Project Report

On

DROWSINESS DETECTION

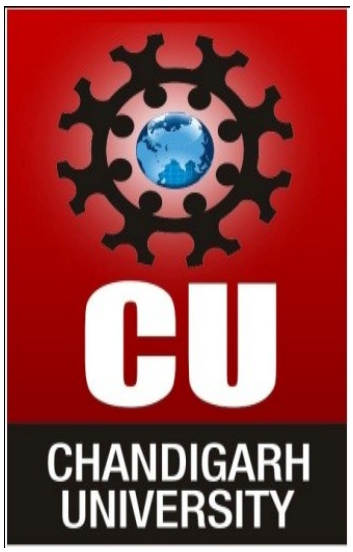
USING OPENCV

Submitted in partial fulfillment of the requirements for the award of degree of

BACHELOR OF ENGINEERING

IN

COMPUTER SCIENCE & ENGINEERING



Submitted to :

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17BCS1044

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
CHANDIGARH UNIVERSITY, GHARUAN
November, 2019

CERTIFICATE

This is to certify that the work embodied in this Project Report entitled **"DROWSINESS DETECTION USING OPENCV"** being submitted by **Tanmay Shivhare** - UID **17BCS1044,** 5th Semester for partial fulfillment of the requirement for the degree of **" Bachelor of Engineering in Computer Science & Engineering "** discipline in " **Chandigarh University** " during the academic session July-Dec 2019 is a record of bonafide piece of work, carried out by student under my supervision and guidance in the **" Department of Computer Science & Engineering ", Chandigarh University.**

APPROVED & GUIDED BY: Ms. Gulbadan Khehra

DECLARATION

I, student of **Bachelor of Engineering** in **Computer Science & Engineering, 5th Semester** , **session: July – Dec 2019, Chandigarh University,** hereby declare that the work presented in this Project Report entitled **" DROWSINESS DETECTION USING OPENCV "** is the outcome of my own work, is bonafide and correct to the best of my knowledge and this work has been carried out taking care of Engineering Ethics. The work presented does not infringe any patented work and has not been submitted to any other university or anywhere else for the award of any degree or any professional diploma.

Tanmay Shivhare

17BCS1044

APPROVED & GUIDED BY: Ms. Gulbadan Khehra

To our parents, teachers and all the well wishers out there . . .

ACKNOWLEDGMENT

I would like to express my special thanks of gratitude to my mentor ***Ms. Gulbadan Khehra*** as well as our Chandigarh University who gave me the golden opportunity to do this wonderful project on the topic ***Drowsiness Detection using OpenCV***, which also helped me in doing a lot of Research and I came to know about so many new things I am really thankful to them.
Secondly, I would also like to thank my parents and friends who helped me a lot in finalizing this project within the limited time frame.

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ABSTRACT

Nowadays, more and more professions require long-term concentration. Drivers must keep a close eye on the road, so they can react to sudden events immediately. Driver fatigue often becomes a direct cause of many traffic accidents. Therefore, there is a need to develop the systems that will detect and notify a driver of her/him bad psychophysical condition, which could significantly reduce the number of fatigue-related car accidents.

However, the development of such systems encounters many difficulties related to fast and proper recognition of a driver's fatigue symptoms. One of the technical possibilities to implement driver drowsiness detection systems is to use the vision-based approach.

This article presents the currently used driver drowsiness detection systems. Here we are detecting the driver drowsiness by estimating vision system of him .

1. Introduction

Driver drowsiness detection is a car safety technology which prevents accidents when the driver is getting drowsy. Various studies have suggested that around 20% of all road accidents are fatigue-related, up to 50% on certain roads. Driver fatigue is a significant factor in a large number of vehicle accidents. Recent statistics estimate that annually 1,200 deaths and 76,000 injuries can be attributed to fatigue related crashes. 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. Unlike driver distraction, driver drowsiness involves no triggering event but, instead, is characterized by a progressive withdrawal of attention from the road and traffic demands. Both driver drowsiness and distraction, however, might have the same effects, i.e., decreased driving performance, longer reaction time, and an increased risk of crash involvement. shows the block diagram of overall system. Based on Acquisition of video from the camera that is in front of driver perform real-time processing of an incoming video stream in order to infer the driver's level of fatigue if the drowsiness is Estimated then it will give the alert by sensing the eyes.

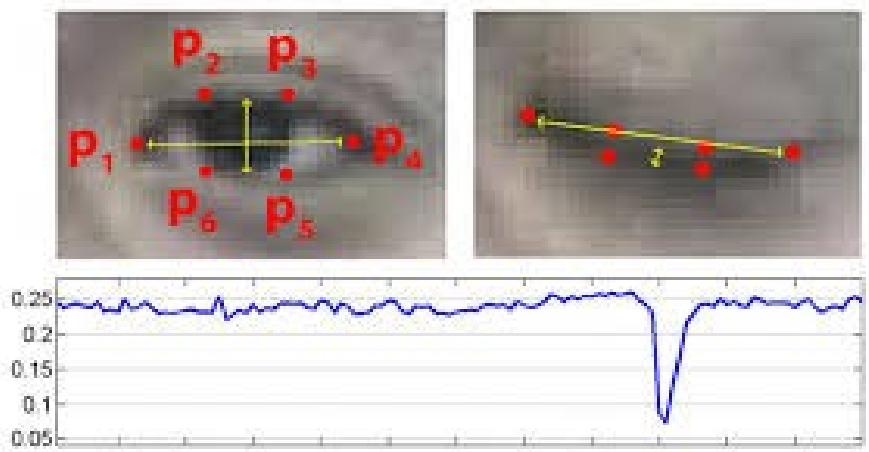


Figure 1.1: Drowsiness Detection

The aim of this paper is to develop a prototype drowsiness detection system. The focus will be placed on designing a system that will accurately monitor the open or closed state of the driver's eyes in real-time. By monitoring the eyes, it is believed that the symptoms of driver fatigue can be detected early enough to avoid a car accident. Detection of fatigue involves a sequence of

images of a eyes, and the observation of eye movements and blink patterns. This paper is focused on the localization of the eyes, which involves searching for the entire image of the eyes, 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 fatigue.

2. SRS:

Software and Hardware Requirements:

- PyCharm
- Python 3.5 and above
- Lubuntu 18.04 Bionic Beaver
- RAM 6GB

Block Diagram:

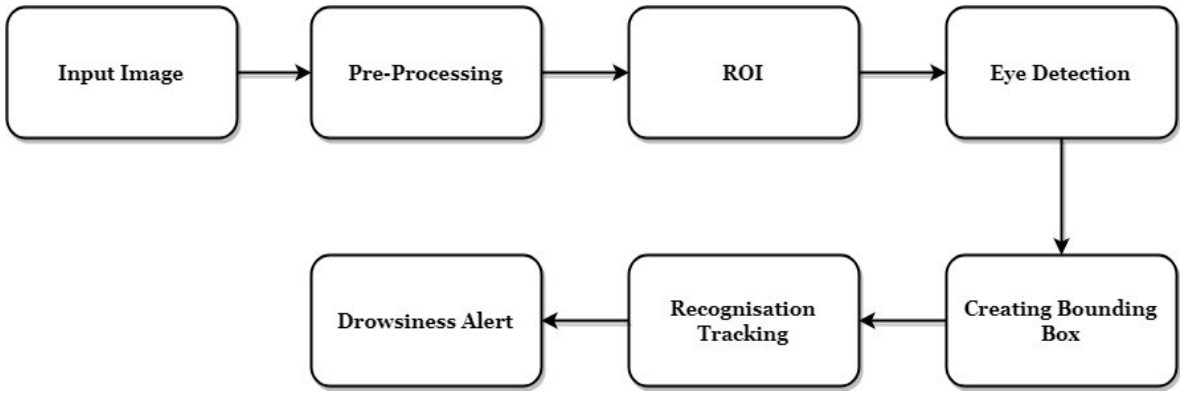


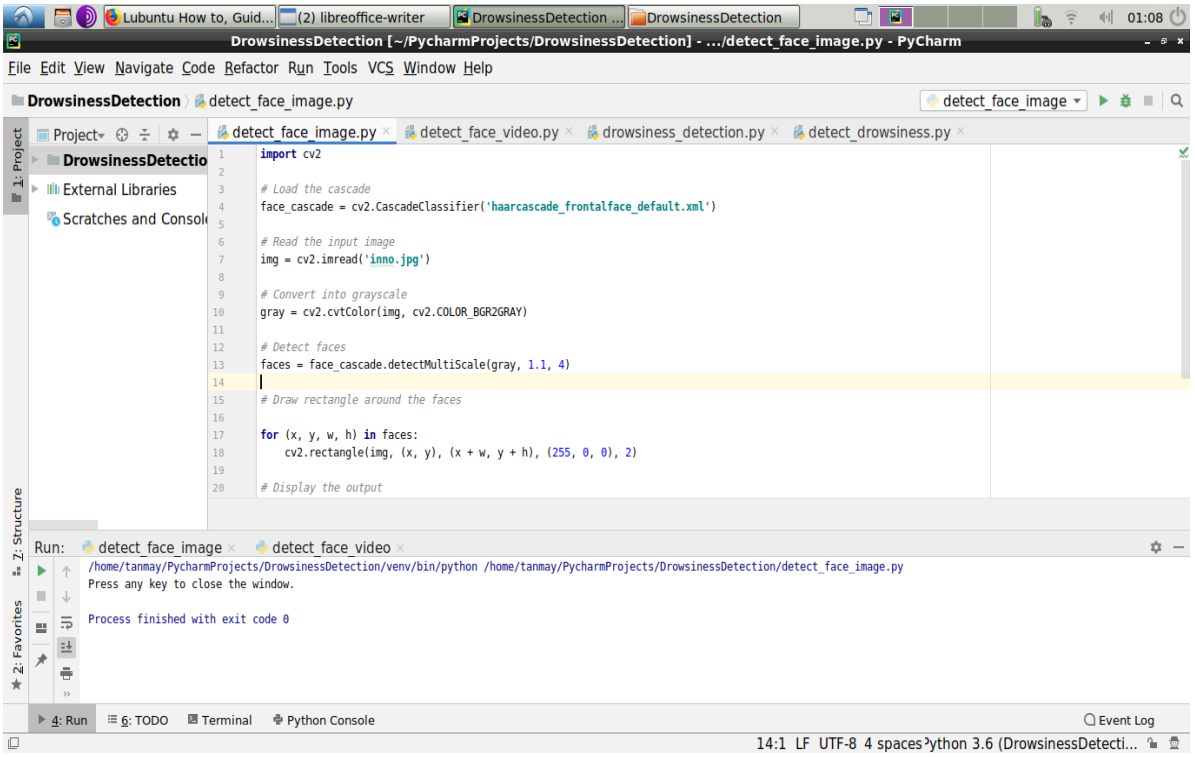
Figure 2.1: Block Diagram

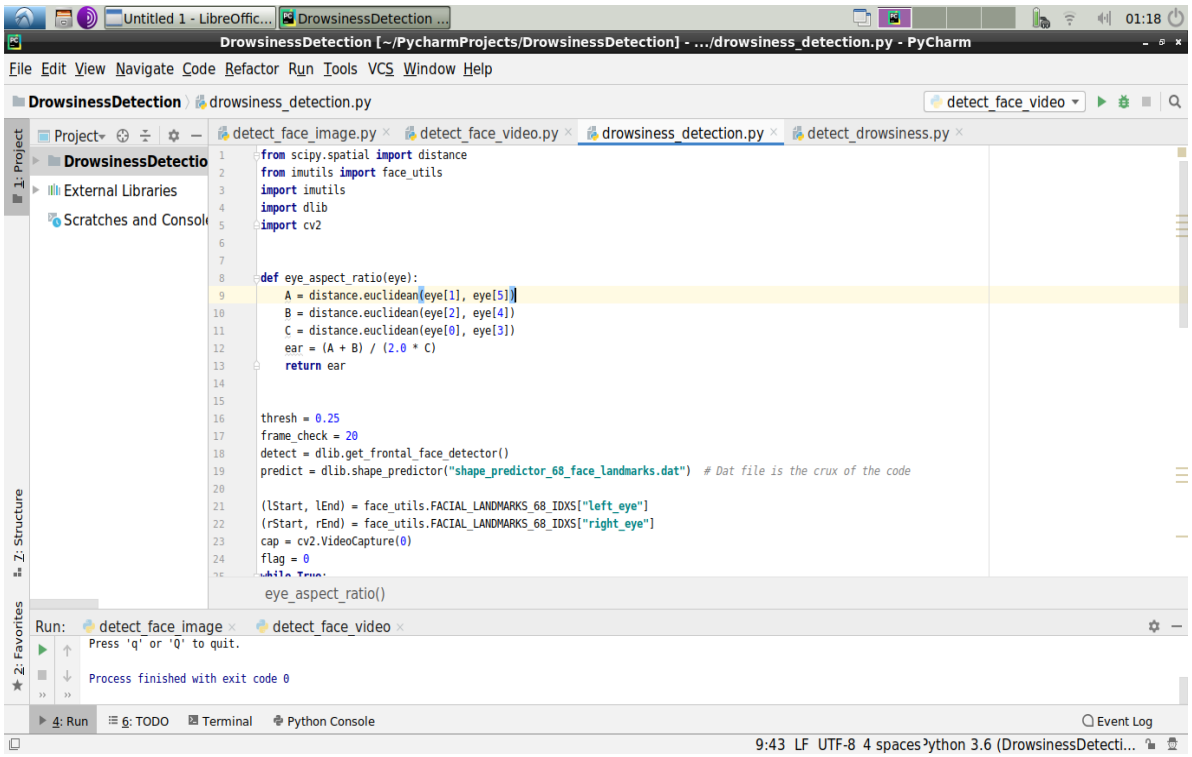
Project Methodology:

The project methodology was developed in a sequential manner as following:

- Face Detection using OpenCV from Images.
- Face Detection using OpenCV from Videos.
- Eye Detection using OpenCV from Real- time videos.
- Applying Drowsiness Detection.
- Deployment of Project.

Implementation:



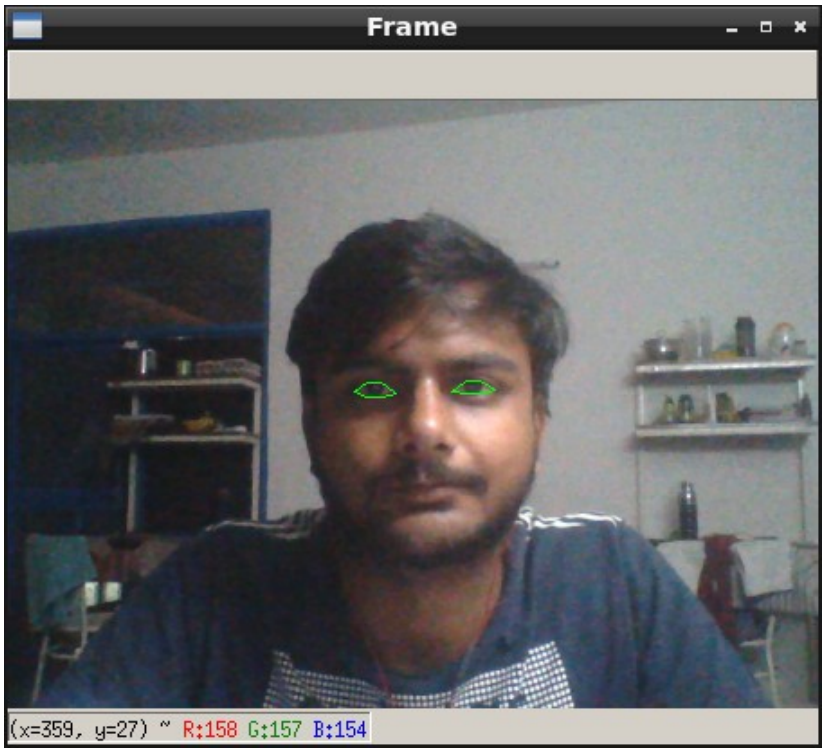


OUTPUT VALIDATION AND COMPARISON:

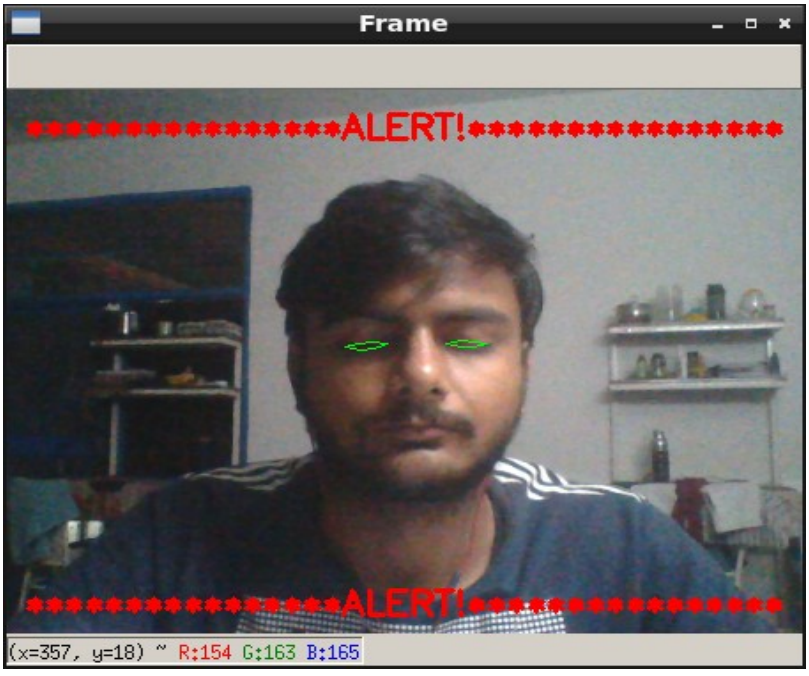
The Output of this project is validated on the basis of two calculations:

[1] Threshold of EAR value should not go down below **0.25**.

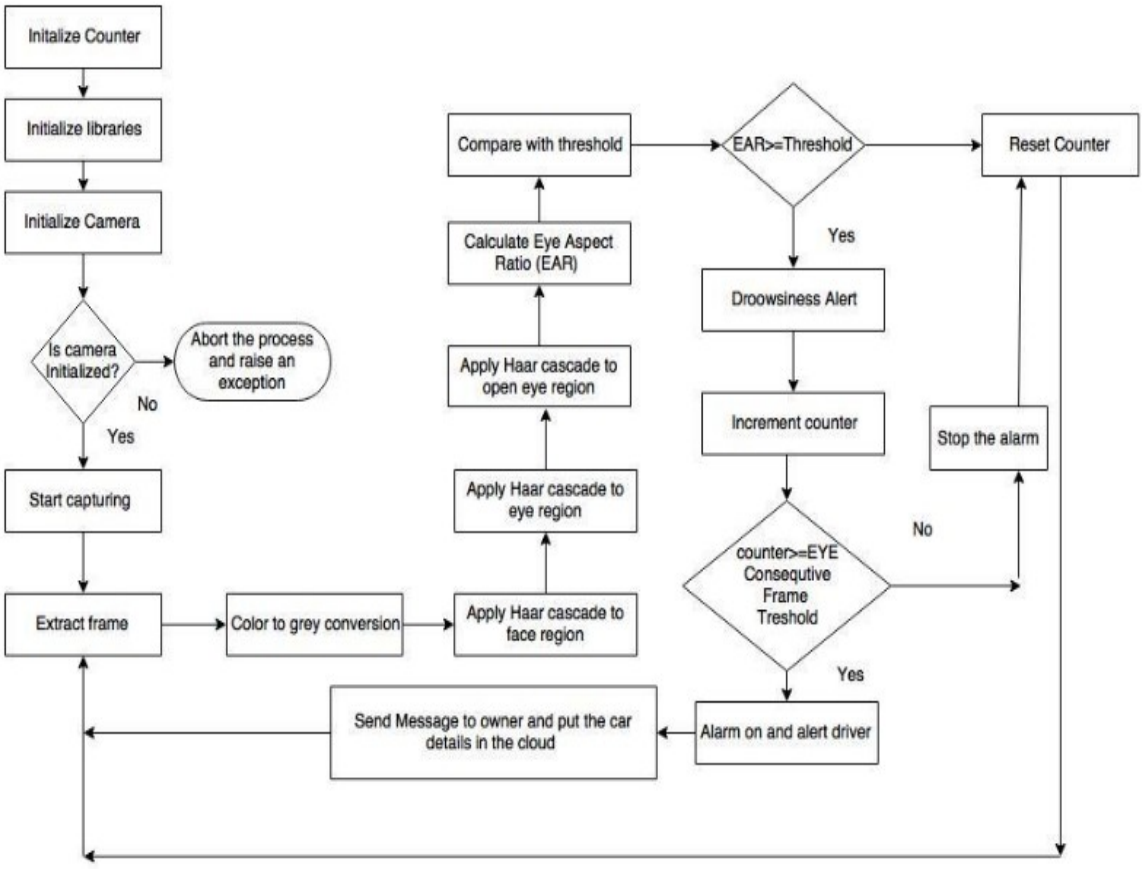
[2] If threshold < 0.25 for more than 20 Frames capptured by the code, then system should show **Alert.**



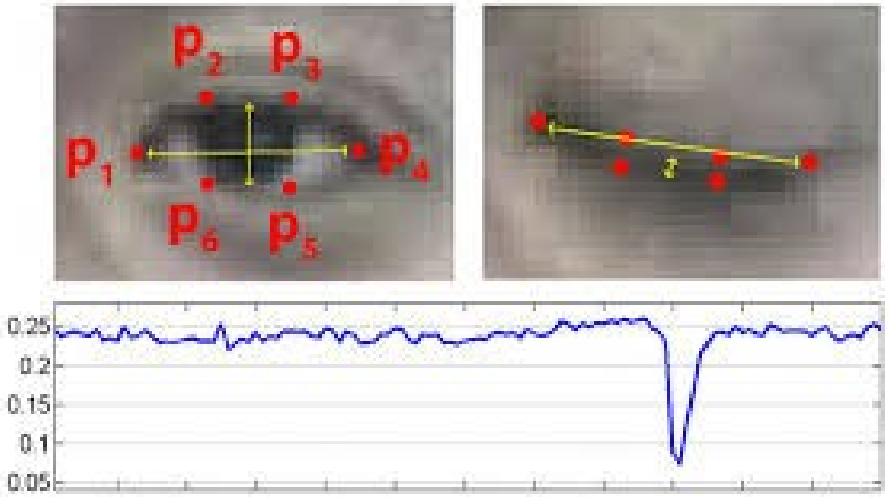
Here, Alert has been shown because EAR < 0.25 for more than 20 frames as captured by webCam.



3. Architectural Diagram:



$$\mathrm{EAR} = \frac{\|p_2 - p_6\| + \|p_3 - p_5\|}{2\|p_1 - p_4\|}$$



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- Applying Drowsiness Detection.
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Algorithm can be divided broadly in following sub modules.

- Frame Acquisition
- Facial landmark detection
- Eye Localization and tracking
- Extracting eye geometrical coordinates
- Measuring EAR
- Monitoring of EAR for blinks detection
- Estimation of micro sleep periods between blinking
- Audio Visual warning on micro sleep detection.

EARis define as per below formula , where p1,p2....p6 is the eye coordinates as discussed in further text:

$$\text{EAR} = \frac{\|p_2 - p_6\| + \|p_3 - p_5\|}{2\|p_1 - p_4\|}$$

5. Results:

The Output of this project is validated on the basis of two calculations:

1. Theshold of EAR value should not go down below **0.25**.
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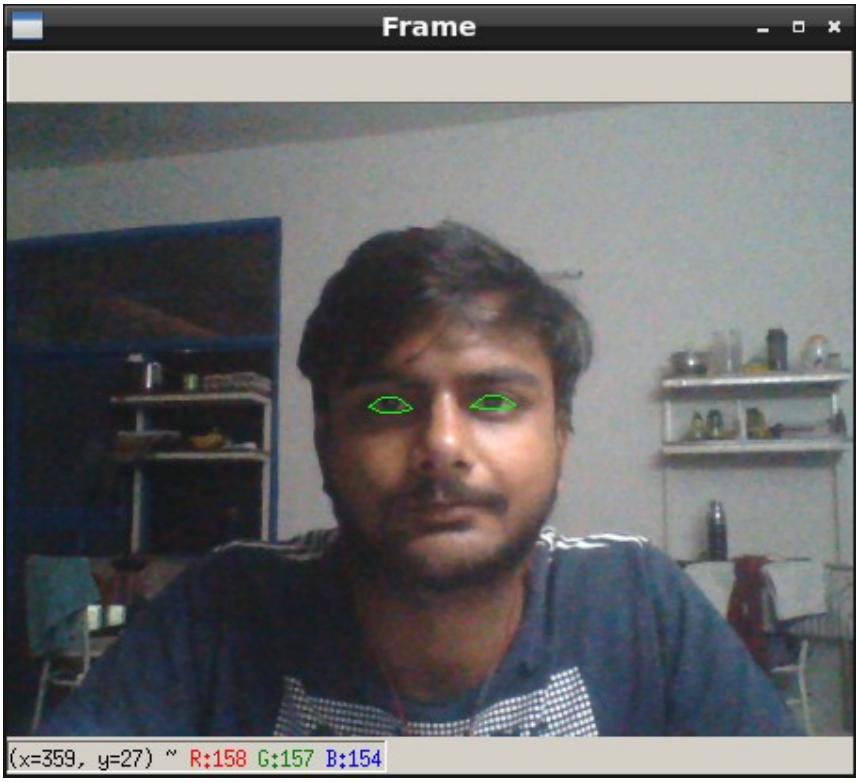

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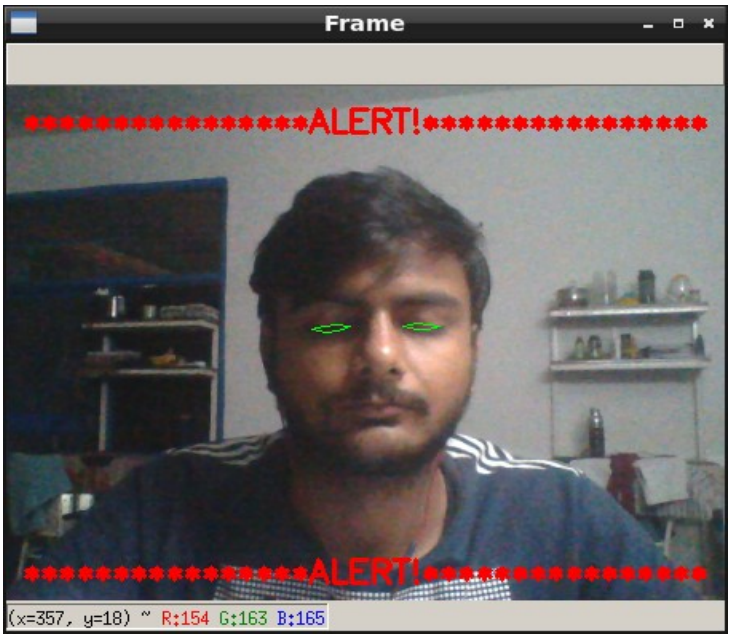

6. Conclusion and Future Scope:

The driver abnormality monitoring system developed is capable of detecting drowsiness, drunken and reckless behavior of driver in a short time. The Drowsiness Detection System developed based on eye closure of the driver can differentiate normal eye blink and drowsiness and detect the drowsiness while driving.

The proposed system can prevent the accidents due to the sleepiness while driving. The system works well even in case of drivers wearing spectacles and even under low light conditions if the camera delivers better output.

Information about the head and eyes position is obtained through various self-developed image processing algorithms. During the monitoring, the system is able to decide if the eyes are opened or closed.
When the eyes have been closed for too long, a warning signal is issued. processing judges the driver's alertness level on the basis of continuous eye closures.

References:

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