

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

INSTITUTE OF ENGINEERING & TECHNOLOGY (Sitapur Road, Lucknow, Uttar Pradesh, India)

2023



DRIVER DROWSINESS DETECTION SYSTEM



by

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Objective

The objective of this project is to ensure the driver safety in the car.

As Per the records each year about 100,000 crashes get reported involving drowsy driving.

THE HINDU

Sleep-deprived drivers responsible for 40% of road accidents, say transport officials





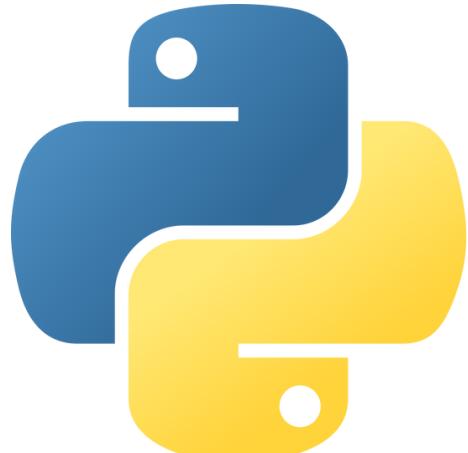
Introduction

- This Project is implementing the system as a prototype by capturing the live images of the eyes and software is used to process the video and convert it into frames and process it accordingly.
- On the whole, by sensing the eye blinks we can decide if the eye blinks are more than the normal ones then driver is very sleepy and it will automatically alert the driver.





Technology



OpenCV

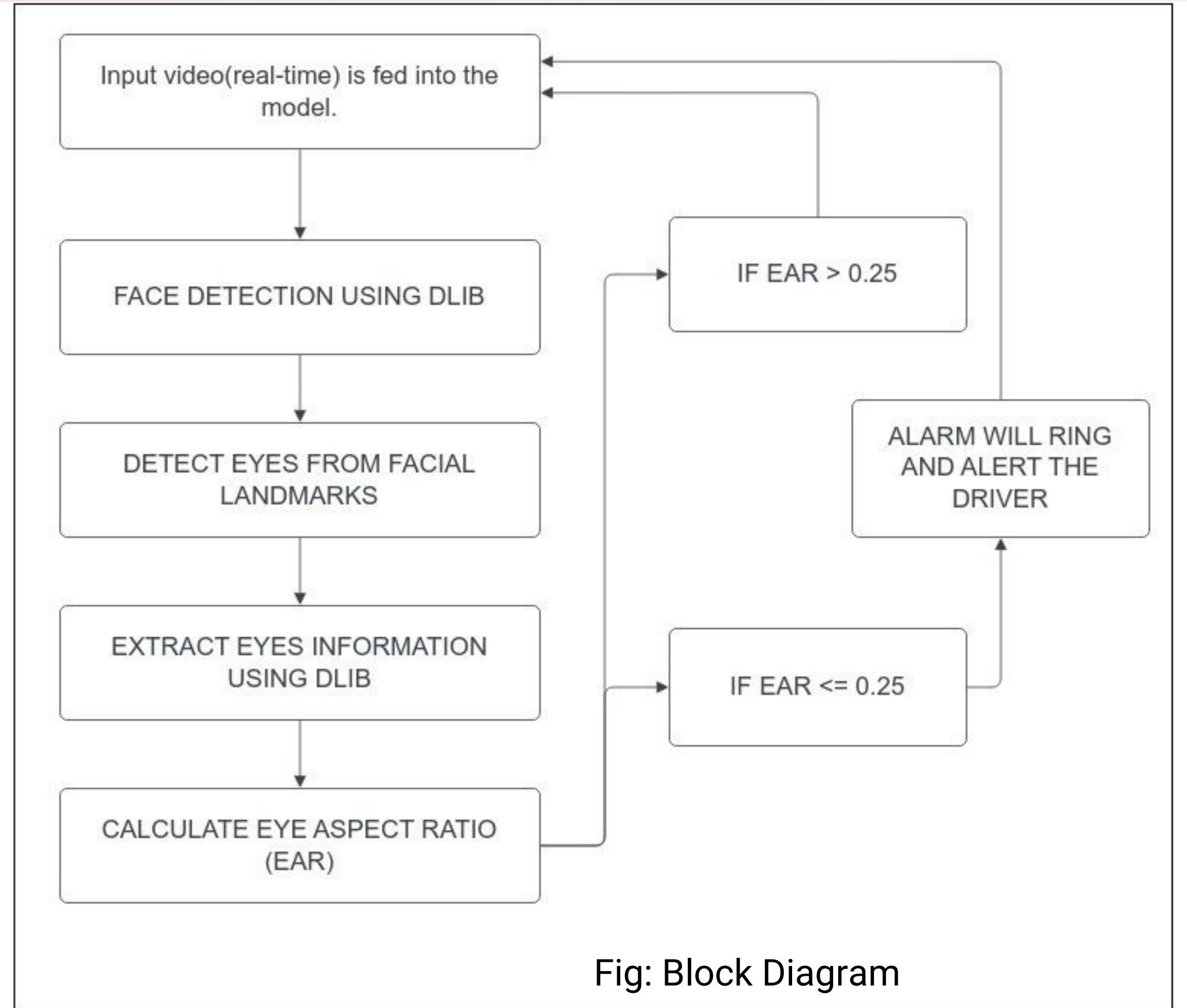


- Python: Python is a high-level, general-purpose programming language.
- OpenCV: OpenCV is a library of programming functions mainly for real-time computer vision.
- Dlib: It is used to estimate the location of 68 coordinates (x, y) that map the facial points.
- Numpy: It is used for working in domain of linear algebra, fourier transform, and matrices.

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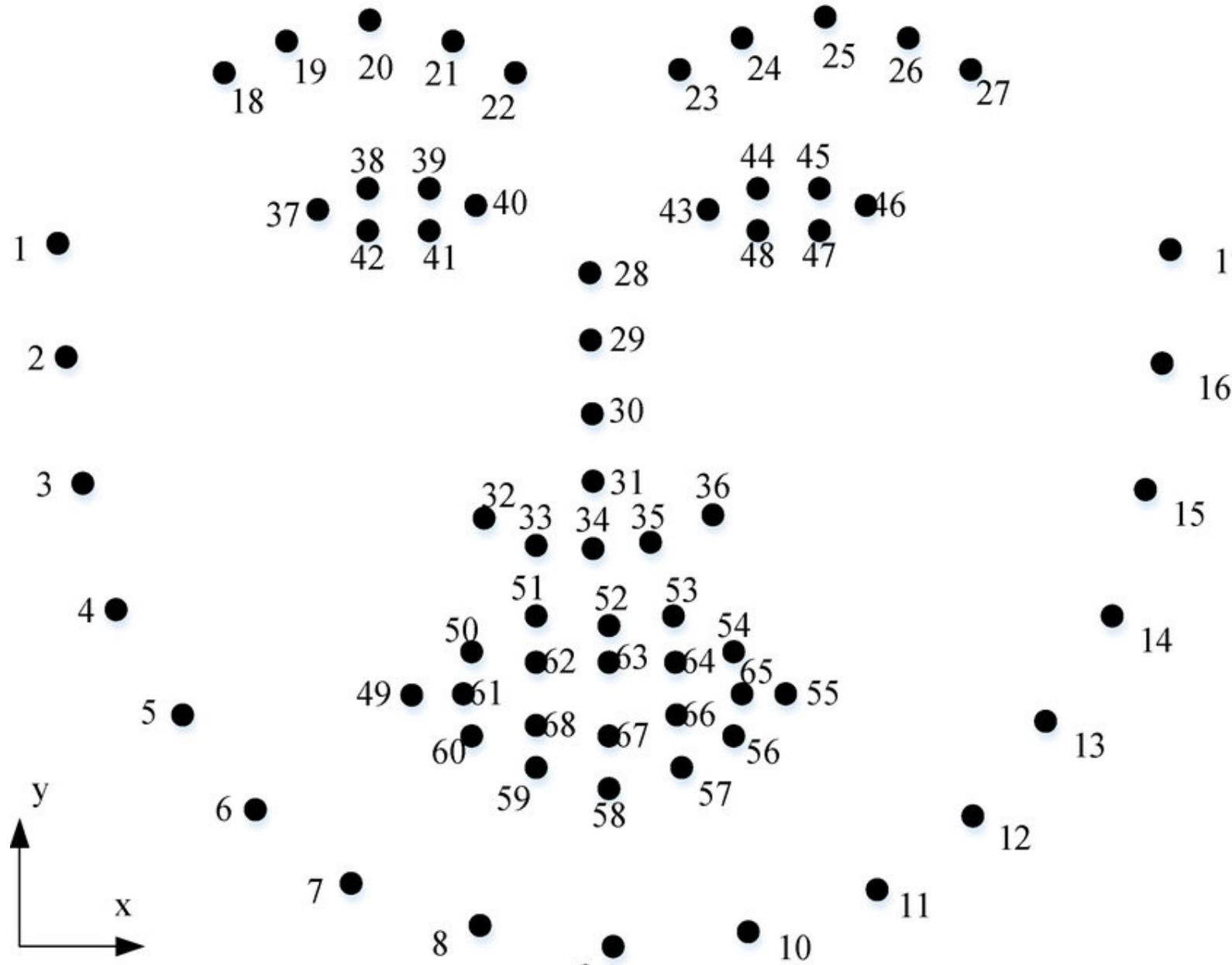
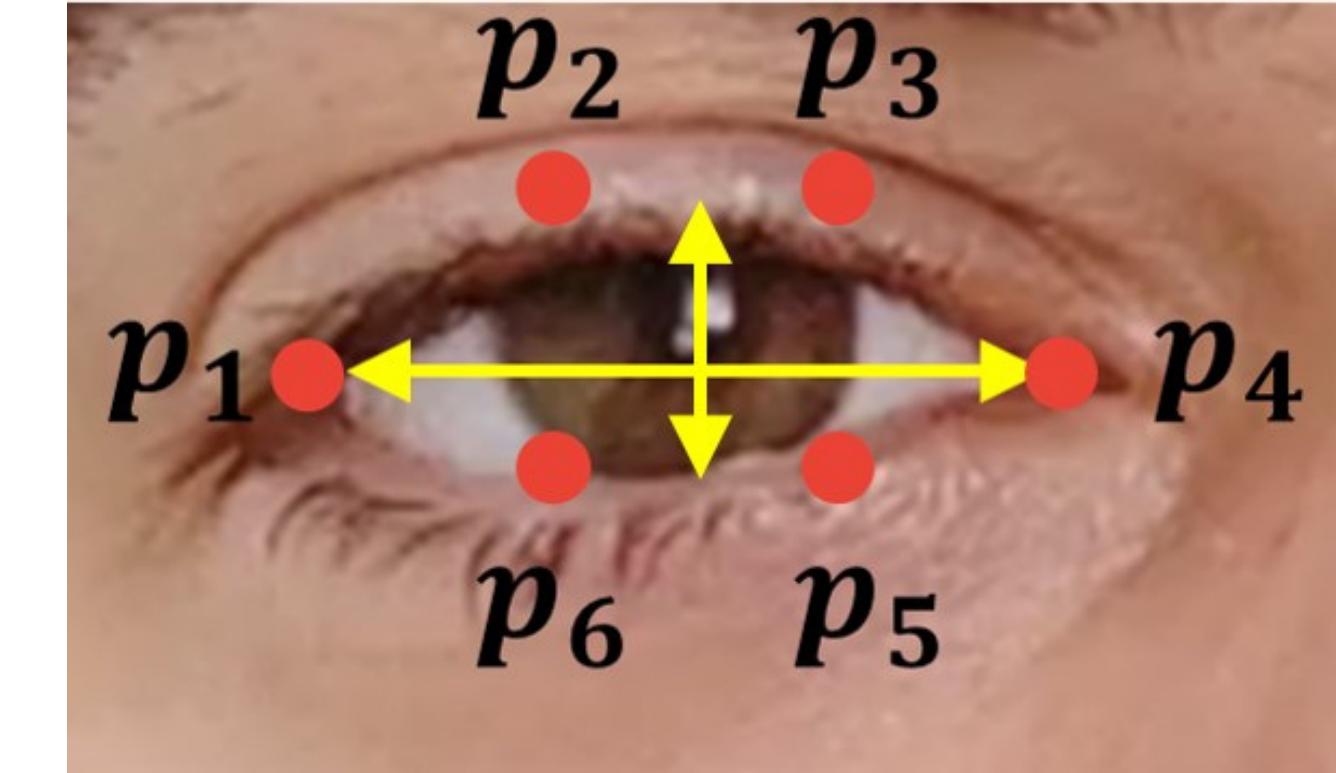


Fig: Dlib 68 Landmarks



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



EYE								
EAR	0.40	0.39	0.34	0.33	0.31	0.29	0.21	0.12

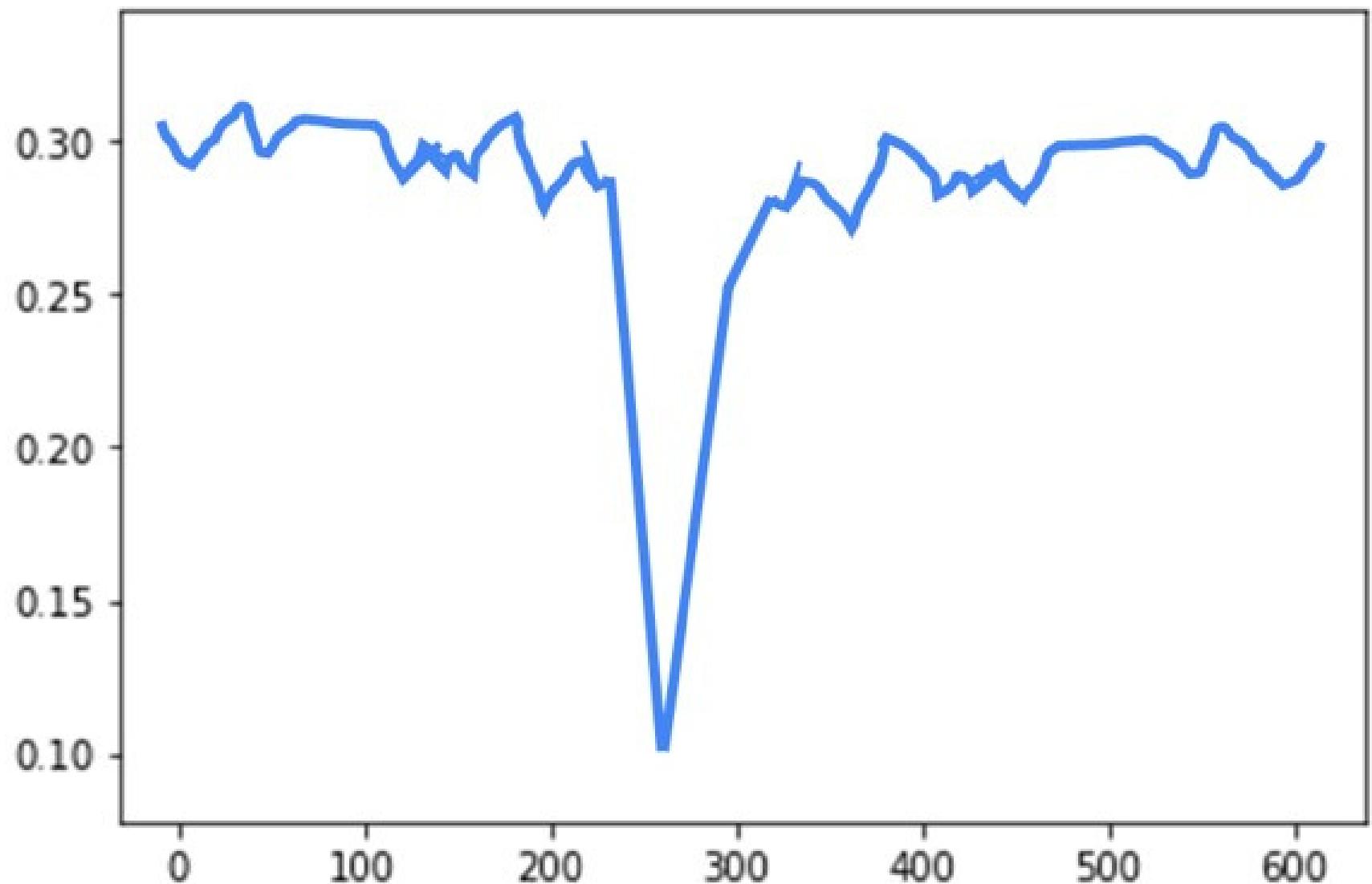


Fig: EAR Graph



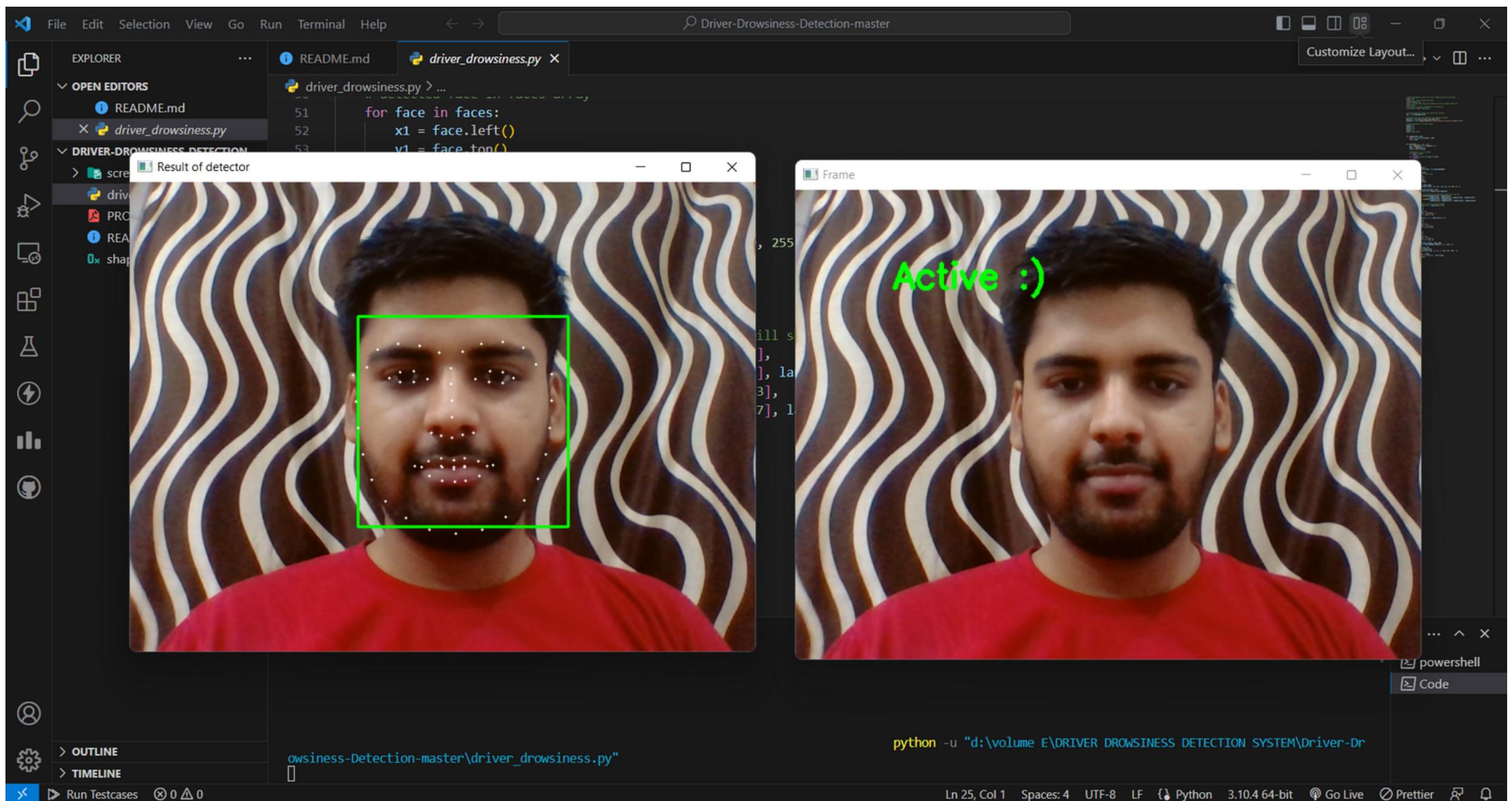
Future Scope

- This project can be implemented in the form of mobile application to reduce the cost of hardware.
- This program can also be used for aircrafts.
- Conduct additional simulator experiments to validate the algorithm, test additional road conditions, and test a more diversified group of drivers.
- Test and refine the algorithm based on the road test data, and conduct research on warning systems integrated with the detection system.



Result of image processing and recognition

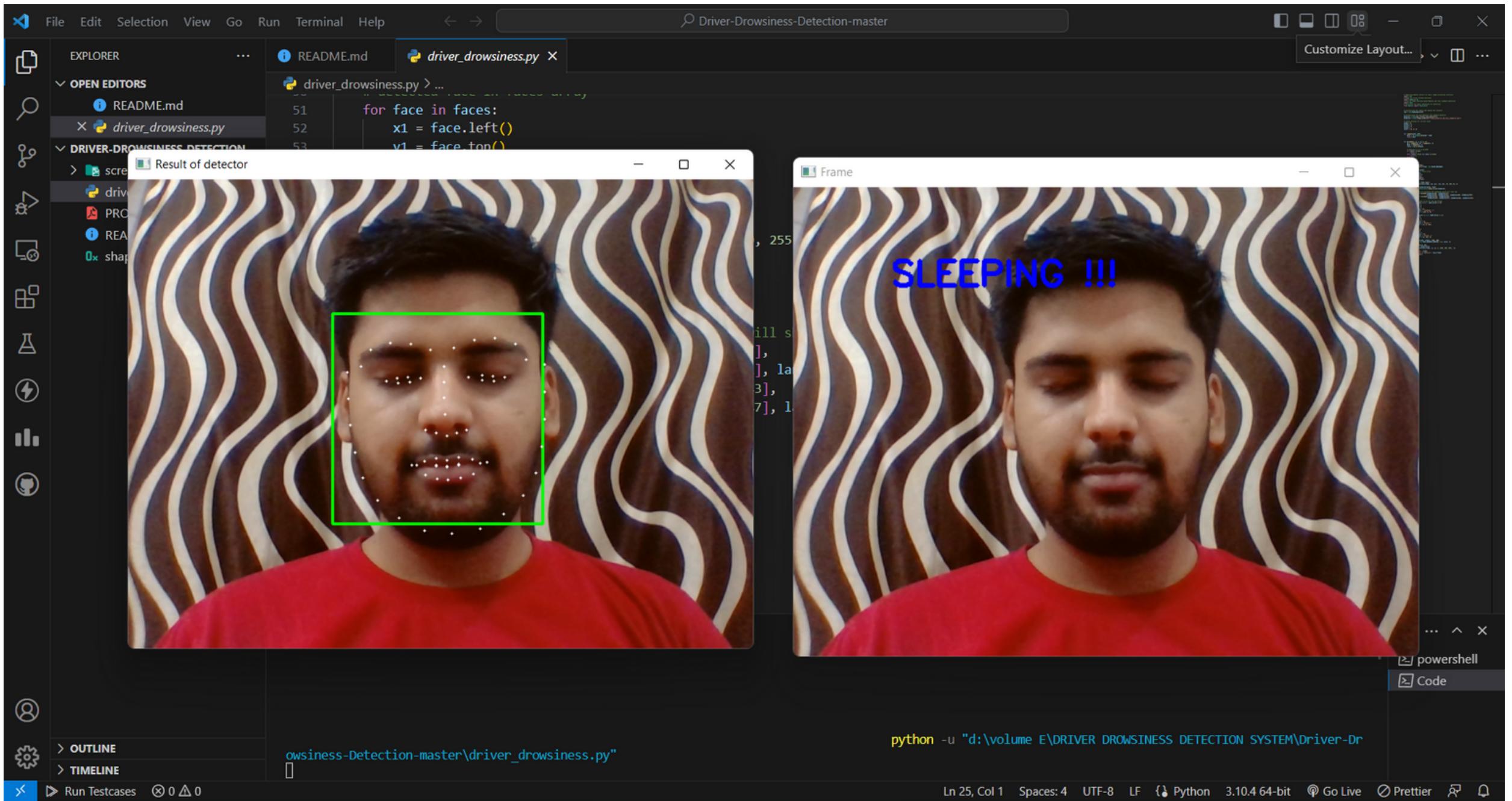
When the driver is Active





Result of image processing and recognition

When the driver is Sleepy





Action Plan for Implementing the Project

What We Have done in 7th Semester

- Literature Survey and study the features of OpenCV, Numpy
- Study the features of Dlib 68 facial landmark detectors.
- Implemented the Facial And Eyes Recognition.
- Implemented Extraction of Information or data from the recognized images.

What We have done in this Semester

- Created the Frontend GUI for result.
- Implemented the EAR Calculation.
- Implemented the Alerting Feature.
- Implemented Android Application for Drowsiness Detection

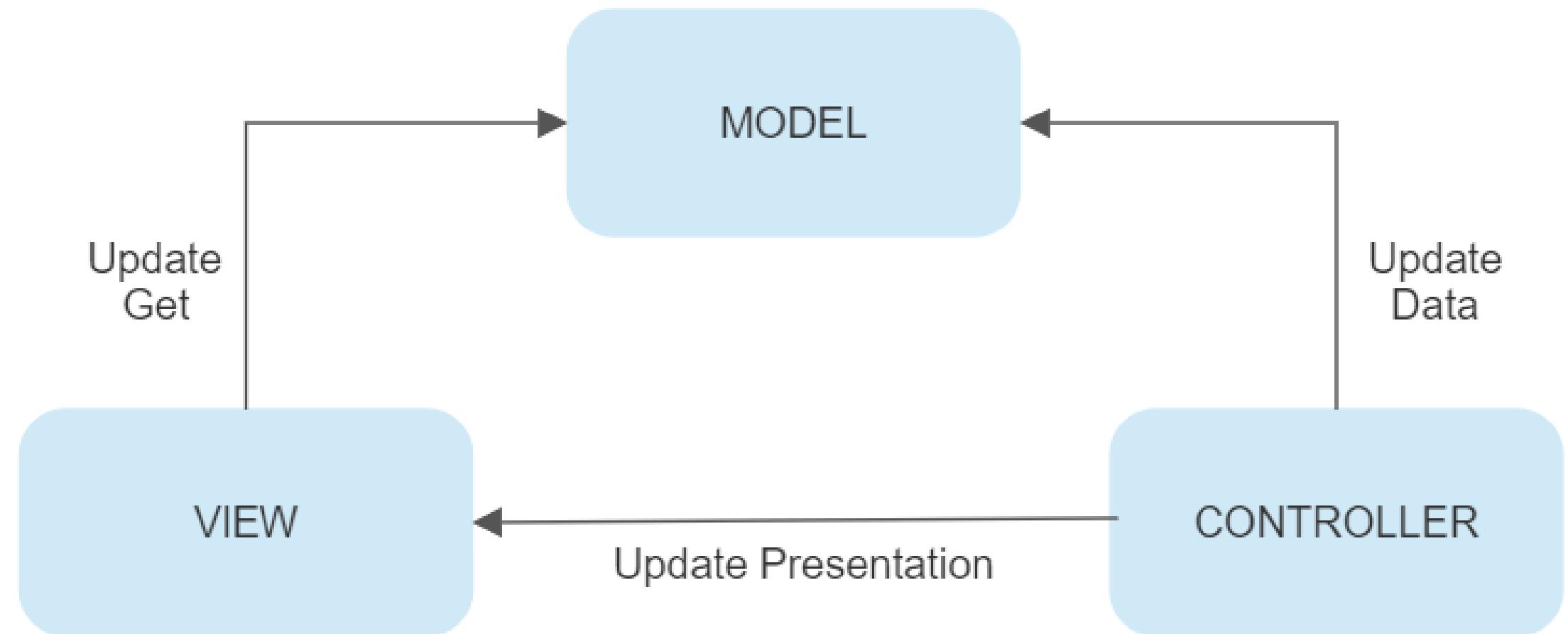


Advantages of Driver Drowsiness Android Application

- Mobility and Flexibility
- Cost-Effective Solution
- Integration with Existing Technologies
- User-Friendly Interface
- Regular updates and improvements
- Real-time notifications and alerts
- Accessibility



Android Architecture Patterns





Driver Drowsiness Android Application

- Driver drowsiness is an android application that helps to combat a dangerous heavily vehicle accident that are social issue known as drowsy driving.
- It takes the driver eye's and detect the eye by id key and initiates alarm alert when driver tends to sleep while driving.
- We are using the help of **Google Mobile Vision Library**



Challenges

- First we are use the **openCV api** to detect the face and eye on the android app using the library.
- Last time openCV has stopped their upgraded version of mobile app so after the we develop the app but it is not successfully run over the android phone .
- We use the **Google Mobile Vision Library** to detect the face and eye and then we are using the help of google vision api to create the Driver Drowsiness App.



Google Vision API

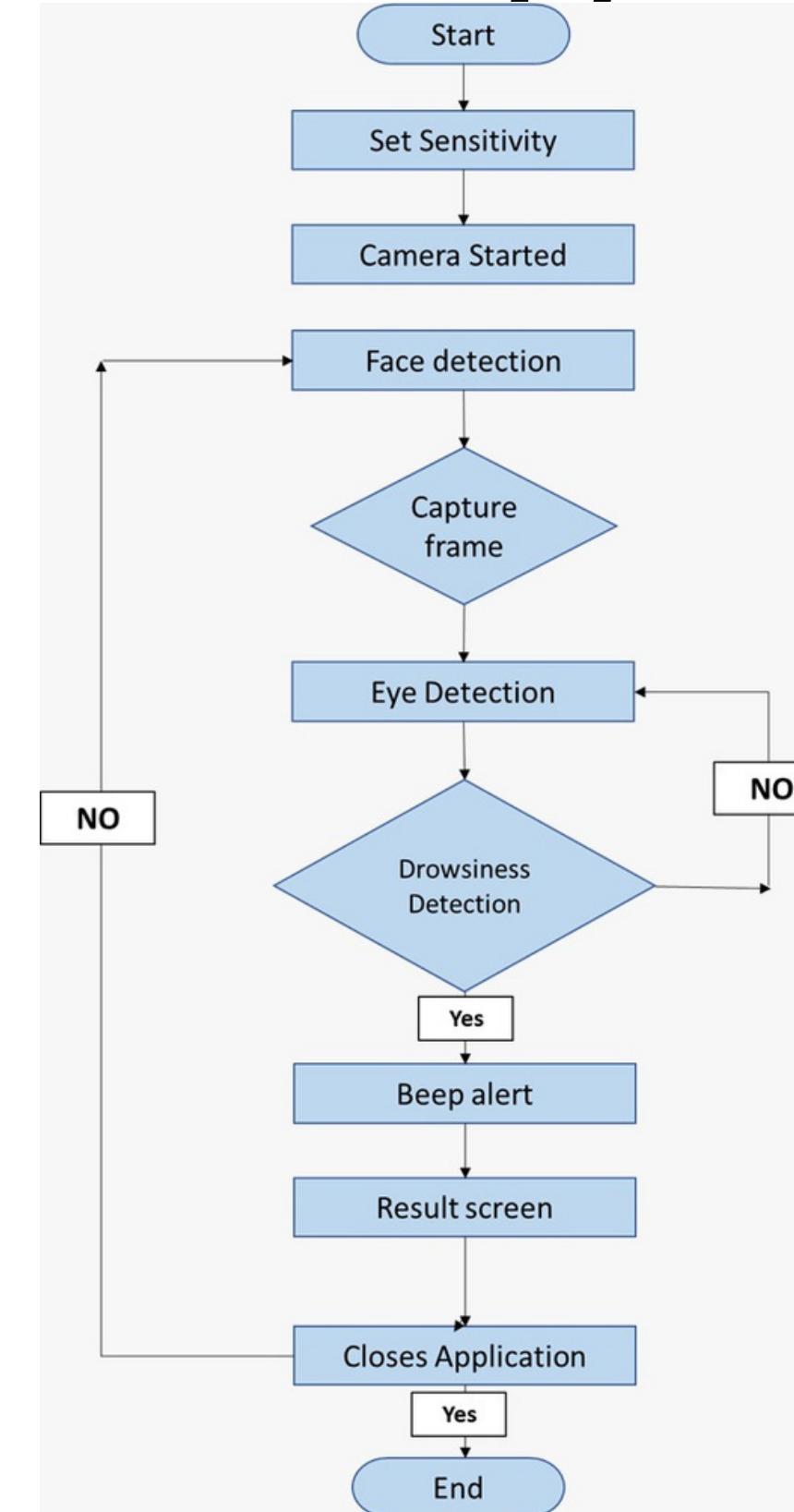


Google Vision API

- The Vision API allows developers to easily integrate vision detection features within applications, including image labeling, face and landmark detection.
- The Mobile Vision API provides a framework for finding objects in photos and video. The framework includes detectors, which locate and describe visual objects in images or video frames, and an event driven API that tracks the position of those objects in video.



Flow chart of Application





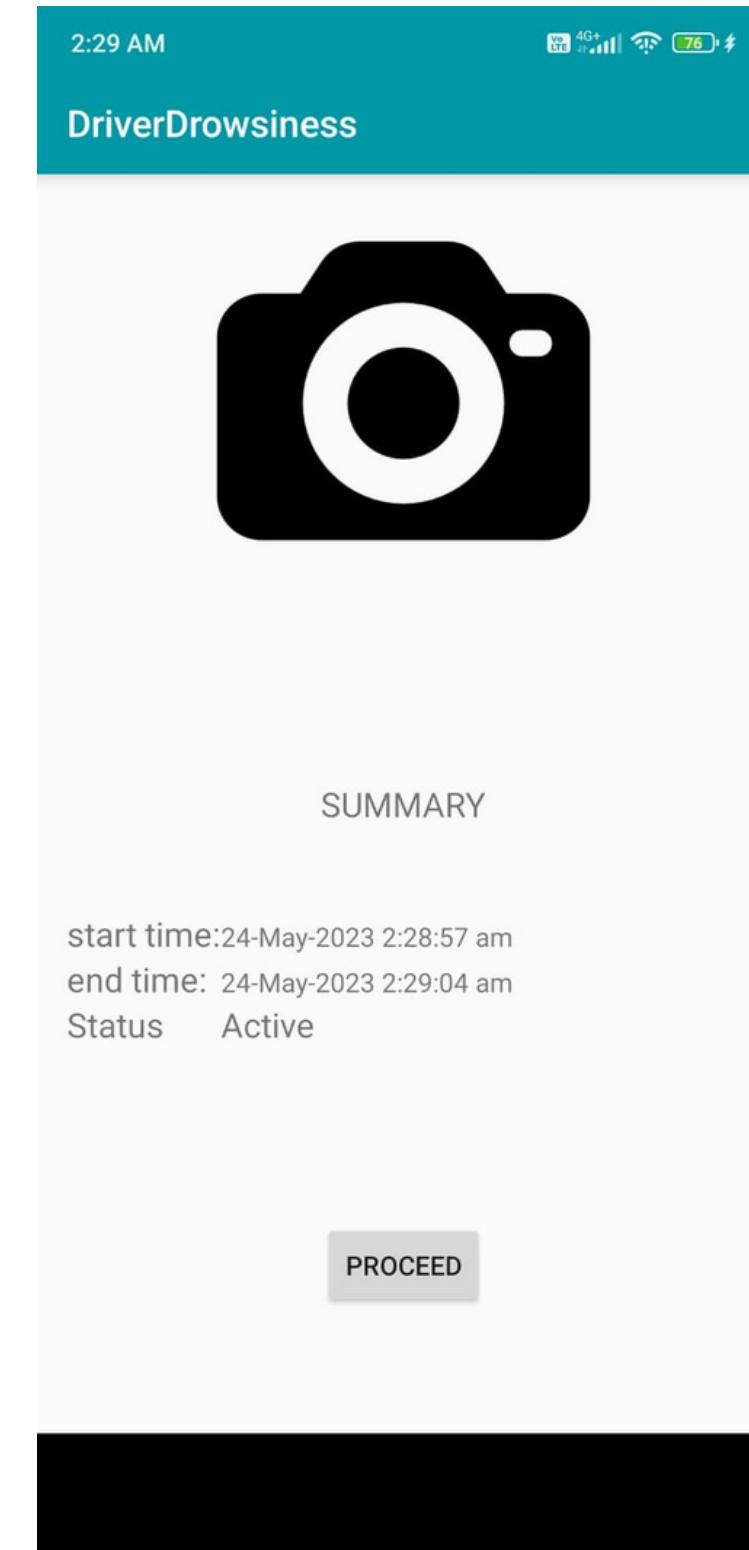
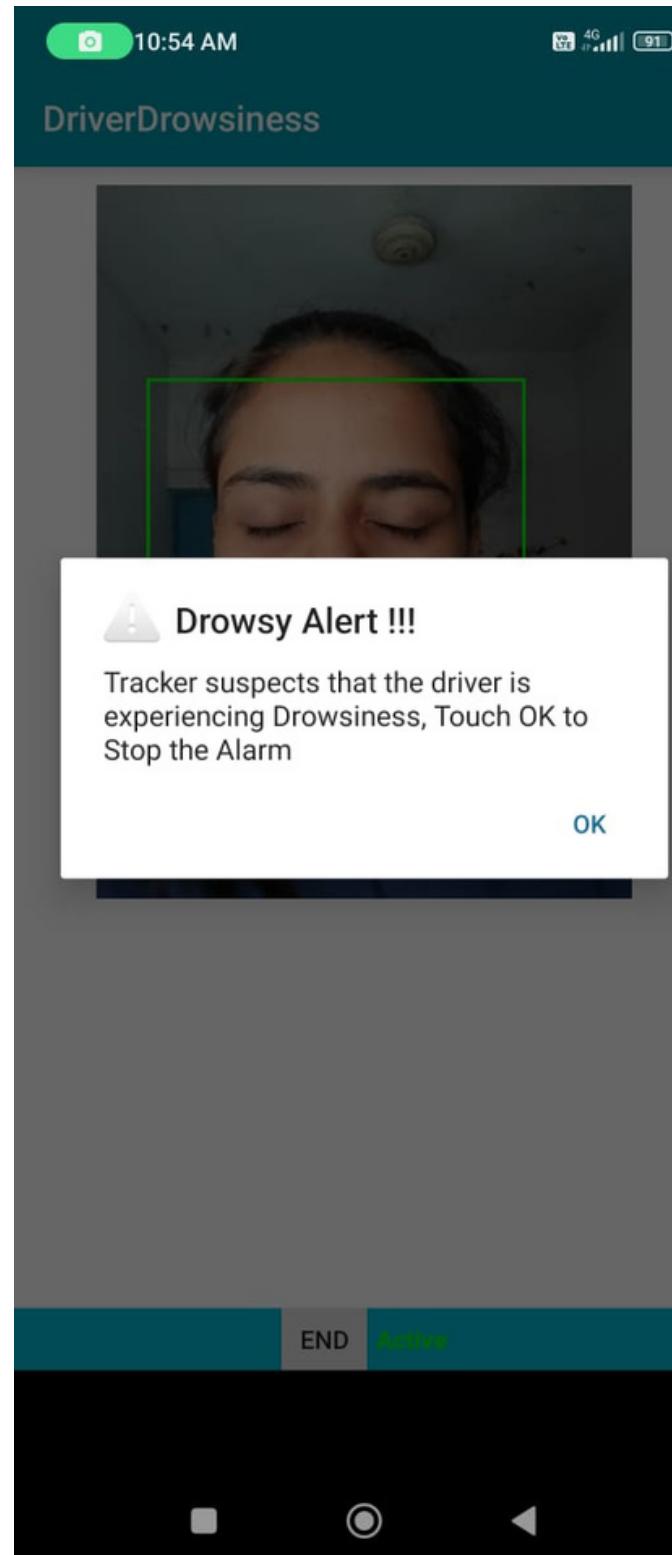
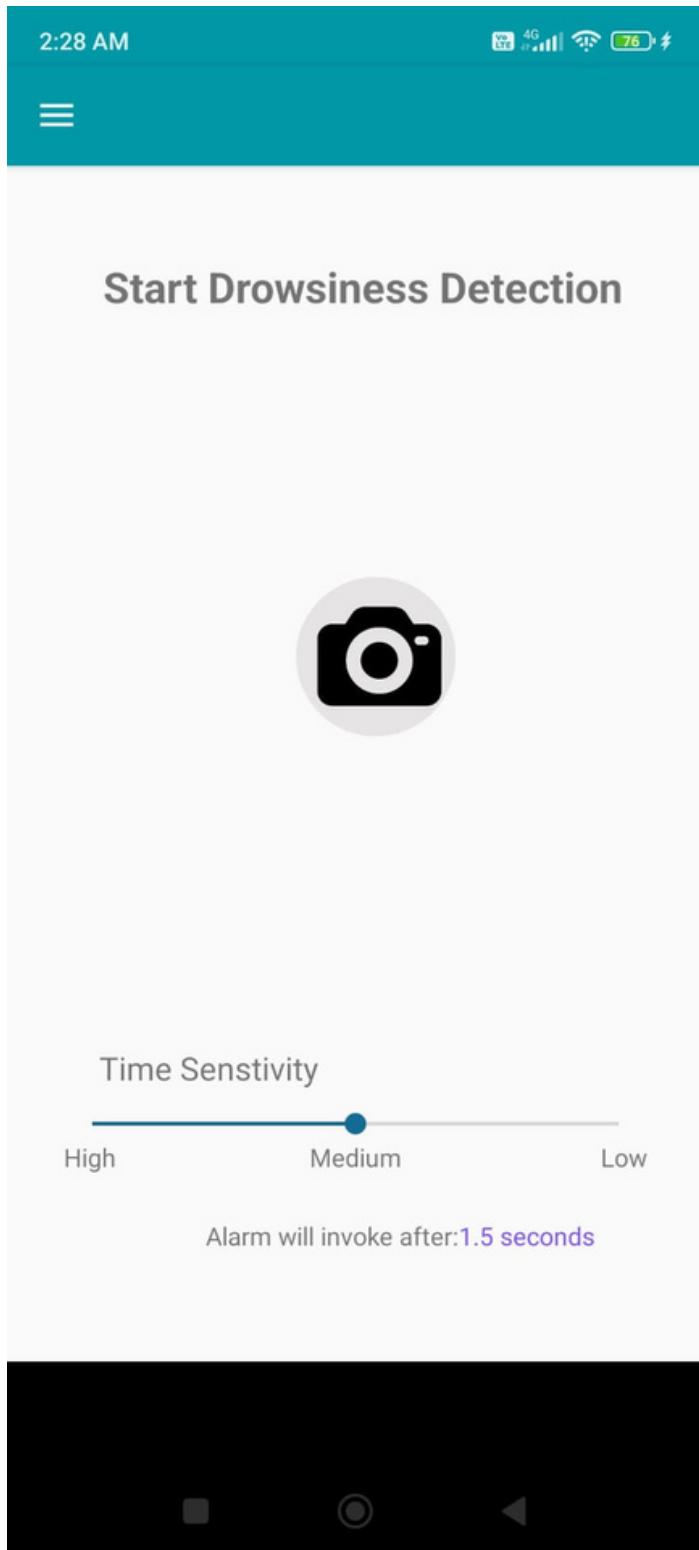
Components of Android Application

- **Camera Access and Frame Acquisition** : The app utilizes the device's camera to capture frames in real-time.
- **Face Detection** : The Google Mobile Vision Library is employed to detect and locate the driver's face within the acquired frames.
- **Eye State Monitoring** : The app utilizes eye tracking algorithms to monitor the driver's eye state.



- **Eye Blink Detection** : Using the Google Mobile Vision Library, the app can detect and track eye blinks, providing insights into the driver's level of alertness.
- **Facial Landmark Detection** : The app utilizes the Google Mobile Vision Library to identify specific facial landmarks, enabling more accurate analysis.
- **Machine Learning Algorithms** : The app incorporates machine learning algorithms to analyze the collected data.
- **Alert System** : Based on the analysis of the driver's drowsiness level, the app can generate alerts using visual, auditory, or haptic feedback.

Screenshots of Application





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Thank You