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Driver Drowsiness Detection using Machine Learning and open CV

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Abstract:- **Intoxicated driving, sleepiness, and reckless driving are the most common causes of accidents and deaths globally, and the major causes of these accidents are usually drunken driving, drowsiness, and reckless driving. According to the United Nations, road traffic injuries have increased to 1.25 billion worldwide, making driver sleepiness detection a significant issue. A promising area for preventing countless sleep-related traffic accidents. This research provides a machine-based method for detecting tiredness. As a result of the learning algorithms, the driver is alerted in real-time. To avoid a collision The Haar Cascade method is used in the model. Along with the OpenCV library to keep track of real-time video the driving and to detect the driver's eyes the system makes use of the Eye Aspect Ratio (EAR) notion is used to detect whether or not the eyes are open.**

Keywords:- *Drowsiness, Threshold, Eye Aspect Ratio, Drowsiness.*

I. INTRODUCTION

Driver sleepiness detection is critical in car safety technologies to avoid road accidents. Many people nowadays rely on automobiles for everyday commuting, greater living standards, comfort, and time restrictions to get to their objectives. This trend results in heavy traffic in cities and on roads. As a result of various reasons, the number of traffic accidents will increase.

Drowsy driving may be the primary cause of car accidents. Early detection of driver drowsiness and notifying with an alarm is one technique to reduce the incidence of accidents. Accidents are frequently caused by drivers who are sleep deprived. To prevent road accidents, technology for detecting driver drowsiness is essential. For both the industrial and research communities, developing this technology is a major undertaking.

While driving, various indicators of driver drowsiness can be detected, such as the inability to keep one's eyes open, frequent yawning, and moving.

The head forward, among others. Various measures are used to assess the degree of driver drowsiness. In their Global Status Report on Road Safety, the World Health Organization named tiredness, drinking, and carelessness as major causes of traffic accidents.

As a result, the deaths and resulting costs pose a serious threat to families all over the world. Because of their high cost and limited availability, current sleepiness detection systems are not widely employed, rendering them unsuitable for usage in everyday or non-luxury vehicles. As a result, a clever and viable solution is becoming increasingly necessary. Numerous autos have a sleepiness detection system. Can swiftly adjust in the industry Machine-related fields Artificial intelligence and machine learning have aided in the development of several products. Breakthroughs that employ various algorithms Clever and self-contained model.

The Haar Cascade technique, which is paired with several Python modules to capture and identify drowsiness in real time, is proposed in this model. Because the method is optimal in speed and accuracy, this model is effective at detecting drowsiness.

II. METHODOLOGY

The suggested system employs Haar Cascades to recognize items in real time, such as the driver's face and eyes. The model makes use of libraries like OpenCV, Dlib, and GPIO to make the software and the hardware input/output easier.

EYE AR THRESH for the eye aspect ratio to indicate a blink and EYE EAR CONSEC FRAMES for the amount of consecutive frames the system will monitor to detect drowsiness are the first two constants defined by the software.

We then set the frame counter 'COUNTER' to 0 and the Boolean 'ALARM ON' to OFF, which keeps track of the number of frames for open and closed eyes as well as the alarm status. Now we'll set up the Dlib's HOG-based face detector and use it to build the facial landmark predictor.

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For yawn detection, a YAWN value will be calculated and compared to a threshold value utilizing the distance between the upper and lower lips.

The eSpeak (text to speech synthesizer) module is used to offer pertinent voice alerts when the driver is weary or yawning.

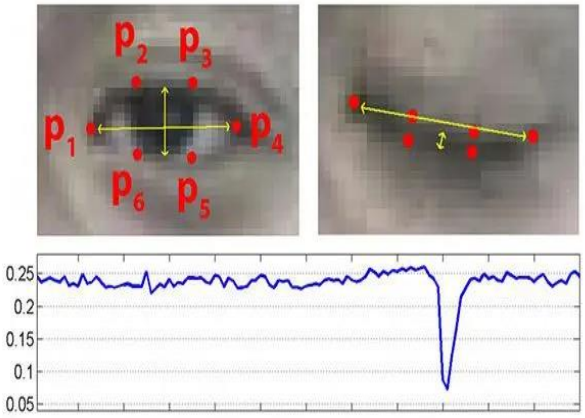

Fig 1: Eye Aspect Ratio

As seen in Figure, the eye aspect ratio controls whether or not the eyes are open. As the eye is open, the EAR is rather constant, but when the eye blinks, it swiftly drops to zero; hence it is used to detect a blink in a single frame. We can also eliminate image processing procedures by using this simple equation to obtain the ratio of eye landmark distances. When a person blinks.

$$EAR = \frac{\|p_2 - p_6\| + \|p_3 - p_5\|}{2\|p_1 - p_4\|}$$

Fig 2: Formula for EAR

EAR is used to determine ocular openness. Now we compute the convex hull for the left and right eyes by averaging the eye aspect ratios for both eyes ((left EAR + right EAR) / 2.0). If the eyes are open, we color them green; if they are closed, we color them red. If the eye aspect ratio is less than the blink threshold, the condition statement increments the blink frame counter.

We sound the alarm if the eyes identified are closed for five frames in a row. Otherwise, the counter is reset to 0. We loop back to the next frame and repeat the technique for the current frame until one iteration for a frame is accomplished.

III. ALGORITHM

- This diagram shows how the sleepiness detection system works in its entirety.
- It explains why each stage in the sleepiness detection process is so important.
- Notice how the camera's brightness and contrast levels are modified initially.
- The face is then discovered.
- Only the next step is taken if it is successfully previewed.
- The detection of the eyes occurs.
- The eye region is targeted and removed when a decision is made for proper eye detection.
- Whether the eyes are closed or opened is determined.
- Drowsiness is determined by the info that is saved and stored.
- Now is the time to assess sleepiness.
- If he is drowsy, the alarm goes off loudly and he gets alerted.

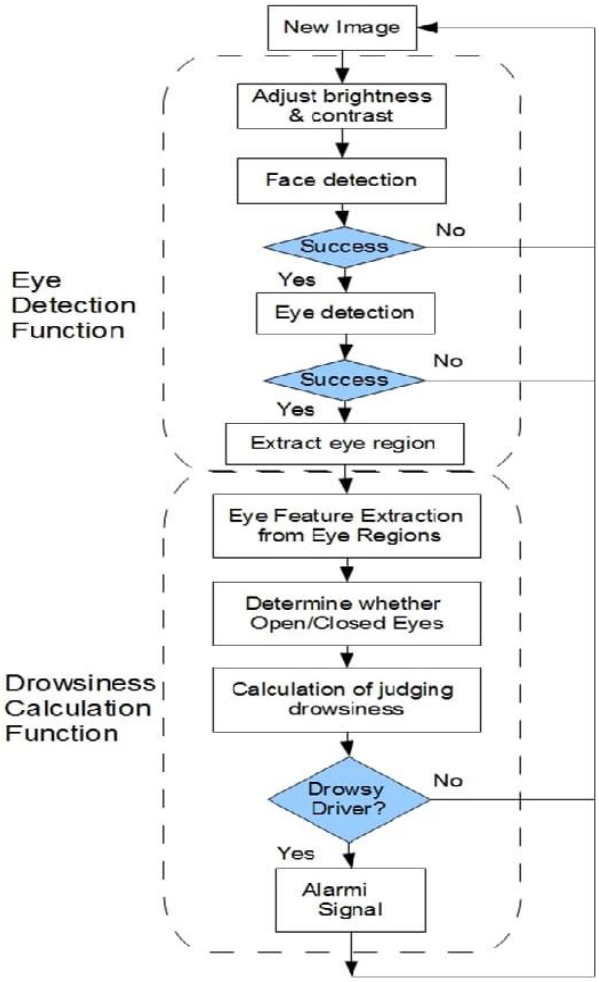

Fig 3

IV. ADVANTAGES

- Because the system consumes fewer resources, it is less expensive.
- Improved driving efficiency and safety.
- Less manual labor.
- The method also saves time and effort for humans
- No driver weariness.

V. CONCLUSION

The proposed method assists the driver in remaining alert while driving and reduces sleep-related accidents.

The buzzer is in charge of notifying the driver by sending sound signals, which effectively awakens the driver in real time to prevent road accidents.

The Haar cascade classifier lowers erroneous eye detections by calculating the Eye aspect ratio, which is a problem with models that just use the OpenCV library.

The Eye aspect ratio of consecutive frames will aid us in removing minor inaccuracies and accurately calculating drowsiness.

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