iJRASET
International Journal For Research in
Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 14 **Issue:** IV **Month of publication:** April 2026

DOI:

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 14 Issue IV Apr 2026- Available at www.ijraset.com

Research on Driver Drowsiness and Distraction Detection System

Eshwari Lade[1], Prof. N.P. Jangada[2], Srushti Kaulwar[3], Achal Gajbhiye[4], Payal Sune[5], Dishika Akhare[6]
Department of CSE, Sipna College of Engineering and Technology Amravati, India

Abstract: The "Driver Drowsiness and Distraction Detection System" is an AI-powered safety solution developed using Python. It uses a laptop camera to monitor the driver's eye activity in real time through computer vision techniques like OpenCV and Dlib or Mediapipe. The system intelligently detects eye closure duration to assess drowsiness levels — triggering alerts when eyes remain closed beyond a safe threshold. If drowsiness is detected for over 5 seconds, a visual popup is displayed to alert the driver. The system will send an SMS alert & location to a registered family member's mobile number.Additionally, the system logs essential details such as driver ID, timestamp, alert status, ear value, vehicle id, location and map link into a local Excel file or Google Sheet for monitoring purposes. This paper offers an efficient and low-cost driver fatigue detection system that supports proactive road safety interventions through real-time automation and digital record-keeping.
Keywords-AI, Python, OpenCV, Dlib,Mediapipe, Driver ID, Timestamp, Excel file, Google Sheet.

I. INTRODUCTION

Long drives can be exhausting especially for truck or bus drivers who travel overnight or cover hundreds of kilometers in one stretch. One major cause of road accidents across the world is driver drowsiness. When a driver starts dozing off behind the wheel, even for a few seconds, it can lead to serious accidents. That's the exact problem we're solving with this system. We've built a Smart Camera-Based Driver Alert System that keeps an eye (literally!) on the driver using a laptop or webcam. This system uses digital image processing to track the driver's face and eyes. If the driver looks sleepy like eyes closing for too long or head tilting forward, the system shows a message on the screen: "Drowsiness Detected." On the other hand, if the driver is alert, it displays a simple "You Are Safe."

But that's not all. We've also added a feature to log these events automatically in a cloud-connected spreadsheet. It records the date, time, and vehicle name, so that the vehicle owner or fleet manager can review the data later. If a driver is repeatedly found sleeping during work hours, the manager can take necessary steps like issuing a warning or scheduling a health checkup. This paper runs using Python, and the smart detection part is powered by an algorithm called DLIB, which helps recognize face features efficiently. We also use face mapping to know exactly when the driver's behavior becomes risky.

One of the best parts? This system is affordable. It doesn't need any fancy hardware, just a laptop with a camera and an internet connection. That makes it ideal for small transport companies or government fleets who want better safety without burning a hole in their budget.

In short, this paper combines real-time detection, alerting, and cloud logging in one complete package. It's practical, smart, and focused on saving lives.

II. LITERATURE REVIEW

1) S. Sathasivam, et al. In this paper, an image detection drowsiness system is proposed to detect the state of the car driver using the Eye Aspect Ratio (EAR) technique. A developed system that is occupied with the Pi camera, Raspberry Pi 4 and GPS module are used to detect and analyse continuously the state of eye closure in real time. This system is able to recognize whether the driver is drowsy or not, with the initial, wearing spectacles, dim light and microsleep condition experiment conducted successfully giving 90% of accuracy.
2) Sanam Narejo, et al. In this paper, the proposed approach to detect driver drowsiness is based on two levels: The face is detected from a video stream using facial landmark detection and the eye region is extracted. These facial landmarks are then used to compute the Eye Aspect Ratio (EAR) and are returned back to the driver. Numerous varieties of images were considered for testing purposes. The obtained accuracy was found to be adequate. The proposed system will alert the driver when drowsiness is detected. Drowsiness detection is a safety technology that can prevent accidents that are caused by drivers who fell asleep while driving.

3) Sukrit Mehta, et al. In this paper, a light-weight, real time driver's drowsiness detection system is developed and implemented on Android applications. The system records the videos and detects the driver's face in every frame by employing image processing techniques. The system is capable of detecting facial landmarks, and computes Eye Aspect Ratio (EAR) and Eye Closure Ratio (ECR) to detect driver drowsiness based on adaptive thresholding. Machine learning algorithms have been employed to test the efficacy of the proposed approach.
4) Dewi, et al. This research paper presents a technique for identifying eye blinks in a video series recorded by a car dashboard camera in real time. The suggested technique determines the facial landmark positions for each video frame and then extracts the vertical distance between the eyelids from the facial landmark positions. The algorithm that has been proposed estimates the facial landmark positions, extracts a single scalar quantity by making use of Eye Aspect Ratio (EAR), and identifies the eye closeness in each frame. In the end, blinks are recognized by employing the modified EAR threshold value in conjunction with a pattern of EAR values in a relatively short period of time.
5) Rahul K, et al. In this paper, we are addressing this issue by creating a system that would alert the driver if he is drowsy or sleepy. At first, the face region is detected and tracked in the captured video sequence utilizing computer vision techniques in the first step. The eye and mouthparts were extracted and analyzed for drivers' drowsiness. It is done by calculating the Eye aspect ratio(EAR) and Mouth aspect ratio(MAR). Both EAR and MAR have a threshold value, The EAR value will decrease if the eyes were closed and the MAR value will increase if the mouth was opened for a yawn. When these values cross their threshold the buzzer starts to alert the driver.
6) Alshaqaqi, Belal, et al. In this paper, a module for Advanced Driver Assistance System (ADAS) is presented to reduce the number of accidents due to drivers fatigue and hence increase the transportation safety; this system deals with automatic driver drowsiness detection based on visual information and Artificial Intelligence. We propose an algorithm to locate, track, and analyze both the drivers face and eyes to measure PERCLOS, a scientifically supported measure of drowsiness associated with slow eye closure.
7) Deng, Wanghua, et al. In this paper, the author proposes a system called DriCare, which detects the drivers' fatigue status, such as yawning, blinking, and duration of eye closure, using video images, without equipping their bodies with devices. Owing to the shortcomings of previous algorithms, they introduce a new face-tracking algorithm to improve the tracking accuracy. Further, they designed a new detection method for facial regions based on 68 key points. Then they use these facial regions to evaluate the drivers' state. By combining the features of the eyes and mouth, DriCare can alert the driver using a fatigue warning.
8) Saini, Vandna, et al. In this paper, the author stated that attention assist can warn of inattentiveness and drowsiness in an extended speed range and notify drivers of their current state of fatigue and the driving time since the last break, offers adjustable sensitivity and, if a warning is emitted, indicates nearby service areas in the COMAND navigation system.
9) Albadawi, Yaman, et al. In this paper, the author presents an up-to-date review of the driver drowsiness detection systems implemented over the last decade. The paper illustrates and reviews recent systems using different measures to track and detect drowsiness. Each system falls under one of four possible categories, based on the information used. Each system presented in this paper is associated with a detailed description of the features, classification algorithms, and used datasets. In addition, an evaluation of these systems is presented, in terms of the final classification accuracy, sensitivity, and precision. Furthermore, the paper highlights the recent challenges in the area of driver drowsiness detection, discusses the practicality and reliability of each of the four system types, and presents some of the future trends in the field.
10) Kolus, Ahmet. This study systematically reviewed empirical studies (with reported performance measures) on driver drowsiness detection (DDD) systems that use eye activities to indicate drowsiness. The objective of this review was to provide researchers and practitioners with in-depth information on DDD systems based on eye activities. Forty-one studies were identified using the preferred reporting items for systematic reviews and meta-analyses methodology. This review investigated various eye activity measures of drowsiness and provides a classification scheme for these measures. In addition, the current technologies used to measure eye activity were examined and a classification scheme for these technologies was formulated. Further, the decision-making algorithms used to classify and predict drowsiness states were investigated using their associated performance measures. Finally, future insights and ideas for utilizing eye activity measures to detect drowsiness at an early stage were discussed.

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 14 Issue IV Apr 2026- Available at www.ijraset.com

III. METHODOLOGY

A. PROPOSED SYSTEM

The proposed drowsiness detection system using the eye aspect ratio (EAR) technique will be a Python-based system for real-time monitoring. The system will utilize the laptop camera to continuously track the driver's face, specifically focusing on the eyes. The DLIB algorithm detects 68 facial landmarks and calculates the Eye Aspect Ratio (EAR) to determine whether the driver's eyes are open or closed. If the system detects that the eyes remain closed for 2 seconds, no action will be triggered, but if they remain closed for 5 seconds or more, an alert action will be initiated. This alert will involve displaying a notification on the laptop screen to wake the driver, a warning message "Drowsiness Detected" appears on-screen. The system will send an SMS alert & location to a registered family member's mobile number.If the driver is attentive, it shows "You Are Safe". This ensures that the driver is immediately informed and can take corrective action to prevent potential accidents caused by drowsiness.

Each detection safe or drowsy is logged to a cloud-based spreadsheet, recording the date, time, vehicle id, status, location & map link. This data helps fleet owners review driver behavior and take necessary action. The system runs throughout the trip and provides a complete log once the journey ends.

By combining DLIB's precise facial analysis with real-time alerts and cloud logging, the system offers a smart, affordable, and scalable solution to improve road safety and reduce fatigue-related accidents.

DLIB facial landmark detection algorithm

The DLIB facial landmark detection algorithm is a machine learning-based approach that accurately identifies key points on the human face. It utilizes a pre-trained shape predictor model, typically detecting 68 facial landmarks that map critical facial regions including the eyes, eyebrows, nose, lips, and jawline. These landmarks are extracted using a combination of Histogram of Oriented Gradients (HOG) for feature extraction and a linear SVM classifier for face detection. Once a face is detected, the algorithm tracks individual facial components in real time, providing spatial coordinatesthat describe facial geometry.

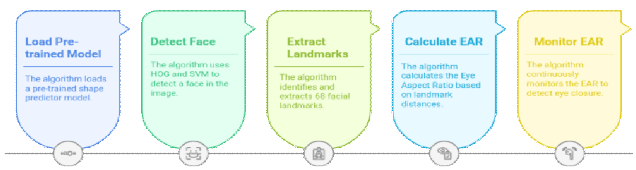


Fig. 1 Shows the DLIB Working Process

A common use of DLIB is in calculating the Eye Aspect Ratio (EAR), which is derived from the distances between specific eye landmarks. The EAR value remains relatively constant when the eyes are open, but drops significantly when the eyes close. By continuously monitoring the EAR across video frames, one can infer blinking patterns or detect eye closure. This method is computationally efficient and robust to changes in lighting, facial expressions, and head orientation. The accuracy and speed of DLIB make it well-suited for real-time facial behavior analysis applications.

B. FLOW CHART

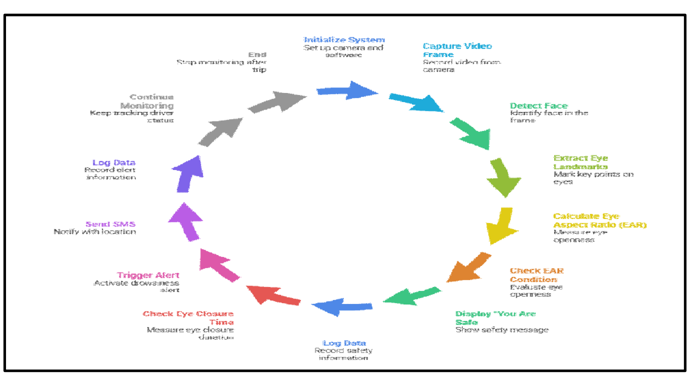


Fig. 2 Shows the Flow Chart of the System

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 14 Issue IV Apr 2026- Available at www.ijraset.com

C. WORKING

The system continuously captures video frames from the laptop camera and identifies the driver's face in real time. Once the face is detected, facial landmark extraction is performed using the DLIB algorithm to locate key facial points, especially around the eyes. Based on these landmarks, the system then performs an Eye Aspect Ratio (EAR) calculation to numerically measure the openness of the driver's eyes. Next, an eye closure check is carried out by comparing the EAR value with a predefined threshold to determine whether the eyes are open or closed. If the eyes remain closed beyond the safe time limit (5 seconds), the system activates the alert trigger, displaying a warning message such as "Drowsiness Detected" on the screen to alert the driver; and the system will send an SMS alert & location to a registered family member's mobile number.

IV. SYSTEM REQUIREMENT

SOFTWARE REQUIREMENTS

- Python Software IDE

LIBRARIES USED

- OpenCV
- dlib

V. IMPLEMENTATION & RESULT

A. IMPLEMENTATION

Step 1 : Execute the code

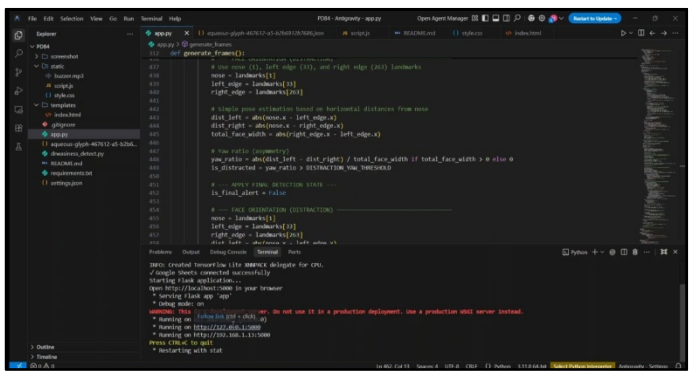


Fig. 3 Shows the Python Code File

This is app.pycode . The user will run the code , after executing the code a URL will be generated in the terminal window . By clicking on the URL the user will redirect to the dashboard.

Step 2 : User dashboard

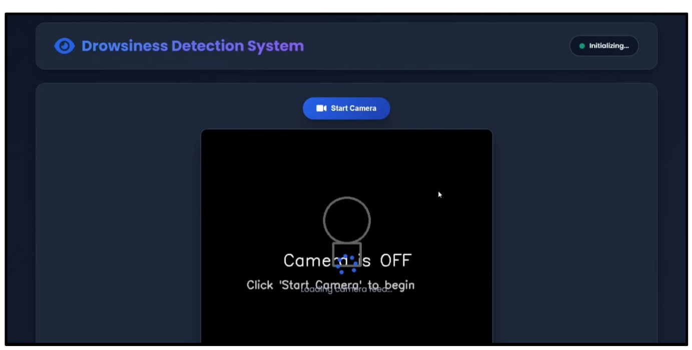


Fig. 4 Shows the Camera Screen

The user will click on the "start camera" button for drowsiness detection prediction.

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 14 Issue IV Apr 2026- Available at www.ijraset.com

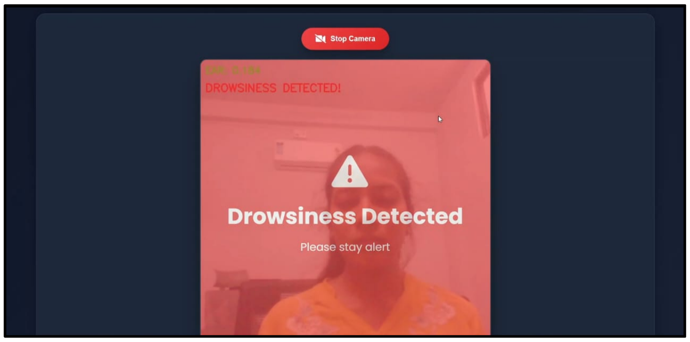


Fig. 5 Shows the Drowsiness Detected interface

The system initiates when the user runs the application. Once active, if the user closes their eyes, the program continuously monitors the duration. If the eyes remain closed for five seconds or longer, the system triggers an alert and displays the warning message “Drowsiness Detected.”

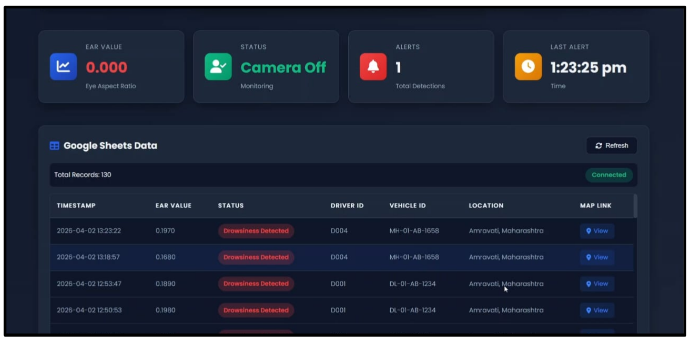


Fig. 6 Shows the Google Sheet Data

The image displays the Ear Value (0.00), Status (camera off), Number of Alerts (1), Last Alert Time (1:23:25 pm). Along with that it also displays Google Sheet Data which shows total number of records (130), timestamp, ear values, status whether drowsiness detected or not, driver id, vehicle id, location and map link.

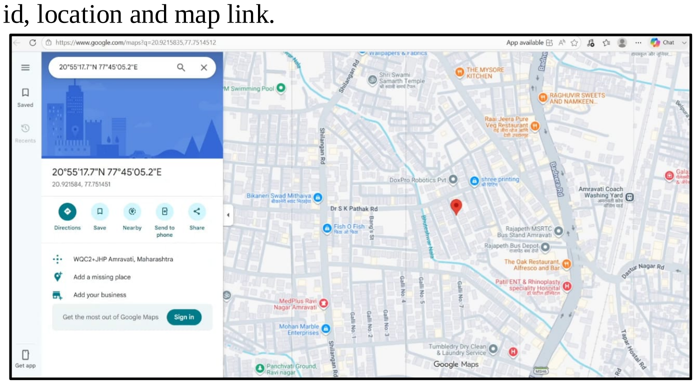


Fig. 7 Shows the Location

It will also show the location where drowsiness is detected.

B. RESULT

The results of the Driver Drowsiness and Distraction Detection System demonstrate effective real-time monitoring of driver alertness using facial and eye analysis. The system successfully detects eye closure and accurately differentiates between alert and drowsy states using the Eye Aspect Ratio (EAR) method. When drowsiness is detected for more than the predefined threshold, timely on-screen alerts are generated, helping to prevent potential accidents. Additionally, all events are correctly logged with date and time details, confirming the system’s reliability, accuracy, and suitability for practical road safety applications.

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 14 Issue IV Apr 2026- Available at www.ijraset.com

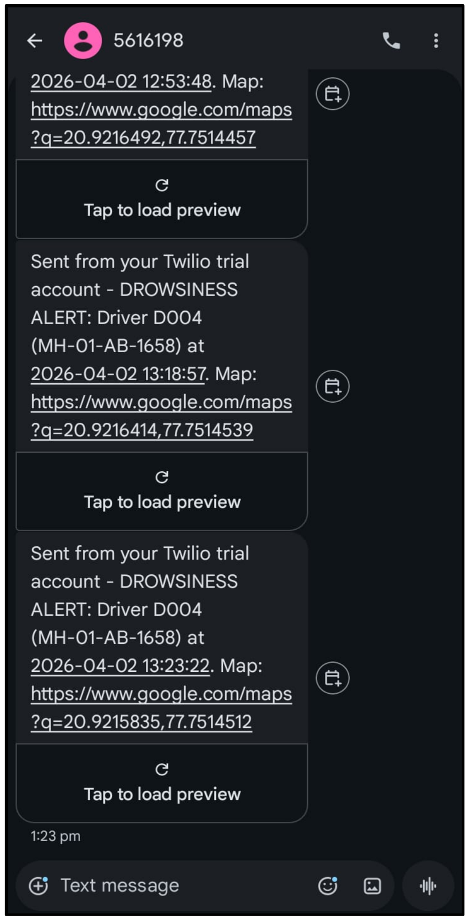


Fig. 8 Shows the SMS Alert

The system will send an SMS alert & location to a registered family member’s mobile number .

VI. CONCLUSION

The “Driver Drowsiness and Distraction Detection System” presents a powerful and intelligent approach to enhancing road safety by continuously monitoring driver alertness using a simple webcam and advanced facial landmark detection through the DLIB algorithm. By calculating the Eye Aspect Ratio (EAR), the system accurately distinguishes between open and closed eyes to detect signs of drowsiness in real time. When drowsiness is detected, immediate alerts in the form of an on-screen warning ensure the driver is made aware and can take corrective action and the system will send an SMS alert & location to a registered family member’s mobile number .

Additionally, the system logs every event—safe or drowsy—to a cloud-based spreadsheet along with the date, time, vehicle id, location, map link & status, enabling fleet owners and transport supervisors to track driver behavior over time and take preventive measures if necessary. Running seamlessly throughout the entire journey, this system not only acts as a real-time safety mechanism but also as a long-term data-driven solution. Its affordability, ease of implementation, and scalability make it an ideal tool for both individual drivers and commercial fleets to reduce fatigue-related accidents and promote responsible driving habits.

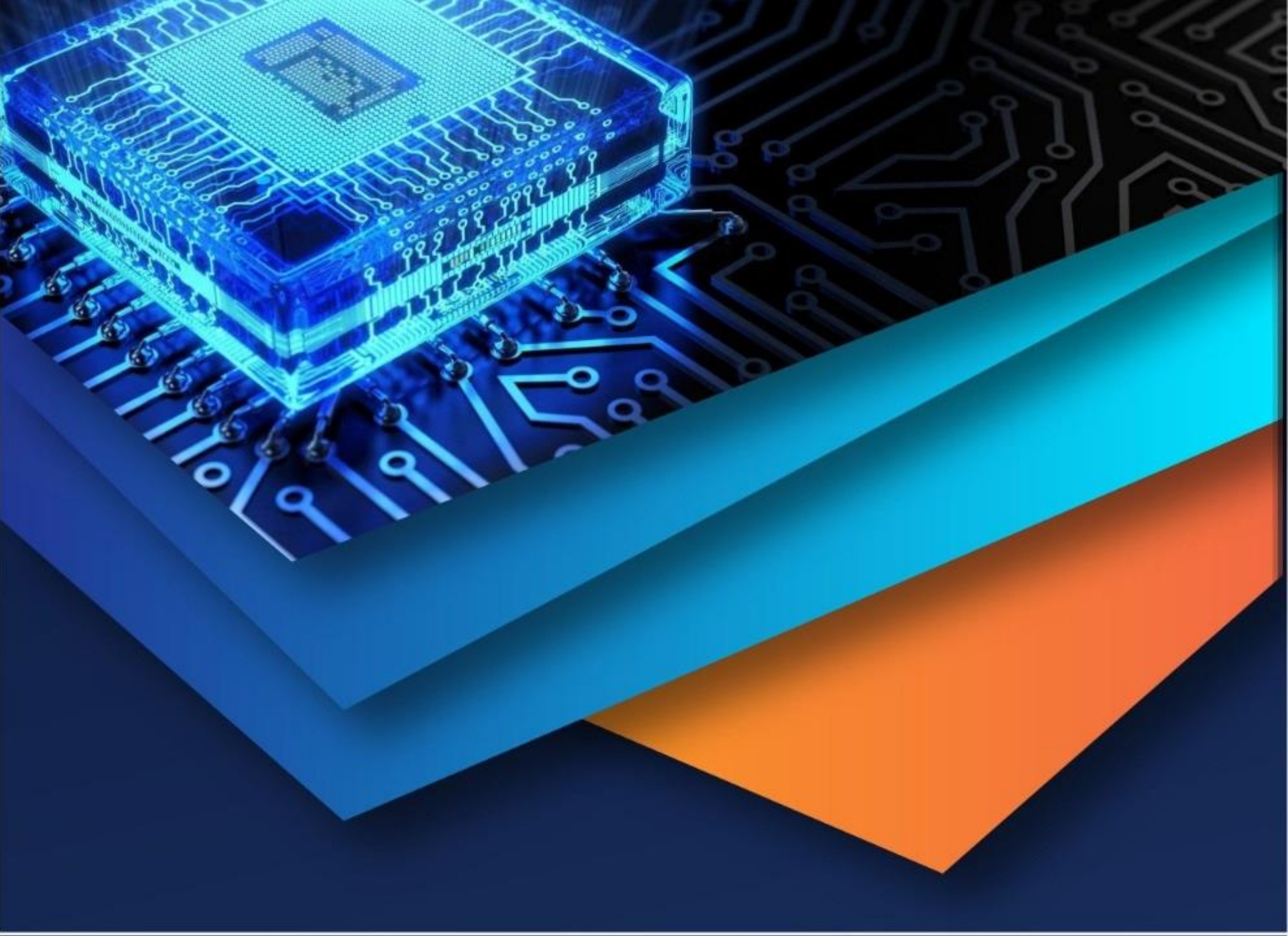
REFERENCES

[1] S. Sathasivam, A. K. Mahamad, S. Saon, A. Sidek, M. M. Som and H. A. Ameen, "Drowsiness Detection System using Eye Aspect Ratio Technique," 2020 IEEE Student Conference on Research and Development (SCOReD), Batu Pahat, Malaysia, 2020, pp. 448-452, doi: 10.1109/SCOReD50371.2020.9251035.

[2] Sanam Narejo, Saima Siraj Soomro, Bushra Naz, Aqsa Noreen, Nadia Memon, “Development Of Vehicle Driver Drowsiness Detection System Using Eye Aspect Ratio”, PJAEE, 17 (9) (2020).

[3] Sukrit Mehta, Sharad Dadhich, Sahil Gumber, Arpita Jadhav Bhatt, “Real-Time Driver Drowsiness Detection System Using Eye Aspect Ratio and Eye Closure Ratio” In Proceedings of international conference on sustainable computing in science, technology and management (SUSCOM), Amity University Rajasthan, Jaipur-India. 2023.

[4] Dewi, Christine, Rung-Ching Chen, Chun-Wei Chang, Shih-Hung Wu, Xiaoyi Jiang, and Hui Yu. "Eye aspect ratio for real-time drowsiness detection to improve driver safety." Electronics 11, no. 19 (2022): 3183.
[5] Rahul K, Raj Suriyan G, Rajesh S, Udhayakumar G, “Driver’s Drowsiness Detection by Analyzing Yawning and Eye Closure”, International Research Journal of Engineering and Technology (IRJET), May 2022.
[6] Alshaqaqi, Belal, Abdullah Salem Baquhaizel, Mohamed El Amine Ouis, Meriem Boumehed, Abdelaziz Ouamri, and Mokhtar Keche. "Driver drowsiness detection system." In 2020 8th international workshop on systems, signal processing and their applications (WoSSPA), pp. 151-155. IEEE, 2020.
[7] Deng, Wanghua, and Ruoxue Wu. "Real-time driver-drowsiness detection system using facial features." Ieee Access 7 (2021): 118727-118738.
[8] Saini, Vandna, and Rekha Saini. "Driver drowsiness detection system and techniques: a review." International Journal of Computer Science and Information Technologies 5, no. 3 (2021): 4245-4249.
[9] Albadawi, Yaman, Maen Takruri, and Mohammed Awad. "A review of recent developments in driver drowsiness detection systems." Sensors 22, no. 5 (2022): 2069.
[10] Kolus, Ahmet. "A systematic review on driver drowsiness detection using eye activity measures." IEEE Access (2024).



10.22214/IJRASET

INDEX COPERNICUS

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY