

# DROWSINESS DETECTION SYSTEM USING COMPUTER VISION

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## ABSTRACT

It occurs when a driver is so fatigued or sleep-deprived that they are unable to maintain their full attention and alertness while driving. Drowsy driving is a problem that affects drivers of all ages and can occur at any time of day. There are many factors that can contribute to drowsy driving, including lack of sleep, and long driving hours, shift work, and the use of certain medications. Drowsy driving can also be exacerbated by factors such as alcohol or drug use or underlying medical conditions such as sleep disorders. The consequences of drowsy driving can be severe, with estimates suggesting that it may be a factor in up to 40% of motor vehicle accidents. To address this issue, I aimed to develop a system for detecting and preventing drowsy driving in real-time. I used a camera to collect data about the person's behavior and physical state. This included measures such as eye movements, facial expressions, and distance from the camera. On the software side, I developed algorithms to analyze this data in real-time and identify patterns that are indicative of drowsy driving. When drowsy driving is detected, the system can take various actions to alert the driver and prevent an accident from occurring. These actions include sounding an alarm and displaying a warning message. This can prevent an accident from occurring.

Drowsy driving is a serious safety concern that can lead to accidents, injuries, and fatalities on the road.

## 1. INTRODUCTION

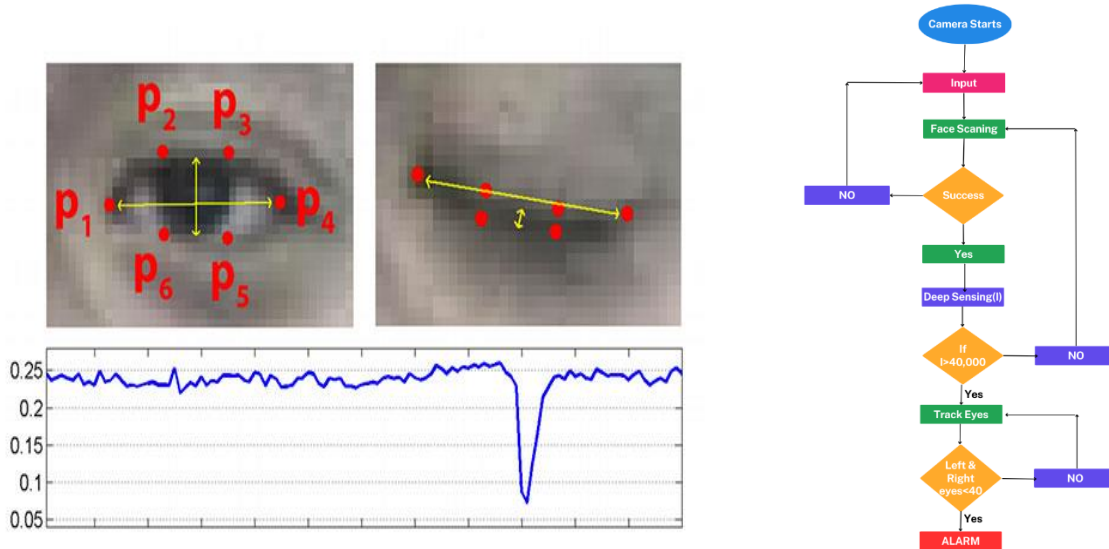
Driver's fatigue causes maximum number of accidents. Drowsiness detection reduces the car accidents and increases the safety of driver. Various studies states that around 30-40% accidents occur due to drowsy driver. The development of technology allows introducing more advanced solutions in everyday life. This makes work less exhausting for employees and increases the work safety. Now a day's vision-based systems are more popular, and it is used in different application. Detection of drowsiness involves an observation of a face, detection of eye position and the observation of eye blinking pattern. The analysis of face images is done by using a **"shape predictor containing 68-facelandmarks"**. To detect fatigue, a webcam has been used which points directly towards face and detect eye movement. In this the project the main focus was on the blinking pattern of the eyes, which involves looking at the entire image of the face, and determining the position of the eyes, by a developed image processing algorithm. Once the position of the eyes is located, the system is designed to determine whether the eyes are opened or closed and detect drowsiness. If the eyes are closed for particular time period, the alarm will play to alert the driver.

## 2. OBJECTIVES

The fundamental goal of the proposed system is to prevent road accidents by alarming drivers in the condition of Drowsiness by playing an alarm.

### 3. PROPOSED METHODOLOGY

Drowsy Driver Detection System has been developed, using the intrusive machine vision-based concepts. The system uses a web camera that points directly towards the face and monitors the eye movements in order to detect fatigue. In such a case when fatigue is detected, a warning signal is issued to alert the driver. The algorithm developed is different from any currently published papers, which was a primary objective of the project. The system deals with detecting eyes within the specific segment of the face. If these are not found for 20 consecutive frames, the system draws the conclusion that the driver is falling asleep.



In this project I have developed drowsiness detection system by using Python. The input video is captured by using webcam (camera) and then it will be extracted. The face and eye detection are done by using OpenCV. By using the Euclidean eye aspect ratio, we can get eye blinking ratio, it helps to detect either eyes are open or closed. It will detect the face and eyes of the driver by using the given commands. Then it will detect whether the eyes of driver are open or close. If the eyes are closed more than given time interval and the Euclidean eye aspect ratio is lower than the set threshold ratio it will warn the driver by playing the alarm or if eyes are open, it will display message “eyes open” and then it will go to taking the video of driver and the process will go on.

$$EAR = \frac{\|p_2 - p_6\| + \|p_3 - p_5\|}{2\|p_1 - p_4\|}$$

### 4. EXPERIMENTAL SETUP

For the purpose of detection and recognition of face Eigen face algorithm is used, further PCA is used to classify it. For the detection of eyes, I am using Haar left eye and right eye detection Cascade.

### 5. EXPECTED OUTCOMES

The System can be used to track driver's Drowsiness. It'll prevent the road accidents that occurs because of Drowsiness.

### References

A Real-Time Eye Tracking System for the Detection of Eye Blinks.

[Anja Witte](#), [Christian Lins](#)

"Driver Drowsiness Detection System Using Computer Vision" by Dey, Nilanjan, et al.

Italo Joes

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[https://github.com/italojs/facial-landmarks-recognition/blob/master/shape\\_predictor\\_68\\_face\\_landmarks.dat](https://github.com/italojs/facial-landmarks-recognition/blob/master/shape_predictor_68_face_landmarks.dat)

Adjusting eye aspect ratio for strong eye blink detection based on facial landmarks.

Christine Dewi, Rung-Ching Chen, Xiaoyi Jiang, and Hui Yu

"Real-time Eye Blink Detection Using Facial Landmarks" by Soukupová, Tereza, and Jiri Matas

"OpenCV library" - OpenCV is a widely used computer vision library, I referred to its documentation and tutorials for practical implementation of computer vision algorithms in drowsiness detection.