Driver Drowsiness Detection System By using Python

Mrs. M. Lavanya,[1] Narapureddy Sravani,[2] K. Pranaya Keerthana,[3] V. S. V. Sarat Chandhra Pranit,[4]

[1] Asst. Professor, Department of Computer Science and engineering

[2,3,4] Student, Department of Computer Science and engineering

[1,2,3,4] QIS College of Engineering and Technology, Ongole-523001

Abstract- All over the world Drowsiness has been the significant cause of horrible accidents which is causing deaths and fatalities injuries. Day by Day fatal injuries numbers are increasing globally. From the past many years, researchers have concluded drivers with a lack of sleep and more tiredness which causes drowsiness of the driver. This paper shows a new experimental model is designed for detecting drowsiness of driver is presented to reduce accidents caused by this problem which increases transport safety. In this work, two ways are used to detect the drowsiness of a person effectively. First Driver face is captured and eye retina detection and facial feature extraction are done and blinking values are calculated then threshold values are set. The result from both methods is taken as input for taking the final decision and alerting the driver. Nowadays, road accidents have become one of the major issues. The major road accidents are caused due to drowsiness, drunken, and rash driving. This is the reason, every year the number of road accidents is increasing especially by cars. Due to drowsiness, drivers become less active while driving. This paper represents to build a system for Drowsiness Detection and Warning for automobile safety and accident prevention. We are using eye detection, drowsiness detection, and eye blinking pattern detection with the help of machine vision-based concepts. In order to detect fatigue or drowsiness, web-camera has been used which points directly towards the driver's face and detects the eye movement of the driver.

Keywords— Drowsiness, Python, Driver, closed eyes, open eyes, yawn.

I. INTRODUCTION

Drowsiness Detection Is a safety technology that can prevent accidents that are caused by drivers who fell asleep while driving. According to a survey 20% of the road accidents are caused due to the drowsiness of the driver. This turns out to be a big problem not only for the driver but also of other people who use that road. This driver drowsiness system is a safety alarm system that alerts the driver whenever he feels drowsy. The eyes movement of the driver is monitored live and whenever the driver feels asleep or closes eye for more than 1 sec Then it alerts the driver with the help of a loud alarm thus preventing any accidents From happening. Drivers fatigue causes maximum number of accidents. Drowsiness detection reduces the car accidents and increases the safety of driver. Various studies states that around 30-40% accidents occur due to drowsy driver. The development of technology allows introducing more advanced solutions in everyday life. This makes work less exhausting for employees, and also increases the work safety. Now a days vision-based systems are more popular and it is used in different

application. Detection of drowsiness involves an observation of a face, detection of eye position and the observation of eye blinking pattern. The analysis of face images is done by using a "shape predictor containing 68-facelandmarks". To detect fatigue, a webcam has been used which points directly towards driver face and detect eye movement. In this the project will focus on the blinking pattern of the eyes, which involves looking at the entire image of the face, and determining the position of the eyes, by a self-developed image processing algorithm. Once the position of the eyes is located, the system is designed to determine whether the eyes are opened or closed and detect drowsiness. If the eyes are closed for particular time period the alarm will play to alert the driver. The development of technologies for detecting or preventing drowsiness at the wheel is a major challenge in the field of accident avoidance systems. Because of the hazard that drowsiness presents on the road, methods need to be developed for counteracting its affects. Driver inattention might be the result of a lack of alertness when driving due to driver drowsiness and distraction. Driver distraction occurs when an object or event draws a person's attention away from the driving task.

II. RELATEDWORKS

It is a serious issue and most people that have driven for long hours at night can relate to the fact that fatigue and slight brief state of unconsciousness can happen to anyone and everyone.There has been an increase in safety systems in cars & other vehicles and many are now mandatory in vehicles, but all of them cannot help if a driver falls asleep behind the wheel even for a brief moment. Hence that is what we are gonna build today. Driver Drowsiness Detection System and Techniques: According to the studies it has been observed that when the drivers continuously drive without taking a break they tend to run a high risk of becoming drowsy. Study shows that accidents occur due to sleepy drivers in need of a rest, which means that road accidents occurs more due to drowsiness rather than drink-driving. Attention assist can warn of inattentiveness and drowsiness in an extended speed range and notify drivers of their current state of fatigue and the driving time since the last break, offers adjustable sensitivity and, if a warning is emitted, indicates nearby service areas in the COMAND navigation system. Implementation of the Driver Drowsiness Detection System: This paper is about making cars more intelligent and interactive which may notify or resist user under unacceptable conditions, they may provide critical information of real time situations to rescue or police or owner himself. Driver fatigue resulting from sleep disorders is an important factor in the increasing number of accidents on today's roads. In this paper, we describe a real-time safety prototype that controls the vehicle speed under driver fatigue. To advance a system to detect fatigue symptoms in drivers and control the speed of vehicle to avoid accidents is the purpose of such a mode. In this paper, we propose a driver drowsiness detection system in which sensor like eye blink sensor are used for detecting drowsiness of driver .If the driver is found to have sleep, buzzer will start buzzing and then turns the vehicle ignition off. Driver Drowsiness Detection System: One of the major cause of traffic accident is Driver‘s drowsiness. It is a serious highway safety problem. If drivers could be warned before they became too drowsy to drive safely, some of these crashes

could be prevented. In order to reliably detect the drowsiness, it depends on the presentation of timely warnings of drowsiness. To date, the effectiveness of drowsiness detection methods has been limited by their failure to consider individual differences. Based on the type of data used, drowsiness detection can be conveniently separated into the two categories of intrusive and non-intrusive methods. During the survey, non-intrusive methods detect drowsiness by measuring driving behavior and sometimes eye features, through which camera based detection system is the best method and so are useful for real world driving situations. This paper presents the review of existed drowsiness detection techniques that will be used in this system like Circular Hough Transform, FCM, and Lab Color Space etc. Drowsiness Detection System Using MATLAB: As the survey done, driver fatigue is the major reason why half (50 %) of road accidents takes place. It is an interesting challenge in today's date to detect drowsiness in order prevent accidents. Various experiments have been done earlier with regard to the drowsiness detection of driver. In the past few years, many countries became curious to pay high attention towards driver's safety problems. Researchers have been making various efforts to invent techniques for the detection of drowsy driver such as monitoring of road and physiological techniques which requires the contact of electrode with our body such as chest, face making it an implantable method. Detecting Driver Drowsiness Based on Sensors: Researchers have attempted to determine driver drowsiness using the following measures: (1) vehicle-based measures; (2) behavioral measures and (3) physiological measures. A detailed review on these measures will provide insight on the present systems, issues associated with them and the enhancements that need to be done to make a robust system. This paper reviews the three measures as to the sensors used and discuss the advantages and limitations of each. The various ways through which drowsiness has been experimentally manipulated is also discussed. It is concluded that by designing a hybrid drowsiness detection system that combines non-intrusive physiological measures with other measures one would accurately determine the drowsiness level of a driver. A number of road accidents might then be avoided if an alert is sent to a driver that is deemed drowsy.

III. PROPOSED SYSTEM ARCHITECTURE

By using a non intrusive machine vision based concepts, drowsiness of the driver detected system is developed. Many existing systems require a camera which is installed in front of driver. It points straight towards the face of the driver and monitors the drivers eyes in order to identify the drowsiness. Bus has a large front glass window to have a broad view for safe driving.If the camera is placed on the frame which is just about the window, then the camera is unable to detain the anterior view of the face of the driver correctly. In the oblique view, the Open CV eye detector (CV-ED) frequently fails to trace the pair of eyes. If the eyes are closed for five successive frames the system concludes that the driver is declining slumbering and issues a warning signal . In order to conquer the problem of existing system, new detection system is developed in this project work. The Pre-Processing steps are Take image as input from a camera, Detect the face in the image and create a Region of Interest (ROI), Segmentation, classification ,

Prediction. The methodology used to design the Drowsiness Detection System is an iterative research and analysis cycle.The research state generates concepts and the analysis stage selects concepts,analyze requirements and constraints .The cycle is then repeated to generate more refined concepts are further analyzed.

Haar cascade is an object detection algorithm used to identify the faces in an image or a real time video .The algorithm uses edge or line detection features proposed by Viola and Jones in their research paper “Rapid Object Detection using a Boosted Cascade of Simple Features” published in 2001. The algorithm is given a lot of positive images consisting of faces, and a lot of negative images not consisting of any face to train on them. The model created from this training is available at the OpenCV GitHub repository. The repository has the models stored in XML files, and can be read with the OpenCV methods. These include models for face detection, eye detection, upper body and lower body detection, license plate detection etc. A convolutional neural network(CNN) is a type of artificial neural network used in image recognition and processing that is specifically designed to process pixel data.CNN have their “neurons” arranged more like those of the frontal lobe,the area responsible for processing visual stimuli in humans and other animals. Drowsy Driver Detection System has been developed, using the intrusive machine vision based concepts. The system uses a web camera that points directly towards the driver’s face and monitors the driver’s eye movements in order to detect fatigue. In such a case when fatigue is detected, a warning signal is issued to alert the driver. The algorithm developed is different from any currently published papers, which was a primary objective of the project. The system deals with detecting eyes within the specific segment of the face. If these are not found for 20 consecutive frames, the system draws the conclusion that the driver is falling asleep. In this project we have developed drowsiness detection system by using Python. The input video is captured by using webcam (camera) and then it will be extracted. The face and eye detection is done by using OpenCv with the help of 68-face-landmarks. By using the Euclidean eye aspect ratio we can get eye blinking ratio, it helps to detect either eyes are open or closed. It will detect the face and eyes of the driver by using the given commands. Then it will detect whether the eyes of driver are open or close. If the eyes are closed more than given time interval it will warn the driver by playing the alarm or if eyes are open it will display message “eyes open” and then it will go to taking the video of driver and the process will go on. It mainly uses for “Image Classification”.

Step1-Take image as input from a camera with a webcam

we will take images as input.so to access the webcam,we made an infinite loop that will capture each frame. We use the method provided by OpenCV,cv2.VedioCapture(0) to access the camera and set the capture object(cap). Cap.read()will read each frame and we store the image in a frame variable.

Step2-Detect Face in the image and create a region of interest(ROI)

To Detect the face in the image ,we need to first covert the image into grayscale as the OpenCV algorithm for object detection takes gray images in the input. We don't need color information to detect the objects. we will be using haar cascade classifier to detect faces.

STEP3-Detect the eyes from ROI and feed it to the classifier
The same procedure to detect faces is used to detect eyes.First, we set the cascade classifier for eyes in leye and reye and reye respectively then detect the eyes. Now we need to extract only the eyes data from the full image.
This can be achieved by extracting the boundary box of the eye and then we can pull out the eye image from the frame with this code l_eye only contains the image data of the eye . this will be fed into our CNN classifier which will predict if eyes are open or closed . Similarly , we will be extracting the right eye into r_eye.

Step 4: Classifier will Categorize Whether Eyes are Open or Closed
we are using CNN classifier for predicting the eye status. To feed our image into the model. First, we convert the color image int grayscale using r_eye=cv2.cvtcolor(r_eye,cv.2.COLOR_BGR2GRAY).
Then , we resize the image to 24*24 pixels as our model was trained on 24*24 pixel images cv2.resizer(r_eye ,(24,24)).We normalize our data for better convergence r_eye = r_eye/255. Now we predict each eye with our model lpred =model.predict_classes(l_eye). If the value of lpred [0]=1,it states that eyes are open , if value of lpred [0]=0 then ,t states that eyes are closed.

Step 5: Calculate score to check whether person is Drowsy
The score is basically a value we will use to determine how long the person has closed his eyes. So if both eyes are closed , we will keep on increasing score and when eyes are open ,we decrease the score.
We are drawing the result on the screen using cv2.put Text()function which will display real time status of the person. A threshold is defined for example if score becomes greater than 15 that means the person's eyes are closed for a long period of time . This is which we beep the alarm using sound.play().The architecture and the Process flow of proposed system is shown in figure 1 and figure 2. The dataset images were shown from figure 3 to figure 6.

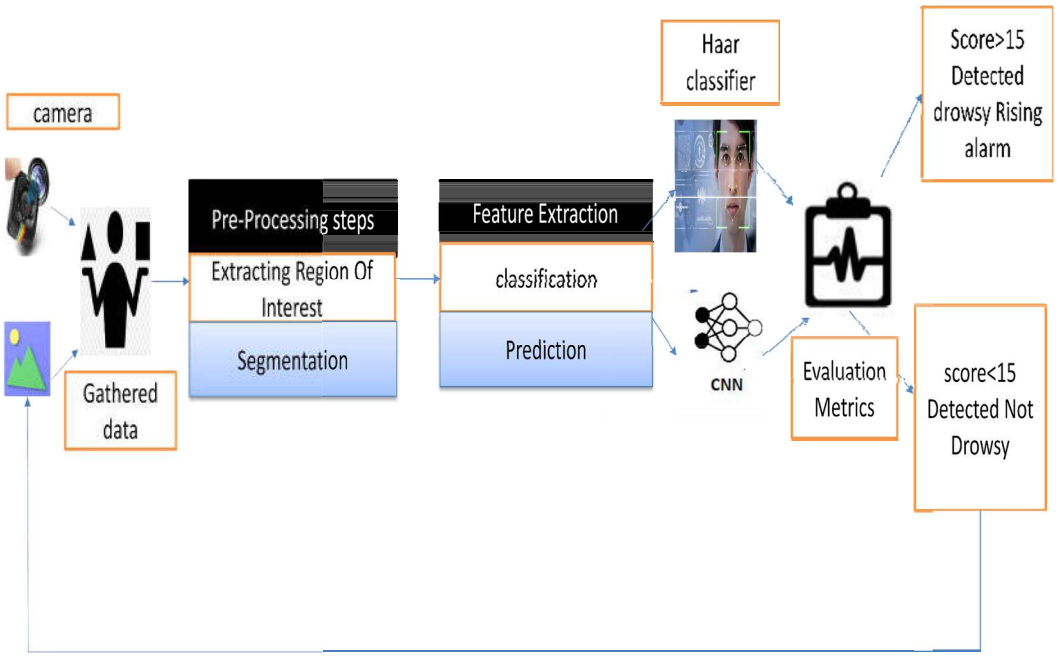


Fig.1 Proposed system architecture

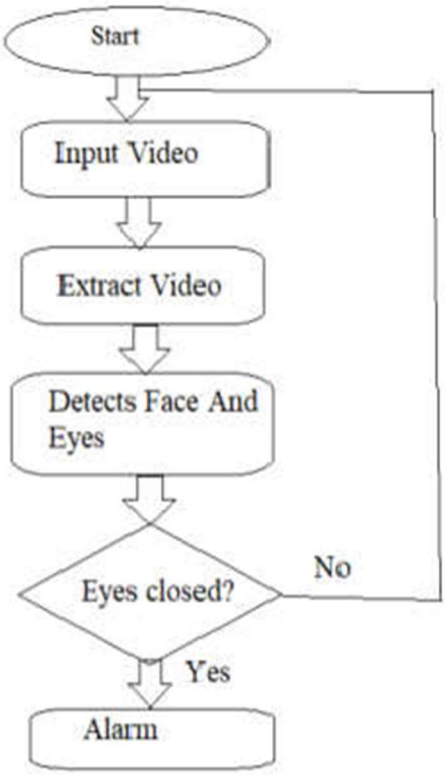


Fig. 2 Process flow of proposed system

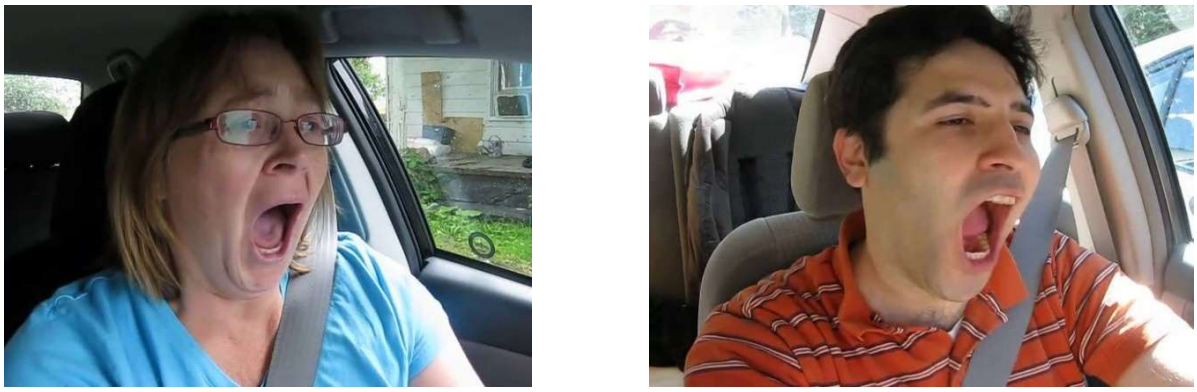


Fig.3 Dataset images with yawn

Fig.4 Dataset images without yawn

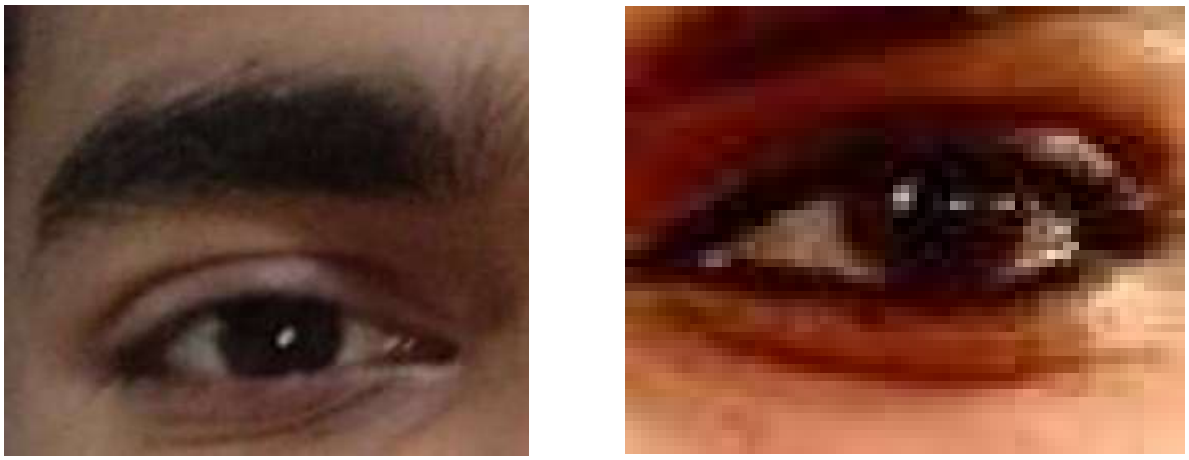


Fig.5. Datset Images with open eyes

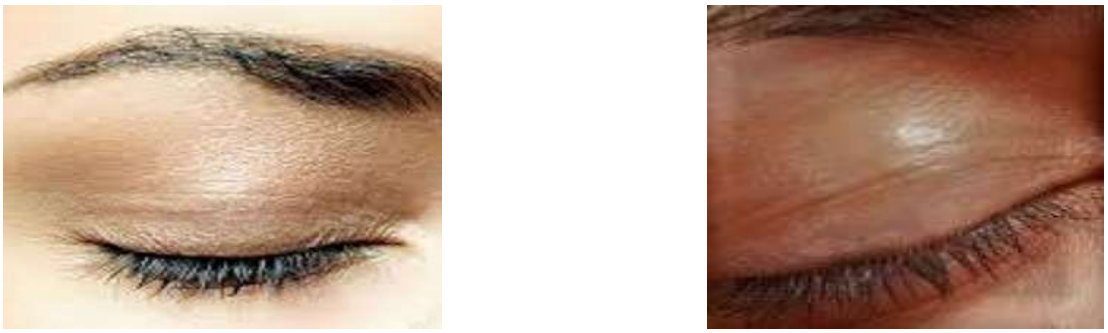


Fig.6 Dataset Images with Closed eyes

IV. RESULTS AND DISCUSSION

The results obtained were shown from Figure 7 to Figure 10.

Example Screenshot:

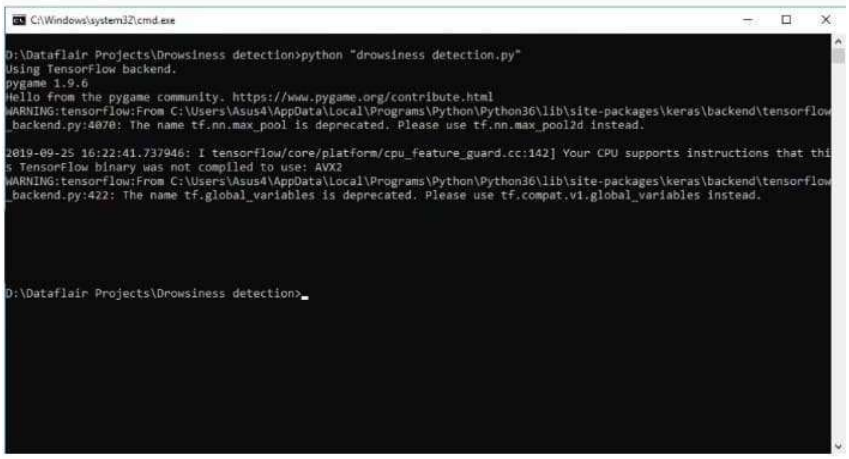
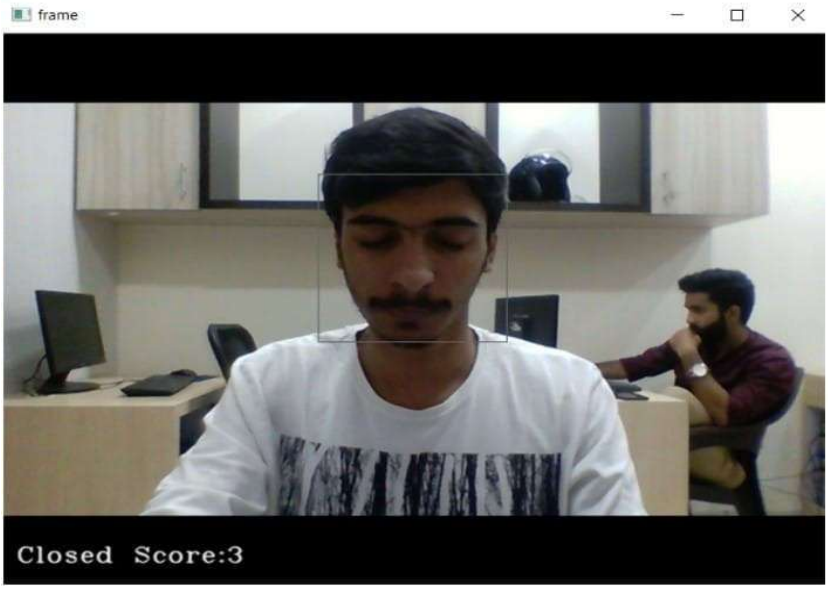


Fig.7 Execution Process

Output Screenshot:



Closed Eye Detection

Fig.8. Closed Eyes detection

Open Eyes Detection

Fig.9. Open Eyes detection

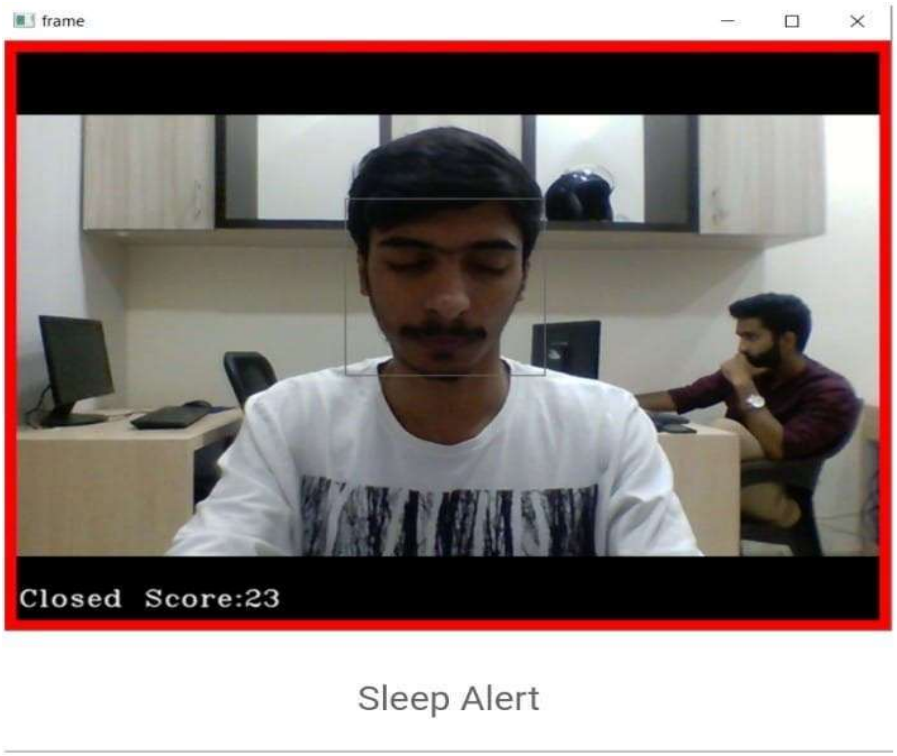


Fig.10. Sleep Alert

V. CONCLUSION AND FUTURE SCOPE

In this way, we have implemented drowsiness detection and warning system using python. Whenever driver feels drowsiness the eyes will close more than given time interval the alarm will play. This project will help to prevent crashes/accidents caused due to drowsiness. In the real time drowsy driver identification using eye blink detection if the parameters exceed a certain limit warning signals can be mounted on the vehicle to warn the driver of drowsiness. In this project it will detect drowsiness by observing the eye blinking pattern. With the help of Euclidean distance ratio i.e. eye blinking ratio it is easier to analyse the blinking ratio. It is more efficient technique than other system. It can be built at very chip cost. It gives more accurate result than the “drowsiness detection using python”. This system can be used to reduce the amount of road accidents that happens to great extent. This can save a lot of lives , which is a main motive of this system. This system does not need any complex system to work effectively. Taking the facts into consideration driver drowsiness detection system is the future of road safety.

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