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DRIVER DROWSINESS DETECTION AND ACCIDENT PREVENTION

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Abstract: Driver drowsiness detection is an essentialcomponent of modern vehicle safety systems. In this project, we propose a novel method for detectingdriver drowsiness using a web camera. Our system captures video footage of the driver and applies computer vision algorithms to track facial features anddetermine the level of drowsiness. The system uses a combination of facial landmarks detection, eye- tracking, and machine learning techniques to determine the driver's level of alertness. Our experiments show that the proposed system can accurately detect driver drowsiness and alert the driverin real-time. The proposed method has the potential toenhance road safety and reduce the number of accidents caused by driver drowsiness.

I. INTRODUCTION

Driver drowsiness is a major cause of road accidents worldwide. According to the NationalHighway Traffic Safety Administration (NHTSA), drowsy driving is responsible for approximately 100,000 crashes and 1,500 deaths in the United States every year. Driver drowsiness detection systems are essential to prevent these accidents andenhance road safety.

In recent years, several driver drowsiness detection systems have been proposed, including systems based on physiological signals, vehicle data, and computer vision. Among these, computer vision-based systems have gained significant attention due to their non-invasive and cost-effective nature.

In this project, we propose a novel method for driverdrowsiness detection using a web camera. Our system captures video footage of the driver and applies computer vision algorithms to track facial features and determine the level of drowsiness. Theproposed system uses a combination of facial landmarks detection, eye-tracking, and machine learning techniques to determine the driver's level of alertness. The system alerts the driver in real- time if it detects drowsiness, enabling the driver to take corrective action before an accident occurs.

The proposed system has several advantages over traditional driver drowsiness detection systems. Additionally, it can be easily integrated into existing vehicle safety systems, enhancing the overall safety of the vehicle. The proposed method has the potential to reduce the number of accidents caused by driver drowsiness and improve road safety.

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II. METHODOLOGY

Drowsiness detection and accident prevention using a web camera can be achieved by following a certain methodology that involves the following steps:

1. Collecting data: The first step is to collect data that willbe used to train the machine learning model for drowsiness detection. This can be done by recording video footage of people performing activities such as driving, working on a computer, or reading.

2. Pre-processing data: Once the data is collected, it needsto be pre-processed to remove any noise and ensure that the images are of good quality. This can be done by using image processing techniques such as filtering, edge detection, and segmentation.

3. Feature extraction: After pre-processing the data, the next step is to extract relevant features from the images.This can be done by using machine learning algorithmssuch as principal component analysis (PCA), convolutional neural networks (CNN), and deep learning.

4. Model training: Once the relevant features are extracted, the next step is to train the machine learning model. This can be done by using techniques such as supervised learning or unsupervised learning, depending on the availability of labelled data.

5. Testing and evaluation: After training the model, it needs to be tested and evaluated to ensure thatit is accurate and reliable. This can be done by using metrics such as precision, recall, and F1- score.

6. Implementation: Finally, the drowsiness detectionmodel needs to be implemented in real-time usinga web camera. The camera can be placed on a dashboard of a car or a computer monitor to detectthe drowsiness of the driver or user. If the model detects drowsiness, it can send an alert to the driveror user to take a break or stop working.

Overall, the methodology for drowsiness detection and accident prevention using a web camera involves collectingand pre-processing data, extracting relevant features, training the machine learning model, testing and evaluatingthe model, and implementing the model in real-time.

III. BLOCK DIAGRAM OF PROPOSEDMODEL

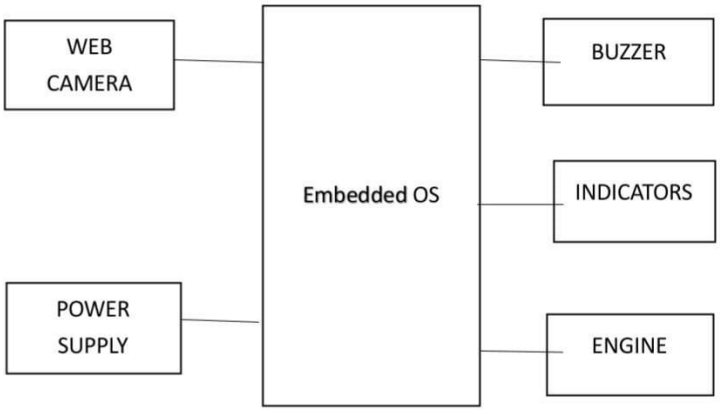

Figure 1 Block diagram of drowsiness detection system

In the above figure 1 using a webcam by 68 landmarks is acomputer vision-based approach that tracks the facial landmarks of the driver in real-time. The following is a block diagram explanation of a typical drowsiness detection system using a webcam and 68 landmarks:

1. Webcam: The system uses a webcam to capture thefacial image of the driver.

2. Face detection: The system detects the face of the driver in the captured image.

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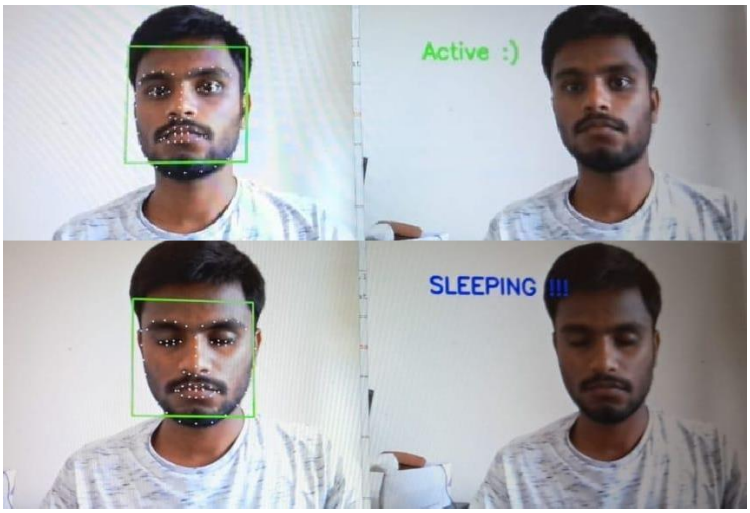
3. Facial landmark detection: The system uses a machine learning-based approach, such as the Convoluted Neural Network (CNN), to detect andtrack 68 landmarks on the driver's face, including the eyes, mouth, nose, and eyebrows.

4. Feature extraction: The feature extraction module analyses the position and movement of thedetected landmarks over time and extracts important features such as eye aspect ratio (EAR),mouth aspect ratio (MAR), and head pose.

5. Feature selection: The feature selection module selects the most relevant features among the extracted features, which will be used for drowsiness detection.

6. Decision-making: The decision-making module uses a machine learning algorithm, such as SupportVector Machine (SVM) or Artificial NeuralNetwork (ANN), to classify the driver's alertness level based on the selected features. If the system detects drowsiness or fatigue, an alert is triggered to warn the driver, for example, by sounding an alarm or vibrating the steering wheel.



IV. RESULTS AND DISCUSSION

The results of a drowsiness detection system using a webcam by 68 landmarks and buzzer, engine as output will depend on the accuracy of the system in detecting drowsiness and the responsiveness of the outputmechanisms.

Assuming a well-designed and properly calibrated system, the following are some possible results:

1. Alertness level: The system accurately detects the driver's alertness level and classifies it into different categories, such as alert, drowsy, and Sleeping.

2. Buzzer output: If the system detects drowsiness or fatigue, the buzzer output is triggered to warn the driver.The volume and duration of the buzzer can be adjusted based on the severity of drowsiness.

3. Engine output: If the system detects very drowsy or unconsciousness and dint get alert by buzzer then the engine gets turrened off and remains off until the drivergets it ON.

4. Indicators: Once, The engine gets turned off then the indicators also gets turned ON, To indicate the vehicle isin critical situation.

Overall, a drowsiness detection system using a webcamby 68 landmarks and buzzer, engine as output has the potential to improve road safety by alerting drivers to their drowsiness level and preventing accidents caused by drowsy driving.

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