



**INTERNATIONAL JOURNAL OF NOVEL RESEARCH  
AND DEVELOPMENT (IJNRD) | IJNRD.ORG**  
An International Open Access, Peer-reviewed, Refereed Journal

# DROWSY DRIVER DETECTION SYSTEM

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**Abstract:** Drowsiness of the driver is one of the critical issues for most road accidents. Drowsiness and fatigue feeling implies a lack of concentration, and tired eyes of the driver while driving vehicles. The project Drowsy Driver Detection System aims to detect the drowsiness nature of the driver and alert him immediately. This system captures images as a video stream through a small monochrome camera that points directly towards the driver's face and monitors the driver's eyes to detect fatigue. Once the area is found, the eye region is located through the camera to determine if the eyes are open or closed. In such a case, when the eyes are closed and drowsiness is detected, a warning alert message is sent to the bus driver, the bus owner, through our software application. The details of the driver, the bus owner should be registered through the app before the journey begins. This project helps to control the increasing number of road accidents and saves many lives.

**IndexTerms** –electromyogram (EMG), electrocardiogram (ECG), Convolutional Neural Networks (CNN)

## I.INTRODUCTION

Road accidents have drastically increased in recent years. According to the reports, driver weariness is one of the leading causes of these collisions. The driver becomes fatigued from long-term, continuous driving, which increases the risk of an accident. To prevent accidents, a system that gauges a driver's level of exhaustion and warns them when they feel sleepy is needed. Hence, we suggest a system that includes a camera mounted on the vehicle's dashboard. The camera recognizes the driver's face and tracks any changes to the driver's facial features, which it then utilizes to determine the driver's level of weariness. Face features include the mouth and eyes. In order to decrease the characteristics while reducing the quantity of information lost, Principle Component Analysis is used.

The Support Vector Classifier is used to classify the characteristics and determine the level of weariness. The alert unit then receives the output from the classifier. According to the WHO, vehicle accidents cause over 1.25 million fatalities worldwide each year. Due to the under-reporting, this number is incorrect. Fatigue driving is one of the key causes of these accidents. India is one of the most significant contributors to this number. Today there are many numbers of technologies developed for fatigue monitoring. The drowsy state detection system can be classified into three kinds. The first one is based on an attribute such as steering wheel movement, lane position, acceleration, distance to nearby vehicles, etc. But this type of system is constrained by limitations like road state, way of driving, the vehicle used, etc.

In the second kind of system, a physiological signal such as an electroencephalogram (EEG), electromyogram (EMG), electrooculogram (EOG), and electrocardiogram (ECG) is used to detect the fatigue level. The physiological signal-based system is the most promising fatigue detection system, but they require a sensor attached to the skin, which may affect the user by causing skin irritation, revulsion, loathing, repulsion, etc. The third kind of system uses characteristics like eye blinking, yawning, head pose, etc., to monitor the behaviour of the driver and alert the driver if any of the drowsiness symptoms are detected. Based on these three kinds of systems and their fusions, several products are commercially available in the market. But some of them make an alarm when the driver maybe goes to microsleep, and the alarm wakes up the driver and maybe become cause of abrupt reaction in the driver, which may lead to an accident. In this project, we propose a more practical, subject-independent, robust, calibration-free, behavioral-based system. Detection and analysis of faces is a challenging problem in

computer vision and has been actively researched for applications such as face verification, face tracking, person identification, etc. However, recent methods based on deep Convolutional Neural Networks (CNN) have achieved remarkable results for eye detection.

## II. NEED FOR STUDY

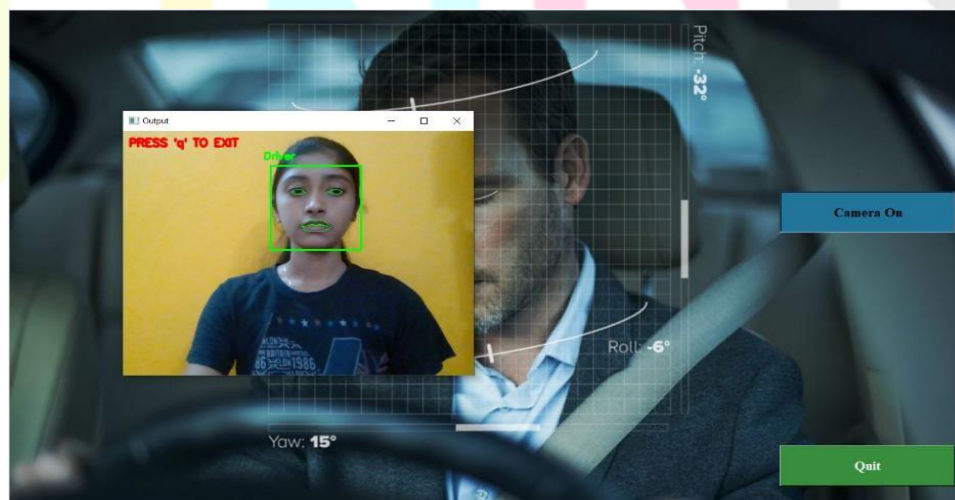
By using non-intrusive machine vision-based concepts, drowsiness of the driver-detected system is developed. Many existing systems require a camera installed in front of the driver. It points straight towards the face of the driver and monitors the driver's eyes to identify the drowsiness. For large vehicles such as heavy trucks and buses, this arrangement is not pertinent. Bus has a large front glass window to have a broad view for safe driving. If we place a camera on the window of the front glass, the camera blocks the frontal view of the driver, so it is not practical. If the camera is placed on the frame, which is just about the window, then the camera is unable to detain the anterior view of the face of the driver correctly.

The open CV detector detects only 40% of the face of the driver in a normal driving position in the video recording of 10 minutes. In the oblique view, the Open CV eye detector (CV-ED) frequently fails to trace the pair of eyes. If the eyes are closed for five successive frames, the system concludes that the driver is declining slumbering and issues a warning signal. Hence the existing system is not applicable to large vehicles. In order to conquer the problem of the existing system, a new detection system is developed in this project work.

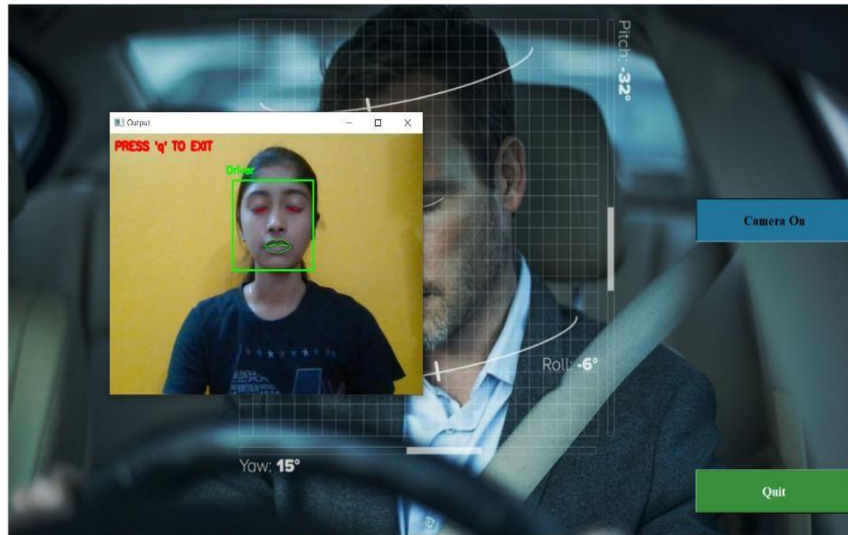
In order to overcome this eye blink sensor is used. A spectacle with an eye blink sensor is used to detect the driver's drowsiness and alerts the driver with a buzzer if the driver is affected by drowsiness. Driver drowsiness driving is one of the main reasons for road accidents. The current survey shows that out of 5 accidents, one accident is due to drowsiness of the driver, which is approximately 20% of road accidents, and it is increasing gradually every year. The survey highlights the fact that the total number of traffic deaths is excessive because of the drowsiness of the driver. Driving a vehicle on a busy road has become a nightmare because of the road conditions, poor weather conditions, haste to reach the destination and excess traffic. Drowsiness of the driver, drunk and driving are becoming further major reasons for road accidents. Due to being less conscious, we can't take care of ourselves while driving. To provide security to the driver, the vehicles are assisted with an automated safety system that alerts the driver by using the alarm. All vehicles should be equipped with eye blink and driver and system monitoring sequentially to evade these types of accidents. The objective of the paper is to, by using a system camera, make the eye blink measured and controlled.

## III. IMPLEMENTATION

Face detection is a computer technology that helps enhance human facial features in a digital image taken as input and used in various applications. This helps in processing the location and size of the human face and avoiding other objects. There are many existing algorithms or methods for face detection technology, but the main difference is detection speed, accuracy, and purpose of use. Face detection algorithms work reasonably well with detecting frontal and bright enough human face images. It returns a sequence of analogous image coordinates where the human face is located and matched bit by bit. The proposal application assumes that the given input video detects only a single face (driver vehicle) in the camera view; otherwise, if there is more than one face, the system will detect the closest face to the center of the frame.

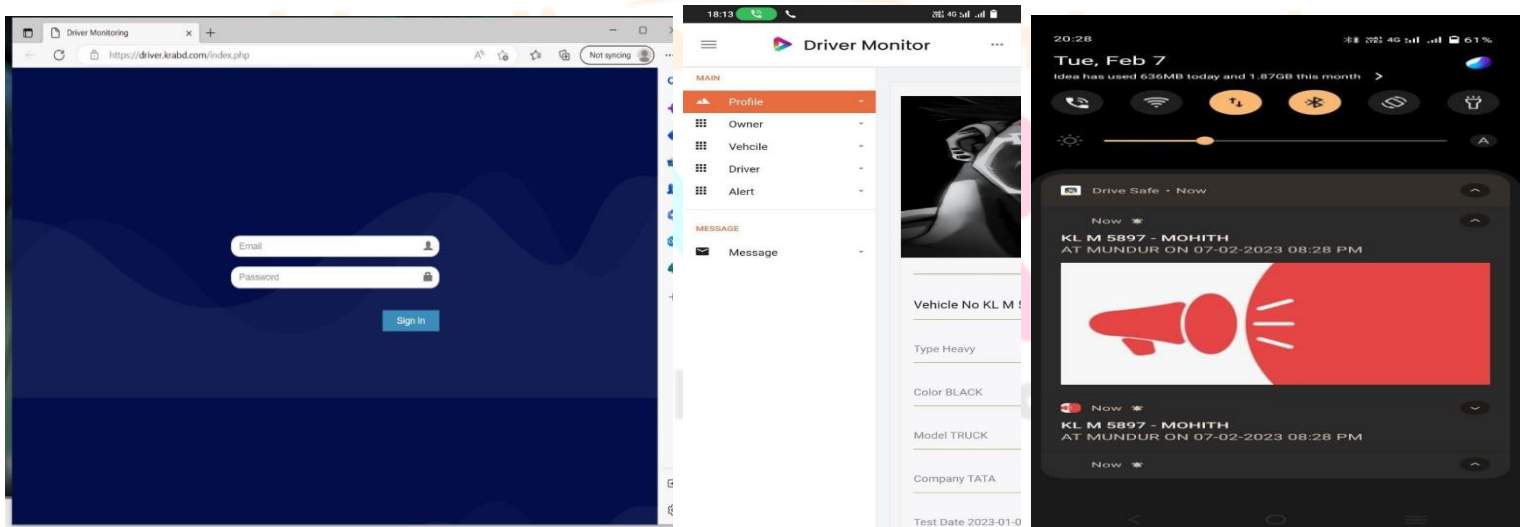


After detecting the face, the next task is to find the locations of different facial features, like the corners of the eyes. Prior to that, the face images should be normalized in order to reduce the effect of distance from the camera, and it is converted to a grayscale image. Different priors are used to find different structures. Using this method, the boundary points of the eyes are marked, and the points are given.



After detecting the facial landmarks, the Eye Aspect ratio (EAR) is calculated. Eye aspect ratio from the eye corner points the eye aspect ratio is calculated as the ratio of height and width of the eye as given by where represents point marked as  $i$  in the facial landmark and is the distance between points marked as  $i$  and  $j$ . Therefore, when the eyes are fully open, Eye Aspect Ratio is high value, and as the eyes are closed, the Eye Aspect Ratio value goes towards zero. Thus, monotonically decreasing EAR values indicate gradually closing eyes, and it's almost zero for completely closed eyes (eye blink). Consequently, Eye Aspect Ratio values indicate the drowsiness of the driver as eye blinks occur due to drowsiness. The analysis of information from the sensors and camera is done to deduce the driver's current driving behavior style. The open/closed state of the eyes is supposed by means of image processing techniques using computer vision. These image processing techniques are performed inside a PC.

The Admin controls the activities of the software application. In Driver Drowsiness Detection System, to log in to the system the Admin can log in with a username and password.



The Admin can view the list of all the users and also can view their logs. Admin can delete and modify data. The Admin gets an alert notification when the driver's drowsiness is detected. The Admin can give responses to the feedback received.



## IV. RESULT AND DISCUSSION

Our proposed system can be a highly efficient system to monitor fatigue levels in a driver. It can dominate over disadvantages from previously developed methods by using both eye and mouth feature sets and also with a vast pool of data. This system requires only a camera to monitor the driver's face, reducing hardware costs. This system works only on the necessary part of the face image, i.e., eyes and mouth reject the rest. This step decreases the unnecessary features in the feature set. Eye and mouth detection is less accurate than face detection; that's why we use face detection to get the eye and mouth image part of the driver. It makes the system optimized in the context of time and accuracy. The division of the system alert unit into three units is an efficient way to alert the driver. It works so that the driver is not subjected to a sudden attack, which may lead to an accident.

## V.CONCLUSION AND FUTURE WORK

The project described a machine learning-based CNN-based drowsiness detection system. A CNN model was used to forecast the state after utilizing OpenCV to recognise faces and eyes using a haar cascade classifier. The evaluation of driver weariness is completed. The experimental results demonstrate that when the drowsy count reaches 5, the driver can be considered in a fatigued state. The system was able to detect facial landmarks from images and pass them to a CNN-based trained Deep Learning model to detect drowsy driving behaviour. There are limitations to this technology, such as obstructing the view of facial features by wearing sunglasses and bad lighting conditions. However, given the current state, there is still room for performance improvement and better facial feature detection, even in bad lighting conditions. Thus, we have successfully designed a prototype drowsiness detection system using OpenCV software and Haar Classifiers. The system so developed was successfully tested, its limitations identified, and a plan of action set. The work can be extended by combining physiological approach techniques, so the driver can be detected as drowsy through those readings. In special situations, like when a driver wears spectacles along with the mask, we can use the physiological reading of the driver. We can detect the drowsiness of the driver more accurately with these readings. We can use the devices which are mentioned earlier and detect the drowsiness of the driver. While this is a research project, there is scope when this completely turns out to be developed into an application which can be run by the end users on their own for their own purposes on their own systems.

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