# Driver Drowsiness Detection

**A Major Project Synopsis Submitted to**



**Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal Towards Partial Fulfillment for the Award of**

**Bachelor of Engineering**

**(Information Technology)**

**Under the supervision of Prof. Shakti Bangre**

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**Jan-May 2020**

## Abstract:

## With this intermediate-level Python project, we will be making a drowsiness detecting device. A countless number of people drive on the highway day and night. Taxi drivers, bus drivers, truck drivers and people traveling long-distance suffer from lack of sleep. Due to which it becomes very dangerous to drive when feeling sleepy.

The majority of accidents happen due to the drowsiness of the driver. So, to prevent these accidents we will build a system using Python, OpenCV, and Keras which will alert the driver when he feels sleepy.

Drowsiness detection is a safety technology that can prevent accidents that are caused by drivers who fell asleep while driving.

Drivers who do not take regular breaks when driving long distances run a high risk of becoming drowsy a state which they often fail to recognize early enough according to the experts. Studies show that around one quarter of all serious motorway accidents is attributable to sleepy drivers in need of a rest, meaning that drowsiness causes more road accidents than drink-driving

## Introduction of the Project:

## Driver drowsiness detection is a car safety Technology which helps prevent accidents caused by the driver getting drowsy. Various studies have suggested that around 20% of all road accidents are fatigue-related, up to 50% on certain roads

## Driver drowsiness detection is a car safety technology which prevents accidents when the driver is getting drowsy. Various studies have suggested that around 20% of all road accidents are fatigue-related, up to 50% on certain roads. Driver fatigue is a significant factor in a large number of vehicle accidents. Recent statistics estimate that annually 1,200 deaths and 76,000 injuries can be attributed to fatigue related crashes. The development of technologies for detecting or preventing drowsiness at the wheel is a major challenge in the field of accident avoidance systems. Because of the hazard that drowsiness presents on the road, methods need to be developed for counteracting its affects.

## Driver inattention might be the result of a lack of alertness when driving due to driver drowsiness and distraction. Driver distraction occurs when an object or event draws a person’s attention away from the driving task. Unlike driver distraction, driver drowsiness involves no triggering event but, instead, is characterized by a progressive withdrawal of attention from the road and traffic demands. Both driver drowsiness and distraction, however, might have the same effects, i.e., decreased driving performance, longer reaction time, and an increased risk of crash involvement.

## 

## Driving is a complex task where the driver is responsible of watching the road, taking the correct decision on time and finally responding to other driver's actions and different road conditions. Based on Acquisition of video from the camera that is in front of driver perform real-time processing of an incoming video stream in order to infer the driver’s level of fatigue if the drowsiness is Estimated then the output is send to the alarm system and alarm is activated.

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## Objective:

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The objective of this intermediate Python project is to build a drowsiness detection system that will detect that a person’s eyes are closed for a few seconds. This system will alert the driver when drowsiness is detected.

The main aim of this is to develop a drowsiness detection system by monitoring the eyes; it is believed that the symptoms of driver fatigue can be detected early enough to avoid a car accident. Detection of fatigue involves the observation of eye movements and blink patterns.

## Scope:

This project can be used in every vehicle currently on road to ensure the safety and reduce the chances of an accident due to drowsiness or distraction of driver.

Driver drowsiness pose a major threat to highway safety, and the problem is particularly severe for commercial motor vehicle operators. Twenty-four hour operations, high annual mileage, exposure to challenging environmental conditions, and demanding work schedules all contribute to this serious safety issue. Monitoring the driver’s state of drowsiness and vigilance and providing feedback on their condition so that they can take appropriate action is one crucial step in a series of preventive measures necessary to address this problem.

Project Description:

In this Python project, we will be using OpenCV for gathering the images from webcam and feed them into a [***Deep Learning***](https://data-flair.training/blogs/deep-learning-tutorial/) model which will classify whether the person’s eyes are ‘Open’ or ‘Closed’. The approach we will be using for this Python project is as follows:

**Step 1 –** Take image as input from a camera.

**Step 2 –** Detect the face in the image and create a Region of Interest (ROI).

**Step 3 –** Detect the eyes from ROI and feed it to the classifier.

**Step 4 –** Classifier will categorize whether eyes are open or closed.

**Step 5 –** Calculate score to check whether the person is drowsy.

To overcome the problem we came up with the solution implemented in the form of image processing. To perform image processing, OpenCV are used. Python is used as a language to implement the idea.

A camera is used to continuously track the movement of eyes of the driver. This project mainly targets eyes of the driver. For detection of drowsiness, landmarks of eyes are tracked continuously. Images are captured using the camera and these images are passed to image processing module which detects the drowsiness of driver. If the driver is found to be distracted then a voice (audio) alert and 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.

### The Dataset

The images are separated into their respective labels ‘Open’ or ‘Closed’. The data comprises around 7000 images of people’s eyes under different lighting conditions.

## Block Diagram**:**

Take image as input from a camera

Detect the face in the image

Create a Region of Interest (ROI).

Detect the eyes from ROI and feed it to the classifier

Score

Score

Alarm

Resources and Limitations:

## There are various requirements (hardware, software and services) to successfully deploy the system. These are mentioned below:

### Hardware

* + - * 32-bit, x86 Processing system
      * Windows 7 or later operating system
      * High processing computer system without GPU or with GPU(high performance
      * Web cam.
      * Speakers.

### Software

The requirement for this Python project is a webcam through which we will capture images. You need to have Python (3.6 version recommended) installed on your system, then using pip, you can install the necessary packages.

**OpenCV –** pip install opencv-python (face and eye detection).

**TensorFlow –** pip install tensorflow (keras uses TensorFlow as backend).

**Keras –** pip install keras (to build our classification model).

**Pygame –** pip install pygame (to play alarm sound).

## Limitations of the Work:

## The limitations of the system are as follows.

## **1.** **Dependence on ambient light**: - With poor lighting conditions even though face is easily

## detected, sometimes the system is unable to detect the eyes. So it gives an erroneous result which

## must be taken care of. In real time scenario infrared backlights should be used to avoid poor

## lighting conditions.

## **2. Optimum range required**: - when the distance between face and webcam is not at optimum

## range then certain problems are arising. When face is too close to webcam(less than 30 cm), the

## system is unable to detect the face from the image. When face is away from the web cam (more

## than 70cm) then the backlight is insufficient to illuminate the face properly. So eyes are not

## detected with high accuracy which shows error in detection of drowsiness. This issue is not

## seriously taken into account as in real time scenario the distance between drivers face and

## webcam doesn’t exceed 50cm. so the problem never arises. Considering the above difficulties,

## the optimum distance range for drowsiness detection is set to 40-70 cm.

## **3. Hardware requirements**: - The system was run in a PC with a configuration of 1.6GHz and

## 1GB RAM Pentium dual core processor. Though the system runs fine on higher configurations,

## when a system has an inferior configuration, the system may not be smooth and drowsiness

## detection will be slow. The problem was resolved by using dedicated hardware in real time

## applications, so there are no issues of frame buffering or slower detection.

## **4. Orientation of face**: - when the face is tilted to a certain extent it can be detected, but beyond

## this system fails to detect the face. So when the face is not detected, eyes are also not detected.

## This problem is resolved by using tracking functions which track any movement and rotation of

## the objects in an image.

## **5. Poor detection with spectacles**: - When the driver wears glasses the system fails to detect

## eyes which are the most significant drawback of our system. This issue has not yet been resolved

## and is a challenge for almost all eye detection systems designed so far.

## **6. Problem with multiple faces**: - If more than one face is detected by the webcam, then our

## system gives an erroneous result. This problem is not important as we want to detect the

## drowsiness of a single driver.

## Conclusion:

## The drowsiness detection and correction system developed is capable of detecting drowsiness in a rapid manner. The system which can differentiate normal eye blink and drowsiness which can prevent the driver from entering the state of sleepiness while driving. The system works well even in case of drivers wearing spectacles and under low light conditions also. During the monitoring, the system is able to decide if the eyes are opened or closed. When the eyes have been closed for about two seconds, the alarm beeps to alert the driver and the speed of the vehicle is reduced. By doing this many accidents will reduced and provides safe life to the driver and vehicle safety. A system for driver safety and car security is presented only in the luxurious costly cars. Using drowsiness detection system, driver safety can be implemented in normal cars also.

## In this Python project, we have built a drowsy driver alert system that you can implement in numerous ways. We used OpenCV to detect faces and eyes using a haar cascade classifier and then we used a CNN model to predict the status.

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