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DRIVER DROWSINESS DETECTION SYSTEM

B. Jagadeesh[1], A. Umesh Chandra[2], G. Uday Sankar Reddy[3], G. Satish[4], Md. Shakeel Ahmed[5]

[1,2,3,4] Department of Information Technology, VVIT, AP, India
[5] Associate Professor, Dept. of Information Technology, VVIT, AP, India

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Abstract - The proposed system is an intelligent driver drowsiness and distraction detection system designed to enhance road safety. By utilizing computer vision techniques and facial landmarks analysis, the system aims to monitor the driver's eye and mouth activities in real-time. It triggers alarms and alerts the driver when signs of drowsiness or distraction are detected. The system contributes to reducing the risk of accidents caused by driver fatigue and inattention

Key Words: OpenCV, Dlib, Face Recognition, Computer Vision (CV), Drowsiness Detection.

1. INTRODUCTION

Driver fatigue and distractions are major contributors to road accidents. To enhance road safety, the proposed system employs computer vision and facial landmarks analysis. By monitoring eye and mouth movements in real time, it detects drowsiness and distractions that can impair driving.

The system's use of advanced algorithms and libraries enables accurate evaluation of the driver's state. Key metrics like eye aspect ratio (EAR) and mouth aspect ratio (MAR) provide vital insights. Alarms and alerts are triggered when these metrics deviate from safe levels, prompting timely corrective action. This system's proactive approach shows potential in reducing accidents caused by fatigue and distractions, thus making roads safer for everyone

2. EXISTING SYSTEM

The existing system utilizes libraries such as scipy, imutils, pygame, dlib, and cv2 to build a real-time driver drowsiness detection system. It processes video frames from a webcam, detects facial landmarks, calculates the eye aspect ratio and triggers alarms when the driver is detected to be drowsy. The system includes features to handle different levels of drowsiness and distraction scenarios.

Some of the major disadvantages includes:

(1) The existing system focuses solely on drowsiness detection, not distraction detection.
(2) It lacks a comprehensive approach to handling different types of distractions.
(3) The system might generate false alarms or fail to detect certain scenarios due to limited feature coverage.
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3. PROPOSED SYSTEM

The proposed system enhances the capabilities of the existing system by introducing distraction detection in addition to drowsiness detection. It utilizes dlib for face and landmark detection, and calculates the eye and mouth aspect ratios. The system maintains different timers for drowsiness and distraction detection intervals. Alarms are triggered based on predefined thresholds and intervals. Additionally, it provides feedback on the level of drowsiness or distraction detected, offering a more comprehensive solution.

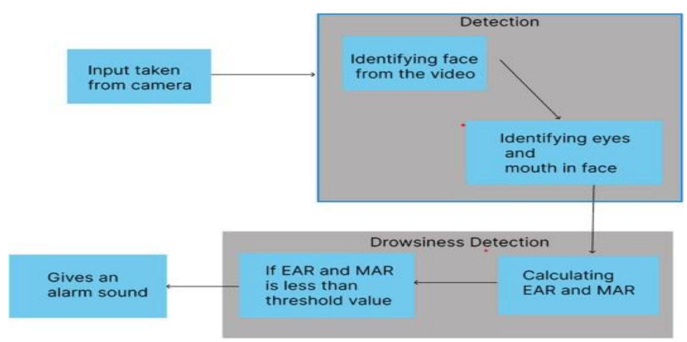


Fig : Block Diagram of Proposed System

The project initiates by setting up the video capture interface with the webcam using OpenCV, a widely used open-source computer vision library. The **cv2.VideoCapture(0)** function initializes a video capture object to access the camera, enabling the system to read video data from this object for subsequent processing.

Moving forward, the system leverages the dlib and imutils libraries for facial processing. The **dlib.get_frontal_face_detector ()** function detects the presence of frontal faces in the video frames, while the **dlib.shape_predictor(shape_predictor_path)** function identifies the specific facial landmarks necessary for calculating the eye and mouth aspect ratios.
The code continuously captures frames from the video feed, processes them, and displays the frames in a window using OpenCV's **cv2.imshow()** function. Various computed parameters, such as the eye aspect ratio (EAR), mouth aspect ratio (MAR), and the frames-per-second (FPS), are displayed on the screen to provide real-time feedback to the user. Additionally, the system triggers audio alerts using the Pygame mixer library when drowsiness, yawning, or distraction is detected based on the computed facial parameters and predefined thresholds.

The user can exit the application by pressing the 'q' key. The proposed system integrates multiple components, including facial landmark detection, aspect ratio calculations, and real-time audiovisual feedback, to create an effective driver drowsiness and distraction detection mechanism using computer vision techniques.

4. OBJECTIVES

(1) Real-time detection of driver drowsiness and distraction using facial landmarks.
(2) Utilizing eye aspect ratios (EAR) and mouth aspect ratios (MAR) for drowsiness and distraction identification.
(3) Implementing sound alarms to alert the driver in case of drowsiness or distraction.
(4) Integrating computer vision techniques for accurate facial feature extraction and analysis
(5) Providing a user-friendly interface with live video feed for monitoring.
(6) Enabling automatic detection and alerting without the need for any external hardware.

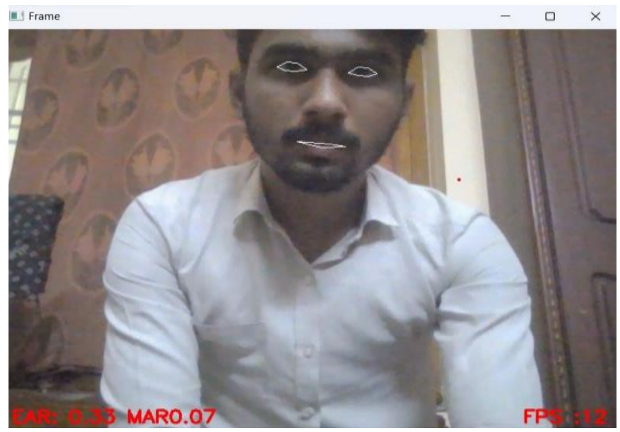
5. METHODOLOGY

The methodology implemented in the system is divided into four modules as follows:

1. Face Recognition
2. Detection of Drowsiness
3. Detection of Distraction
4. User Interface and Interaction

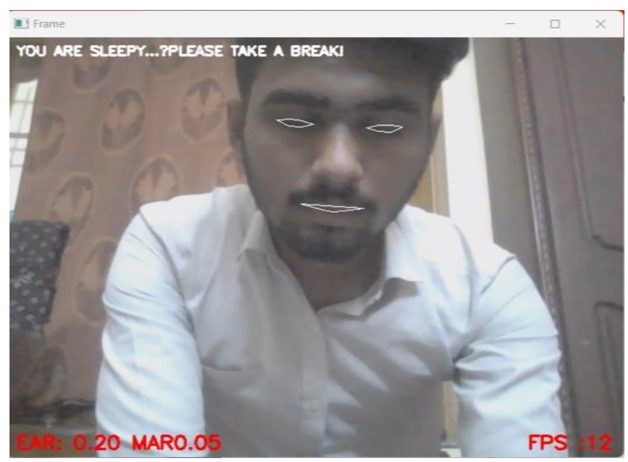
By implementing these four modules step by step Driver Drowsiness Detection System is developed. In this proposed framework, we are going to utilize camera and the speaker for the reading inputs and playing outputs.

5.1. FACE RECOGNITION



This module focuses on accurately detecting and interpreting user hand gestures. Utilizes computer vision libraries such as OpenCV for real-time video capturing.

5.2. DETECTION OF DROWSINESS



This module will identify whether the driver is drowsy or not after detecting the face it analyzes the face which was captured through webcam based on eye and mouth movements of the driver. We have used Dlib library for identifying facial landmarks.

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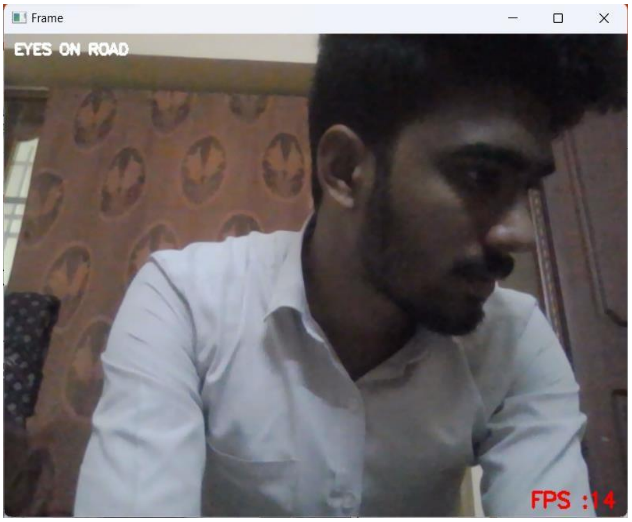
5.3. DETECTION OF DISTRACTION

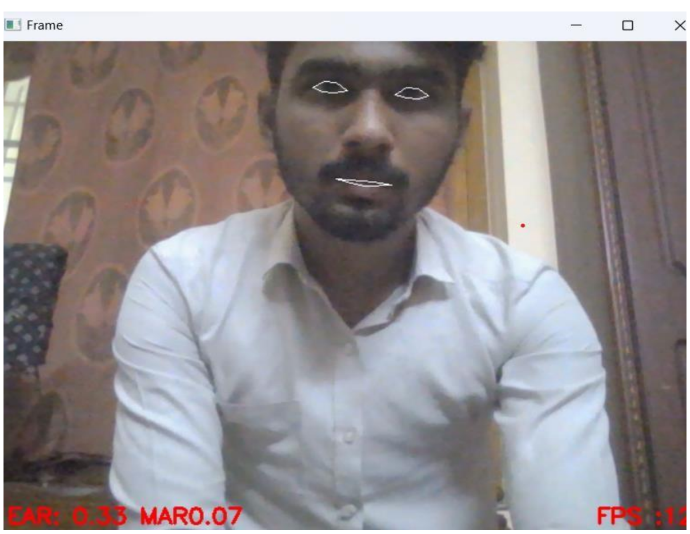


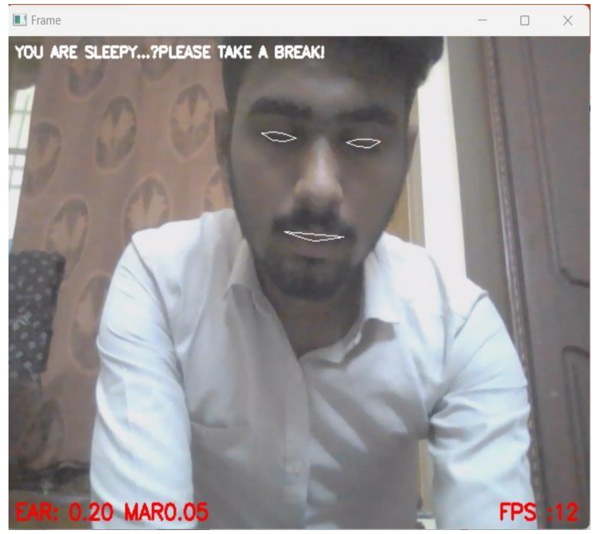
This module will identify whether the user is distracted or not after detecting the face through webcam it analyzes the video and checks whether the driver is seeing the road or not.

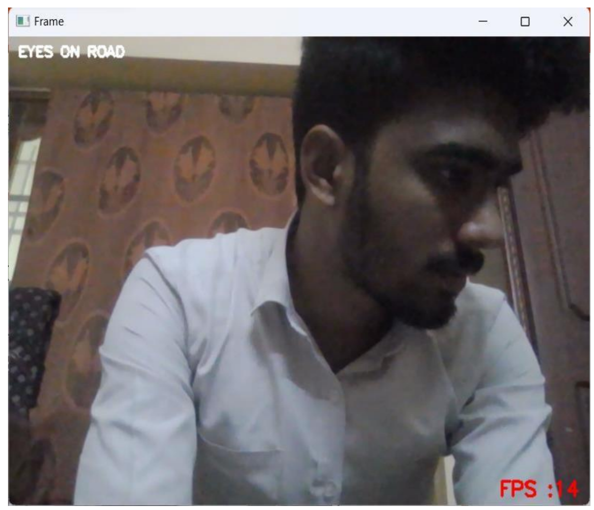
5.4 USER INTERFACE AND INTERACTION

Ensures a user-friendly and intuitive interaction experience by providing audio feedback. Includes a graphical user interface for user guidance and interaction management.

6. OUTPUT SNAPSHOTS







7. CONCLUSION

This real-time facial monitoring system is a significant step toward making various activities safer, such as driving and healthcare.

It's easy to customize and has the potential for more improvements, like connecting to the internet or understanding changes in how people talk.

This system leverages computer vision techniques and facial landmark detection to address the critical issues of drowsiness and distraction in individuals, alerting them promptly to mitigate potential risks.

8. FUTURE ENHANCEMENT

(1) **Adaptive Alarms**: Customize alarm responses based on the severity of drowsiness or distraction. For instance, the system can issue a gentle alert for mild drowsiness and a more urgent warning for extreme cases.

(2) **Multi-Modal Sensing**: Integrate additional sensors, such as heart rate monitors or EEG sensors, to complement facial monitoring. Combining multiple sources of data can enhance the system's accuracy and reliability in detecting drowsiness and distraction.

(3) **Integration with Wearables**: Extend the system's functionality to wearables, such as smart glasses or augmented reality (AR) headsets. Users can benefit from real-time alerts displayed in their field of vision.

(4) **Alert Preferences**: Allow users to customize their alert preferences, including the choice of alarms, alarm volume, and visual cues. Personalized settings can make the system more user-friendly.

9. REFERENCES

1]. Ameratunga.S, Bailey.J, Connor.J, Civil.I, Dunn.R, Jackson.R, Norton.R, and Robinson.E, ―Driver sleepiness and risk of serious injury to car occupants: Population control study. || British Medical Journal, vol. 324, 2002, pp. 1125–1129.

[2]. Bronte.S, Bergasa.L, Delgado.B, Garcia.I, Hernandez.N and Sevillano.M, ―Vision- based drowsiness detector for a realistic driving simulator, || in IEEE Intelligent Transportations Systems Conference (ITSC), 2010.

[3]. Distante. A, D'Orazio. T, Guaragnella. C and Leo .M, ―A visual approach for driver inattention detection, ||Pattern Recogn., vol.40, no. 8, 2007, pp. 2341–2355.

[4]. Bradski. G, Kaehler. A, -Learning OpenCV, O'Reilly, 2008.

[5]. Igarashi.K, Itou.K, Itakura.F, Miyajima.C, Ozawa.T, Takeda.K and Wakita.T, ―Driver identification using driving behavior signals, ‖ IEICE - Trans. Inf. Syst., vol. E89-D, 2006.

[6]. Nakano.T, Suzuki.M, Yamamoto.N, Yamamoto.O and Yamamoto.S, ―Measurement of driver's consciousness by image processing a method for presuming driver's drowsiness by eye-blinks coping with individual differences. ‖ Systems, Man