Active Driving Assistant and Alert System

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Abstract— This paper presents the study to examinetwo separate approaches, each of which aims to enhance the safety of drivers while they are behind the wheel. The first system is a driver fatigue detection system that uses the powerful computer vision frameworks dlib and OpenCV to evaluate facial expressions and eye movements in real-time. In contrast to conventional drowsiness detectionsystems, this technology identifies and alerts the driver if they are exhibiting signs of fatigue through the use of image processing techniques. The second system mentioned in this paper is an email notification system for emergencies meant to determine the precise location of the driver in the event of an emergency. A driving safety warningsystem is integrated into the system to monitor the driver's behaviour. This technology delivers a warning if the driver begins to become tired or inattentive. If the driver fails to respond to the alert system, the emergency email system will be activated.It will establish the driver's location and relay it to the local emergency services so that aid can be provided as quickly as feasible. Both of these systemsare designed to work together to provide drivers witha full safety solution. With the assistance of the driverdrowsiness detection system, accidents caused by driver drowsiness can be avoided, while the emergency email system ensures that drivers receiveprompt medical care in the event of an emergency.

Keywords: **Facial Landmarks, Computer Vision, Real-Time Monitoring, Geo-Location, Emergency Email Notification System, Eye Movements.**

I.INTRODUCTION:

Driver fatigue poses a huge threat to the safety of transportation systems. Drowsiness can result in accidents and fatalities; hence it is crucial to recognise and inform drivers when they exhibit drowsiness symptoms. Conventional driver sleepiness detection systems rely on machine learning algorithms that require significant amounts of training data, which can be time- consuming and computationally costly. In this article, we discuss two systems developed to improve driving safety. The first system used dlib and OpenCV computervision libraries to detect driver drowsiness in real-time. Our system combines image processing techniques to assess facial expressions and eye movements, thereby providing a non-invasive, cost-effective, and efficient method for detecting tiredness. The second system is anemergency email system that extracts the location of thedriver in the event of an emergency. Included into our system is a driver safety warning system that analyses the driver's behaviour and provides an alert in the eventof tiredness or distraction. If the driver does not respondto the alert system, the emergency email system extracts
the driver's location and sends it to neighbouring emergency services so that they can provide rapid medical aid. Our systems collaborate to give drivers witha comprehensive safety solution. The driver drowsinessdetection system aids in the prevention of accidents caused by driver fatigue, while the emergency email system guarantees that drivers receive timely medical assistance in the event of an emergency. The evaluationof our technologies utilising real-world scenarios demonstrates their efficacy in improving driver safety.

II.LITERATURE REVIEW

P.Baby Shamini[1] In this research the authors explain, sleepy driving is a serious concern for motorists and other road users. Machines designed to monitor motive force abnormalities can spot signsof exhaustion, illness, and sleepiness. The existing system is missing some crucial component(s) that are necessary to provide the desired results. Cameras are positioned in front of people so they can track them as they enter and exit a building. It was created with the aim of detecting driver fatiguevia tracking eye closure rates. Spectacle-wearing drivers will find that this technology performs admirably, and it also functions well in dim environments. A facial landmarking system is basedon the information gathered by an image processingsystem. Counting the amount of times a driver's eyesare closed continuously, this technique determines how alert the driver.

M.M.El-Barbary[2], In this research, the author suggestsa technology that might be installed in cars to prevent accidents caused by drowsy drivers. The suggested system consists of a camera-based facial features extraction algorithm and a touch sensor that can beseamlessly incorporated into the steering wheel's surfacearea. Drowsiness is recognized and recorded based on the driver's hand grip strength on the steering wheel andthe estimated value of EAR. Results from both experiments indicated promise for verifying drivers' levels of tiredness and preventing inaccurate reports. TheEAR value, which measures the depth to which the eyesare opened, verified that the amplified induced voltage detected was an accurate estimate of grip strength on thesteering wheel, and so supported sleepiness detection sitting or sleeping by observing the effects of a person movement ambient wireless links

V. Kavathekar [3] In this research the authors A comprehensive Drowsiness Detection and warning system has been built by the author to ensure the well-being of drivers and cut down on the increasingincidence of traffic accidents. By incorporating facial recognition into the system, we were able to make it practical for a wide range of motorists. The system keeps a close eye on the

driver, noting any signs of fatigue or drowsiness. If it detects that the driver hasbeen yawning for longer than four seconds, an alarm will sound. The driver can leave the system after his trip is over. If the system detected that the driver wasnodding off while driving, it would save the driver's exiting image to a "dataset" if the motorist was asleepat the wheel.

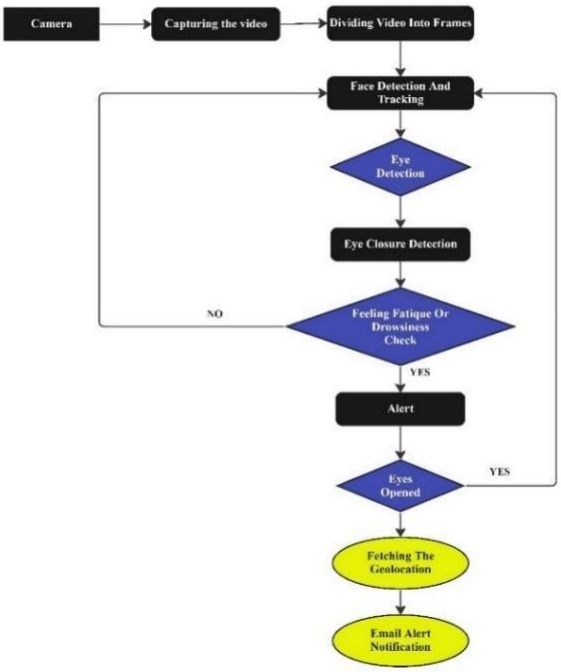
S.Mohamed[4] Here, the author presents a techniquefor detecting tiredness while behind the wheel in realtime using a visual cue from the eyes, namely the ocular aspect ratio. First, the facial region in each frame is localized using the proposed technique, which is then applied to movies taken from a publiclyavailable sleepiness detection dataset. Subsequently,a facial landmarks detector is used to zero in on the area around the eyes and extract it as the region of interest. The next step is to compute, examine, and catalogue each image's eye aspect ratio value. Finally, three distinct classifiers—a linear support vector machine, a random forest, and a sequential neural network—are used to enhance the accuracy ofdetection. Data is then categorized to ascertain whether the driver's eyes are closed or open based onthe retrieved data. If the driver's eyes close for more than a certain amount of time, an alarm will go off towake them up.

A.T Gaikwad[5] The author of this study developed a method for the prediction and detection of a driver's levelof tiredness while they were operating a motor vehicle. This technique is essential for saving not only the life ofthe driver but also the lives of the other passengers and pedestrians. The researchers in this study were able to build a system that could identify tiredness in drivers in a very rapid and accurate manner by making use of facialfeatures such as the eyes and the lips. This system was one of the most significant contributions to the field of biometrics. The technology is able to recognize yawns inreal time and calculate how long a driver's eyes have been closed for at any given point in time. The alarm willgo off as soon as the system detects that the driver's eyes are closed. This is done in order to prevent the driver from falling asleep at the wheel and causing an accident.As soon as the alert goes off, the driver will snap back into his normal level of awareness to alert the driver whose is in drowsiness state.

III.PROPOSED SYSTEM

We propose the Emergency Email System, a vital instrument for safeguarding the safety and security of individuals in emergency situations. A potential upgradeto this Active driving assistant and alert system would be the incorporation of a geo-location component that would enable first responders to quickly and correctly find drivers who are unresponsive or unable to report their whereabouts in case of any emergency. In order toimplement this functionality, a driver drowsiness systemmight be used as if the driver doesn't respond to the alertsystem that already exists in the system to automaticallygather and broadcast the driver's geo-location data to emergency stations during a sleepiness occurrence. Thisdata might be acquired via sensors or other technology in the future as it will be embedded into the hardware components that follows the vehicle's movements and location, and would be communicated automatically to emergency responders if the driver does not respond to the drowsy system's alert. This would allow emergencyresponders to swiftly and precisely locate the driver in the case of an accident or other emergency, and could potentially save lives by lowering response times and ensuring that assistance is supplied as promptly as feasible.

3.1. Proposed Architecture



3.1 Proposed Architecture

IV.METHODOLOGY

The development of a Active driving assistant alert system and emergency email system necessitates a thorough process that takes into account the project's unique requirements. Video Capture And Image Segmentation, Drowsiness Detection Using Eye Moments, and Emergency Mail Notification System are three essential modules that must be designed and incorporated into the system. Following is a methodology breakdown for each module.

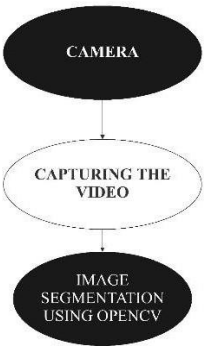
4.1 Video Capture And Image Segmentation

Step 1: START.

Step 2: Accessing the camera.

Step 3: Capturing the video.

Step 4: Segmentation of video into frames using python module OpenCV.



4.1 Video Capture and Image Segmentation

In the module of driver drowsiness detection, imageacquisition using OpenCV. First, a camera records videoof the driver's face and eyes, followed by OpenCV pre- processing, which divides the video into frames, and image analysis later to determine the driver's level of attentiveness.

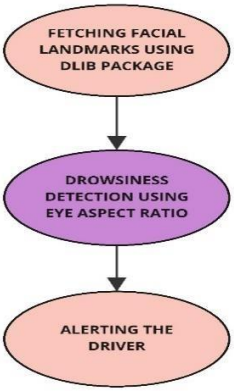
4.2Drowsiness Detection Using Eye Moments

Step 1: The frames that are segregated using OpenCV will be used by Dlib.

Step 2: Then the pre-trained 68 Facial Landmarks are marked on frames continuously

Step 3: By using the EAR, or Eye Aspect Ratio, is a method for detecting the presence and position of eyes in an image depending on certain ratio.

Step 4: If the ratio of EAR finds the driver feels drowsy immediately the alert system activates.



4.2Drowsiness Detection Using Eye Moments

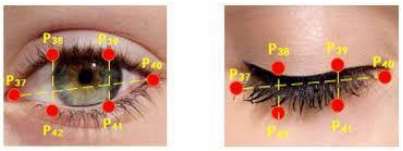
4.2.1 Facial Landmarks

The 68 facial landmarks are trained by machine learningnetwork using a vast dataset of facial photos. The modelanalyses the input image and predicts face landmarks using a deep convolutional neural network (CNN). A NumPy array stores the 68 facial landmarks from 0 to
67. Each landmark represents a facial feature, such as theeyes or nose. These markers can track facial expression changes and detect facial features. Points 36-47) Eye landmarks the inner and outer corners, top and bottom eyelids, and eyebrows are identified by these landmarks.

4.2.1Facial Landmarks

4.2.2 EAR (Eye Aspect Ratio)

The EAR, or Eye Aspect Ratio, is a measure of the openness of the eyes and is used in computer vision taskssuch as detecting blinks and monitoring drowsiness.EAR is defined as the ratio of the distance between the horizontal landmarks of the eye to the distance betweenthe vertical landmarks of the eye. A low aspect ratio indicates that the eyes are open and alert, while a high aspect ratio indicates that the eyes are closed or drowsy.



4.2.2Eye Aspect Ratio

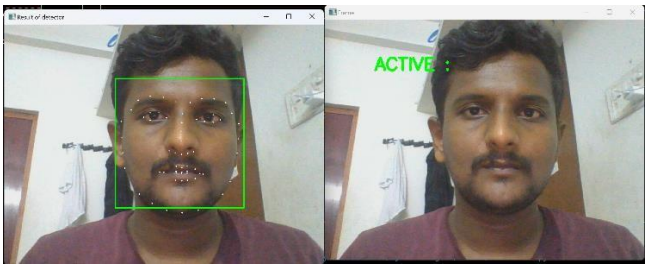
$$EAR = \frac{|p38-p43|+|p39-p41|}{2|p37-p40|}$$

4.2.3 Person Status

In this proposed system there are three of driver status

4.2.3.1 Active Status

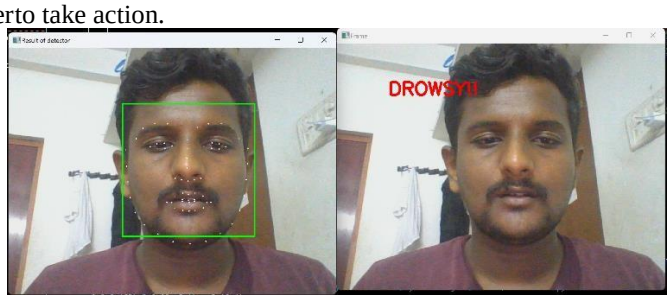
In this driver is currently in Active status. This means that the system is fully operational and monitoring the driver's behaviour for any signs of drowsiness or fatigue.The system may use Dlib to detect the driver's eyemovements, to determine the level of alertness.



4.2.3.1Active Status

4.2.3.2. Drowsy Status

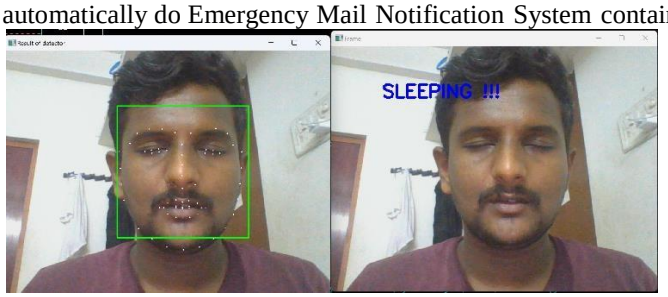
In this driver is currently in Drowsy status. This means that the system has detected some signs of drowsiness orfatigue in the driver's behaviour and is warning the driverto take action.



4.2.3.2Drowsy Status

4.2.3.3. Sleepy Status

The driver drowsiness system is currently in Sleepystatus. This means that the system has detected severe signs of drowsiness or fatigue in the driver's behaviour and is taking action to prevent an accident. Then the system uses alarm to alert driver .If the driver doesn't respond to the alert it will automatically do Emergency Mail Notification System containing the Geo-Loction .



4.2.3.3 Sleepy Status

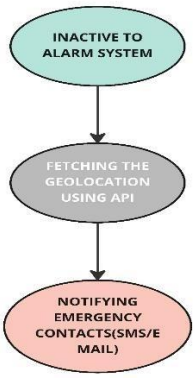
4.3 Emergency Mail Notification System

Step 1: If the driver does not respond to the alert system, the Emergency Mail Notification System is triggered.

Step 2: Then the emergency mail system uses the API which provides the accurate location of the person.

Step 3: As the data of geo-location collected and automatically.

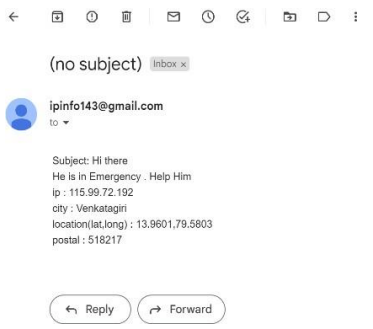
Step 4: Then by using SMTP (Simple Mail Transfer Protocol) the collection location data will be sent to nearby emergency services through mail system.



4.2.1. Emergency Mail Notification System

The emergency mail system is activated when the individual fails to respond to the system's existing alert system. Although the emergency mail system employs aportion of the APIs utilised to provide the precise location of a person using cellular data, it is able to determine the individual's precise location. As these dataare collected in JSON format, they will be retrieved and mailed to the nearest emergency service.

RESULT



4.2.1. Emergency Mail Notification System

The primary objective of this system is to offer theprecise geolocation of a person who is in an emergency situation, such as an accident or persondoes not respond to the alert system. Immediately emergency mail notification system delivers mail to local emergency services informing them of the incident's location with a small message.

CONCLUSION

The Driver Drowsiness System Alert System is a crucial safety feature that can prevent accidents caused by drowsy or fatigued drivers. The system continuously monitors the driver's behaviour and uses various sensors and algorithms to accurately determine the driver's alertness level. The system can alert or warn the driver to take action before it's too late, providing an extra layer of safety and security on the road. However, in some cases, the driver may not respond to the alert system, which can be a cause for concern. In such cases, the Emergency Mail Notification feature can be extremely helpful. If the system detects that the driver is not responding to the alert system, it can automatically get the accurate geo-location and send an email notification to the designated nearbyemergency Services, informing them the location of the vehicle. This feature can help ensure that help arrives quickly and efficiently, potentiallysaving lives. The Driver Drowsiness System AlertSystem and Emergency Mail Notification feature work together to provide a comprehensive safety solution for drivers on the road. By investing in these technologies, drivers can take proactive stepsto prevent accidents and ensure that help arrives quickly in case of an emergency. It is highly recommended for all drivers, especially those whodrive long distances or operate heavy machinery, to consider these features and prioritize safety on the road.

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