Capstone Project
Driver Drowsiness Alarming System

by

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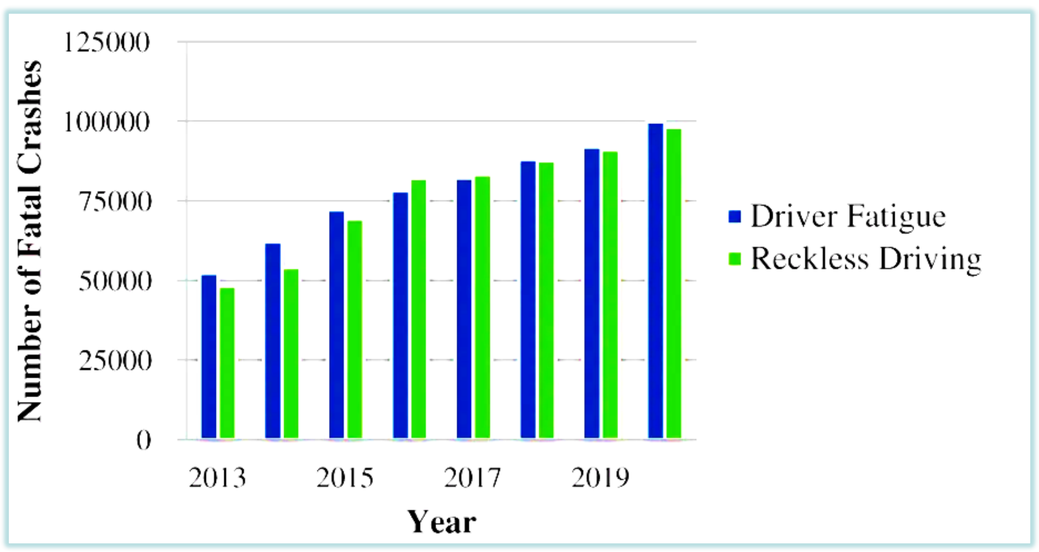
Abstract

In response to the rising concern of traffic accidents, the project aims to develop a fatigue detection and warning system for vehicles. Utilizing machine vision principles, the hybrid approach integrates non-intrusive physiological measures with eye movement patterns to effectively determine a driver's level of drowsiness. The goal is to proactively prevent accidents by issuing timely alerts to fatigued drivers, contributing to enhanced road safety.

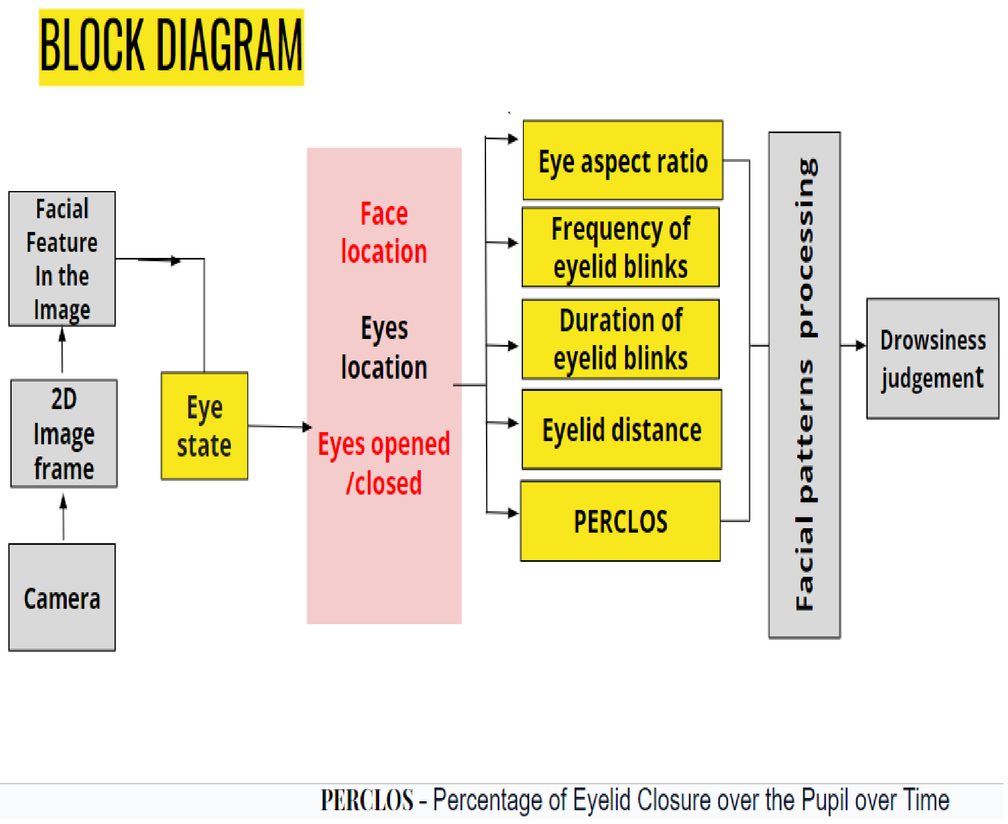
Introduction

Addressing the significant issue of tired drivers causing a 30% to 40% increase in accidents, our project focuses on leveraging technological advancements for drowsiness detection using a vision-based system. The developed image processing algorithm identifies the eyes' location, triggering an alarm if closed for a specific duration(5 secs). Mitigating the dangers of driver fatigue, our system aims to enhance road safety by providing timely warnings.



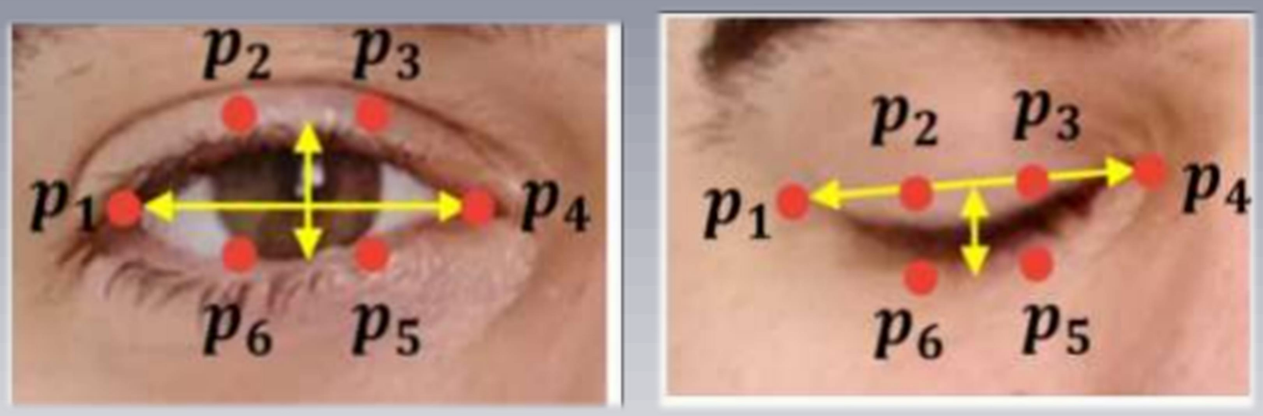
Proposed Method

A block diagram detailing the operation of a driver drowsiness detection system with an alarm mechanism is depicted in the below image provided. The following steps are taken by the system to function:



PERCLOS - Percentage of Eyelid Closure over the Pupil over Time

Experimental Results and Discussion



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

The primary approach for image feature detection relies on extracting facial landmarks. The dlib library includes a facial-landmark detector that identifies 68 coordinates. For open eyes, the coordinates contribute to calculating the Eye Aspect Ratio (EAR), approximately 0.24. In contrast, closed eyes exhibit an EAR of around 0.15.

Conclusions

In conclusion, driver drowsiness detection systems play a crucial role in enhancing road safety by mitigating the risk of accidents caused by drowsy driving. By employing advanced image processing techniques to monitor driver behavior, these systems effectively identify and alert drivers of drowsiness, providing timely interventions to prevent potential crashes.

References

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