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Driver Sleep Alert System using Face Recognition

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Abstract : Driver sleepiness is a major issue while driving alone or on long roads.Feeling sleepy while driving can cause major road accidents. However, if a driver or a person drives on a long road or a highway for a long time then there is a chance that the driver will get bored or may fall asleep . So to prevent any road accident, driver drowsy detection is a necessary procedure. Aim of our project to implement a technique that can automatically detect drowsiness and can give instant alert using buzzer/speaker or some other output devices. Since drowsiness is a natural activity of human behaviour and that can happen due to different factors such as if a person is tired or in night time generally people feel drowsy. Hence it is required to develop a system that can detect all such cases and give alert to the driver/person.In this project we develop a technique in which video streamed Processing is analyzed by eye blink concept through an Eye Aspect Ratio and Euclidean distance of eyes. Face landmark algorithm is also used for detection of the eye. First the program will collect the image of the driver/person and verify whether the driver is feeling drowsy or fatigue either in the day or night. For input we will use a camera to take live video of the driver then this will be verified using a program to alert the driver by a loud alarm (buzzer/speaker/audio device) which is present in the same system. The report proposed the results and solutions on the limited implementation of the various techniques that are introduced in the project. Whereas the implementation of the project give the real world idea of how the system works and what changes can be done in order to improve the utility of the overall system. Furthermore, the paper states the overview of the observations made by the authors in order to help further optimization in the mentioned field to achieve the utility at a better efficiency for a safer road.

IndexTerms **- Drowsiness,OpenCv, Python, Dlib**

I. INTRODUCTION

Humans have always invented machines and devised techniques to ease and protect their lives, for mundane activities like travelling to work, or for more interesting purposes like aircraft travel. With the advancement in technology, modes of transportation kept on advancing and our dependence on it started increasing exponentially. It has greatly affected our lives as we know it. Now, we can travel to places at a pace that even our grandparents wouldn't have thought possible. In modern times, almost everyone in this world uses some sort of transportation every day. Some people are rich enough to have their own vehicles while others use public transportation. However, there are some rules and codes of conduct for those who drive irrespective of their social status. One of them is staying alert and active while driving.Neglecting our duties towards safer travel has enabled hundreds of thousands of tragedies to get associated with this wonderful invention every year. It may seem like a trivial thing to most folks but following rules and regulations on the road is of utmost importance. While on road, an automobile wields the most power and in irresponsible hands, it can be destructive and sometimes, that carelessness can harm lives even of the people on the road. One kind of carelessness is not admitting when we are too tired to drive. In order to monitor and prevent a destructive outcome from such negligence, many researchers have written research papers on driver drowsiness detection systems. But at times, some of the points and observations made by the system are not accurate enough. Hence, to provide data and another perspective on the problem at hand, in order to improve their implementations and to further optimize the solution, this project has been done.

1. LITERATURE SURVEY

1.1 Survey Existing system:

Several studies have shown various possible techniques that can detect driver drowsiness. Such driver drowsiness detection can be measured using physiological measures, ocular measure and performance measure (Mario, 2015 and Mayank Chauhan, 2014). Among these physiological measures and ocular measures can give more accurate results. Physiological measures include brain waves, heart rate, pulse rate measurements and these require some sort of physical connection with the driver such as connecting electrodes to the driver body. But This leads to uncomfortable driving conditions.

1.2 Limitation Existing system or research gap:

It is possible that the driver could forget to wear the detection device while driving

It might also feel uncomfortable to some of the drivers to wear an existing device while driving.

1.3 Problem Statement and Objective:

i] If a person is relaxed or has any health related problem then the existing system using physiological measures like heart rate, pulse rate will detect it as a sleep and alert the system unnecessarily.

An IoT-based system is designed to avoid countless mishaps due to drowsy drivers' behavioral and psychological changes by focusing on driver's eye movements. In addition to monitoring the intensity of the collisions impacts during road accidents, it is also required to keep records of the location for taking supportive action.

1.4 Facts & Statistics:

Our current statistics reveal that just in 2015 in India alone, 148,707 people died due to car related accidents. Of these, at least 21 percent were caused due to fatigue causing drivers to make mistakes. This can be a relatively smaller number still, as among the multiple causes that can lead to an accident, the involvement of fatigue as a cause is generally grossly underestimated. Fatigue, in general, is very difficult to measure or observe unlike alcohol and drugs, which have clear key indicators and tests that are available easily. Probably, the best solutions to this problem are awareness about fatigue-related accidents and promoting drivers to admit fatigue when needed. The former is hard and much more expensive to achieve, and the latter is not possible without the former as driving for long hours is very lucrative. When there is an increased need for a job, the wages associated with it increases leading to more and more people adopting it. Such is the case for driving transport vehicles at night. Money motivates drivers to make unwise decisions like driving all night even with fatigue. This is mainly because the drivers are not themselves aware of the huge risk associated with driving when fatigued. Some countries have imposed restrictions on the number of hours a driver can drive at a stretch, but it is still not enough to solve this problem as its implementation is very difficult and costly.

1.5 Problem Definition:

Fatigue is a safety problem that has not yet been deeply tackled by any country in the world mainly because of its nature. Fatigue, in general, is very difficult to measure or observe unlike alcohol and drugs, which have clear key indicators and tests that are available easily. Probably, the best solutions to this problem are awareness about fatigue-related accidents and promoting drivers to admit fatigue when needed. The former is hard and much more expensive to achieve, and the latter is not possible without the former as driving for long hours is very lucrative.

2. PROPOSED SYSTEM

2.1 Software Requirements Specification:

Python: • Python 3

Libraries • Numpy • Scipy • Playsound • Dlib • Imutils • opencv, etc.

Operating System • Windows or Ubuntu

2.2 Hardware Requirements Specification:

I. Laptop with basic hardware.

II. Webcam

2.3 Requirement analysis:

Python: Python is the basis of the program that we wrote. It utilizes many of the python libraries.

Libraries:

• Numpy: Pre-requisite for Dlib • Scipy: Used for calculating Euclidean distance between the eyelids

. • Playsound: Used for sounding the alarm

• Dlib: This program is used to find the frontal human face and estimate its pose using 68 face landmarks.

• Imutils: Convenient functions written for Opencv.

• Opencv: Used to get the video stream from the webcam, etc.

OS: Program is tested on Windows 10 build 1903 and PopOS

Laptop: Used to run our code.

Webcam: Used to get the video feed.

2.4 Project Description:

In this Python project, we will be using OpenCV for gathering the images from webcam and feed them into a Deep Learning model which will classify whether the person's eyes are 'Open' or 'Closed'. The approach we will be using for this Python project is as follows :

Step 1 – Take image as input from a camera.

Step 2 – Detect the face in the image and create a Region of Interest (ROI).

Step 3 – Detect the eyes from ROI and feed it to the classifier.

Step 4 – Classifier will categorize whether eyes are open or closed.

Step 5 – Calculate score to check whether the person is drowsy.

3. SYSTEM ALGORITHM:

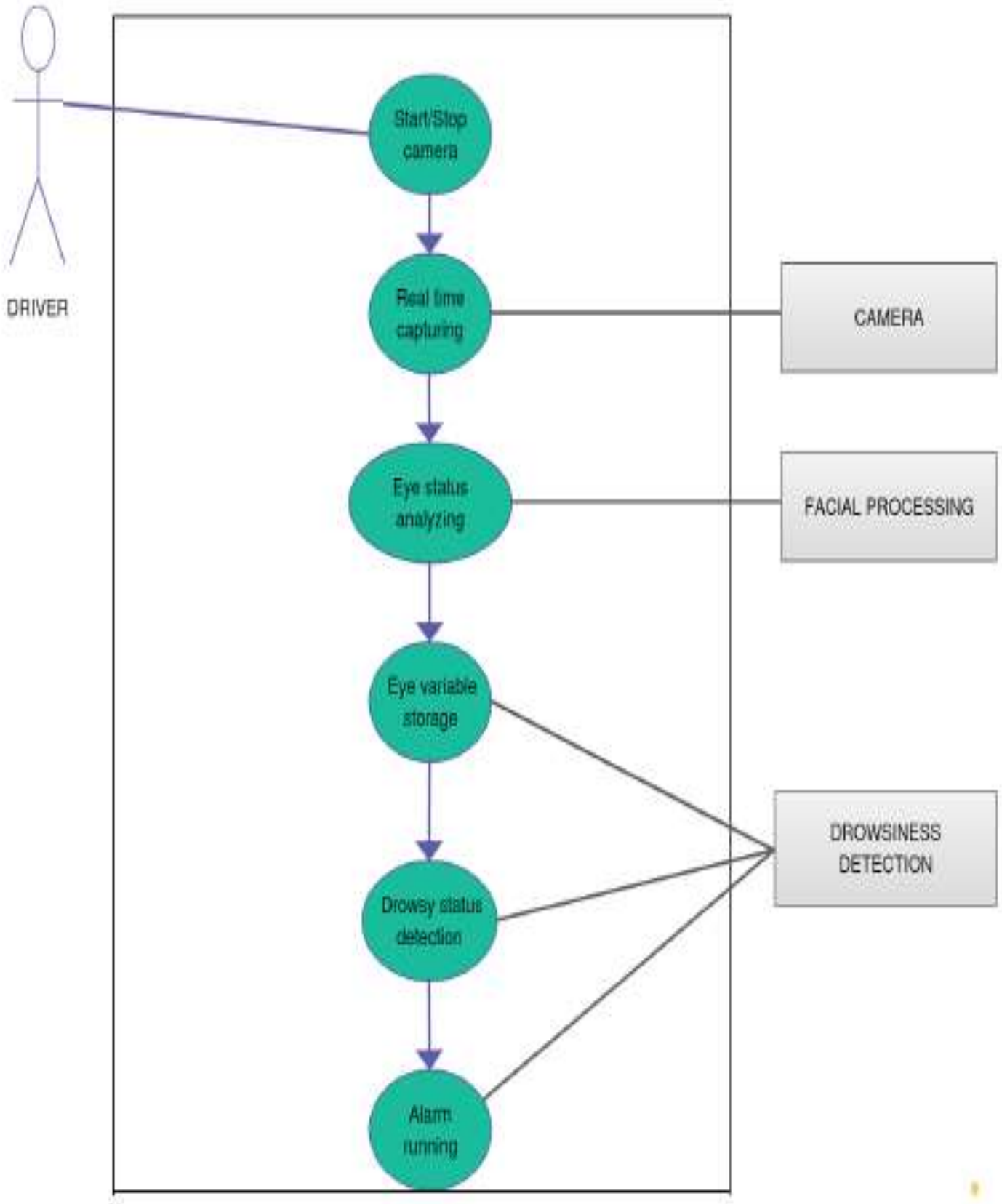
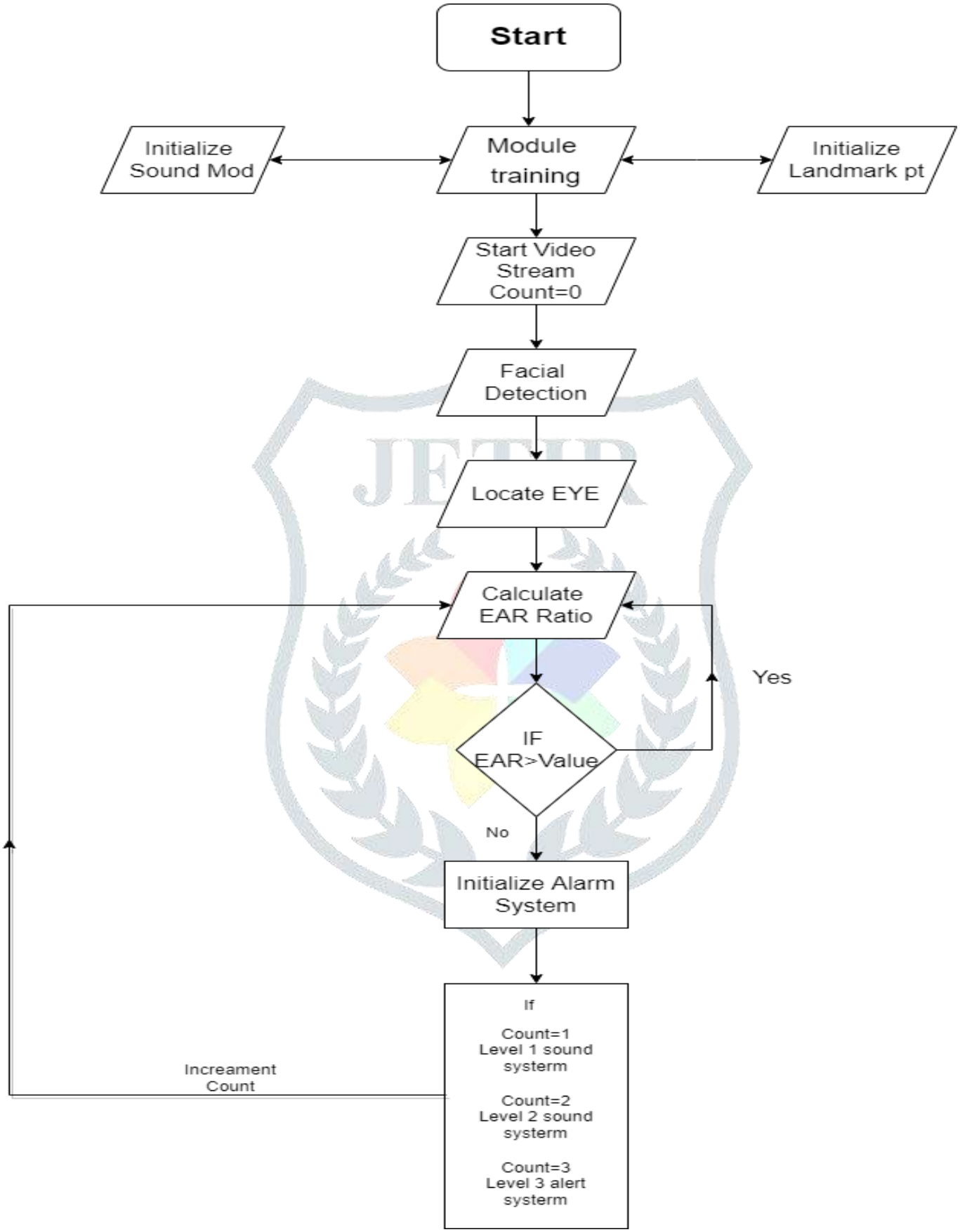


FIGURE 1

4. FLOW CHART:



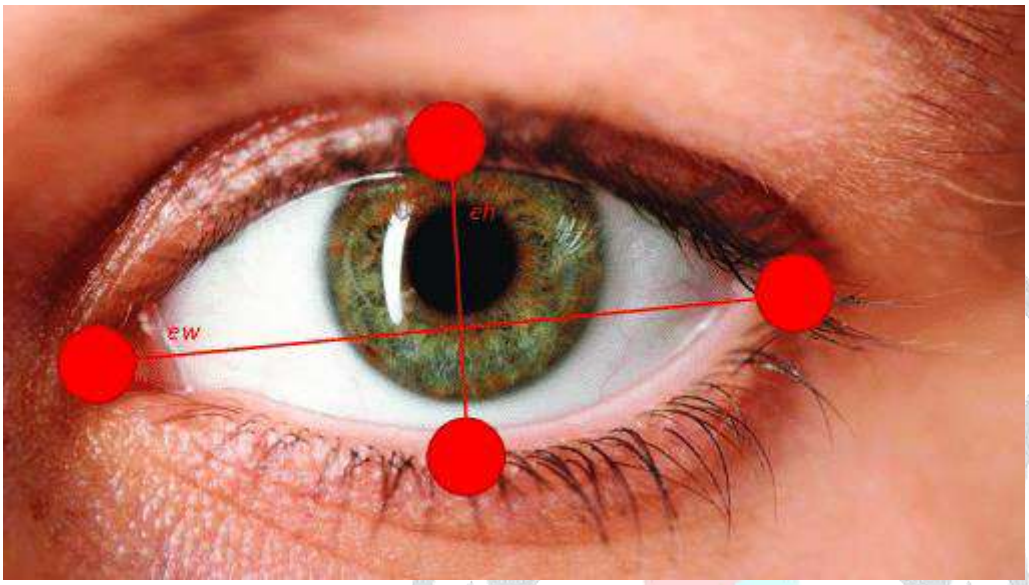
5. SYSTEM REVIEW

This survey is done to comprehend the need and prerequisite of the general population, and to do as such, we went through different sites and applications and looked for the fundamental data. Based on these data, we made an audit that helped us get new thoughts and make different arrangements for our task. We reached the decision that there is a need for such an application and felt that there is a decent extent of progress in this field too.

5.1 TECHNOLOGY USED;

PYTHON - Python is an interpreted, high-level, general-purpose programming language. Python's design philosophy emphasises code readability with its notable use of significant whitespace. Its language constructs and object-oriented approach aim to help programmers

write clear, logical code for small and large-scale projects. Python is dynamically typed AND supports multiple programming paradigms, including procedural, object-oriented, and functional programming.
IMAGE PROCESSING - In computer science, digital image processing is the use of computer algorithms to perform image processing on digital images.
• In our program we used Dlib, a pre-trained program trained on the HELEN dataset to detect human faces using the predefined 68 landmarks.
Landmarked Image of a person by Dlib
Dlib landmark image
After passing our video feed to the dlib frame by frame, we are able to detect left eye and right eye features of the face.
• Now, we drew contours around it using OpenCV.
• Using Scipy's Euclidean function, we calculated the sum of both eyes' aspect ratio which is the sum of 2 distinct vertical distances between the eyelids divided by its horizontal distance.



Eyes with horizontal and vertical distance marked for Eye Aspect Ratio calculation.
• Now we check if the aspect ratio value is less than 0.25 (0.25 was chosen as a base case after some tests). If it is less, an alarm is sounded and the user is warned.

6. OUTPUT:

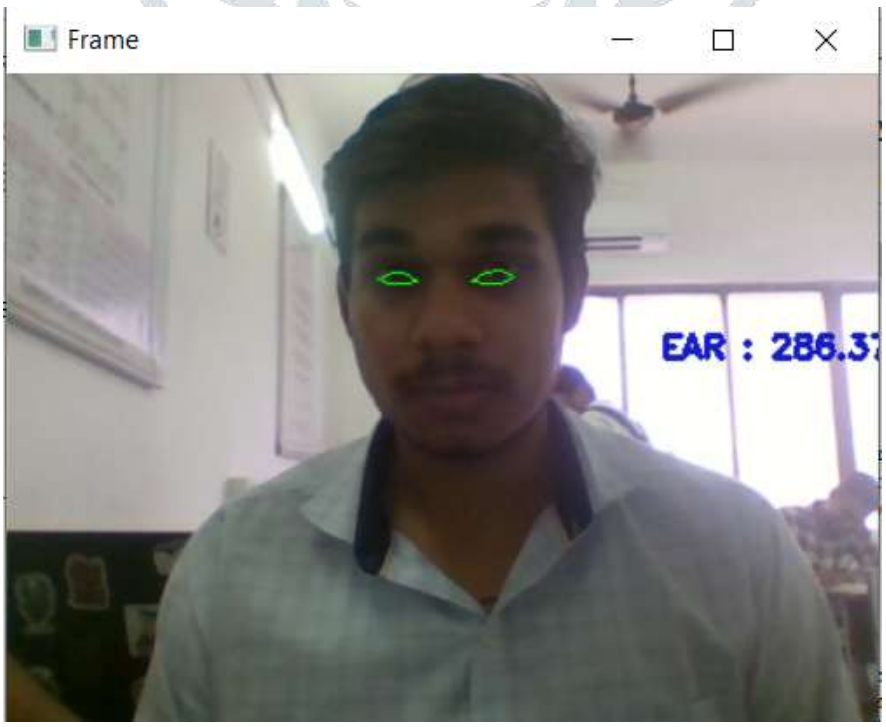
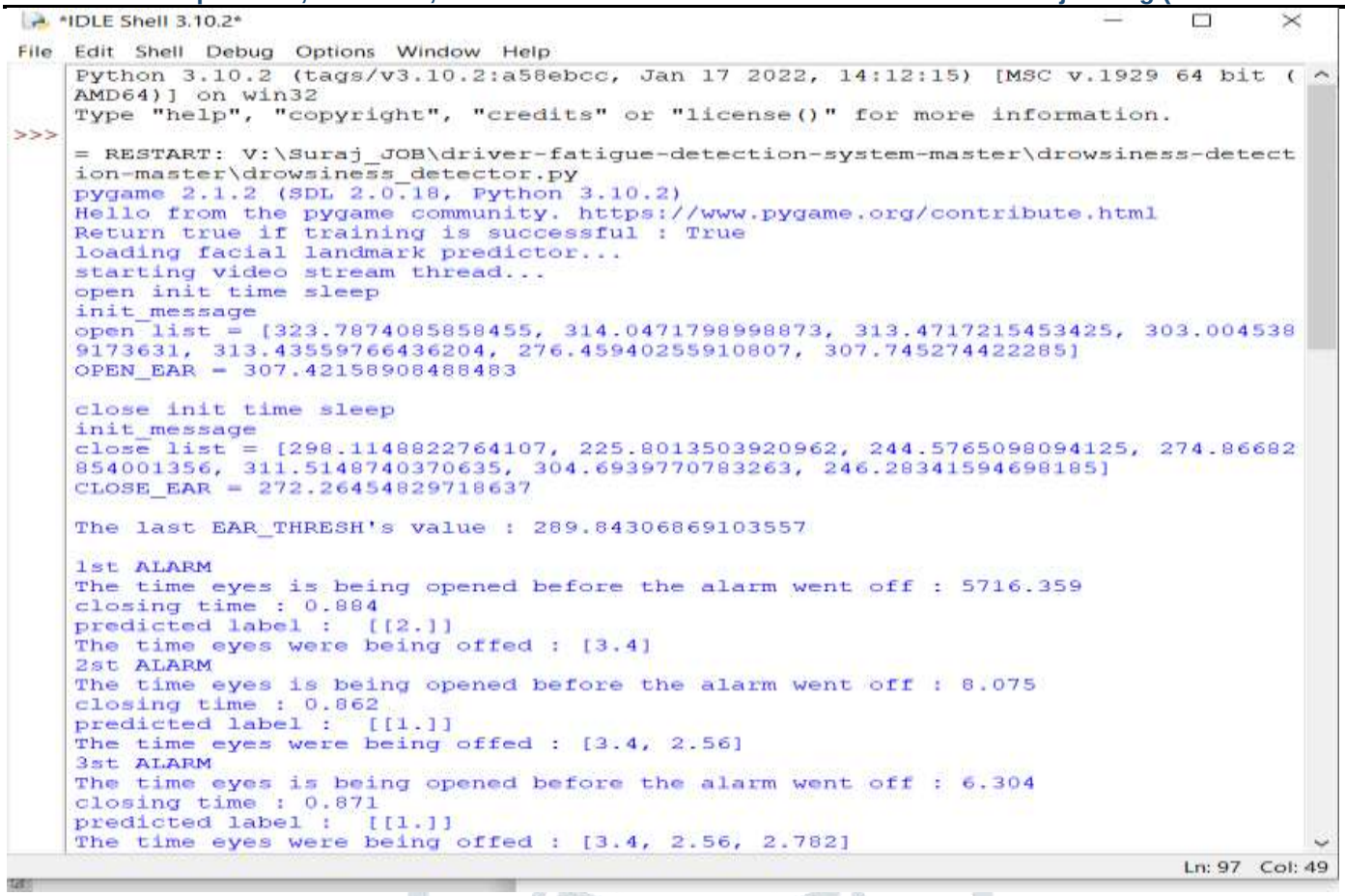


Figure 02 : Eye detection with EAR



7. CONCLUSION:

This research provides a robust method for detecting drowsiness of drivers and collision impact systems in the present time.the proposed system is used to construct a non intruding technique for measuring drowsiness of the driver with severity of collision due to braking or mishap. Software will record the face periodically using dlib facial recognition and compare the eye ratio as programmed, if the value falls from the threshold range, then the system uses three level alerts using different sounds which are already programmed in the system .The first sound is normal sound which will alert the user named and second sound is warning based sound and the last sound is siren sound which runs continuously in the loop unless the user gets back to normal state, and if the eyes are kept open then also the system runs continuously but without any sounds.
speech speaker in which the first level is normal sound and second level is slightly high pitch sound while in third level drive is alerted using high volume siren.

8. FUTURE SCOPE:

The model can be improved incrementally by using other parameters like blink rate, yawning, state of the car, etc. If all these parameters are used it can improve the accuracy by a lot. We plan to further work on the project by adding a sensor to track the heart rate in order to prevent accidents caused due to sudden heart attacks to drivers. Same model and techniques can be used for various other uses like Netflix and other streaming services can detect when the user is asleep and stop the video accordingly. It can also be used in applications that prevent users from sleeping.

9. ACKNOWLEDGEMENT

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10. REFERENCES

1. https://www.analyticsvidhya.com/blog/2021/05/image-processing-using-opencv-with-practical-examples
2. https://en.wikipedia.org/wiki/Driver_drowsiness_detection
3. International Journal of Development Research Papers Vol. 07, Issue, 02, pp.11499-11503,February, 2017
4. Wei Zhang, Bo Cheng, Yingzi Lin," Driver Drowsiness Recognition Based on Computer
5. Vision Technology," Tsinghua Science And Technology, pp 354-362,Volume 17, Number 3, June 2012.
6. Computationally efficient face detection; b. schlkopf-a. blake, s. romdhani, and p. torr.
7. Use of the hough transformation to detect lines and curves in picture; r. duda and p. e. heart.
8. Jain, "face detection in color images; r. l. hsu, m. abdel-mottaleb, and a. k. jain.
9. Open/closed eye analysis for drowsiness detection; p.r. tabrizi and r. a. zoroofi.
10. http://ncrb.gov.in/StatPublications/ADSI/ADSI2015/chapter1A%20traffic%20accidents.pdf
11. http://www.jotr.in/text.asp?2013/6/1/1/118718
12. http://dlib.net/face_landmark_detection_ex.cpp.html