# AB6

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# Driver Drowsiness Detection using MachineLearning

***Abstract*** *- Driver drowsiness detection is a critical area of research in the field of transportation safety. Drowsy driving can cause accidents and fatalities, particularly among drivers of commercial vehicles who often have to drive long distances without a break. To address this problem, researchers have developed various technologies and techniques for detecting signs of drowsiness in drivers.*

*These technologies typically rely on a combination of sensors and algorithms to monitor the driver's behavior and determine if they are becoming drowsy. Some of the most common indicators of drowsiness that these systems monitor include eye movement, head movement, and steering behavior.*

*If the system detects signs of drowsiness, it can alert the driver through visual, auditory, or physical cues. For example, the system may emit a warning sound or vibration, prompting the driver to take a break, stretch their legs, or get some rest before continuing their journey.*

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## I. INTRODUCTION

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Driver tiredness detection is the process of using technology to detect signs of fatigue or drowsiness in drivers. Drowsy driving is a major problem on the roads, as it can lead to accidents and injuries. This is particularly true for drivers of commercial vehicles, such as long-haul truck drivers, who often have to drive for long periods of time without a break.

Drowsiness detection systems use various sensors and algorithms to monitor the driver's behavior and determine if they are becoming drowsy. Some of the most common indicators of drowsiness that these systems monitor include eye movement, head movement, and steering behavior

If the system detects signs of drowsiness, it can alert the driver through visual, auditory, or physical cues, such as a warning sound or vibration. This can give the driver a chance to take a break, stretch their legs, or get some rest before continuing their journey.

Overall, driver drowsiness detection technology has the potential to improve road safety by reducing the number of accidents caused by drowsy driving

## 2. Related Work:

Driver drowsiness detection has been an active area of research for many years, and there have been numerous studies and developments in this field. Here are some examples of related work:

1.Sensor-based systems: Various sensor-based systems have been developed for detecting drowsiness in drivers. These include systems that use eye-tracking technology, steering wheel sensors, and facial recognition software. One example is the eye-tracking system developed by Bosch, which uses infrared cameras to monitor the driver's eye movements and detect signs of drowsiness.

2.Machine learning algorithms: Machine learning algorithms have been used to analyze driver behavior and detect signs of drowsiness. These algorithms can analyze data from sensors and other sources, such as GPS and accelerometer data, to identify patterns and predict when a driver is likely to become drowsy.

3.Wearable devices: Wearable devices, such as smartwatches and fitness trackers, can also be used to monitor the driver's vital signs and detect signs of drowsiness. For example, the Garmin dēzl™ OTR500 trucking navigator includes a driver fatigue monitoring system that uses a wearable device to track the driver's heart rate and alertness.

4.Real-time alert systems: Real-time alert systems can provide warnings to drivers when signs of drowsiness are detected. These systems can include visual, auditory, or physical alerts, such as a vibration in the seat or a warning sound.

5.Driving simulation studies: Driving simulation studies have been conducted to test the effectiveness of driver sleepiness discovery organizations. These studies can help researchers and developers refine their algorithms and improve the precision oftheir systems.

Overall, the related work in driver drowsiness detection has resulted in many promising developments and technologies, which have the potential to significantly improve road safety and prevent accidents caused by drowsy driving.

## 3.The Proposed System:

A proposed driver drowsiness detection system might consist of several components, including sensors, data analysis algorithms, and real-time alert systems. Here is an indication of how such a system might work:

1.Sensors: The system would use a combination of sensors to screen the driver's performance and detect signs of drowsiness. These sensors could include a camera to monitor the driver's facial expressions and eye movements, as well as a steering wheel sensor to detect any erratic driving behavior.

2.Data analysis: The data collected by the sensors would be analyzed by an algorithm to identify patterns and signs of drowsiness. Machine learning algorithms could be used to analyze the data and predict when the driver is becoming drowsy.

3.Real-time alerts: If the system detects signs of drowsiness, it could alert the driver through real-time alerts. These alerts could include an auditory alert, such as a warning sound or voice prompt, or a visual alert, such as a flashing light on the dashboard. Additionally, the system could provide a physical alert, such as a vibration in the driver's seat

4.Driver feedback: The system could also include a feedback mechanism to inform the driver of their driving behavior and alertness levels. This feedback could be displayed on a dashboard screen or sent to the driver's smartphone.

5.Data logging: The classification could also log data on the driver's behavior and alertness levels. This data could be used to analyzethe effectiveness of the system and identify areas for improvement.

Overall, a driver drowsiness detection system could help prevent accidents caused by drowsy driving by alerting the driver when they are becoming drowsy and encouraging them to take a break or rest before continuing their journey.

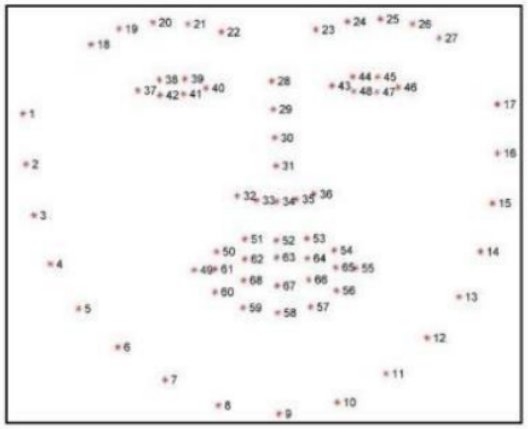
3.1 Face Detection and Facial Land Marking:

Face detection and facial landmarking are two techniques that are often used in driver drowsiness detection systems to monitor the driver's behavior and detect signs of drowsiness.

1..Face detection is a computer vision technique used to identify the presence and location of human faces in an image or video. It works by analyzing an image or video frame for patterns that match a human face, such as the presence of two eyes, a nose, and a mouth. Once a face is detected, the system can track it over time and use other techniques, such as facial landmarking, to extract more detailed information about the face.

2.Facial landmarking is a technique used to identify specific features on a face, such as the position of the eyes, nose, mouth, and eyebrows. This information can be used to determine the orientation and expression of the face, and to track changes in the face over time. Facial landmarking typically involves the use of machine learning algorithms and deep neural networks to identify and track the features of the face.

In driver drowsiness detection systems, face detection and facial landmarking are often used together to monitor the driver's behavior and detect signs of drowsiness. For example, the system might use face detection to identify the driver's face, and then use facial landmarking to track the position and movement of their eyes, mouth, and other facial features. By analyzing changes in these features over time, the system can detect signs of drowsiness, such as drooping eyelids or a slack jaw, and provide alerts to the driver to take a break or rest before continuing their journey.



## 3.3 Yawning Detection:

Yawning detection is a technique used in driver drowsiness detection systems to monitor the driver's behavior and detect signs of drowsiness. Yawning is a common physiological response to fatigue and drowsiness, and can be a useful indicator of the driver's level of alertness.

Another approach to yawning detection is to use sensors to monitor the driver's physiological responses, such as changes in heart rate, breathing rate, and muscle activity. These sensors can be placed on the driver's body, such as on the chest or wrist, and can be used to detect subtle changes in their physiological responses that are indicative of drowsiness and yawning.

Once yawning is detected, the driver drowsiness detection system can provide an alert to the driver to take a break or rest before continuing their journey. This alert can be provided through auditory or visual cues, such as a warning sound or a flashing light on the dashboard.

Overall, yawning detection is a useful technique for driver drowsiness detection, and can be used in grouping with other techniques such as eye trailing and steering wheel monitoring to provide a comprehensive picture of the driver's behavior and level of alertness.

## 4.Result And Discussion:

The outcomes of a driver drowsiness detection system depend on the specific techniques and algorithms used, as well as the quality and quantity of data available for training and testing the system. In general, however, driver drowsiness detection systems have shown promising results in improving road safety by detecting signs of drowsiness and alerting drivers to take a break or rest before continuing their journey.

One common evaluation metric used for driver drowsiness detection systems is the accuracy of the system in detecting drowsiness. This can be measured by comparing the

system's output to a ground truth label, such as a manual observation of the driver's behavior or physiological state. Studies have reported high accuracy rates for driver drowsiness detection systems, with some systems achieving accuracy rates of over 90%.

Another important factor to consider in the evaluation of driver drowsiness detection systems is the response time of the system. The response time refers to the time it takes for the system to detect signs of drowsiness and provide an alert to the driver. A fast response time is important to ensure that the driver can take action to prevent an accident before it occurs. Studies have reported response times of less than one second for some driver drowsiness detection systems.

One challenge in the evaluation of driver drowsiness detection systems is the variability in driver behavior and the effectiveness of the system in detecting drowsiness in different contexts. For example, the system may perform well in detecting drowsiness during daytime driving on highways, but may not be as effective in detecting drowsiness during nighttime driving or on winding roads. Further research is needed to evaluate the effectiveness of driver drowsiness detection systems in different driving contexts and under different conditions.

Overall, driver drowsiness detection systems have shown promising results in improving road safety by detecting signs of drowsiness and alerting drivers to take a break or rest before continuing their journey. However, further research is needed to optimize these systems and ensure their effectiveness in a range of driving contexts and conditions.

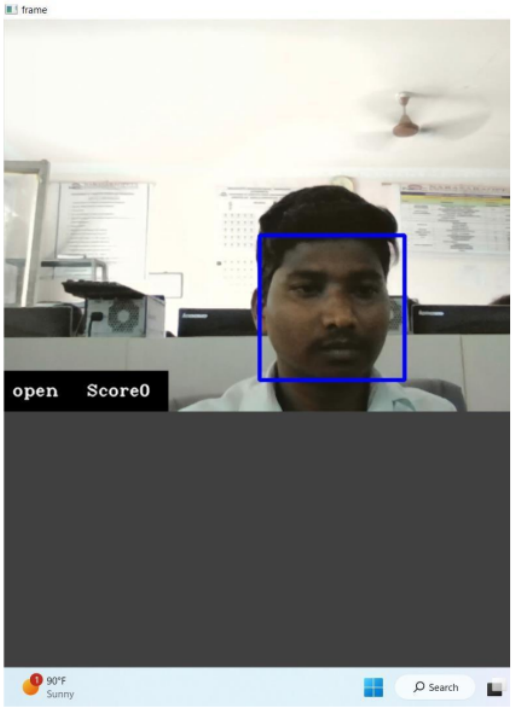



**Fig: open eye**

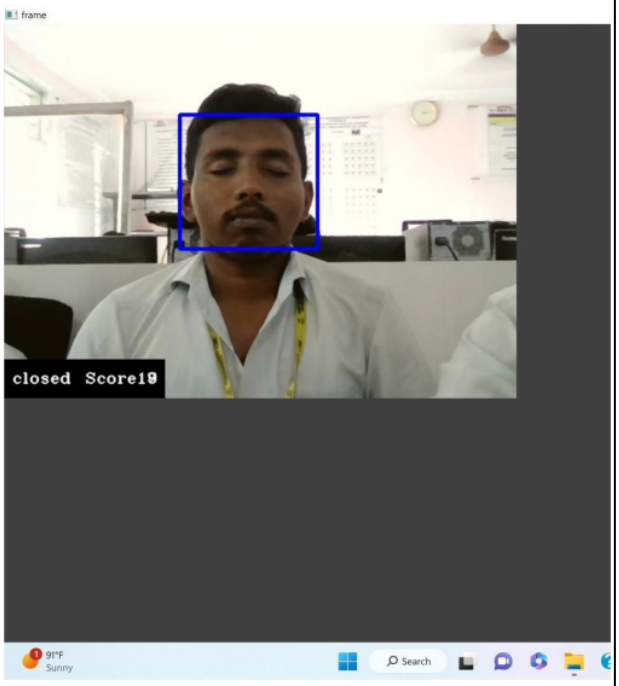



**Fig :Closed Eye**

## 5. Conclusion:

In conclusion, driver drowsiness detection systems are an important area of research and development in the field of road safety. Drowsy driving is a major cause of accidents on the road, and driver drowsiness detection systems have the potential to significantly reduce the incidence of these accidents.

There are a variety of techniques and algorithms used in driver drowsiness detection systems, including facial recognition, eye tracking, and yawning detection. These techniques have shown promising results in detecting signs of drowsiness and alerting drivers to take a break or rest before continuing their journey.

However, there are still challenges to be addressed in the development and implementation of driver drowsiness detection systems. These challenges include variability in driver behavior and the effectiveness of the system in different driving contexts, as well as issues related to privacy and data security.

## 6. Reference:

[1] Kyong Hee Lee, Whui Kim, Hyun Kyun Choi, Byung Tae Jang, “A Study on Feature Extraction Methods Used to Estimate a

Driver’s Level of Drowsiness”, International Conference on Advanced Communications Technology (ICACT), 2019.

[2] Ashish Kumar, Rusha Patra, “Driver Drowsiness Monitoring System using Visual Behaviour and Machine Learning”, IEEE

Conference, 2018.

[3] Cyun-Yi Lin, Paul Chang, Alan Wang, Chih-Peng Fan, “Machine Learning and Gradient Statistics Based Real-Time Driver

Drowsiness Detection”, 2018 IEEE International Conference on Consumer Electronics-Taiwan (ICCE-TW).

[4] Ching-Hua Weng, Ying-Hsiu Lai, Shang-Hong Lai, “Driver Drowsiness Detection via a Hierarchical Temporal Deep Belief

Network”, In Asian Conference on Computer Vision Workshop on Driver Drowsiness Detection from Video, Taipei, Taiwan,

Nov. 2016

[5] Anjith George, Aurobinda Routray, “Real-time Eye Gaze Direction Classification Using Convolutional Neural Network”, IEEE,

2016.

[6] Media Research Lab, http://mrl.cs.vsb.cz/, 2018.

[7] Venkata Rami Reddy Chirra, Srinivasulu Reddy Uyyala, Venkata Krishna Kishore Kolli, “Deep CNN: A Machine Learning

Approach for Driver Drowsiness Detection Based on Eye State”, Revue d'Intelligence Artificielle Vol. 33, No. 6, December,

2019, pp. 461-466.

[8] Mkhuseli Ngxande, Jules-Raymond Tapamo, Michael Burke, “Driver drowsiness detection using Behavioral measures and

machine learning techniques: A review of state-of-art techniques”, 2017 Pattern Recognition Association of South Africa and

Robotics and Mechatronics International Conference (PRASA-RobMech).

[9] T. Vogelpohla, M. Kühn, T. Hummel, M. Vollrath, “Asleep at the automated wheel—Sleepiness and fatigue during highly

automated driving”, https://doi.org/10.1016/j.aap.2018.03.013, Accident Analysis and Prevention, 2018.

[10] Xuan-Phung Huynh, “Detection of driver drowsiness using 3D deep neural network and semi-supervised g

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