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Survey on Driver Drowsiness Detection System

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Abstract: ***We proposed to use this system to minimise the frequency of accidents caused by driver exhaustion, hence improving road safety. This device uses optical information and artificial intelligence to identify driver sleepiness automatically. We use Softmax to find, monitor, and analyse the driver's face and eyes in order to calculate PERCLOS (% of eye closure). It will also employ alcohol pulse detection to determine whether or not the person is normal. Due to extended driving durations and boredom in crowded settings, driver weariness is one of the leading causes of traffic accidents, particularly for drivers of big vehicles (such as buses and heavy trucks).***
Keywords: Driver Drowsiness, OpenCV, TensorFlow, Image Processing, Computer Vision

I. INTRODUCTION

When a rider's ability to drive safely is harmed as a result of being physically or mentally fatigued or drowsy, this is known as driver fatigue. For the road transportation business, driver weariness is a serious safety threat.
Too little sleep, driving when you should be sleeping, and working or being up for lengthy periods of time are the major reasons of "drowsy driving." There are three types of methods for detecting driver drowsiness:

1) Vehicle-based approaches,
2) Behaviour-based approaches, and
3) Physiological-signal based approaches.

The physiological signals from a body, such as the electroencephalogram (EEG) for brain activity, the electrooculogram (EOG) for eye movement, and the electrocardiogram (ECG) for heart rate, are assessed to identify driver sleepiness in physiological techniques. Recent research have shown that approaches based on physiological signals (particularly the EEG signal) can identify driver tiredness with more reliability and accuracy than previous methods. In driving condition descriptions, the terms FATIGUE, drowsiness, and sleepiness are frequently interchanged. It's complex in nature, encompassing various human elements, and it's been tough for scholars to characterise throughout the years. Regardless of the uncertainty around weariness, it is an important element in driving safety. Fatigue has been identified as one of the top causes of road accidents throughout the world, according to research. It will also employ alcohol pulse detection to determine whether or not the individual is normal. It's especially important for professional drivers like bus and truck drivers. It is especially important for occupational drivers, such as bus and heavy truck drivers, who may be required to drive for lengthy periods of time during peak sleepiness hours.
Bus drivers in the city encounter a stressful and taxing work environment on a regular basis, putting them at risk of driver fatigue. However, there has been a lack of research on the distinct origins and effects of this type of weariness. Much of the research into urban bus drivers has so far been done as part of major heavy vehicle driving studies, which involve a disproportionately large population of long-haul drivers who are expected to encounter a fundamentally distinct set of tiredness issues.

II. LITERATURE SURVEY

A. Safe Driving By Detecting Lane Discipline and Driver Drowsiness-[Yashika Katyall,Suhas Alur,Shipra Dwivedi,(2014)]

This paper presents a real time lane detection and driver fatigue or driver drowsiness detection system Road accidents have become all too prevalent in today's environment. They not only inflict property damage, but they also put people's lives in danger while travelling. Given its extent and the resulting negative effects on the economy, public health, safety, and the general welfare of the people, road safety is a national priority. Rough driving, drunk driving, inexperience, jumping signals, and disregarding signboards are all possible causes of road accidents. The paper is divided into two sections. To begin, the Hough Transform is used to detect lanes. Second, driver eye detection for sleepiness detection. As a result, the attention is mostly on the driver's weariness and adherence to lane discipline (Katyall, Alur, & Dwivedi, 2014).

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B. Monitering Driver's Drowsiness Status at Night Based on Computer Vision-[Vidhu Valsan A,Paul P Mathai,Lerin Babu(2021)]

This research describes a real-time tiredness driving detection system that operates at night. The location of facial landmarks on the driver's face is determined by employing one shape predictor and then computing eye aspect ratio, mouth opening ratio, and yawning frequency.

The values of these parameters are used to identify drowsiness.

The thresholds are established using an adaptive thresholding approach. Offline implementation of machine learning techniques was also done. The proposed approach was tested in both real-time and on the Face Dataset. The system's accuracy and robustness are demonstrated by the experimental findings (Valsan, Paul, & Babu, 2021).

C. Intelligent Driver Drowsiness Detection through Fusion of Yawning and Eye Closure [M. Omidyeganeh, A. Javadtalab, S. Shirmohammadi,(2011)]

Drowsy driving is a key component in the majority of car accidents. We describe a robust and clever approach for detecting driver tiredness in this study, which combines eye closure and yawning detection methods. A camera fitted in the automobile captures the driver's face look in this method. The eye and mouth portions of the face are then removed and examined for symptoms of driver tiredness. Finally, during the fusion phase, the driver's condition is assessed, and if sleepiness is identified, a warning message is issued to the driver. Our tests show that the proposed approach is quite effective (Mandal, Li, Wang, & Jie, 2016).

D. Portable Prevention and Monitoring of Driver's Drowsiness Focuses to Eyelid Movement Using Internet of Things [Menchie Miranda, Alonica Villanueva, Mark Jomar Buo, Reynald Merabite, Sergio Paulo Perez, John Michael Rodriguez,(2018)]

Since the number of vehicular accidents in the Philippines has been increasing year after year, this paper offers a sleepiness prevention device. Current safety measures are used to boost driver awareness, such as the construction of standard rumble strips on highways, GPS, speed limiters, sensors, and other research that employ signal processing incorporated in a costly car. The system makes use of the internet of things to allow the car owner to keep track of the driver's tiredness at all times throughout working hours. The current study focuses on eyelid movement, which was not covered in the prior study. This suggested system continually detects the driver's eyelid movements, and if sleepiness is identified, the gadget notifies him with a random-typed sound. It sends the report to the car owner automatically via internet access from the web application (Miranda, Villanueva, Buo, & Merabite, 2018).

III. SYSTEM ARCHITECTURE

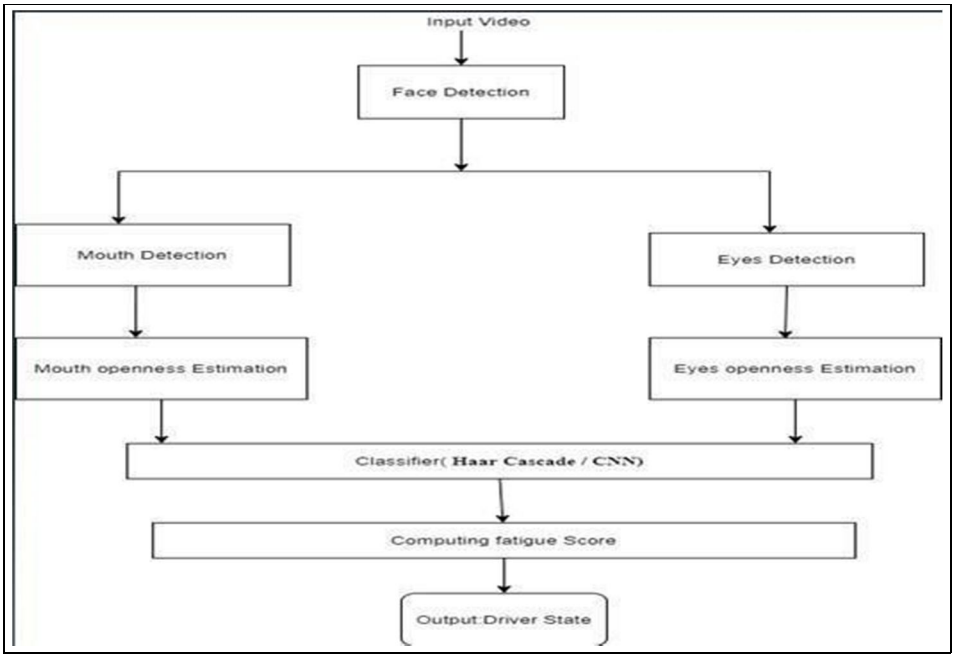


Figure 5.1: system Architecture

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IV. PROPOSED SYSTEM

The ability to glance up ahead and scan for dangers is determined by the driver's incentive to do so, which is connected to their understanding of the potential risks or hazards that glancing ahead may discover. The awareness (knowledge) and ability to respond to diverse traffic conditions will be the driving motive behind a driver's judgments. This entails internalising the driving process and taking responsibility for making good driving judgments.

1) This is in contrast to the more straightforward example of motivation, in which a driver slows down as a police officer approaches. There isn't much internalisation going on.
2) It will also employ alcohol pulse detection to determine whether or not the individual is normal.
3) If a person is driving for work, he or she may be encouraged to disregard the need for safe driving behaviour in order to reach performance goals, especially if there is a financial incentive to do so. The difficulty for people who attend driver instruction is how motivated they are to improve their driving habits. Rather of relying on external variables like enforcement, this should be led from inside.
4) This system will analyse the driver's characteristics automatically and, if they suggest probable exhaustion, will advise the driver to take a break.
5) When a motorist falls asleep behind the wheel, he or she loses control of the vehicle, which often results in a collision with another vehicle or object. The previous technique was created to prevent these terrible incidents; this system monitored the driver's level of tiredness. To measure sleepiness, the following tests were routinely used:
a) Vehicle-based detection: Deviations from lane position, steering wheel movement, acceleration pedal pressure, and other actions/metrics are constantly monitored, and any change in these that surpasses a predefined threshold indicates a much increased risk that the driver is drowsy.
b) Behavioral measures: A camera was used to track the driver's actions, such as yawning, eye closure, eye blinking, head posture, and so on, and the driver was alerted if any of these signs of tiredness were detected.
c) Physiological measures: The researchers looked at the link between physiological markers (ECG, electromyogram (EMG), electrooculogram (EOG), and electroencephalogram (EEG) and driver fatigue.

V. WORKING

The advised machine is a driving force face tracking machine that detects driving force hypo vigilance through eye and face processing (each weariness and attention). Following the seize of a photograph, the primary degree of processing is face detection. Low vigilance indicators are then extracted from the face picture.
However ,an specific eye detection section isn't used to decide the attention withinside the face; instead, a number of the maximum extensive signs associated with the attention area (top-1/2 of section of the face) are collected, making it computationally costly to rebuild the face popularity technique for all frames. It may also use alcohol pulse detection to peer if the man or woman is ordinary or not. Face monitoring algorithms are utilised to observe the driving force`s face in destiny frames till it's miles misplaced after the primary frame's face detection.
This may primarily be extended to provide an alert prior to sleeping by computing the heart beat measure without causing physical disturbance, i.e., a non-intrusive way utilising modified ECG methodologies. It will also employ alcohol pulse detection to determine whether or not the person is normal. Typically, critical body locations (such as the chest, head, and wrist) are wired in the ECG technique. Sticking wire can be prevented using the extended procedure. This will lead to a method for determining the optimal degree of sleepiness.

A. Modules

1) *Person Detection:* A person's picture can be detected first.
2) *Eye Detection:* After detecting a person's eyes, they are captured.
3) *Iris Detection:* The iris will be identified once the eyes have been detected.

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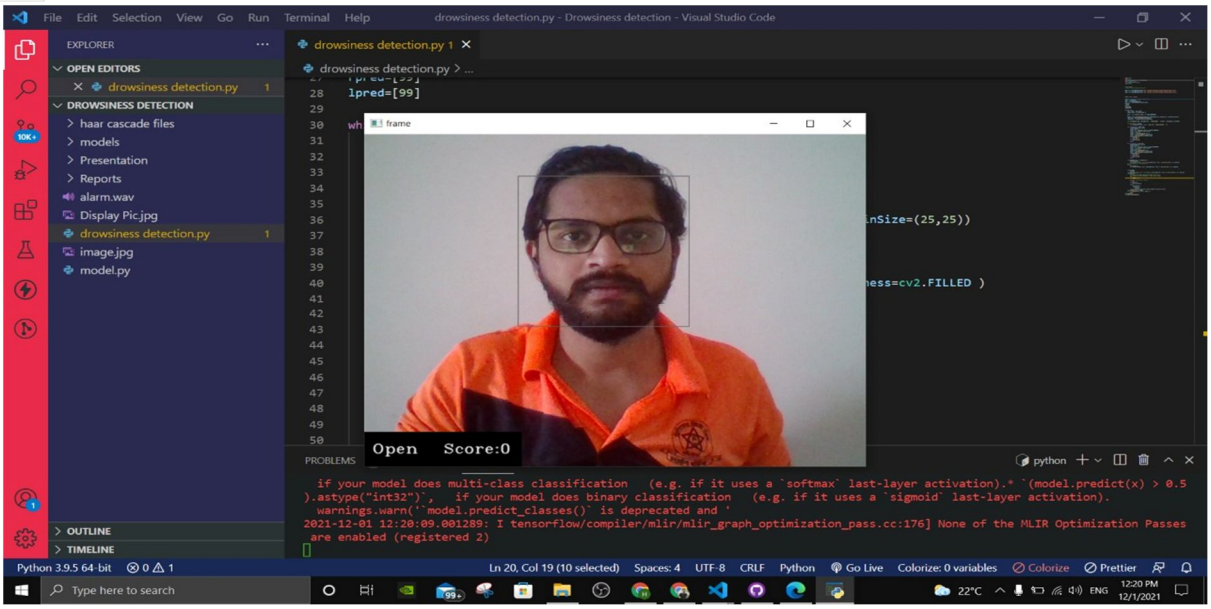


Image 5.1.Normal State

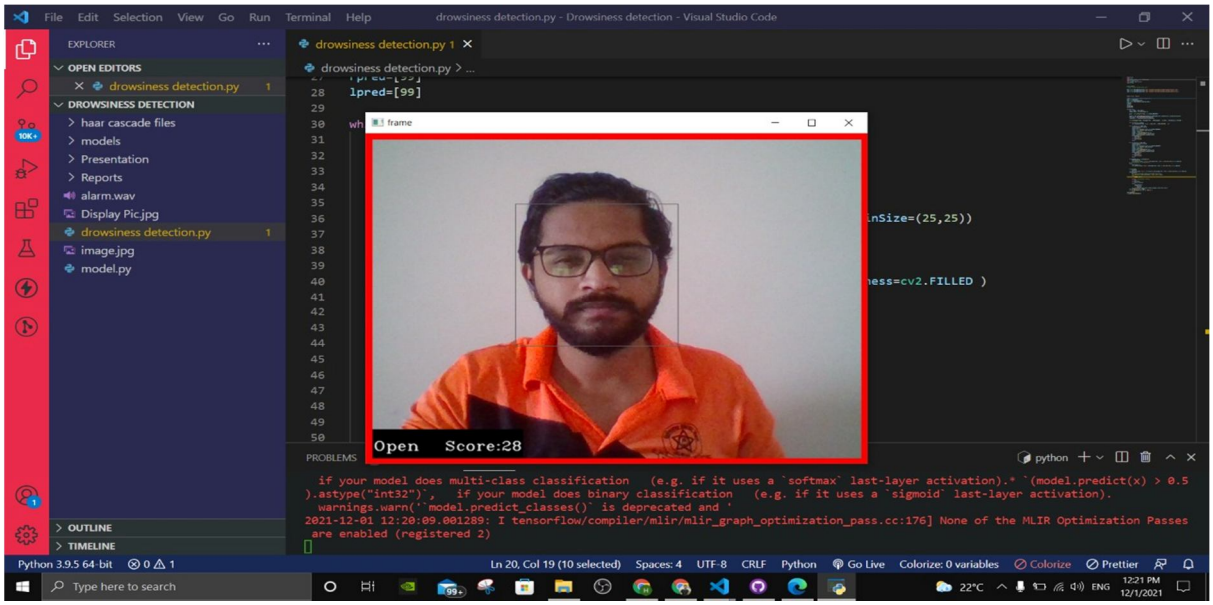


Image 5.2.Drowsy State

VI. CONCLUSION

The rising incidence of traffic accidents caused by less driver alertness has become a severe societal issue. According to statistics, 20 percent of all road accidents are caused by drivers who are not paying attention. Furthermore, incidents involving driver hypo-vigilance are more dangerous than other types of collisions, since drowsy drivers frequently fail to take the necessary precautions before a collision. As a result, establishing methods for monitoring driver attentiveness and warning the driver when he is tired and not paying attention to the road is critical to avoiding accidents. It will also employ alcohol pulse detection to determine whether or not the person is normal. In the subject of active safety research, preventing such mishaps is a key focus of work. Changes in facial characteristics such as the eyes, head, lips, and face are visible in those who are tired. To check a driver's alertness, computer vision can be a natural and nonintrusive tool. Faces, being the fundamental form of human communication, have long been a focus of computer vision research. One of the most promising commercial applications of automated facial expression recognition is the identification of driver weariness. Face detection, facial expression information extraction, and expression categorization are the three tiers of tasks involved in automatic facial expression identification (or analysis).

The key difficulty in these jobs is information extraction for feature-based face expression identification from a picture sequence. It entails detecting, identifying, and tracking facial feature points in a variety of lighting conditions, face orientations, and expressions. In this study, an SVM Classifier is used to identify weariness and provide various outcomes. The work's accuracy is 70 percent in this case.

VII. FUTURE WORK

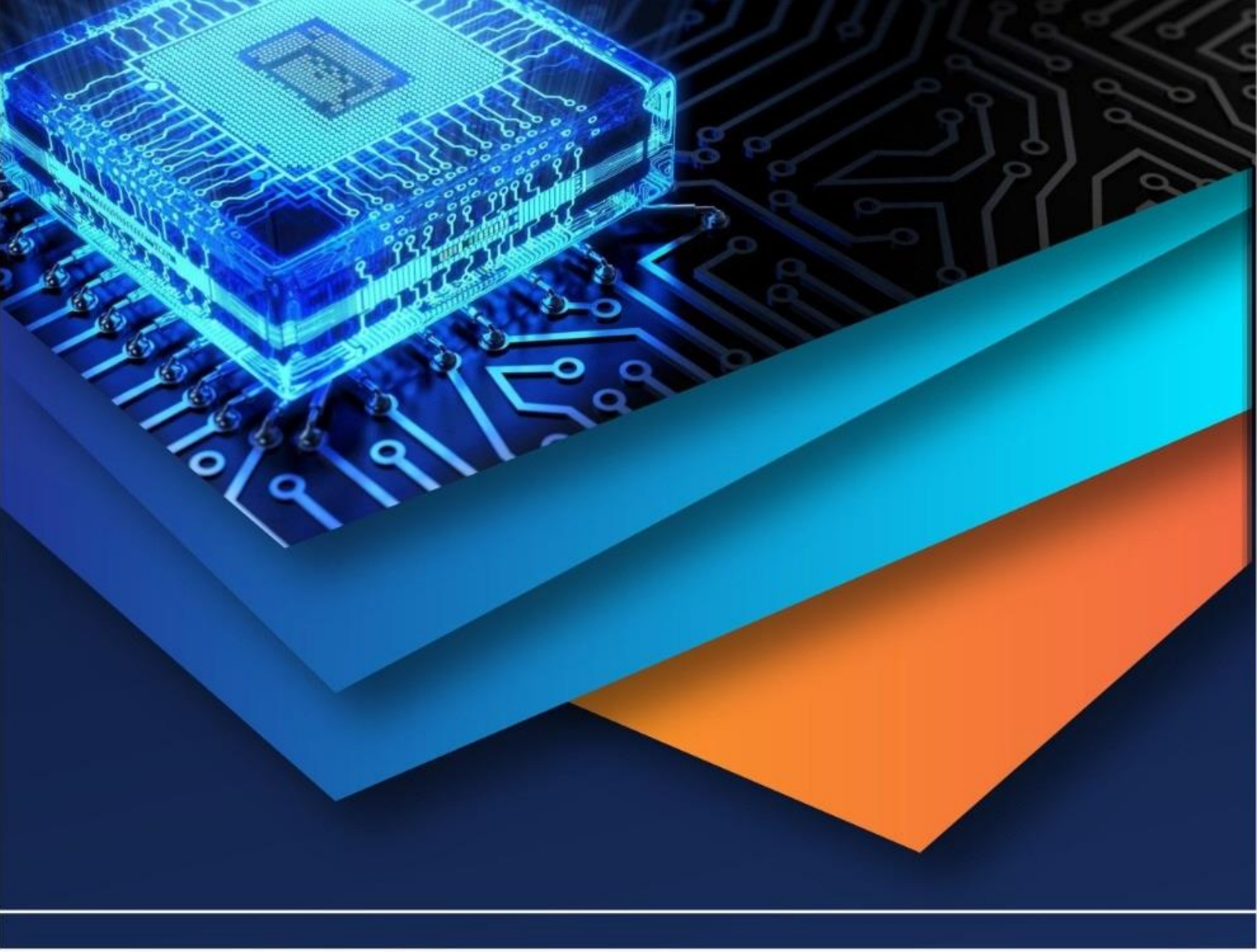
Driver sleepiness is a major concern in today's culture, as the drowning problem is causing an increase in accidents on a regular basis. With the help of Neural Networks and other real-time sensor devices, it will be deployed in the future. So that more accuracy may be achieved.

A. School bus drivers found the strategy to be incredibly useful.
B. It will also use alcohol pulse detection to assess whether the person is normal.

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