DROWSINESS DETECTION SYSTEM

Minor Project Synopsis

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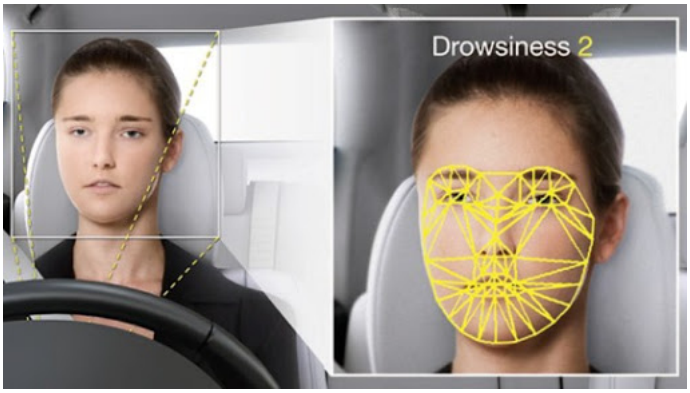
1 Introduction

1.1 What is the idea?

The term Driver Drowsiness Detection system refers to in-vehicle systems that monitor driver and/or vehicle behaviour. These systems monitor the performance of the driver, and provide alerts or stimulation if the driver seems to be impaired. It warns drivers when they are getting drowsy.

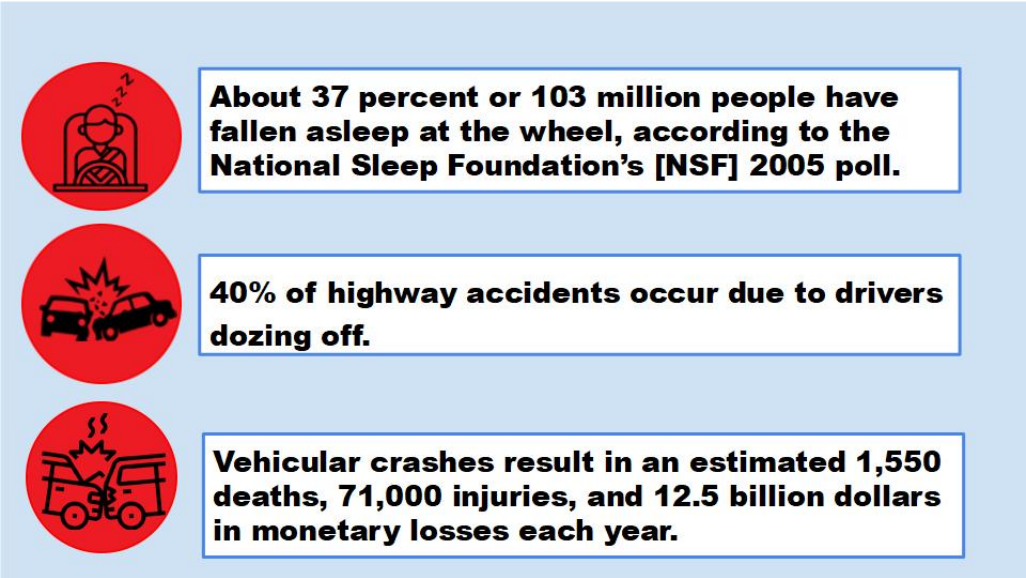


1.2 Why this Project?

Car accident is the major cause of death in which around 1.3 million people die every year. Majority of these accidents are caused because of distraction or the drowsiness of driver. Construction of high-speed highway roads had diminished the margin of error for the driver. The countless number of people drives for long distance every day and night on the highway. Lack of sleep or distractions like the phone call, talking with the passenger, etc may lead to an accident. To prevent such accidents we propose a system which alerts the driver if the driver gets distracted or feels drowsy. I think the stats on the accidents due to sleepiness will encourage us to pick this project. Some of the recent stats shows that :

2 Objective

2.1 Some Facts!



2.2 What has been done:

1. Simple driver strategies:
Clever signs are one of the most popular ways that the government has used to mitigate drowsy driving (Border Roads Organisation, 2016). Their signs have fun sayings on them intended to catch drivers attention.
2. Vibrations and alerts:
Multiple studies have explored the use of vibrations or alarms to alert drivers of their drowsiness. One particular study of 25 participants was conducted using a prototype steering wheel with vibration capability and a loud buzzer. When a driver displayed signs of drowsiness, the wheel would vibrate and the buzzer would sound, alerting the driver of their drowsy behavior. In general, subjects reported that the buzzer was more effective in alerting drivers, but also significantly more annoying than the vibrations. The study was based on a relatively small sample and produced mostly qualitative data, so the study is relatively incomplete if used on its own to propose a broader solution to drowsy driving. Despite the small

sample, the study shows potential options for alert systems.
3. Blue light: With the introduction of blue light, the body becomes more alert because the light suppresses the creation of melatonin and shifts circadian rhythms as much as three hours with the right amount of exposure (Harvard Health Letter, 2012). In a study, the introduction of a constant blue light with a wavelength of 468 nm led to a decrease in the amount of times the driver crossed the centerline while driving by around 45

2.3 Main Objectives

.To process image of the person driving the vehicle with the help of OpenCV
.To detect the drowsy or active state of a person with the help of algorithm convolutional neural network
.To send alert to driver with the help of buzzer with the help of with python libraries
.

3 Feasibility Study

3.1 Is this plan technically feasible?

Drowsiness detection system will need different images for image recognition method and can be implemented with the help of advance algorithms of machine learning so it is quite feasible to make and it is definitely technically feasible.

3.2 Is this system Operationally feasible?

Will Drowsiness detection system completely solve the problem which we are intended to solve?We can't say for sure that it will solve all the problems but it will definitely help in reducing the number of accidents and other problems caused by drowsiness during driving.

3.3 Is this system Economically feasible?

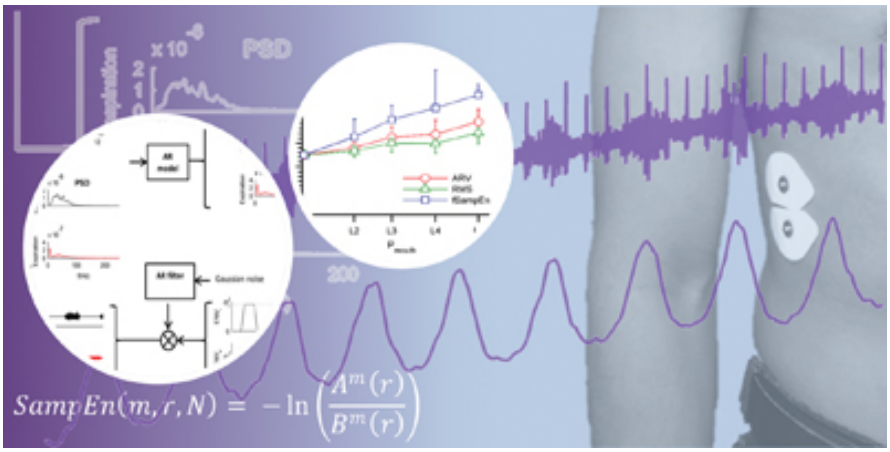
Initial this system will only need software things and algorithm which doesn't take any of our expenses and for complete project we will need raspberry pi which will cost some money but overall it is quite economically feasible.

4 Methodology/Planning of Work

4.1 How to Implement ?

The techniques that can be used to detect driver's sleepiness can be divided into three main categories:

The first category includes methods based on biomedical signals, like cerebral, muscular and cardiovascular activity. Usually, these methods require electrodes attached to the driver's body, which will often cause annoyance to the driver, and cannot be expected to become commercially viable unless ways are found to measure such body signals without electrodes being directly attached to the body.



The second category includes methods based on driver behaviour, which evaluate variations in the lateral position of the vehicle, in the velocity, in the steering wheel angle and in other signals recorded. The advantage of these approaches is that the signal is meaningful and the signal acquisition is quite easy.These procedures require a considerable amount of time to analyse user behaviour and, therefore, they do not work with the so called micro-sleeps—when a drowsy driver

falls asleep for a few seconds on a very straight road section without changing the vehicle signals.
The third category includes methods based on driver visual analysis using image processing techniques. Computer vision can be a natural and non-intrusive technique for monitoring driver's sleepiness from the images taken by some cameras placed in front of the user

4.2 How we are Implementing?

To overcome the problem we came up with the solution implemented in the form of image processing. To perform image processing, OpenCV and Cascade Classifier open source libraries are used. Python is used as a language to implement the idea. A raspberry pi camera is used to continuously track the facial landmark i.e. movement of eyes of the driver. For detection of drowsiness, landmarks of eyes are tracked continuously. Images are captured using the camera at fix frame rate of 20fps. These images are passed to image processing module which performs face landmark detection to detect drowsiness of driver using Convolutional Neural Network. If the driver is found to be sleepy then a voice (audio) alert is provided and a message is displayed on the screen.

If eyes of drivers are closed for a threshold period of time then it is considered that driver is feeling sleepy and corresponding audio alarm is used to make the

driver aware. All this functionality is then implemented with the help of raspberry pi, an audio interfacing is used to provide audio feedback to the user and a small LED screen is used to display the message.

5 Facilities required for the proposed work

5.1 Convolutional Neural Network

A convolutional neural network (CNN or ConvNet) is one of the most popular algorithms for deep learning, a type of machine learning in which a model learns to perform classification tasks directly from images, video, text, or sound.

5.2 Large amount of Data

Large amount of data will be required to prepare our algorithm to recognize certain image and differentiate between drowsy and active person.

References

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