

 

an alert when he is not paying enough attention to the road is a promising way to reduce the accidents caused by driver factors. The fatigue monitoring can be starts with extracting visual parameters. This can be done via a computer vision system. In the purposed work, author purpose a real time robust methods for eye tracking under variable lighting conditions and facial orientations. In this paper the latest technologies in pattern classification recognition and in object tracking are employed for eye detection.

The [4] the tracking is based on the eye appearance. Visual information is acquired using a specially designed solution combining a CCD video camera with an IR illumination system. The system is fully automatic and detects eye position and eye closure and recovers the gaze of eyes. Experimental results using real images demonstrate the accuracy and robustness of the proposed solution. This could become an important part in the development of the advanced safety vehicle. drowsiness Warning System Using Artificial Intelligence, Nidhi Sharma, V. K. Banga: In this paper author discuss about the various artificial intelligence methods for detecting the drowsiness of system. Drivers drowsiness is an important factor in motoring of vehicle from accidents. The driving performance deteriorates with increased drowsiness with resulting crashes constituting morel vehicle accidents. In recent years, there has been growing interest in intelligent vehicles. The ongoing intelligent vehicle research will revolutionize the way vehicles and drivers interace in the future. The detection mechanism into vehicles may help prevent many accidents. There are various techniques used for analyzing driver exhaustion. Most of the published research on computer vision approaches to detection of fatigue has focused on the analysis of blinks and head movements. After long hours of driving or in absence of mental alert state, the attention of driver starts to loose and that creates risks of accidents. These are the typical reactions of fatigue, which are very dangerous. In image fatigue detection, correct and real time decision is very important. In this paper, author discusses the various artificial detection. Describe that the drowsy is the major issue behind the road accidents. The use of assistive systems that monitor a drivers level of vigilance and alert the driver in case of drowsiness can be significant in the prevention of accidents.

In [5] author purposed a new approach towards detection of drives drowsiness based on yawning measurement. This involves several steps including the real time detection and tracking of drivers face, detection and tracking of the mouth contour and the detection of yawning based on measuring both the rate and the amount of changes in the mouth contour area. In this paper several techniques are used, that are applied several techniques to ensure the robust detection of yawning expression in the presence of variable lighting conditions and facial occlusions. Test results demonstrate that the proposed system can efficiently measure the aforementioned parameters and detect the yawning state as a sign of drivers drowsiness Prof.V.K.Banga: Describe the facial image analysis. As due to the increase in the amount of automobile the problems created by accidents have become more complex. The transportation system is no longer sufficient. Hence the research upon the safety of the vehicles is the recent topic nowadays. In this paper author discuss about the safety warning systems. This system is active warning systems for preventing traffic accidents have been attracting much public attention. Safe driving is a major concern of today's societies. There are thousands of accidents are happen in a day. Due to which many people get injured and many out of them got die. The aim of this paper is to develop a prototype drowsiness detection system. The main focus is on designing a system that are used for l accurately monitor the open or closed state of the drivers eyes in real time. By monitoring the eyes, it is believed that the symptoms of driver fatigue can be detected early enough to avoid a car accident. The author purposed a vehicle driver drowsiness warning system using image processing technique with neural network. it is based on facial images analysis for warning the driver of drowsiness or inattention to prevent traffic accidents. The facial images of driver are taken by the video camera that is installed on the dashboard in front of the driver. A Neural network based algorithm is proposed to determine the level of fatigue.

 

## PROPOSED SYSTEM

The Smart Drowsy Detection System called (SDDS) aims to monitor the driver and the alertness to prevent them from falling asleep at the wheel. SDDS software is modified to be run in smart phone instead of Laptop which is very hard to fixed in a car and use all advantages of smart phones like camera and light weight. The proposed system will solve this problem by using a mobile phone camera; the phone camera positioned in front of the driver behind the steering in a position will be taking continues videos of the driver's face. The camera should be positioned such that the drivers face takes up the greater part of the image and also that the drivers face should be more or less in the center of the image. The video will be transformed to frame by frame data and remitted to the frame memory of the image processor. The frame memory will be hoarding each image in appropriate pixel format. An android application will be linked to the image processor for manipulating the image processing procedure and for ascertaining the processed results. The functions of the system can be broadly divided into face detection and eye detection function, embracing the first half of the processing schedule, and a drowsiness detection function, including the second half.

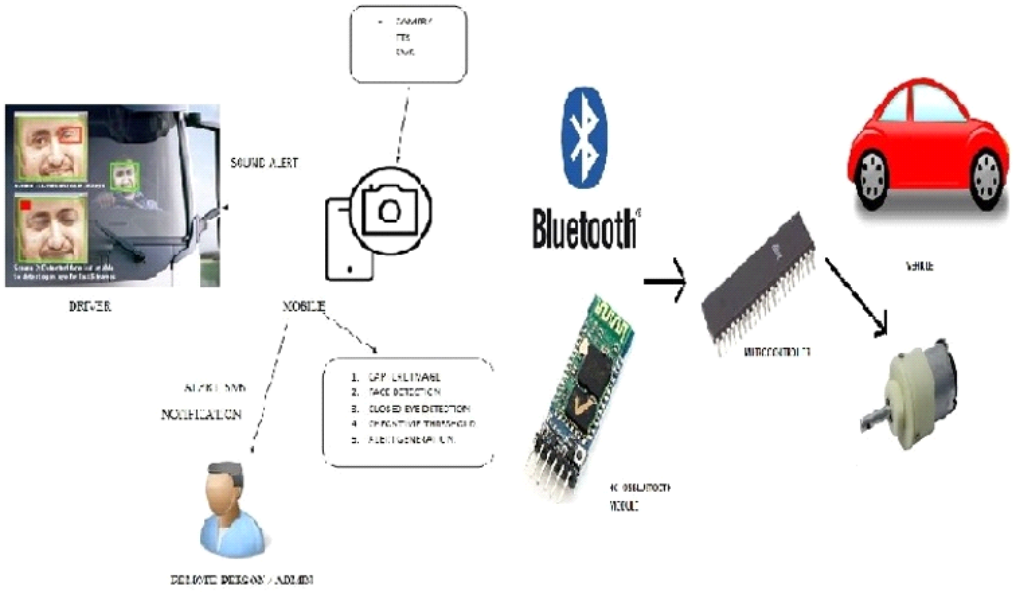


Fig. Prototype of the working system

Naturally, video images are always contaminated by noise in different degree which roots in several factors, such as driving condition, underexposure, overexposure, or nonlinearity of devices. Originally images are usually converted to gray scale images to be easily used in classifiers. Images are easily malfunctioned, including lacking contrast and blurring .Thus, histogram equalization is the next important step. The goal of histogram equalization is to highlight the features by enhancing contrast of gray scale images and reducing interference caused by the asymmetric illumination.

 

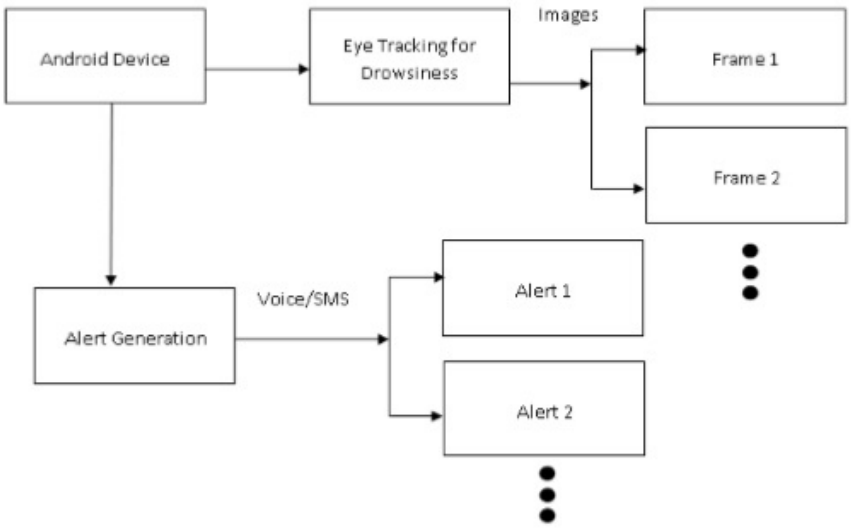


Fig. Methodology

In the driver status monitor system, the method or the timing for offering information to a driver is changed according to the level of the consciousness or the attention of a driver, and the media or its method to offer information is changed according to assent or urgency level of the information. The purpose of this study is to realize a system that wins drivers confidence by the ways mentioned above. The driver Stan.s monitor detects drowsiness from the change in the duration of eye closure during blinking and in attention from the change in the gaze direction. This method describes the detection of degradation of consciousness. In this paper, a non-intrusive driver's drowsiness system has been presented based on computer vision and image processing. This system uses visual information to analyze and monitor driver's eye state at near real-time and real-driving conditions. The proposed algorithm for eye detection and eye tracking is robust and accurate under varying light, external illuminations interference, vibrations, changing background and facial orientations. Furthermore, all drivers used in these experiments were exposed to a variety of difficult situations commonly encountered in a roadway. This guarantees and confirms that these experiments have proven robustness and efficiency in real traffic scenes. [paper3] Eye detection is a pre-requisite stage for many applications such as human computer interfaces, iris recognition, driver drowsiness detection, security, and biology systems. In this paper, template based eye detection is described. The template is correlated with different regions of the face image. The region of face which gives maximum correlation with template refers to eye region. The method is simple and easy to implement. The electiveness of the method is demonstrated in both the cases like open eye as well as closed eye through various simulation results A novel and simple eye detection scheme is proposed in this paper. An eye template is used to detect eye region from face image. The template is matched with eye region using cross correlation technique. The method does not require any complex mathematical calculation and prior knowledge about the eye. It is a simple method and can easily be implemented by hardware. Drowsiness is a state of decreased awareness or alertness associated with a desire or tendency to fall asleep. Drowsiness is therefore the brains last step before falling asleep. This could for example be the outcome of hard physical work or other activities that uses the energy supply system of the body . It is a normal and natural companion of fatigue but it does appear alone. Experts say, drowsiness during the day, even during boring activities, indicates a sleeping disorder. Drowsiness detection system that captures, processes, recognizes and

 

provides results to the user, which user can take actions on the events Detection of fatigue involves a sequence of images of a face, and the observation of eye movements and blink patterns. By monitoring the eyes, it is believed that the symptoms of driver fatigue can be detected early enough to avoid a car accident. The requirements for an effective drowsiness detection system are as follows: A non-intrusive monitoring system that will not distract the driver. A real-time monitoring system, to insure accuracy in detecting drowsiness.A system that will work in both daytime and nighttime conditions. Detection of fatigue involves a sequence of images of a face, and the observation of eye movements and blink patterns. The analysis of face images is a popular research area with applications such as face recognition, virtual tools, and human identification security systems Region of Interest (ROI) is estimated depending on Eye state (open/closed) and Mouth (yawning state). Depending on these Features, Drowsiness of a person is detected and generates an alert message.

### 3.1 Algorithm

RGB-HSV Conversion Algorithm

```
//Take a color value in a variable this value contains r, g, b
col = getRGB(x, y) 0xffffff;
 //Separate R, G, B components from that value
r = (col ¿¿ 16) 0xff; g = (col ¿¿ 8) 0xff; b = (col ¿¿ 0) 0xff; //Find Min and Max from R, G, B Component.
rgbMin = Math.min(Math.min(r, g), b); rgbMax = Math.max(Math.max(r, g), b);
//Assign max value to v variable
v = rgbMax;
 //Convert to hsv value
if (v == 0) hue = s = 0;
else
s = 255 * (rgbMax - rgbMin) / v;
if (s == 0)
hue = 0;
else
if (rgbMax == r)
hue = 0 + 43 * (g - b) / (rgbMax - rgbMin);
else if (rgbMax == g) hue = 85 + 43 * (b - r) / (rgbMax - rgbMin);
else
if (rgbMax == b) hue = 171 + 43 * (r - g) / (rgbMax - rgbMin);
if (hue ¡ 0)
hue = 255 + hue;
col = (hue ¡¡ 16) — (s ¡¡ 8) — (v);
```



 

## CONCLUSION

In Drowsy Detection System the eye region can be approximately determined within the detected facial region. The system is able to decide if the eyes are open or closed. when the eyes have been closed for certain predefined time. The system is able to recover and properly localize the eyes, the main component of the system consist of a hardware system which is the Smartphone and software implantations for real-time video image of the driver face and eye tracking. This system also preventing road accident

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