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DRIVERS FATIGUE DETECTION SYSTEM BASED ON PERCLOS

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ABSTRACT: This project is about making vehicles more intellectual and interactive which may warn or resist user under unacceptable conditions, they may provide critical information of real time situations to rescue him. Driver fatigue resulting from sleep deprivation or sleep disorders is an important factor in the increasing number of accidents on today's roads. In this project, we describe a real-time safety prototype for driver fatigue. The purpose of such a model is to advance a system to detect fatigue of a driver.

Keywords: **DriverFatigue Detection, Eye Detection, Face De-tection,**

I. INTRODUCTION

This study develops a real-time drowsiness detection system based on PERCLOS to determine if the driver is fatigued. The proposed system comprises three parts: first, it calculates the approximate position of the driver’s face, and then uses a small template to analyze the eye positions; second, it uses the data from the previous step and PERCLOS to establish a fatigue model; and finally, based on the driver’s personal fatigue model, the system continuously monitors the driver’s state. Once the driver exhibits fatigue, the system alerts the driver to stop driving and take a rest.

II. SCOPE OF THE PROJECT

Currently, detecting driver drowsiness systems can be classified into two categories contact types and contactless types. Contact types include measuring the pulse or body temperature, while detecting and analyzing the driver’s facial expression is a standard contactless type.

However, the products requiring physical contact are inconvenient for drivers and easily forgotten. On the other hand, most commercially available contactless driver drowsiness detection systems and related products use visible light to achieve face detection.

III.MODULE DESCRIPTION

The various phases associated with the proposed work are:

- Face detection
- Eye detection

- Drowsiness Detection

A. Face detection:

To identify driver's drowsy state first we need to analyze driver's drowsy state to analyze driver's face we are using open computer vision (OPENCV) this openCV will analyze each and every part of the body. By using this open computer vision we are going to detect drivers face. The driver face will be marked by a boundary line. Then pass the acquired frame to an edge detection function, which detects all the possible objects of different sizes in the frame. To reduce the amount of processing, instead of detecting objects of all possible sizes, since the face of the automobile driver occupies a large part of the image, we can specify the edge detector to detect only objects of a particular size, this size is decided based on the Haarcascade file, wherein each Haarcascade file will be designed for a particular size. Now, the output the edge detector is stored in an array. Now, the output of the edge detector is then compared with the cascade file to identify the face in the frame. Since the cascade consists of both positive and negative samples, it is required to specify the number of failures on which an object detected should be classified as a negative sample. In our system, we set this value to 3, which helped in achieving both accuracy as well as less processing time. The output of this module is a frame with face detected in it.

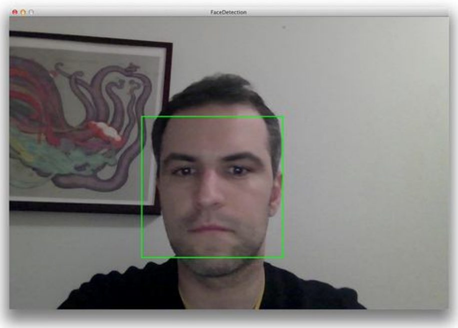

Fig:3.1 Face Detection

B Eye Detection

Once driver's face has been identified successfully now we need to identify driver's eyes The eyes of the driver will be identified to detect drivers drowsy state eyes will be detect by eyelid and white area of the eyes.

- The eyes are present only in the upper part of the face detected.
- The eyes are present a few pixels lower from the top edge of the face.

Once the region of interest is marked, the edge detection technique is applied only on the region of interest, thus reducing the amount of processing significantly. Now, we make use of the same technique as face detection for detecting the eyes by making use of Haarcascade Xml file for eyes detection. But, the output obtained was not very efficient, there were more than two objects classified as positive samples, indicating more than two eyes. To overcome this problem, the following steps are taken:

1. Out of the detected objects, the object which has the highest surface area is obtained. This is considered as the first positive sample.
2. Out of the remaining objects , the object with the highest surface area is determined. This is considered as the second positive sample.
3. A check is made to make sure that the two positive samples are not the same.
4. Now, we check if the two positive samples have a minimum of 30pixels from either of the edges.

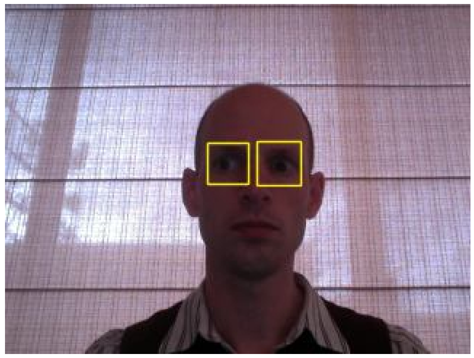

Fig: 3.2 Eye Detection

C.Drowsiness Detection

The eyelid will be detected by eyelid of the driver the eyelid will not be visible 100% for every one so when the visibility of the eyelid is less than 25% we need to intimate to driver by a beep sound this is determined my percentage of eye closure(PERCLOS). Once the visibility of the eyelid is less than 25% it will be captured and a beep sound will be intimated to the driver.

Once the eyes are detected, the next step is to determine if the eyes are in closed or open state. This is achieved by extracting the pixel values from the eye region. After extracting , we check if these pixel values are white, if they are white then it infers that the eyes are in the open state, if the pixel values are not white then it infers that the eyes are in the closed state. This is done for each and every frame extracted. If the eyes are detected to be closed for two seconds or a certain number of consecutive frames depending on the frame rate, then the automobile driver is detected to be drowsy. If the eyes are detected to be closed in non consecutive frames, then We declare it as a blink.

If drowsiness is detected, a text message is displayed along with triggering an audio alarm. But, it was observed that the system was not able to run for an extended period of time , because the conversion of the acquired video from RGB to grayscale was occupying too much memory. To overcome this problem, instead of converting the video to grayscale, the RGB video only was used for processing

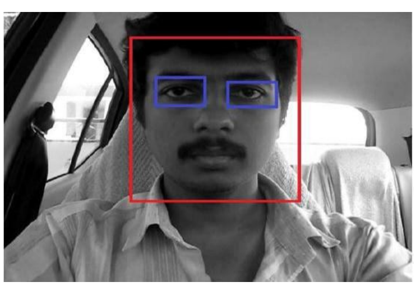

Fig: 3.3 Drowsiness Detection

IV. CONCLUSION

The future work will be to monitor driver state in the transport network like OLA,UBER an alert will be given to driver as well as to the transport office like that particular driver name with car Number will be stored in that particular transport office.

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