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DRIVERS DROWSINESS DETECTION SYSTEM

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Abstract - **The non-intrusive machine vision-based concepts were used in the development of the Driver Drowsy Detection System. To identify signs of drowsiness, the system looks into the driver's eyes using a tiny monochrome security camera aimed straight at their face. In In this scenario, a warning signal is given to the driver to alert them when weariness is detected. This report explains how to locate the eyes and how to tell if they are open or closed. One of the main goals of the research was to design an algorithm that is exclusive to currently published publications. In order to identify the margins of the face and reduce the possible range for the eyes, the system uses data from the binary version of the picture. The eyes are located by computing the horizontal once the face area has been identified. Regional averages. The location of the eyes is determined by identifying the notable changes in intensity inside the face, keeping in mind that the ocular areas exhibit large variations in brightness. Once the eyes have been found, their openness or closeness can be ascertained by measuring the intervals between intensity changes in the ocular area. Eye closure is correlated with a wide distance. For five consecutive frames, if the eyes are detected to be closed, the system draws the conclusion that the vehicle is dozing off and flashes the warning light. In addition, the system can recognize when the eyes are not visible and functions in appropriate illumination.**

Key Words: **Driver, Drowsiness, Accident, Road Safety, Speed analysis, drunk face, vehicles.**

I. INTRODUCTION

The number of automobiles in our nation is rising at an exponential rate. Road accidents are becoming more frequent, which is the biggest issue associated with the expanding usage of vehicles. Without a question, traffic accidents pose a worldwide threat to our nation. How frequently accidents occur on the roads in India ranks among the top countries worldwide. Approximately 135,000 people die in India each year as a result of traffic accidents, according to data from the National Crime Records Bureau (NCRB). The World Health Organization (WHO) found that driver mistake and carelessness are the main causes of traffic accidents in its Global Status Report on Road Safety.
The main factors that led to the accident were driver fatigue, alcoholism, and negligence. The deaths, related costs, and associated risks are acknowledged as posing a major threat to the nation. These elements combined resulted in the creation of Systems for Intelligent Transportation (ITS). Driver assistance systems including adaptive cruise control, park assistance, pedestrian detection, intelligent headlights, blind spot detection, and others are included in the category of Intelligent Transportation Systems (ITS).
Considering these aspects, one of the biggest design challenges for sophisticated driver assistance systems is the driver's condition. Sleepiness, intoxication, and reckless behavior of the driver are the main causes of driver errors. Transporter Errors and blunders that arise cause significant losses for humanity. A system for abnormality monitoring needs to be put inside the car in order to reduce the impact of driving abnormalities. One significant concern with the construction of enhanced safety systems in cars is the real-time detection of these behaviors. This project is centered on an ITS driver anomaly detection system for the automotive industry.

1.1 Objective

- Provide a reliable and precise system for detecting driver weariness or sleepiness that can recognize symptoms in real time
- Establish a dependable monitoring system to continuously assess the driver's condition based on behavioral and physiological cues, such as head position, eye movement, and facial expressions.
- Create an alert system that uses hectic feedback, visual alerts, or auditory alarms to notify the driver as soon as drowsiness is detected.

1.2 Scope

- Sensor Integration and Selection: Choose and install the right sensors, such as wearable technology or camera-based systems, to collect pertinent data for the purpose of detecting driver sleepiness.
- Data Acquisition and Processing: Create methods and algorithms to instantly gather and process sensor data. This could entail machine learning, computer vision, and image processing.
- The objective is to create and execute an algorithm that can accurately identify indicators of weariness or drowsiness based on the data that has been gathered. Several signs and their combinations should be taken into account by this algorithm to guarantee accurate detection.
- Alert System: Provide a reliable alert system that warns the driver when it senses fatigue. This could entail producing hectic feedback, visual alerts, or auditory alerts to draw the driver's attention and encourage quick action.

II. EXISTING SYSTEM

The instruments that monitor blood pressure, heart rate, breathing rate, and other parameters are used in the sleepiness detection systems of today. The use of these gadgets may make driving uncomfortable for the motorist. It is not guaranteed that the drivers use these gadgets while operating a vehicle. could be misplaced or malfunction, which could result in a result with poor precision. Low light levels are not well served by the current system's output. Lower accuracy occurs from the system's inability to recognize the driver's face and eyes in dim or low light.

2.1 Disadvantage

There might be some restrictions on the current driver sleepiness detection system that makes use of Open CV and Python. It might have trouble correctly identifying sleepiness in different lighting situations, which could result in false positives or negatives.

Furthermore, depending only on visual cues—such eye movement—may miss other important aspects of sleepiness, like physiological signs or cognitive exhaustion. Additionally, the system may not be able to adjust to different driving actions and facial traits, which could result in decreased efficacy for a variety of users. Finally, real-time notifications may not be able to accurately target different degrees of driver drowsiness.

III. PROPOSED SYSTEM

There are numerous algorithms and techniques for monitoring and tracking the eyes. The majority of them have something to do with eye characteristics, usually reflections from the eye, in a driver's video view.

The initial goal of this experiment was to locate the eyes on the face using the retinal reflection, and to determine when the eyes are closed by looking for the absence of this reflection. The eye closure period can be computed more easily if this approach is applied to successive video frames. Drivers who are sleepy tend to blink their eyes more slowly than usual. A significant accident might also occur in a much shorter amount of time. Thus, the moment we identify a closed eye, we will alert the driver.

3.1 Advantages

- Enhancement of Road Safety: The project's goal is to increase road safety by identifying and immediately notifying drivers when they exhibit signs of fatigue. Potential accidents brought on by drowsy driving can be avoided, saving lives and minimizing injuries on the road, by acting quickly when drowsiness is detected.
- Accident Prevention: Fatigue is a frequent contributing factor in a lot of traffic accidents. The technology can assist in preventing accidents brought on by driver inattention or loss of control due to weariness by identifying and warning drivers about their drowsy condition.
- Raising Awareness of Drowsy Driving: The project educates the public and drivers alike about the risks associated with driving while intoxicated. It promotes responsible driving behaviors and emphasizes the significance of maintaining awareness when operating a vehicle.
- Early Driver Fatigue Intervention: By identifying early indicators of sleepiness, the system gives drivers the chance to take the appropriate countermeasures, such taking breaks, altering their driving style, or getting more rest.
- Customizability and Adaptability: The system's adaptability and customization are enhanced by the project. The alert system can be customized to fit individual user requirements and accommodate a variety of driving scenarios by offering modifications to alarm thresholds, sensitivity levels, and connectivity with different automobiles.
- Data Gathering and Analysis: The initiative produces insightful datasets about driver weariness and drowsiness. These datasets can be utilized for more investigation, analysis, and the creation of better systems and algorithms to increase the safety of drivers.

IV. IMPLEMENTATION

The suggested method mainly relies on the driver's eye blinking and yawning, which are behavioral indicators. The project's goal is to inform the driver when it detects closed eyes or an opened mouth, which is indicative of yawning. To accomplish this, a camera or recording device in front of the driver and continuously record video in real time with

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Open-CV and dlib. The laptop's camera and external camera process the application, which is run in Python.
The work is mostly divided into three steps:
1. Face, eye and mouth detection
2. Eye closure detection

1. Face, eye detection :
In this phase, the dlib library is used to detect faces. To locate face landmarks, the dlib library's shape predictor is employed. The Predictor provides 68 landmark points that can be used to pinpoint facial features including the eyes, eyebrows,
ears, mouth, and nose. Figure 1 displays the face landmarks that Dlib can identify. For this reason, by using facial landmark detection.

B. Eye Closure Detection :
As seen in figure 1.2, each eye is represented by six coordinates. One can extract the Eye Aspect Ratio (EAR) equation, which expresses the relationship between the coordinators' height and width.
Using the Euclidean distance formula, the distance between vertical eye landmarks is determined in the numerator, while the distance between horizontal eye landmarks is calculated in the denominator.

$$\text{Eye Aspect Ratio} = \frac{\|P2-P6\| + \|P3-PP5\|}{2\|P1-P4\|}$$

where p2 and p3 denote the upper eyelid points, p6 and p5 the lower eyelid points, and p1, p4 the endpoints of an eye. You can use this ratio of eye landmark distances to tell if someone is blinking or not.

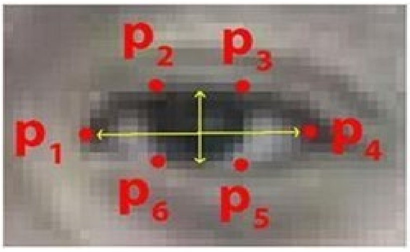

Fig 1.2

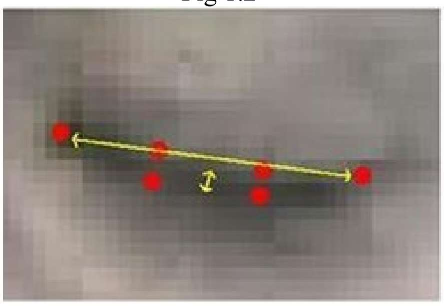

Fig 1.3

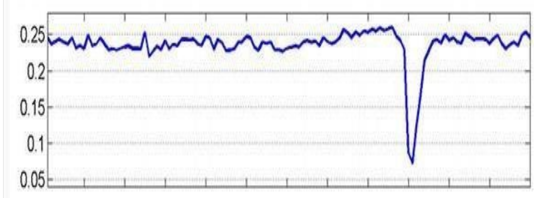

Fig 1.4

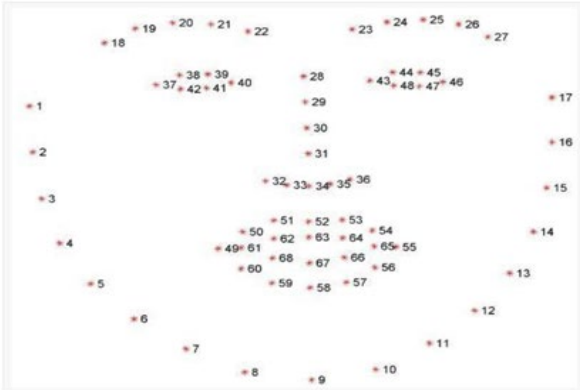

Fig 1.5

V. CONCLUSION

In conclusion, a major advancement in improving road safety and averting probable collisions brought on by driver sleepiness has been made with the creation and deployment of a driver drowsiness detection system utilizing Python and Open CV. When combined with real-time analysis, the system's monitoring of important facial and eye movement markers offers a dependable way to detect drowsiness and warn the driver.
All things considered, the driver drowsiness detection system created with Python and OpenCV has a great deal of promise to improve road safety by continuously tracking driver weariness and sending out timely alerts. Technology has the potential to significantly contribute to a decrease in accidents resulting from fatigued driving and eventually improve road safety for all users as it develops and matures.

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