DRIVER DROWSINESS DETECTION AND ALARMING SYSTEM

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Abstract

Lack of sleep is a significant contributing factor in auto accidents. Due to the greater speeds and slower reaction times, there is a substantial likelihood that drowsy driving may result in accidents. This project's goal is to advance a system. to identify driving sleepiness signs. The strategy is to examine the driver's live video clip frame by frame, looking for the driver's eyes and then examining whether they are open or closed.The system issues an alarm alert, sends a text message of warning, and sends the driver's GPS location to a list of contacts if the driver's eyes are closed for more than five seconds

The main goal of this research is to create a sleepiness detection system that monitors the eyes; it is thought that by identifying the signs of driver fatigue early, an accident can be prevented. When this happens when drowsiness is found, a warning signal is sent to the driver to let them know. This detection device enables early identification of a reduction in driver alertness while driving and offers a noncontact technique for evaluating various levels of driver attentiveness. When this happens when weariness is found, a warning signal is sent to the driver to let them know. If the driver doesn't react to the alarm, the system also includes a mechanism that will slow down the car until it stops.

Among the major contributing factors to traffic accidents are driver fatigue and drowsiness. The numbers of fatalities and injuries worldwide are rising each year. In this paper, a module for the Advanced Driver Assistance System (ADAS) is presented. This system deals with automatic driver drowsiness detection based on visual data and Artificial Intelligence, thereby reducing the number of accidents caused by drivers fatigue and increasing transportation safety. In order to measure PERCLOS, a measure of tiredness linked with sluggish eye closure that has received scientific backing, we present an algorithm to find, track, and analyse both the driver's face and eyes.

Key Words: Dlib, Eye Aspect Ratio, Face detection, facial landmarks, OpenCV..

INTRODUCTION

In this study, we propose a method for maintaining the security and safety of both vehicles and people—a drowsiness detection system.In this paper, Matlab-based programming, computer vision, and pattern recognition are coupled with image processing.

Nowadays Driver fatigue is a major factor in a lot of auto accidents.

Recent statistics show that fatigue-related crashes cause 1,200 fatalities and 76,000 injuries annually. The creation of tools to identify and prevent driving while fatigued is a key issue in the field of accident prevention systems. The danger that drowsiness brings on the road necessitates the development of techniques to lessen its effects.

The objective of this research is to develop a prototype drowsiness detecting system. The objective is to develop a system that can accurately track the driver's eyes' open or closed state in real time. It is believed that by keeping an eye on the eyes, the symptoms of driver weariness may be detected early enough to avert a vehicle crash. The pattern of face images, eye movements, and blink rate are used to detect drowsiness. Virtual tools, human identity security systems, and face recognition are some examples of applications for the analysis of face pictures. In this study, the localization of the eyes—which entails examining a face image and figuring out the eyes' locations using a matlab program—is used. Once the eyeballs' positions are known, the system can tell whether they are open or closed and may also spot signs of fatigue. The goal of this study is to identify driver drowsiness in order to reduce accidents and increase highway safety.

LITERATURE SURVEY

A partial least squares regression-based fusion model for predicting the trend in drowsiness was described by Hong Su et al. in 2008 [15]. In order to address the issue of strong collinear relations among eyelid movement features and, as a result, predict the tendency of the drowsiness, they proposed a new method of modelling driver drowsiness with multiple eyelid movement features based on an information fusion technique called partial least squares regression (PLSR). It is demonstrated that the constructed model provides a novel method of fusing a number of indicators to enhance our capacity to detect and foresee the condition of tiredness. The model has proven to be robust and accurate at making predictions.

In June 2010 [16], Bin Yang et al. released a description of camera-based sleepiness reference for driver state classification during actual driving. They recommended that The driver's eyes can be measured in an experiment or simulator to gauge their level of weariness. The most modern eye tracking-based fatigue detection solutions for automobiles are assessed for their efficacy. These factors are evaluated statistically using a classification algorithm that is based on a sizable dataset of 90 hours of actual driving. The findings demonstrate that eye-tracking fatigue detection for some drivers can be successful provided that the blinks are accurately detected. Despite some recommended modifications, there are still issues with insufficient illumination especially for people who wear glasses.

A article titled "Driver Drowsiness Detection through HMM based Dynamic Modelling" was published in June 2014 by Eyosiyas et al. [20]. For analysing the driver's facial expression, they created a brand-new technique based on dynamic modelling and Hidden Markov Models (HMM). Using a driving simulator, they tested the method. Experimental findings confirmed the efficacy of the suggested strategy.

Visual Analysis of Eye State and Head Pose for Driver Alertness Monitoring was discussed by G. Kong et al. in 2013 [19]. They provided visual analyses of the eye's condition and head position (HP) for continual monitoring of a driver's attention. The majority of currently used methods for detecting non-alert driving patterns visually rely on the angle of the head nod or the closure of the eyes to assess the extent of driver distraction or tiredness. The proposed approach extracts crucial data on a driver's lack of awareness using visual indicators like eye index (EI), pupil activity (PA), and head position (HP). A series of video clips is classified into alert or non-alert driving occurrences using a support vector machine (SVM).

PROPOSED SYSTEM

In the suggested system, a camera that scans a video stream for faces will be installed.
If a face is discovered, the harrcascade classifier (which locates facial landmarks) is used to extract the eye region. An extremely straightforward and effective method of estimating "Eye Aspect Ratio(EAR)" is employed in place of the conventional image processing strategy of calculating the width of the eye white region and performing comparisons
Each eye is described using six (x,y) coordinates.
When the driver's eye is open, the EAR values will be high, and when the driver closes his eye, the EAR value decreases and approaches 0. Then we apply the Euclidean formula to calculate the EAR.
EAR=(|p2-p6|+|p3-p5|)/(2*(|p1-p4|)
The system determines that the driver is drowsy if the eye is closed for five seconds. An alarm buzzes, and a message with the driver's GPS location is sent to a list of contacts.

UML Diagram:

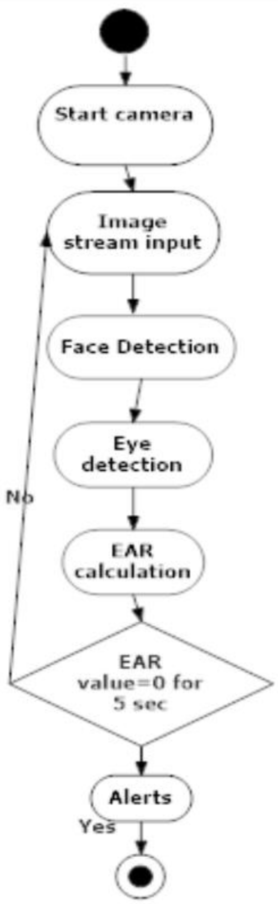


Fig -1: Figure

Algorithm

EYE ASPECT RATIO (EAR) :To distinguish between the open and closed states of the eye, use EYE ASPECT RATIO (EAR).When the eye is open, the eye aspect ratio is constant, but when the eye is closed, it quickly decreases to zero.

SIMPLE MAIL TRANSFER PROTOCOL (SMTP):The application layer protocol SMTP stands for SIMPLE MAIL TRANSFER PROTOCOL. A TCP connection is established between the client and the SMTP server before the mail is sent via the connection.

MODULE DESCRIPCTION

Messaging Module: Sending SMS through our SMS gateway is free API. With up to 8,000 messages per second, the highest calibre SMS service is ensured by our Platinum Partner Operator designation. Our SMS API also enables you to schedule messages, receive delivery confirmations, customise messages, and import data from mobile forms and surveys directly into your app. You can send specific vouchers or tickets using our SMS gateway, which can also manage tickets. Try utilising our API to send a message right now.

TrackMe Module: Google Maps

\To track and manage moving assets like buses or delivery vehicles, create a transport tracker. Your vehicles' locations are recorded by an Android app and saved in a Firebase Realtime Database. The Maps JavaScript API gives you real-time visibility of your vehicles, routes, and timetables on a map.

Implementation Details

OpenCV :

Generally used for constant PC vision, OpenCV (Open-Source Computer Vision) is a library of programming constraints. It is a library that is used for image handling, to put it simply. It is mostly utilised for all tasks associated with images. The important machine learning frameworks TensorFlow, Torch/PyTorch, and Caffe are supported by OpenCV. There are basically four modules.

Python 3.8:

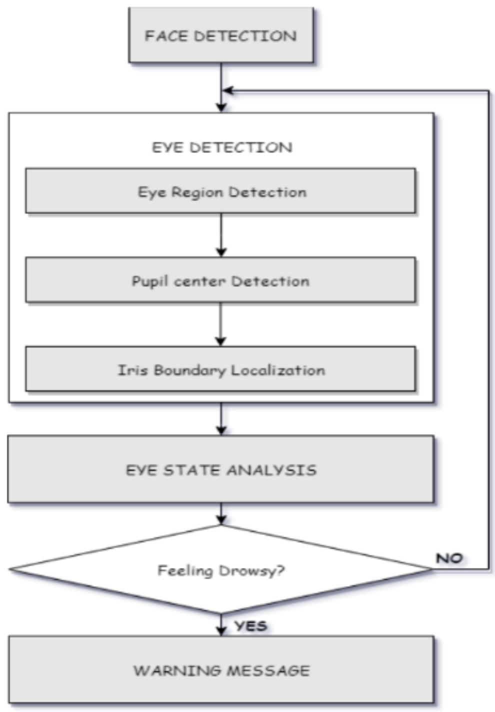
The most recent feature release of Python 3 is Python 3.8, which replaces the older bugfix release of Python 3.7, 3.7.5.

PyCharm:

The Python language is notably supported by PyCharm, an integrated development environment for use in computer programming. It is created by the Czech business JetBrains.

PROJECT DESCRIPTION

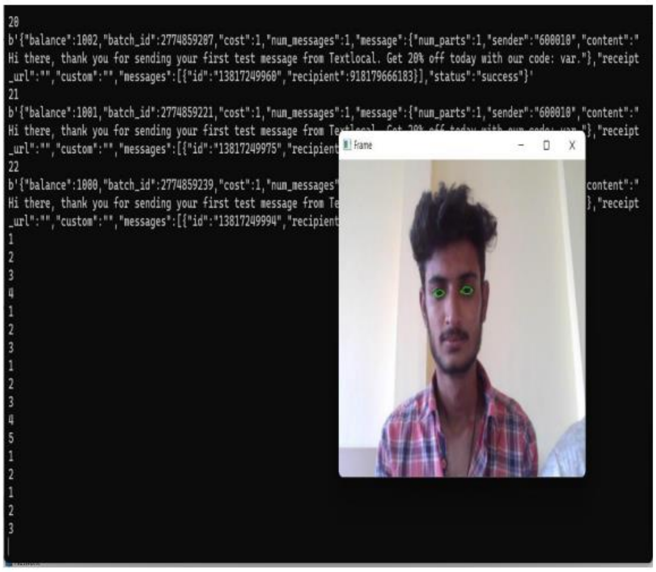
The framework is constructed using the incremental model. The fundamental model of the framework is initially constructed, and it is then improved in this way after testing at each level. The fundamental undertaking structure was expanded to include varying degrees of capability. At the subsequent incremental level, it could include enhanced and novel execution backing.



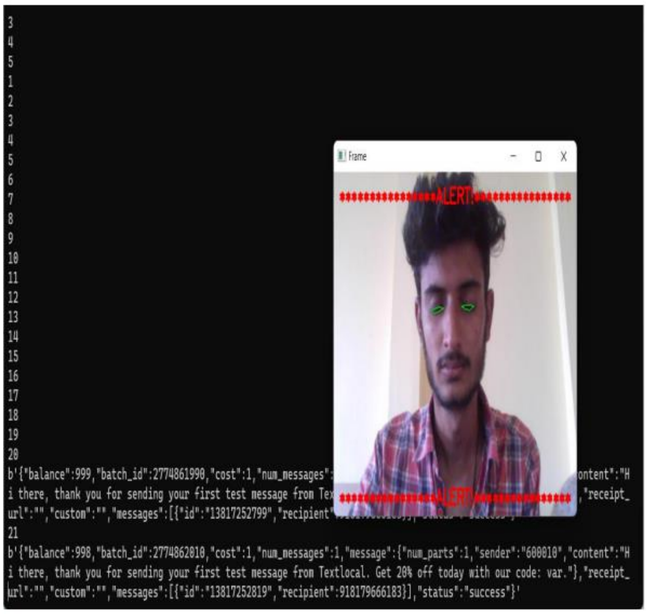
RESULT

Following the completion of the algorithm modelling, the algorithm simulation was carried out using the footage from the MIROS experiment. Due to the length of the video, which MATLAB® cannot handle since the CPU does not have enough memory, the movie was divided into three parts. minutes for every video. This results in no more than 400 photos per video for each video. There are ten people that finish the driving experiment, but we only include one of them in the analysis.

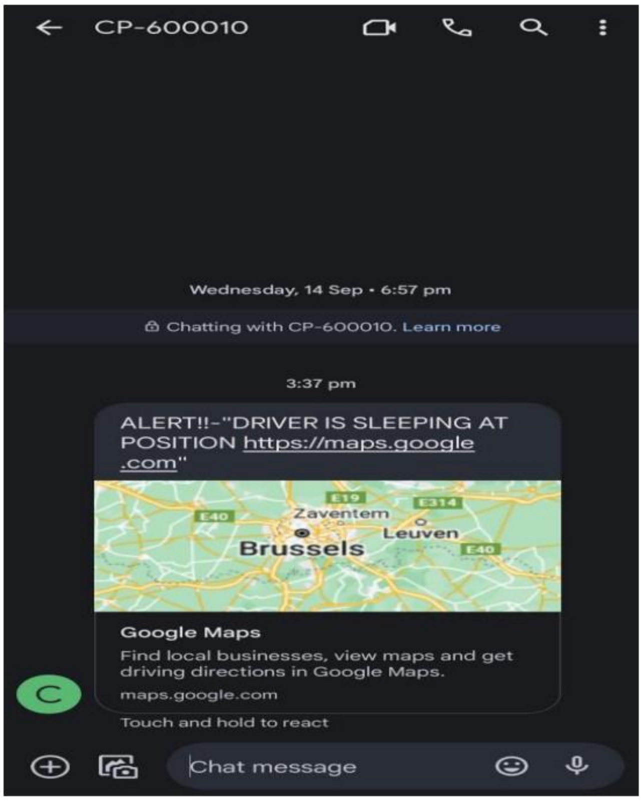
WHEN EYES ARE OPENED:



WHEN EYES ARE CLOSED:



MESSAGE SENT:



CONCLUSIONS

Due to advances in IoT, sensor miniaturisation, and artificial intelligence, the sleepiness detection sector has seen substantial improvements over the past ten years. A thorough and current analysis of the driver sleepiness detection technologies that have been put into place over the past 10 years is offered here. According to the kind of sleepiness indicating parameters used, it has outlined the four basic ways used in creating DDD systems. Image-based, biological-based, vehicle-based, and hybrid-based systems fall under these four categories.

DDD systems are anticipated to benefit greatly from 5G networks. Future DDD systems will be based on actual driving circumstances thanks to 5G connection. Information will be gathered from a variety of drivers while operating actual automobiles, taking into account variables like ambient light, road surface vibrations, and driver variances. Deep learning will be able to employ multi-access edge processing capacity thanks to the deployment of 5G connection, producing incredibly precise real-time choices. cars are anticipated to function as IoV network members, allowing the network to warn a drowsy driver, take control of the vehicle (if necessary), and get in touch with other cars to let them know about the tired driver.

I'll emphasise once again that DDD technology has a huge business potential in closing. Many automakers, like Toyota and Nissan, have lately enhanced or added driver assistance features to their vehicles. The disciplines of deep learning and artificial intelligence are rapidly expanding. The DDD systems will probably advance soon, enabling the development of smart cities.

Future Enhancement

Future research may concentrate on the use of external elements for measuring tiredness, such as vehicle statuses, sleeping patterns, weather, mechanical data, etc. The issue of driver sleepiness poses a serious risk to highway safety, and it is particularly serious for drivers of commercial vehicles. Intensive work schedules, 24-hour operations, high yearly mileage, exposure to hazardous environmental conditions, and high annual mileage all contribute to this major safety concern. One important step in a series of preventive measures required to solve this issue is to monitor the driver's level of tiredness and attentiveness and to provide feedback on their condition so they may take appropriate action.
Currently, the camera's zoom or orientation cannot be changed while it is in use. The eyeballs may be automatically zoomed in on when they have been located in future work.

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