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Drowsiness Detection of Cab Driver

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Abstract: Life is a precious gift but full of risk. When driving long distances run a high risk of becoming drowsy and cause accidents. Drowsiness causes more road accidents than drunken driving. Driver fatigue is a significant factor in a large number of vehicle accidents. The main aim of this project is to develop a drowsiness detection system which is used to detect the drowsiness of the drivers. In the existing drowsiness detection system it detects whether the driver is feeling drowsy or not. But in our proposed system we find whether the driver is feeling drowsy or not and then it sends the message regarding the drowsiness to the cab owner and the message regarding the drowsiness is passed to the nearby vehicles.
Keyword: Driver fatigue detection, Face detection, Location of eye, Eye closeness, Indication to driver.

I. INTRODUCTION

Each year hundreds of people lose their lives due to traffic accidents around the world. Driver fatigue is one of the major causes of accidents in the world. Detecting the drowsiness of the driver is one of the best ways of measuring driver fatigue. In this project we aim to develop a drowsiness detection system which is used to detect the drowsiness of the drivers. In the drowsiness detection system found already detects whether the driver is feeling drowsy or not. But it does not detect the drowsiness very efficiently because it does not work well under all circumstances. The existing system suffer from a lot of shortcomings. So in our proposed system we find whether the driver is feeling drowsy. If the driver feels drowsy, it sends the message regarding the drowsiness of the drivers to the cab owner. In order to prevent the accidents the message regarding the drowsiness is passed to the nearby vehicles.

II. LITERATURE SURVEY

Literature survey is the most important step in software development process. Before developing the software it is necessary to determine which platform can be used to develop the drowsiness detection software. Once these things are satisfied the programmer tries to develop the software. This is done with the help of the information gained from books, lot of papers and with the help of the guide to get the correct view about the existing systems.

In the past few years, many researchers have been working on the development of drowsiness detection system to prevent road accidents by using the different techniques. The most accurate techniques are based on physiological measures like brain waves, heart rate, pulse rate, respiration, etc. However, these techniques are intrusive since they require electrodes to be attached to the drivers, causing annoyance to them. A representative project in this line is the MIT Smart Car where several sensors (electrocardiogram, electromyogram, respiration, and skin conductance) are embedded in a car and visual information for sensor confirmation are used. In the advanced safety vehicle (ASV) project conducted by Toyota the driver must wear a wristband in order to measure his heart rate. Others techniques monitor eyes and gaze movements using a helmet or special contact lenses. These techniques, though less intrusive, are still not acceptable in practice. Also in recent days the eye blink detection sensor is used to detect the driver drowsiness. The sensor detects whether the driver is feeling drowsy and if it detect the driver drowsiness it give an alert to the driver. However this method is not so efficient. It does not work well under all circumstances. Our proposed system overcomes all the difficulties in the existing systems.

We have referred many papers from those papers we understood what are the limitations of the existing system.

In this paper eye blinking based technique is used to check whether the driver is drowsy or not .It makes use of local binary pattern which increases interest in image processing. Then Head nodding detection determines the head tilt angle, if the angle goes beyond a limit, it transmit an audio alarm signal. The main drawback in this paper is that it only sends the alert message to the driver, if the driver don't take in account of the alert message, then it may lead to accident.

In this paper viola-jones algorithm is used to detect the face. It processes a live feed via external USB operated camera. Here, cascade object detector function is used for detecting face and then crop the eye region from the image. The limitation of the paper is that the quality of the camera used for image processing the live video feed. It doesn't detect drowsiness efficiently

In this paper Open CV is used for image processing technique. Viola-jones algorithm is used to detect the face. Haar classifier, the rectangle integral is used to identify the image. It has a threshold value which is constant obtained from AbaBoost algorithm. The

limitation in this paper: when multiple faces are detection the results are inaccurate. The rectangle would obviously Occupies a large area than the rest of the detected faces.

In this paper, they make use of IR sensor to detect the eye blink. If the eye blink is detected, then the buzzer indication is given to the driver. Only this system can detect whether the driver is drowsy or not .If this system detect that the driver is drowsy, it produces the alert message only to the driver. So nearby vehicles cannot know that the driver who is driving nearby is drowsy. It leads to accident.

In this paper Vision Cascade Object detector is used to capture the face and Viola Jones algorithm is used to detect eyes. It captures the image from the web cam and converts it into frames. The limitation in this paper is that if the driver is using sun glasses then the computation doesn't work.

In this paper connected component analysis, Cascade classifiers, Gabor Filter, Haar algorithm are used for detection of face, eye & mouth. Support vector machine, Fuzzy classifier, neural classifier are used for drowsiness detection. The limitation in this paper is Intrusive Light condition background.

In this paper voice recognition, LBP, Optical Detection techniques are used for eye detection. The limitation in this paper is extremely limited and not very effective.

In this paper Eye Blink Sensor are used for detecting the rate of eye blink and alcohol sensor for detecting the consumption of alcohol. The limitation in this paper is when the vehicle is at a very high speed on highways due to which handling is tough and getting the vehicle to halt in such a condition is difficult.

It takes input image from web cam and analyzes the image frames by frame. It tries to recognize facial features. This detects facial expression by MLL algorithm. It gives a sleep alert by SAP1 toolbox.

In this paper the techniques like sensing physiological characteristics, sensing driver operation, sensing of vehicle response of driver. It uses methods like the localization of face and edges, tracking eyes in subsequent frames and the detection of failure in tracking. The draw back in this paper is that we must make sure that the geometrical constraints are violated. And in order to perform best match of eye template use initially center at darkest pixel and then perform a gradient descendant in order to find the local minimum

A. Proposed Work

The proposed algorithm conducts the detection process by recording the video sequence of the drivers and image processing techniques. The system consists of four well-defined phases, namely the face detection, localization of eyes, detects drowsiness, sending messages.

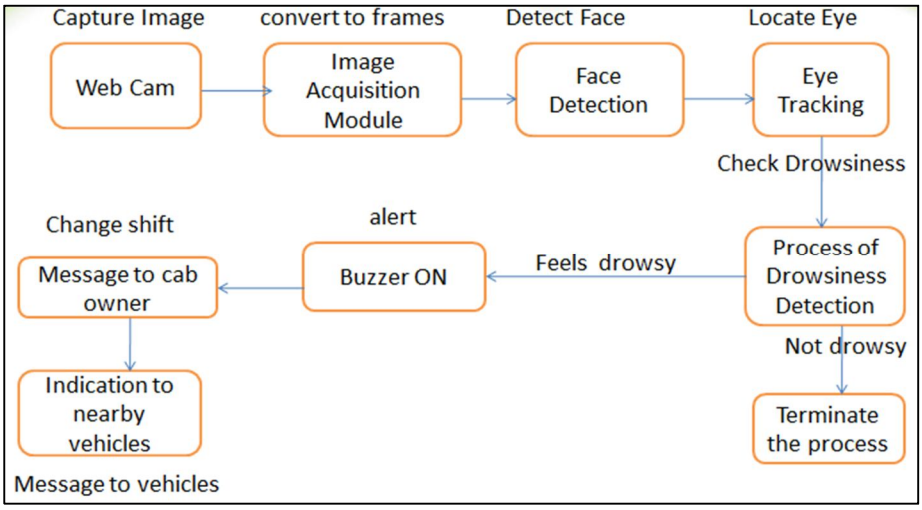
The video streams obtained from web camera are fed to the system. Initially, the system doesn't know the initial position of the face. The system grabs the first image and tries to find the face region in the image using the Viola Jones algorithm. This algorithm uses the haar feature to detect the face region. The system grabs another frame and repeats the same process until the face region is detected with certainty. Then it tries to locate eye region from the image obtained. This system finds whether the driver is feeling drowsy or not from the obtained frames. If the driver feels drowsy then it sends an alert signal to the driver to wake up the driver. Then it send the message to the cab owner regarding the drowsiness of the driver. It also sends an alert to the nearby vehicles indicating the driver drowsiness in order to avoid accidents.

B. Architecture

The architecture for the drowsiness detection system includes the following components. The components are Web cam, Buzzer, Mobile phones. The web cam captures the static image or the live stream from the web camera. Image processing module process the obtained input stream. It converts the given input stream into frames. The system uses these frames for further processing. The system tries to find the location of the face and the eyes. System detects whether driver is drowsy. If the driver is drowsy then a buzzer sound is produced to alert driver. Message is shared to the cab owner's mobile phone. The nearby vehicles are alerted in order to prevent accidents.

C. Block Diagram

The following diagram illustrates each and every modules in the driver drowsiness detection system. It includes components like webcam, buzzers. It includes processes like the image acquisition module, face detection, eye detection, drowsiness detection function, buzzer sound, message to cab owner and indication to nearby vehicles.



2.2.2. Block diagram of the proposed system

D. Description Of Modules

1) *Webcam:* The webcam is used mainly to capture the static image or the video stream. This captured image or video stream is given as input to the system.
2) *Detect Drowsy:* This module include the following things: Image processing, Face detection, Eye region detection, Detect closeness of eye.
3) *Image Processing:* The image processing module will process the obtained image or video input fed into the system. It process the input and convert it into frames for further processing.
4) *Face Detection:* The face detection technique is used to locate the face from the image. The video stream which is given as input is converted into frames and the face is detected from those frames. Haar classifier in Viola Jones algorithm is used to detect the face from a given image.
5) *Eye Detection:* The position of the driver's eye is determined by using appropriate threshold. In this work, edge detection of the eyes region is considered.
6) *Detect Closeness Of Eye:* After locating the eye region in the frame the system finds out whether the eye is in a closed state or in a open state. If the eye remains open then the system gives the message that the driver is not feeling drowsy. If the eyes remain closed then the system gives the message that the driver is feeling drowsy.
7) *Output:* The output from the system includes : Alert,Message to the cab owner,Indication to nearby vehicles. The indication is given inorder to prevent road accidents which occur due to the drowsiness of the cab drivers.

a) *Alert:* The system continuously checks whether the driver is feeling drowsy or not. If the driver feels drowsy then an alert signal in the form of an alarm sound or a beeo sound is generated. This is done inorder to make the driver to wake up from a sleepy state.
b) *Message To The Cab Owner:* Their is a high probability for the occurence of accidents if the driver feels drowsy. So if the driver drowsiness is detected by the system then a message regarding the driver drowsiness will be given to the cab owner. The cab owner receive this message and take any action like changing the shift time of the corresponding driver or sending another driver.
c) *Indication To Nearby Vehicles:* Giving an alert to the driver and message to the cab owner cannot prevent from the accidents. So inorder to prevent the occurence of accidents a message regarding the drowsiness is passed to the nearby vehicles. This will alert the drivers in the nearby vehicles and the approaching vehicles.By this method the accidents due to the driver drowsiness can be completely stopped.

III. ALGORITHM

The Viola-Jones algorithm is a widely used mechanism for object detection. This algorithm uses Haarbasis feature filters, so it does not use multiplications. Haar feature are similar to convolution kernels which are used to detect the presence of that feature in a given image. Each feature result in a single value which is calculated by subtracting the sum of pixel under white rectangle from the sum of the pixels which are under the black rectangle.

IV. FLOW CHART

It is a diagram of the sequence of movement or actions of people or things involved in a complex system or activity.

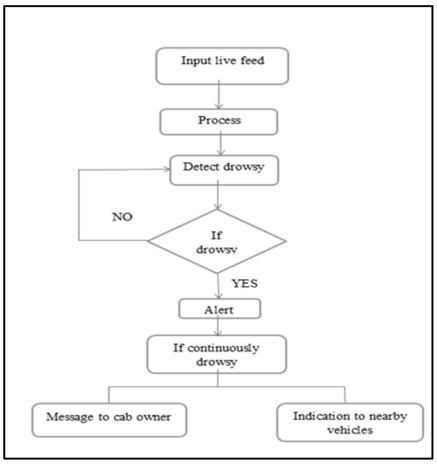


Fig 3.Flow chart

In this flow chart, the live feed is given as input the then the live feed is processes to check whether the driver feels drowsy or not. If the driver feels drowsy then an alert message is given to driver. After giving alert message to the driver who is feeling drowsy, if the diver doesn't wake. Then the message is given to the cab owner. and at the same time it sends an indication message to the nearby vehicles.

V. RESULT

A. Face Detection

Face detection is a computer technology being used in a variety of applications that identifies human face in digital images. Face detection also refers to the psychological process by which humans locate and attend to faces in a visual scene.

B. Eye Detection

Face is capture from the video stream by using the face detection technology. From the face, eye region is well detection

C. Notification Message

1) *Case 1:* The system continuously checks whether the driver is feeling drowsy. It analyzes each and every frame to check the driver drowsiness. If the system detects the driver is drowsy then it sends the notification message as "DRIVER FEELING DROWSY"
2) *Case 2:* In this case if the driver's EYES are open then the system finds thst the driver is not feeling drowsy. It gives a notification message as "DRIVER IS NOT DROWSY". This is done by finding the pupil location in the frames. If the pupil is located then the driver is not feeling drowsy.

D. Buzzer Alert

In our proposed system it detects the drowsiness effectively. If the driver's eye remains closed for more than a certain period of time then the driver is said to be drowsy and an alarm sound is generated to wake up the driver who is feeling drowsy. This alert signal will be produced any number of times. But in the existing systems it has the capability to produce the alarm sound only once. However our proposed system can efficiently produce this buzzer sound.

VI.IMPLEMENTATION

A. Does Not Feels Drowsy

In this case, the system first detects the face from the live video stream which is captured by face detection technique. Face is captured from the video stream, and then eye region is well detected.
In first case the driver's EYES are closed, so the message displayed is "DRIVER FEELS DROWSY".

B. Feels Drowsy

In this case, first the system detect the face from the live video stream which is captured by face detection technique. Face is captured from the video stream, and then eye region is well detected.

In this case the driver's EYES are open, so the message displayed is "DRIVER FEELS DROWSY". Then the notification message will be.

If the driver's eye remains closed for more than a certain period of time then the driver is said to be drowsy and an alarm is generated to alert the driver who is in a drowsy state.

VII. COMPARISION GRAPH

The parameters used for comparison are hardware requirement, software requirement, cost, efficiency and performance

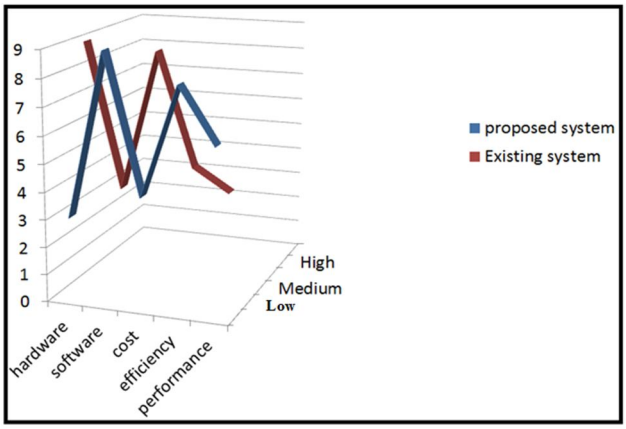


Fig 7.This graph illustrates the comparison between the existing system and DDCD

VIII. CONCLUSION

This Project will efficiently find the drive fatigue. Also this method send the information regarding the driver drowsiness to the cab owner. As a result of that the cab owner can change the shift time of the driver the car. The cab owner can also try to replace the drowsy driver with another driver so that the passenger can have a good and safe journey. The information regarding driver drowsiness is passed to nearby vehicles so that we can prevent drivers meeting the fatal accidents.

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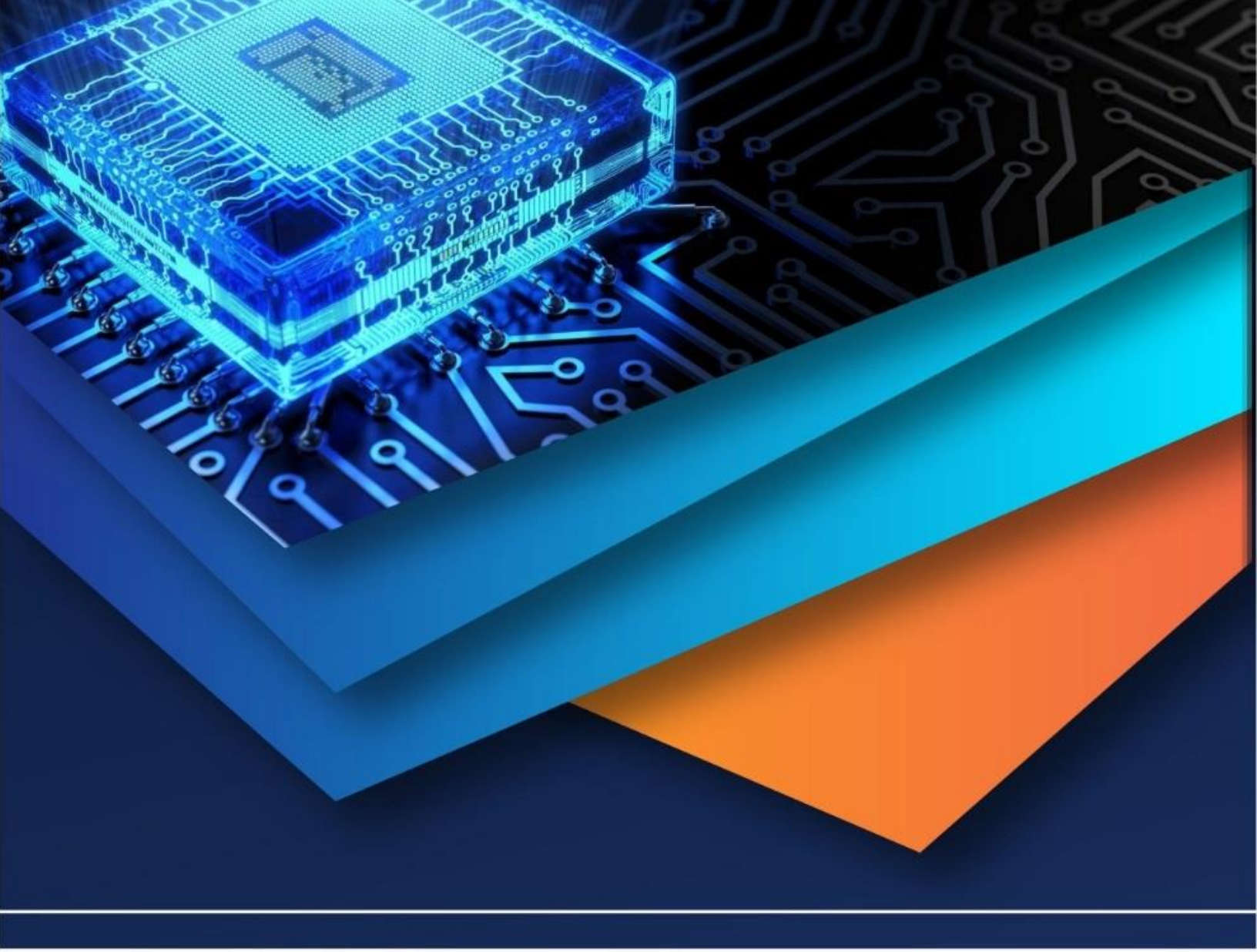

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