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DRIVER ASSISTANT FOR THE DETECTION OF DROWSINESS AND EMERGENCY ALERT

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Abstract: Many Driver Monitoring System (DMS) have been proposed to reduce the risk of human–caused accidents, but those systems will not guide users under critical or emergency conditions. So, a Real-Time accident prevention system has been proposed in which the drowsy condition of the driver can be detected and appropriate action will be performed automatically. In the current world, road accidents are fatal. In order to reduce such accidents and their brutality, we have introduced the Drowsy Driver Detection and Alert System. The main concept includes the recognition of face (facial features) and these features are taken as the input for the processing. The threshold features are set and after that the deviation from these thresholds would result in the alert system activation. Additionally, this system will alert with notification message for any of user needs or emergencies. This system shows the nearest service provider who can provide appropriate service. If the vehicle stops due to any problem such as repair or puncture, a notification will be sent to the nearby registered garages and repair zones. The garage or repair zone will send a request to the vehicle driver to offer solution for the problem. Any of the requests can be chosen and the respective garage or repair zone will send helpers to serve the vehicle driver. Similarly, one can send notifications to nearby fuel stations, food suppliers and health centers to get their respective service. Finally, this project prevents accident and also acts as a AI assistant to the driver.

Index Terms **- Drowsiness, Alert system, Image Processing, Face detection.**

I. INTRODUCTION

According to the Large Truck Crash Causation Study, 13% of crashes involving heavy commercial vehicles are occurring because of the driver's tiredness [1]. As reported by the U.S. National Highway Traffic Safety Administration every year approximately 60,000 traffic accidents take place due to sleepiness related problems [2]– [4]. Also, up to 20% of road accidents in UK are based on the aforementioned reasons [5],[6]. It is not only the drowsiness of a driver, which is a major factor beyond the traffic accidents, but also driver distraction is another threat for drivers' and passengers safety [7], [8]. Drowsiness is a human characteristic that is not taken seriously by any individual. But this particular human feature can have grave and fatal consequences if not considered and acted upon especially on roads while driving. Drowsiness is defined as the state of feeling sleepy. Driver drowsiness detection is a technology that ensures car safety that can in turn help prevent mishap such as accidents when the driver is feeling sleepy. There are various other factors that can cause car accidents like the conditions of the road, weather conditions and mechanical fault/error of the car. But 80% of the mishaps occur due to driver's error that includes drinking and driving, fatigue and drowsiness. There are factors that affect the driver's ability to control the vehicle such as perception, natural reflexes and recognition. The diminishing of these factors can cause accidents. Our paper aims to evaluate specific activities of the driver to determine the drowsiness level. We majorly focus on the factors related to the eyes of the driver and detecting the state of drowsiness .The use of image processing in the following system is very important and necessary as it provides one of the best solutions to detect the drowsiness at earliest and spares time to work on avoiding the accidents. Image processing is used in this system to process the images that are collected from vehicle of the person driving the vehicle.

Driving is a complex task, requiring the concurrent execution of various cognitive, physical, sensory and psychomotor skills. The contribution of this proposed method is to include the dynamic feature from image sequences with the data in the analysis. Drowsy as being defined in most dictionaries is referring to feeling of half-sleep. In medical term, it is defined as abnormally sleepy during day time. The drowsiness symptoms can be captured by face detection method. A major factor beyond the traffic accidents is the drowsiness of the driver is the threat for drivers' and passengers' safety. Systems designed for the analysis and detection of drowsiness can be broadly divided into two categories: visual features based and non-visual features based. Techniques using visual features take advantage of computer vision approaches for the detection of drowsiness.

II. LITERATURE

2.1 Detection Of Driver Cognitive Distraction: An Svm Based Real – Time Algorithm

Detection of driver cognitive distraction is critical for active safety systems of road vehicles. Compared with visual distraction, cognitive distraction is more challenging for detection due to the lack of apparent exterior features. This paper presents a novel real-time detection algorithm for driver cognitive distraction by using support vector machine (SVM). Driver cognitive distraction while driving is induced by clock tasks which compete with the main driving tasks for visuospatial short working memory. Features concerning both driving

performance and eye movement are used for training and validation. The proposed algorithm have correct rate of 93.0% and 98.5% for highway and urban scenarios respectively.

2.2 Eye State Detection For Driver Inattention Based On Lucas Kanade Optical Flow Algorithm.

Traffic accidents due to drivers inattention has become one of the major factor in road accidents and highway crashers. The problem has led many researchers to develop drivers monitoring systems which can send warning signals to the drivers. Apart from that, research on facial expression is expanding to the dynamic analysis whereby the temporal data is taken into consideration to determine the state of mind. Lucas Kanade optical flow is one of the methods that is being used to detect motions of objects. The method is later being proven to be capable of detecting facial features motion. However, there are no specific research being done on sleepiness and eye region motion analysis using Lucas Kanade optical flow method. This paper presents an optical flow using the Lucas Kanade algorithm by measuring optical flow on eye region from video sequences. In this stage, the drivers face and eye region are detected using facial feature detector. The optical flow of the eyes region is then computed. Results show that the proposed method can be applied to extract significant temporal data from the eye region.

2.3 Abnormal Driving Behavior Detection Using Sparse Representation.

To reduce the chance of traffic crashes many Driver Monitoring Systems (DMSs) have been developed. A DMS warns the driver under abnormal driving conditions. However, traditional approaches require enumerating abnormal driving conditions. So, we propose a novel DMS, which models the driver's normal driving statuses based on sparse reconstruction. The novel DMS compares the driver's statuses with his/her personal normal driving status model and identifies abnormal driving statuses that greatly change the driver's appearances. The experimental results show good performance of the novel DMS to detect variant abnormal driver conditions.

2.4 Efficient Drowsiness Detection At Moderate Levels of Drowsiness.

Driver drowsiness and distraction are two main reasons for traffic accidents and the related financial losses. Therefore, researchers have been working for more than a decade on designing driver inattention monitoring systems. As a result, several detection techniques for the detection of both drowsiness and distraction have been proposed in the literature. This paper discusses and provides a comprehensive insight into the well-established techniques for driver inattention monitoring and introduces the use of most recent and futuristic solutions exploiting mobile technologies such as smart phones and wearable devices**.** Then, a proposal is made for the active of such systems into car-to-car communication to support vehicular ad hoc network's (VANET's) primary aim of safe driving. We call this approach the dissemination of driver behavior via C2C communication. Then, research on the driver drowsiness was further divided into two main subgroups based on the exploitation of either visual features or non visual features. A comprehensive compilation, including used features, classification methods, accuracy rates, system parameters, and environmental details, was represented as tables to highlight the advantages and/or limitations of the aforementioned categories. A similar approach was also taken for the methods used for the detection of driver distraction.

III. EXISTING SYSTEM

3.1 Working

Traditional DMSs focus on detecting specific predefined abnormal driving behavior. It uses robust facial landmark detectors. DMSs of the former type monitor the driver's physiological activities based on electrocardiogram (ECG), photoplethysmogram (PPG) or electroencephalograph (EEG) signals. Visual-based DMSs monitor the driving behavior based on an inspection of the driver's face in a sequence of video frames captured by a camera placed in front of the driver. Recent visual-based DMSs mainly detect drowsy driving behavior based on eye closure or mouth yawning motion and used the eyelid height to distinguish various levels of eye closure. A support vector machine (SVM) is then used to detect if the driver exhibits drowsy driving behavior. Consequently, traditional DMSs often fail to properly detect drowsy driving behavior. To address this problem, Mandal constructed a drowsy driving detection system based on a process of spectral regression performed on the level of eye openness and a multi-model eye detection fusion process.DMS for tracking the driver's eyes and estimating the gaze direction by means of LEDs with special wavelengths.

3.2 Drawbacks

It is almost impossible to enumerate and define all possible types of abnormal driving behaviors. To collect sufficient training data for representing the diversified abnormal behaviors of all drivers presents as another challenge. Furthermore, the computational cost increases with an increasing number of abnormal driving behavior detectors.

IV.PROPOSED SYSTEM

4.1 Working

The drowsy behavior of driver can be deducted by monitoring their driving. The proposed method significantly improves the drowsiness estimation accuracy. The driver monitoring system is proposed to monitor driver's driving statuses. When a abnormal driving behavior is detected, this system will alert the driver to avoid possible accidents or crashes. In this system we will detect the drowsiness behavior by monitoring their eye lid opening and closing. We should set a predefined threshold value and here we have fixed it as five. Initially the threshold value will be zero, then for every closed lid in the frame the threshold value will be incremented by one, and for every frame with open eye lid the threshold value will be decremented by one. And if the threshold value reaches five then the system will alert the driver with buzzer sound. This system will also guide users to take corrective actions. If the vehicle stops due to any problem such as repair or puncture, a notification will be sent to the nearby registered garages and repair zones. The garage or repair zone will send a request to the vehicle driver to offer solution for the problem. Any of the requests can be chosen and the respective garage or repair zone will send helpers to serve the vehicle driver. Similarly, one can send notifications to nearby fuel stations, food suppliers and health centers to get their respective service. Finally, this project prevents accident and also gives smart guidance to the vehicle driver.

4.2 System Architecture

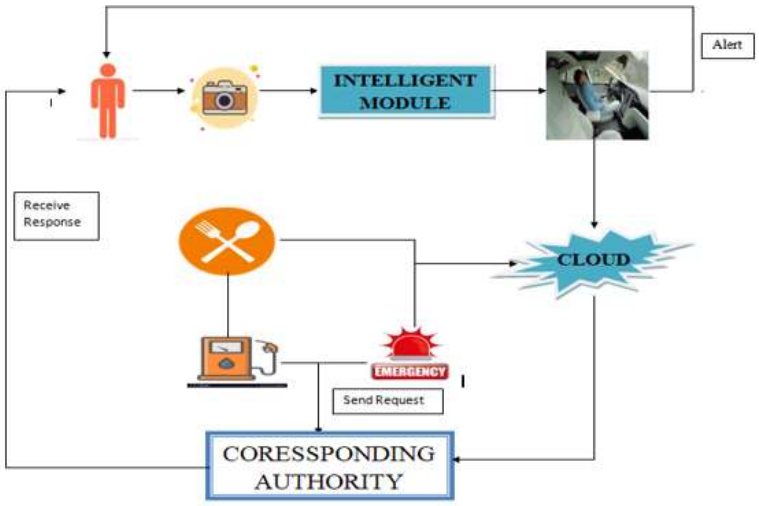

Fig.1

4.3 Advantages

A safety system that monitors the drowsy behavior and alert the driver to prevent the accidents. Most helpful in any emergency situations. For example, vehicle brake down, searching for food, health issue, fuel issue etc. This system shows the nearest service provider who can provide appropriate service. Any of the requests can be chosen and the respective zone will send helpers to serve the vehicle driver. Moreover it is going to act as complete assistant for a driver.

V. MODULES

We achieved this work my dividing the entire project into five modules.

1. Device Initialization Module
2. Drowsiness Detection Module
3. Alert Module
4. Connecting to cloud
5. Report Generation Module

5.1. Device Initialization Module

In this module, we initialize the webcam to detect the driver drowsiness. A buzzer or beeper is a signaling device, used to alert the driver.

5.2. Drowsiness Detection Module

In this module openCV is used for gathering the images from webcam and feed them into a Intelligence model which will classify whether the person's eyes are open or closed. This will take image as input from a camera. Detect the face in the image and Classifier will categorize whether eyes are open or closed. Calculate score to check whether the person is in drowsy state or not.

5.3. Alert Module

Alert module is used to alert the driver if drowsy behavior is detected and appropriate proprietor regarding insufficient of fuel, food or any other emergency to driver. This module will send request to nearby fuel station if fuel is insufficient. And Show all nearby fuel station and point out low rated fuel station. This module will also send request to nearby police station if driver needs emergency help.

5.4. Connecting To Cloud

In this module we connect to the cloud to upload the details of vehicle owner and vehicle. User need to access the data over the Internet, or at the very least, have that data synced with other information over the Web. Cloud Connect allows you to connect to any one of the many cloud service providers.

5.5. Report Generation Module

The Report generation module enables transmission of various files to the clients. This module operating in the automatic mode supplies current data from the trading system to the information archives.

VI. CONCLUSION AND FUTURE ENHANCEMENT

We have proposed a novel Driving Monitoring System (DMS) for monitoring drivers driving behavior. In this system, the changes in the eye movement during driving have been effectively represented using open cv. The driver will hear the buzzer sound if he/she have closed his eyes in the consecutive five frames i.e., when the threshold values reaches above 5 the user will hear buzzer sound and the admin of the driver will get alert mail in the respective mail id. This system can be further improved by considering all factors like head pose, yawning, fatigue so that all the distracted driving behavior and abnormal driving behavior can be observed. We can add all the nearby stores (including stationary, Pharmacy, textile shops).so that user will get all the details about the stores. Thus further studies will aim to significantly reduce the computational burden and memory usage.

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