Detecting Driver Fatigue with Python and OpenCV

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Objectives:

- Develop a driver safety system using computer vision and facial recognition technology.

- Alert the driver if they appear to be falling asleep or losing focus while driving.

- Send an alert message to the owner of the vehicle if the driver appears to be fatigued or has repeated the same activity for some duration.

- Store video footage of the driver's face and eyes in cloud storage for up to 30 days, which can be used as evidence in the event of an accident.

- Demonstrate the feasibility and effectiveness of using computer vision and facial recognition technology to improve driver safety.

Abstract:

This project develops a driver safety system using computer vision and facial recognition technology to detect driver fatigue in real-time. The system alerts the driver and the vehicle owner if fatigue is detected, and can store video footage of the driver's face and eyes for up to 30 days. The goal is to improve driver safety and reduce the risk of accidents caused by fatigue.

Abstract:

System based on eye recognition to detect whether the driver is sleeping or not by classifying the eyes into closed or open by using Euclidean distance. If the driver continues to close his eyes for sometime driver will get an beep alarm.
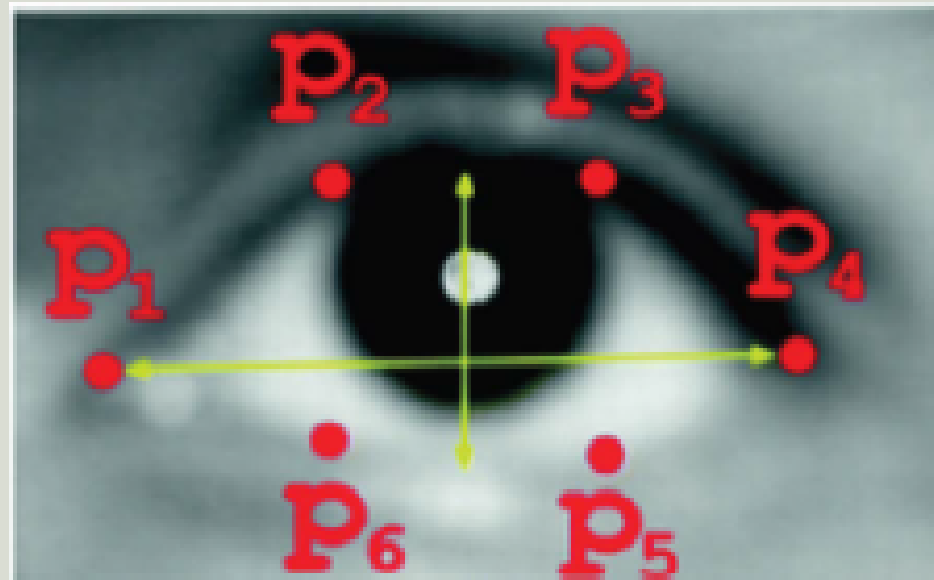
$$\text{EAR} = \frac{\|p_2 - p_6\| + \|p_3 - p_5\|}{2\|p_1 - p_4\|}$$

Software used:

Software:

- Python programming language
- OpenCV library for image processing
- dlib library for facial detection and recognition
- NumPy library for numerical computing
- PiCamera library for controlling the camera module
- Time library for working with time and dates
- PlaySound library for playing audio alerts

Existing System:

There are existing systems in the market that use similar technology to detect drowsiness and prevent accidents, such as cameras to monitor the driver's face and sensors in the steering wheel. Some car manufacturers have also started to incorporate advanced safety features.

However, these systems are still in early stages of development and may not be widely available or affordable. This mini project aims to make driver safety technology more accessible by developing an affordable system that can be used as an accessory for any vehicle.

Advantages:

- Improved driver safety
- Easy installation
- Affordable
- Cloud storage for video footage
- Customizable alerts

Disdvantages:

- False positives
- Limited effectiveness
- Privacy concerns
- Technical limitations

Modules Installed:

- OpenCV
- dlib
- NumPy
- PiCamera
- Time
- PlaySound

Thank You