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Enhanced Drowsiness Detection Using Machine Learning

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***Abstract*- A recent study showed that around half a million accidents occur in a year, in India itself. Out of which 60% of these accidents are caused due to Driver Drowsiness. Previous approaches are generally based on blink rate, eye closure, and other hand-engineered facial features. The proposed algorithm makes use of features learned using a convolutional neural network (CNN) to explicitly capture various latent facial features and the complex non-linear feature interactions. This system is hence used for warning the drowsiness of driver by ringing an alarm as well as to prevent traffic accidents by turning ON Parking lights and information shared to the registered mobile number via SMS, Phone Call with the help of GSM Module. This can reduce more than 50 percent of the accident.**

***Keywords*- CNN,SMS , GSM , Drowsiness, Parking Light.**

I.INTRODUCTION

Our day after day lifestyles transportation systems play a critical role in human activities. all people may be the victim of avenue accidents at any time for various reasons however most of the accidents are brought on due to drowsiness of the motive force. The most important reasons for drowsiness are because of loss of relaxation and sleep which causes tiredness on long journeys. because of those elements, driving force vigilance will reduce which causes critical situations and will increase the probabilities of accidents. Due to this reason yearly, the maximum of coincidence is going on all around the globe.

In this technology superior era, new technologies can play an essential role in providing a method to this problem. considering the data evaluation finished with the aid of the country wide Sleep foundation America one hundred thousand injuries are brought on because of driver drowsiness troubles.

Certainly, the analysis record indicates that if a man or woman wide awake for 18 hours causes drowsiness. consequently, the length commentary of the motive pressure status and import remarks (e.g. alarms or protection computerized approaches) got to be integrated to improve the safety of car systems. According to the country-wide most important avenue traffic protection management, as soon as a year concerning 100,000 police-pronounced crashes contain drowsy using. these crashes result in pretty one,550 fatalities and 71,000 accidents. The researchers endorse the superiority of drowsy driving fatalities is quite 350% bigger than rumored.

Riding once going pretty twenty hours while now not sleep is that the equal of driving with a blood-alcohol awareness of 0.08% arise most customarily among time of day and a half of-dozen a.m., or inside the past due afternoon. At each time of the day, individual expertise dips of their unit of time rhythm— the human body's internal clock that regulates sleep. it's located that plenty of drowsy-using crashes contain one car, without passengers except the using force, running off the road at an excessive rate of speed and not using evidence of braking.

Drowsy riding injuries ofttimes occur on rural roads and highways. This paper proposes a singular methodology for sleuthing the somnolence of a person supported by 2 elements. the number one is to size facial and eye alternatives from the digicam and observe the hour of the attention and therefore the threshold well worth is ready for eye closing. Secondly, the Raspberry Pi is hired that may be a mini laptop for the method the attention standing whether or not or no longer is closed or not. An effect of every way is taken as input for taking the closing name and alert the driving pressure.

This paper discusses the making plans and implementation of an advanced algorithmic rule to extract facial and eye options alongside hardware integration with Raspberry Pi to observe motive force situation.

II. RELATED WORKS

Previous works are reportable within the literature survey to drop the number of road accidents due to drowsiness detection and monitoring drowsiness systems based on real-time data.

Davidson et al. designed a simple machine that makes use of the Haar Algorithmic software to come across items and facial features the usage of OpenCV libraries. the attention vicinity is captured from captured photographs with size factors. Then they find the eyelid to stay the volume of the attention closure.

Paola designed a technique to note signs of driving force sleepiness supported with the aid of an infrared digital camera. by way of exploiting the development of vibrant functions, an algorithmic program for sleuthing and pursuit of the driving force's eyes has been designed. as soon as sleepiness is detected, the software warns the cause force with an alarm message.

C Kumar used the method referred to as thresholding to locate facial functions. the attention is created by means of locating face functions and essential points like hair and feasible face middle. Morphological operations and manner are used for proper eye detecting. Then a proper set of shape alternatives rectangular measure calculated and the skilled exploitation non-linear SVM to urge the status of the eye.

Various factors mirror driving force driving conduct and overall performance which include environmental troubles like (weather adjustments, awful road situations), physiological and organic elements (tiredness, age) social and financial factors (alcohol, tablets, tobacco, abnormal work shift), and issues related to vehicle (terrible circumstance, broken vehicle) these kind of elements will affect the using force at bigger volume every mentally and physically.

Diverse researches are completed to calculate driver drowsiness primarily based on objective and subjective measurements. Measurements associated with subjective are associated with questionnaires given to the driving force. on this approach there are drawbacks like evaluation is carried out both before or after using occasion and driver drowsiness related troubles aren't taken into consideration via using task.

For nearly the last two decades, methods like muscle fatigue estimation-based diagnostic techniques have contended full-size significance in detecting motive force fatigue bodily. SEMG has been used as a base for various other researchers to discover muscle fatigue in numerous styles of vehicles which include automobiles, two-wheelers, heavy motors. The modification within the electromyogram approach became associated with the muscle metabolic procedure that may find driver fatigue physically.

Previous works have via the subsequent physiological sign to discover drowsiness: Graphical report ECG, myogram EMG, Electron-cephalogram EEG, and electrooculogram EoG. preceding works have used EOG indicators to spot driver sleepiness via changes in eye motion. the electrical distinction between the tissue layers generates a one-of-a-kind electrical discipline the offers different alerts from eye orientation those chances are measured as EOG indicators. previous studies have investigated changes in eye motion by using inserting a disposable Ag-Cl conductor on both sides of the attention and 3rd conductor inside the center of the head for reference. Based totally on those alerts given by way of electrodes on different parameters like velocity and gradual-movement moves of eye drowsiness are detected selection is taken to tell the user.

III. PROPOSED SYSTEM

1. Overview Design:
The general design of driver Drowsiness is to seize a photograph from the Pi digicam and estimate the kingdom of the driving force. when the driver sleeps then the machine will wake till the motive force wakes. If the warning exceeds greater than 3 instances, SMS could be sent to the registered cell and at the side of that parking, lights may grow to become ON to reduce greater than 50 percent of the injuries.

we are the use of OpenCV for facial and Eye detection and CNN with the HOG algorithm for photograph processing.

2. Face Detection and Creating Region of Interest (ROI):
With a webcam, we will accept pictures as info. So to get to the webcam, we made a boundless circle that will catch each casing. we need to initially change over the picture into grayscale as the OpenCV calculation for object recognition takes Gray pictures in the information.

In the first place, we set the course classifier for eyes as shown Fig 1 and concentrate just the eyes information from the full picture. It returns a variety of recognitions with x,y directions, and stature, the width of the limit box of the item as shown if fig 2.

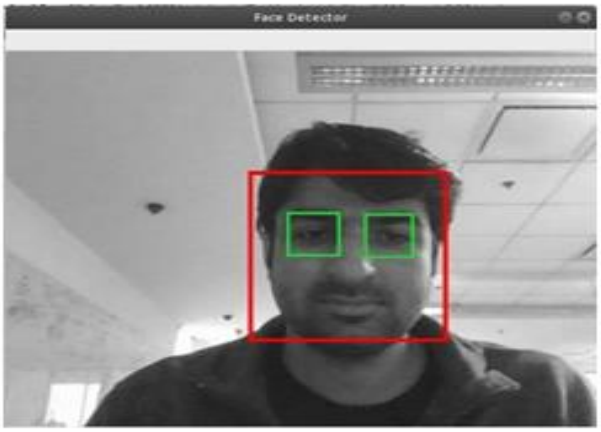

Fig 1. Face Detection.

Fig 2. Creating Region of Interesting

3. Classification of Image in Classifier:
We are utilizing CNN classifier for anticipating eye status shown in Fig 3 and Fig 4. To take care of our picture into the model, we need to play out specific tasks on the grounds that the model necessities the right measurements to begin with. This can be accomplished by removing the limit box of the eye and afterward we can pull out the eye picture from the casing with this code.

Fig 3. Eye Opened.

Fig 4. Eye Closed.

4. Calculation of Score Count:
The score is fundamentally worth what we will use to decide how long the individual has shut his eyes. So if the two eyes are shut, we will continue expanding the score and when eyes are open, we decline the score.

5. Alarm System Activation:
A limit is characterized for instance if the score gets more prominent than 15 which implies the individual's eyes are shut for an extensive stretch. This is the point at which we blare the alert. On the off chance that the alert framework keeps on initiating multiple occasions, the leading light of the vehicle will be turned ON which will diminish the 50% of the mishap. Then again, this sleepiness message will be imparted to the enrolled portable number through SMS and Phone call.

6. Hardware:
For this project , the Raspberry Pi shown in Fig.1 is used which is user friendly open-source and high performance I/O system. Another input to Raspberry Pi received from the Pi camera as eye closure rate which is connected Raspberry Pi, the design is shown in Fig 5.

6.1 Technical Features of Raspberry Pi 4:

- **Processor:** quad-core Cortex-A72
- **Clock Speed :**1.5GHz
- **Memory:** 2GB LPDDR4
- **Connectivity:** wireless LAN, Bluetooth 5.0, BLE Gigabit Ethernet 2 × USB 3.0 ports 2 × USB 2.0 ports.
- **Video & sound:** 2 × micro HDMI ports, 2-lane MIPI CSI camera port 4-pole stereo audio and composite video port
- **SD card support:** Micro SD card slot for loading operating system and data storage
- **Input power:** 5V DC via USB-C connector

IV. EXPERIMENT AND RESULTS

This part details the investigations performed to validate our proposed framework shown in Fig. 5

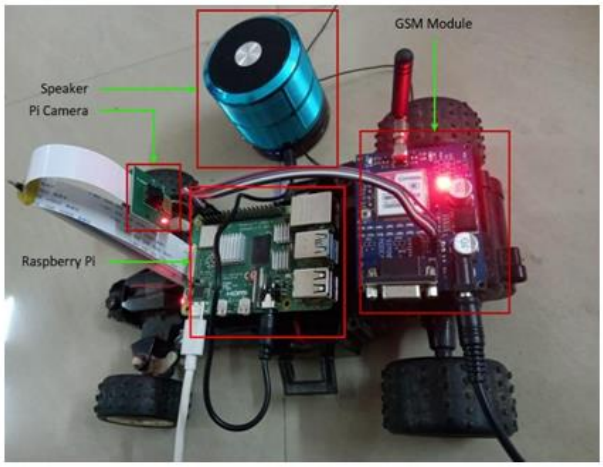

Fig 5. Raspberry Pi Circuit Design.

1. Data Set:
The data set is gathered from the live video record of people who are driving the vehicle. Eye features of driver

are caught utilizing the live Pi camera and live following of eye developments is caught and utilized as information for taking a Decision. The shape predictor landmark spots are utilized for checking client information.

2. Evaluation Metric:

The Performance of this application is tried under various situations like when the client isn't driving however eyes are shut and opened qualities are determined and if the client is driving in a hurry esteems are tried with Eye conclusion rate. Assuming the conclusion rate is above edge esteem, just the caution is set to on state else alert is off state. Bogus rate and positive rates are distinguished and values are determined.

Bogus rates are chances when the alert isn't set to on state. Positive rates are chances when the caution is set to one state when both sensor and eye flicker edge are coordinated. If the admonition is more prominent than multiple times, the SMS and Dialing are done the enlisted versatile number.

V. RESULTS

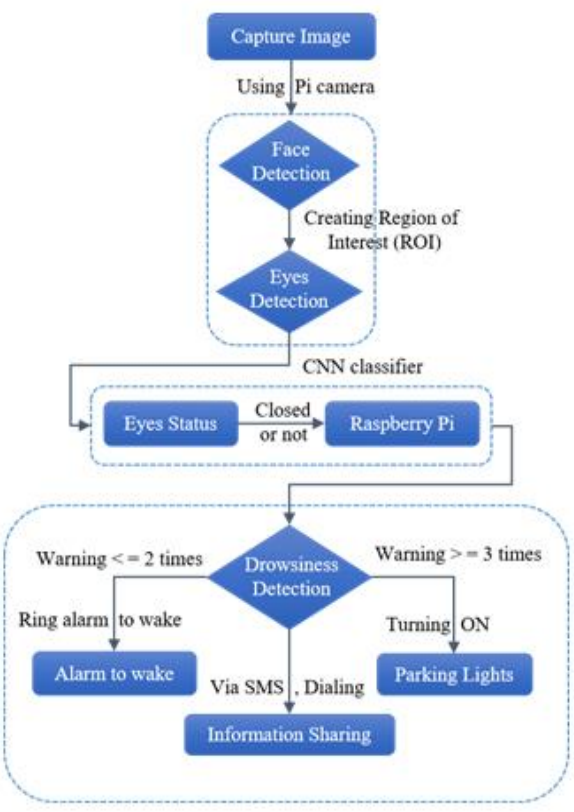

Fig 6. Architecture Diagram.

The above shown Fig 6 will shown overall flow of the system. Thus if the driver feels drowsy , it will warn the driver and if the warning exceeds 2 times , the information is shared to the registered mobile number as shown in Fig 7.

Fig 7. Message Receiving.

VI. CONCLUSION

Thus our system will detect drowsiness while driving and alert the driver and reduce the accident rate. Also, it will send the information about drowsiness to the registered mobile number via, SMS, Dialing. This will helps the other drivers to be alert by turning ON the parking light.

Future work is to implement automated car parking along with the alert system.

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