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Drowsiness Alert Alcohol Detection System

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Abstract-

This article is designed to improve road safety by addressing driver fatigue, a major factor in accidents. The system uses visual data and artificial intelligence to detect drowsy drivers. It uses technology to detect, track and identify the driver's face and eyes,using the Softmax neurotransfer function to measure PERCLOS (percentage of closed eyes). In addition, the systemincludes an alcohol test to assess the driver's condition and de termine whether he is in normal or abnormal conditions.Driver fatigue poses a particular risk for drivers of large vehicles suchas buses and heavy trucks, due to the stress and long driving ina congested commute.
By using this technique, we aim to reduce the number of accidents caused by driver fatigue and contribute to road safety.

Keyword-

Mouth Detection, Eyes Detection, Convolutional neural Network, Drowsiness.

INTRODUCTION

In recent years, driver fatigue has become a significant issue in society, leading to an alarming number of car accidents. Studies indicate that approximately 20% of fatal crashes are caused by reduced driver awareness, making accidents involving drowsy drivers even more dangerous due to their failure to react appropriately.To address this problem and prevent accidents caused by driver drowsiness, it is crucial to develop effective systems that can monitor driver alertness and provide timely alerts when signs of drowsiness are detected. This focus on preventing accidents caused by drowsy drivers has become a top priority in safety research.Various approaches leveraging technology have been discovered to improve road safety and reduce driver drowsiness. These methods encompass tool-based, behavioral, and physiological signal-based techniques. The vehicle-based approach involves utilizing sensors embedded in the vehicle to monitor driving patterns, such as deviations from the road or changes in behavior, which may indicate that the driver is falling asleep.Machine learning algorithms are often employed in these systems to analyze sensor data and ensure the driver's attentiveness. Behavioral analysis focuses on monitoring the driver's eye movements, head position, and facial expressions to detect signs of fatigue. Computer technology plays a critical role in monitoring and interpreting these behaviors, enabling the measurement of the driver's awake time.Physiological signal-based systems utilize signals from the driver's body, such as the electroencephalogram (EEG) for brain activity, the electrooculogram (EOG) for eye movement, and the electrocardiogram (EKG) for heart rate changes. By monitoring these signals, these systems can provide accurate and reliable information about the driver's drowsiness levels.Despite significant progress in detecting driver fatigue, several challenges remain. These include accounting for individual variations in sleep patterns, considering environmental influences, and addressing potential adverse or inconspicuous effects. Moreover, ensuring the deployment and acceptance of these systems is crucial for their widespread adoption and effectiveness.This article aims to provide a comprehensive review of the latest research and advancements in driver drowsiness detection systems. The dataset encompasses seven key elements. Additionally, this study attempts to develop four models that aid visually impaired individuals in managing their daily activities. The models provide auditory descriptions of objects and signs, enabling visually impaired people to navigate their surroundings using voice commands and image-based guidance.

Existing System-

To address the issue of drowsy driving and prevent serious accidents, previous approaches have focused on implementing measures to monitor and assist fatigued drivers. Several strategies commonly employed include:

Vehicle Inspection: This method entails continuously monitoring various driving behaviors and indicators, such as lane departure, steering wheel movements, and pedal pressure. If any of these factors exceed predefined thresholds, it indicates that the driver may be experiencing drowsiness.

Behavior Analysis: By utilizing cameras, the driver's behavior can be monitored for signs of fatigue, such as yawning, eye closure, blinking patterns, and head movements. Detection of any of these indicators can trigger warnings to alert the driver of potential dangers.

Physiological Tests: These involve conducting physical activity correlations and examining signals such as electrocardiogram (ECG), electromyography (EMG), electrooculogram (EOG), and electroencephalogram (EEG) to assess drowsiness levels.

Implementing these measures aims to detect and prevent accidents caused by drowsy driving, ultimately enhancing overall road safety.

Related work-

Data analysis is the most important step in research before we start development, we should review the previous data in the field we are working with , guess or create flaws based on the research and start working with the historical data. In this section we briefly describe studies on fatigue detection using various techniques. This document introduces WE(WES) in sliding window, ApEn(PP_ApEnS) in sliding window to control the time of driver vehicle fatigue. The real time neural network equipment obtained from the WE, PP-ApEn and PP-SampEn sliding window was used to train and evaluate the system and the fatigue degree of the training in four cases, that is, the normal state was given somewhat weak, mood swings and very weak. The advantage is that driver fatigue can be better predicted using techniques based on EEG, EOG and EMG signals.[1] This article presents sleep information that does not interfere with the use of the eyes and imaging. visual stability algorithm introduced to solve problems caused by changes in lightning and drivers posture. Six param parameters were calculated, including percentage of eyes closed, maximum closed time, blinking, average eye opening, eye opening speed and eye closing speed. The good thing is: accuracy of the video sleep recognition method is 86% The downside the need to improve this precision.

This article presents a visual analysis of the eyes and head system (HP) for continuous monitoring of a driver alertness visual planning techniques such as eye index 2020 (JETIR) April 2020, Volume 7, Issue 4 www.jetir.org (ISSN-2349-5162) JETIR2004462 Journal of Emerging Technologies and Innovation Research(JETIR) ww.jetir.org

The primary function of fatigue/fatigue detection (DFD) is to monitor and monitor the condition of the drive. Advantage: A better timed view is indicative of the physical characteristics of the drive.[4] This article focuses on a sleepy driver detection system in smart vehicles, focusing on abnormal behavior exhibited by drivers using Raspberry Pi signal board computer. During the planning process, a non-invasive driver sleep monitoring system was developed using computer vision techniques. Advantage: The system detects driver fatigue when eyes are closed for four frames or more (eg. more than two seconds). The system is inconspicuous and can be easily installed in any vehicle. Disadvantage: The system is expensive.[5] This article introduced driving behavior based seizure and access testing. The task is to capture facial images from the images collected by the car and transmit the data to the learning model to recognize the driver status. When it is detected that collected data shows sleepiness, the person is warned by using loudspeaker in the vehicle so that the person can stop in order to avoid an accident due to his sleep state. The system also includes vehicle GPS tracking and a mobile app to report vehicle movements.[6] Design that protects commercial or personal vehicles from theft and other serious damage is very important due to the bad environment around us.In this case, they automatically turn off the car with the help of sleep detection alcohol and other necessary multitasking system for safe driving such as accidents. With the effective operation of smart driving, the probability of accident will decrease and the main thing is that human nature cannot be imagined, so we provide a system that can work in all kind of ways. [7] This article presents a low-cost, non-invasive driver fatigue and detection solution based on face and eye detection in real time which truly determines driver fatigue status. Regional facial recognition based on the optimization of the Jones and Viola method. The eye area is obtained by horizontal projection. Finally, a new complex function with a dynamic method to detect eye state.[8] This article presents the detection of drowsy driver using the topic based on the blind spot detection system. The system uses a webcam aimed directly at the drivers face and monitors the driver's head movements to detect fatigue. In such a weak situation, warning alert warns the driver. The system controls the eyes, nose and mouth in certain area of the image. If five consecutive image are not detected, the system concludes that drive is asleep.[9] This document describes the sleepy driver detection system. They proposed the concept of application of on-vision based driver sleepiness detection, which aims to warn drivers when they are drowsy. [10] This document represents a system for automatic detection of fatigue in films. Their systems use Cb and Cr components of the YCb Cr color space. The system uses vertical mirroring to detect faces and horizontal mirroring to detect eyes. When the eye is open the system calculate the eye state using the complexity function.[11] These documents provide real time and monitoring alerts of the driver. They use the Harr algorithm to detect objects and face isolated from the OpenCV library. The eye region is derived from the facial region by anthropometric factors. They then examined the eyelids to measure eye closure to determine if the driver is awake and to determine if he is asleep. This paper, proposed, Real Time Driver Identity and Alertness Monitoring. They used the harr algorithm to detect objects and face classifier implemented by in OpenCV libraries eye regions are derived from the facial region with anthropometric factors. Then, they detect the eyelid to measure the level of eye closure and thereby analyze the alertness of level of the driver and conclude whether he is drowsy or not.[12]

This paper, proposes a detection and prediction of drowsiness, Automatic classifiers for 30 facial actions from the Facial Action Coding system were developed using machine learning on a separate database of spontaneous expressions. These facial actions include blinking and yawn motions, as well as a number of other facial movements head motion was collected through automatic eye tracking and an accelerometer [13]

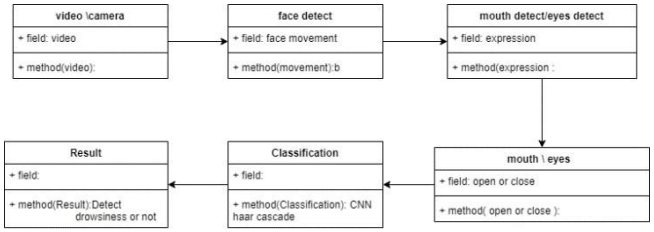
Proposed system-

The system starts with continuously capturing the video. The proposed system will generate the frames of driver's face and eye. Select one frame form the list of frames as known as image. The face and eye detection is based on the PCA algorithm. Detecting the face and eye with such method is proven to be a faster and efficient way of eye detection. This method stays good even under improper/extreme light conditions, as long as the data captured and provided for training includes these conditions. The image of drivers face will be processed and the eye images will be derived out of it. Then the eye region along with the boundary of iris will be detected in the frame using Circular Hough Transform. Circular Hough Transform helps in extracting the circles with a center point (xc; yc) and a radius r. The CHT will detect bright spots based on the circles. The proposed system consists of three components:

1. Capturing: Camera mounted on the automotive dashboard captures the video of driver's face including eyes.

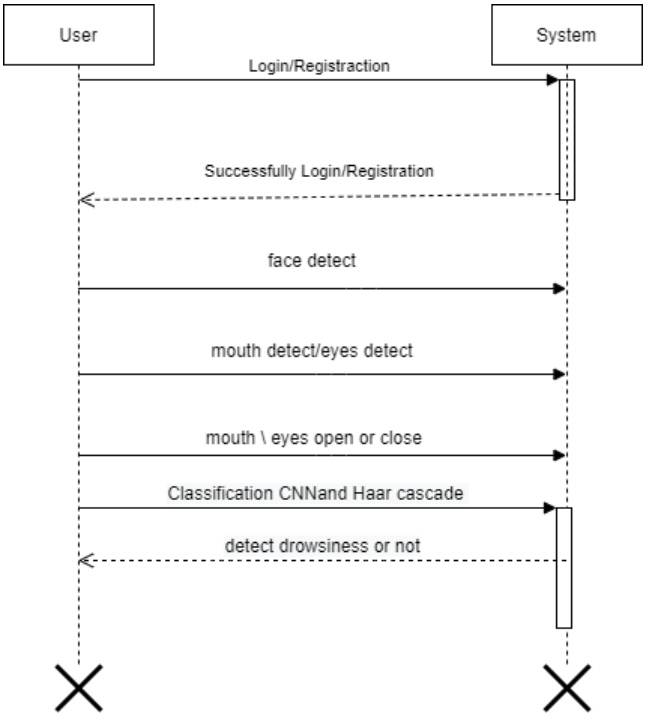
2. Processing: Captured video is converted in frames. Select every frame as facial image is used to determine driver's eye i.e. open or closed. The driver's current eye state can be determined using HARR classifier cascades and Circle Hough Transform in OpenCV.

3. Detecting: When system is to read images and detect drowsy condition when eye is closed. The system operates by continuously recording video footage.



.Python programming language is widely employed for image processing due to its adaptability to the latest trends and technologies. After the image undergoes processing, it is converted into audio signals and transmitted through an audio jack, resulting in output through the speaker. However, the existing method has certain limitations, such as incompatible sizes and immobility. To overcome these drawbacks, an embedded platform like Raspberry Pi is chosen, and the camera is connected to the board for image processing. The ROI (region of interest) technique is utilized to identify and extract relevant text from the captured images.

Implementation and algorithm-



Software Used:

OpenCV-Python is a Python library that offers Python bindings for solving computer vision problems. It is an open-source BSD-licensed library containing a vast collection of computer vision algorithms. OpenCV-Python combines the advantages of the OpenCV C++ API with the flexibility of the Python language. It utilizes Numpy, a highly optimized numerical operations library with a Python-style syntax, for seamless integration. Numpy allows easy collaboration with other libraries like SciPy and Matplotlib, which also rely on Numpy arrays.

TensorFlow is a popular open-source software library used for machine learning tasks. It serves as both a symbolic math library and a platform for constructing and training neural networks. TensorFlow enables the detection and interpretation of patterns and correlations, mimicking human learning and reasoning processes. It provides APIs for various programming languages, including Python, C++, Haskell, Java, Go, and Rust.

Anaconda Navigator is a graphical user interface (GUI) that comes with the Anaconda distribution. It allows users to easily launch applications, manage conda packages, environments, and channels without relying on command-line commands.

Navigator enables users to search and install packages from Anaconda Cloud or a local Anaconda Repository. It supports Windows, macOS, and Linux operating systems.

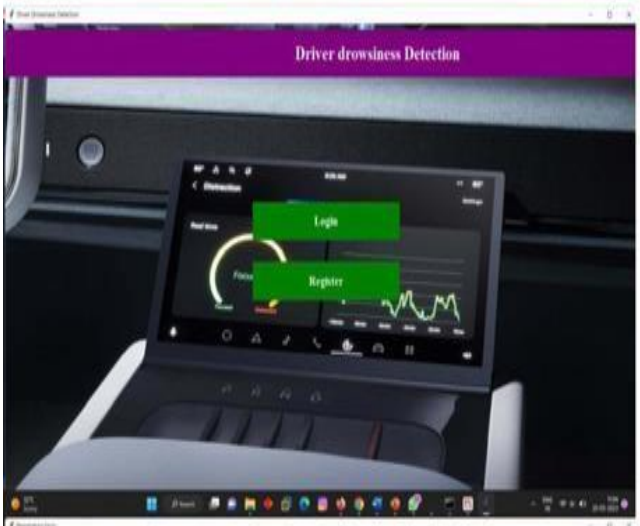
Spyder, an open-source cross-platform Integrated Development Environment (IDE), is commonly used for scientific programming in Python. Spyder seamlessly integrates with various packages in the scientific Python stack, such as NumPy, SciPy, Matplotlib, and pandas. It is released under the MIT license.Object detection involves the use of Haar characteristic-based cascade classifiers, which employ a machine learning approach. The cascade function is trained using a large set of positive and negative images, enabling it to detect object features in different images. This algorithm utilizes Haar-like features, which consist of interconnected white and black rectangles. These features have specific lengths and are square in shape.

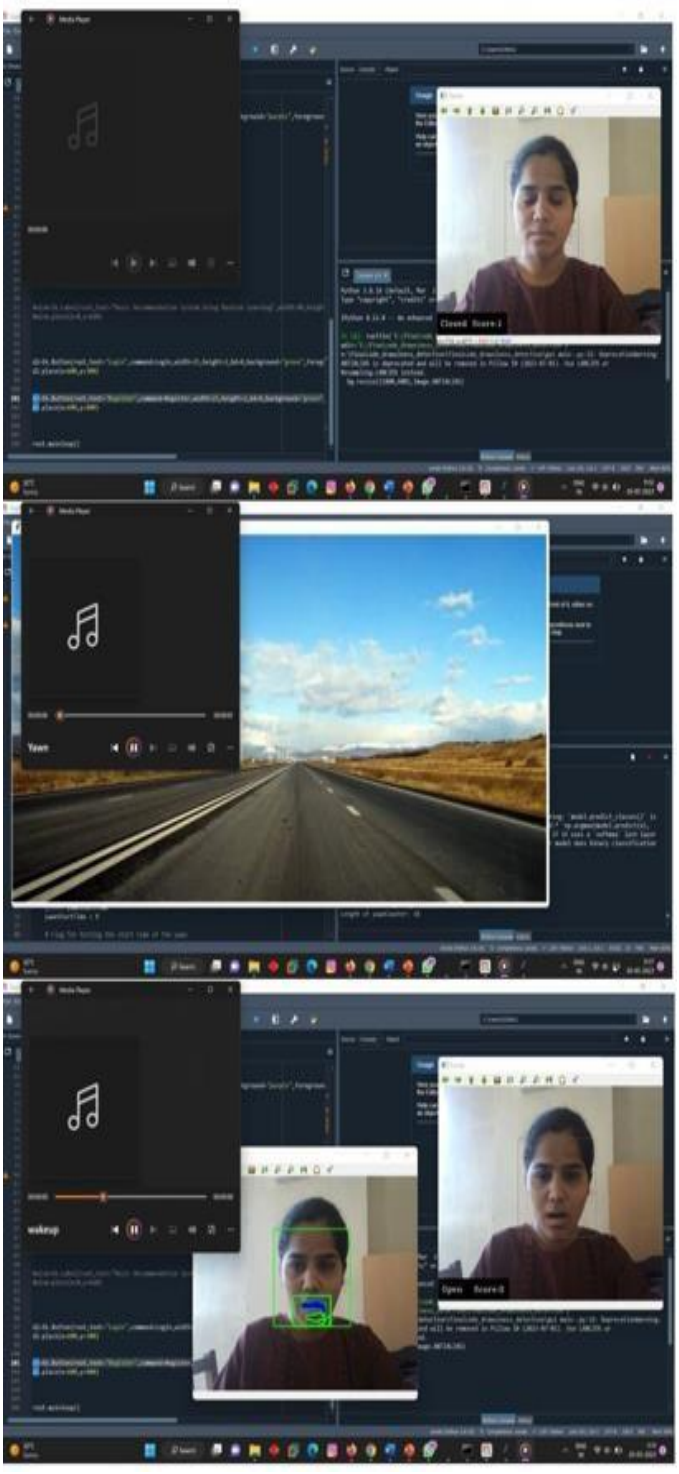
Result-

The proposed system is useful for drivers for their safety. It not heir

Registration test case

Test Case ID	Test Case	Test Case I/P	Actual Result	Expected Result	Test case criteria(P/F)
001	Enter the number in username, middle name, last name field	Number	Error Comes	Error Should Comes	P
001	Enter the character in username, middle name, last name field	Character	Accept	Accept	p
002	Enter the invalid email id format in email id field	Kkgmail.com	Error comes	Error Should Comes	P
002	Enter the valid email id format in email id field	kk@gmail.com	Accept	Accept	P
003	Enter the invalid digit no in phone no field	99999	Error comes	Error Should Comes	P
003	Enter the 10 digit no in phone no field	9999999999	Accept	Accept	P





Conclusion-

The increasing occurrence of traffic accidents caused by reduced driver alertness is a significant societal issue. Statistics indicate that 20 percent of all traffic accidents can be attributed to drivers experiencing decreased vigilance. It is worth noting that accidents resulting from driver drowsiness are often more severe, as tired drivers tend to react inadequately before a collision. Therefore, it is crucial to develop systems that can monitor driver alertness and issue alerts when the driver is drowsy or not paying sufficient attention to the road. Preventing such accidents is a central focus of ongoing research in active safety.Individuals who are fatigued exhibit noticeable visual cues in their facial features, including changes in their eyes, head position, mouth, and overall facial expression. Utilizing computer vision techniques provides a natural and non-intrusive way to monitor driver vigilance. Facial expressions have long been a subject of research in the field of computer vision due to their significance in human communication. Consequently, the detection of driver fatigue stands out as a highly promising commercial application of automatic facial expression recognition.Automatic recognition or analysis of facial expressions involves three primary levels of tasks: face detection, extraction of facial expression information, and expression classification. The main challenge within these tasks lies in accurately extracting information from facial sequences using feature-based facial expression recognition. This process encompasses the detection, identification, and tracking of facial feature points across different lighting conditions, face orientations, and facial expressions.

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