Drowsiness Detection System

Arpan Singh[1], Kamran Mallik[2], Vikas Sharma[3], Dr. Amolk.Kadam[4]
[1, 2, 3] Dept Of Computer Science Engineering
[4]Assistant Professor, Dept Of Computer Science Engineering
[1, 2, 3, 4] Bharati Vidyapeeth University College Of Engineering Pune

Abstract- *Road accidents are increasing day by day and one of the major cause of the these road accidents occur due to drowsiness of the driver while driving so we try to figure out how we can contribute in improving the road safety so we came up with solution in building the "ANTI-DROWSY SYSTEM" which will not only monitor the eye movements of the driver but based on the data it will also alert the driver if there is the case of if the driver is feeling drowsyThis project is based on the idea of using the raspberry pie as the microcontroller which act as the small computer on which we will install the different modules required for the successful completion of the project.This project also uses the python programming also for monitoring the facial changes it will use the open cv platform and for storage it will use dlib which is the library .By using this technique we can figure out the movement of the eye by using "EDR" eye distance ratio in the open cv platform .*

Keywords *- anti drowsy system ,raspberry pie, open cv, image processing , dlib , EAR.*

I. INTRODUCTION

The demand for the usage of car is increasing day by day so the risk involved while driving is also increasing day by day .there are numerous factors which are responsible for road accidents but one of the major factor that we are discussing is none other than drowsiness during driving which could end fatal and catastrophic[1] .

Drowsiness while driver is nothing but the situation where driver experiences the fatigue which in the end causes the sleepiness which results that driver could not focus on driving and at the end could cause crash while driving which could risk the individual life.

Drowsiness or fatigue while driving is considered to be fatal because it hampers the decision-making ability of driver and it delays the reaction time because of this driver could not judge the incoming traffic correctly and the crash becomes inevitable[2].

So, it's Our strong desire to solve this complex problem using simple computational technique.

II. PROPOSED SYSTEM

A. Stages in the proposed system

In the first part, we will setup the camera in car with the help of raspberry pie so It could easily detect our face and apply the landmark localisation of the face to monitor the impressions of the eyes.[3]

In the second stage of the project we can implement our own drowsiness detector using OpenCV, dlib, and Python. The technique would be used to measure the dimensions and changes in the impressions of theeyes by the help of using a computational technique "EDR" ie. eyes distance ratio.
In the third stage we will check the working of our project in the real time scenario or in real life conditions as we'll see, the drowsiness detector works well and reliably alerts us each time its start to "snooze". This case wewill observe when the driver feels sleepy at that moment alarm would be activated which gives the possible signs to the driver that driver is not in the condition of driving the car.[4]

B. Working of the model

The working of the model can be illustrated with the help of the following diagram
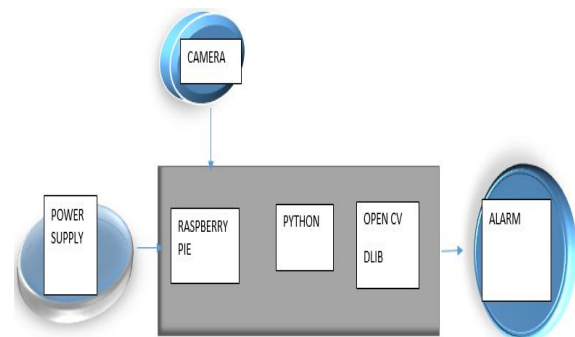

FIG1. BLOCK DIAGRAM

By the help of diagram the flow of working of our proposed system could be illustrated .[5]

For making anti drowsy system we required with 3 major hardware component which will act as a building pillars for our system that is: -

1- Raspberry pi – it will be going to act as a mini computer which will act as a control surface for our device
2- Camera- it will be used to monitor the eye impressions on the basis of which raspberry pie would able to decide whether driver is feeling fatigue or not.
3- Alarm- it will be going to snooze as soon as computational [6]

Our system works on the basis of monitoring the occurrence or disappearance of sclera of the eye so for that we have to determine the "EDR" that is proportionality of the distance between the landmarks of the eyes. Unlike the previous method it gives more accurate results as compared to other computational technique which   for achieving the analysis of the eye it is divided into 6 points in which eachpointhas a role to play the same objective to achieve. The points are p0, p1,p2,p3,p4,p5 respectively. These points will help us to determine the occurrence and disappearance of sclera.[7]
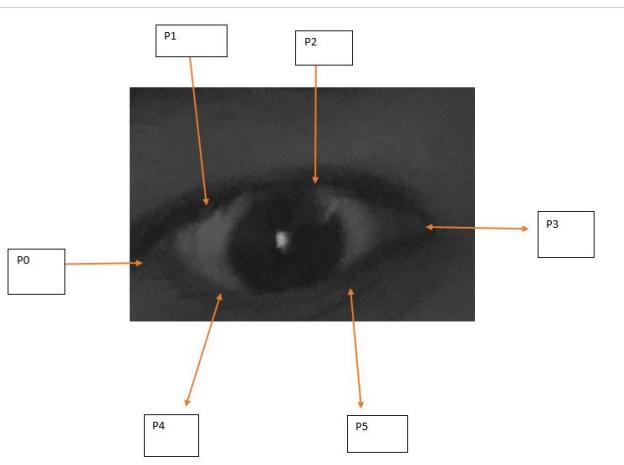

FIG2. COORDINATES OF EYES

The coordinates donate the height and width of the eye and we will obtain the relations from that by using distance formula[8]. The main objective is to trigger the alarm in that condition when all the coordinates of the facial landmarks of eye lies on linear straight line that case could be achieved by the help of using following relations which in end gives us the value of EDR[9].

$$EDR = \frac{||p1-p4|| + ||p2-p5||}{2||p0-p3||}$$

The above equation could be explained as the numerator in above equation will give us the intersection point of vertical eye while the denominator in the equation will gives us the intersection point of horizontal eye.This equation gives us the point of intersection which can help us in determining that whether EDR is zero or not.
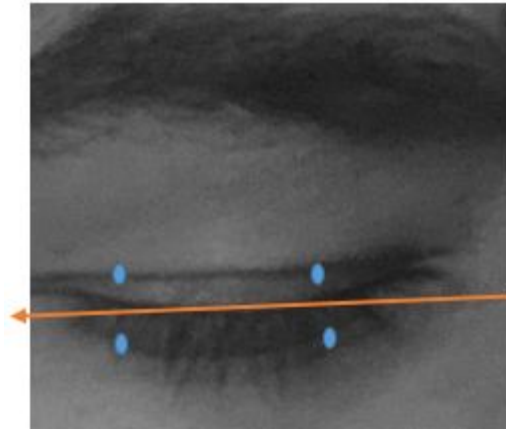

FIG3. EYE ASPECT RATIO

If the driver closes or blinks the EDR approaches to zero which indicates that eye is closed so if use this timing and compute that for an instance if the driver's eye is closed for certain time consider "x seconds" and if the duration reaches till "y seconds" then alarm would be triggered based on the duration which driver had closed his eyes ,for achieving that goal so we will preferred to write the code on python since python gives us the access to various libraries which are required in fulfilling different stages of the project as well as inspired by the use of open cv platform which can used to read an analyse the facial landmarks. [10]

III. CONCLUSION

The demand for the usage of car is increasing day by day so the risk involved while driving is also increasing day by day. There are numerous factors which are responsible for road accidents but one of the major factors that we are discussing is none other than drowsiness during driving which could end fatal and catastrophic.

So, our proposed model is our effort to solve this complex problem in a rapid and accurate manner which will not going to reduce the chances of such catastrophe but also will going to alert the driver when his experiencing fatigue or not.

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