Ramrao Adik Institute of Technology

Dr. D. Y. Patil Vidyanagar, Nerul, Navi Mumbai

CERTIFICATE

This is to certify that Mini Project report entitled

Driver Drowsiness Detection Using Open CV

by

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is successfully completed for Third Year Computer Engineering as prescribed by University of Mumbai.

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(Mr Tushar Ghorpade)	**(Ms Pallavi Chitte)**
Head of Department	Principal
(Dr. Leena Ragha)	**(Dr. Ramesh Vasappanavara)**

Mini Project Report Approval

This is to certify that the Mini Project entitled ***" Driver Drowsiness Detection using Open CV "*** is a bonafide work done by ***Nikita Chorghe***, ***Aishwarya Kamtam***, ***Divya Kapil***,and ***Akhil Kedare*** under the supervision of ***Mr Tushar Ghorpade***. This Mini Project has been approved for Third Year Computer Engineering.

Internal Examiner :

1. .....

2. .....

External Examiners :

1. .....

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DECLARATION

I declare that this written submission represents my ideas and does not invovle plagiarism. I have adequately cited and referenced the original sources wherever others' ideas or words have been included. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action against me by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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Abstract

Drowsy driving is one of the major causes of road accidents and death. Hence, detection of drivers fatigue and its indication is an active research area. Over the last decade many image processing based approaches were developed to detect drivers fatigue and drowsiness status.The existing systems in the literature, are providing slightly less accurate results due to low clarity in images and videos, which may result due to variations in the camera positions. In order to solve this problem, a driver drowsiness detection system is proposed in this report, which makes use of eye blink counts for detecting the drowsiness. The experimental results of the proposed system, which is implemented on Open CV environment with a single camera view, illustrate the good performance of the system in terms of accurate drowsiness detection results and thereby reduces the road accidents.

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Chapter 1

Introduction

Driver drowsiness is a serious hazard and major concern, which is identified as a direct or contributing cause in most of the road accidents. Since drowsiness can seriously slow down the reaction time and subsequently decreases drivers awareness and judgment.Drowsiness refers to sleeping abnormally sleepy. People who are drowsy may fall asleep in inappropriate situation or at times.

1.1 Overview

Driver drowsiness detection is a car safety technology which helps prevent accidents caused by the driver getting drowsy.It impacts the alertness and response time of the driver but also enhances the chances of being involved in car accidents.Sleepy drivers fail to take right actions prior to a collision.Aim of this project is implementing this system as a prototype by capturing live images of the eyes.

1.2 Motivation

Almost all the statistics have identified driver drowsiness as a high priority vehicle safety issue. Drowsiness has been estimated to be involved in 10-40 per cent of crashes on motorways [5, 6]. Fall-asleep crashes are very serious in terms of injury severity and more likely to occur in sleep-deprived individuals. Drowsiness influences mental alertness, decreasing an individuals capability to handle a vehicle safely and expanding the possibility of a human mistakes that could lead to deaths and injuries. Furthermore, it has been indicated to slow response time,

decreases awareness, and impairs judgment. A drowsy driver is unable to predict when he or she will have an uncontrolled sleep onset [9].

There is an increased interest with respect to the design and advancement of computer controlled automotive applications to overcome those problems by enhancing safety to reduce accidents, increase traffic flow, and enhance comfort for drivers.

1.3 Problem Definition

Robust and accurate algorithm in real time eye tracking system has been a fundamental and challenging problem for computer vision.This system proposed a new method to estimate eye-position and direction using python and Open CV.Algorithm used is Eye Aspect Ratio.In this system, we represent a methodology for detection of eye blinking robustly in real time environment.

1.4 Objectives

The objective of this research is to identify the current drowsiness detection by Eye Aspect ratio methods for studying the relationships between drivers manoeuvre performances whiles the vehicle on the move and the physiological driver drowsiness states.Monitoring the driver behaviour by using eye-tracking and image processing.

1.5 Organization of report

The project is introduced in Chapter 1.The literature survey on existing systems is given in Chapter 2.The proposed system,implementation and a brief description on Eye Aspect Ratio Algorithm is explained in Chapter 3. The results and analysis is given along with the screenshots of the output in the Chapter 4. The project has been concluded in Chapter 5 along with some future work.

Chapter 2

Literature Survey

2.1 Existing Systems

The concept used in Driver Drowsiness Monitoring System using Visual Behaviour and Machine Learning (2018) is Histogram of oriented gradients (HOG) and Linear SVM method which is Tested on INVEDRIFAC dataset Tested on 6 different driver videos. It has been observed that Additional sensors are not used to detect drowsiness. Drowsiness is detected only on the basis milof image processing[1].

Author designed a system using Four support vector machine and Classification model. Highest accuracy 91.3black ratio are employed. The average computation time from capturing face image to decide the corresponding drivers drowsiness status was 0.4 seconds. Limitation observed is Only Behavioral data used physical approach is not used[2].

In 2018[3] Fouzia, Roopalakshmi R, Jayantkumar A Rathod,developed a system Driver Drowsiness Detection System Based on Visual Features which used OpenCV and Raspberry pi. The Eye Aspect Ratio (EAR) between height and width of the eye is computed. Non-invasive approach to detect drowsiness without any annoyance and interference. But system fails for multimodality.

Hyung-Tak Choi, applied Long Short Term Memory (LSTM) algorithm which uses Multimodal deep learning and (MTCNN)-Multi-task Cascaded Convolution Networks technology. Its accuracy can be further enhanced by testing it against a larger dataset[4].

2.2 Outcome of Literature Survey

From literature survey we can say that the existing system have to be enhanced by testing it against a larger dataset that employs modified Eye Aspect Ratio algorithm for drowsiness detection for face recognition.

Chapter 3

Proposed System

3.1 Proposed Work

To overcome the drawbacks of the existing system, the proposed system has been evolved.This system proposed a new method to estimate eye-position and direction using python and Open CV. The objective of this research is to identify the current drowsiness detection.

3.2 Proposed Methodology/Techniques

Proposed Technology is used for driver drowsiness detection. OpenCV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library. OpenCV was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in the commercial products. Being a BSD- licensed product, OpenCV makes it easy for businesses to utilize and modify the code. The library has more than 2500 optimized algorithms, which includes a comprehensive set of both classic and state-of-the-art computer vision and machine learning algorithms. These algorithms can be used to detect and recognize faces, identify objects, classify human actions in videos, track camera movements, track moving objects, extract 3D models of objects, produce 3D point clouds from stereo cameras, stitch images together to produce a high resolution image of an entire scene, find similar images from an image database, remove red eyes from images taken using flash, follow eye movements, recognize scenery and establish markers to overlay it with augmented reality, etc.

Eye Aspect Ratio Algorithm

Eye blinks can be detected by referencing significant facial landmarks. Many software libraries can plot significant facial features within a given region of interest. The program uses a facial training set to understand where certain points exist on facial structures. The program then plots the same points on region of interests in other images, if they exists. The program uses priors to estimate the probable distance between keypoints. In Real Time Eye Blinking Using Facial Landmarks derive an equation that represents the Eye Aspect Ratio. The Eye Aspect Ratio is an estimate of the eye opening state. the eye aspect ratio can be defined by the below equation. The Eye Aspect Ratio is a constant value when the eye is open, but rapidly falls to 0 when the eye is closed. This determines if a persons eyes are closed if the Eye Aspect Ratio falls below a certain threshold.

3.3 Design of the System

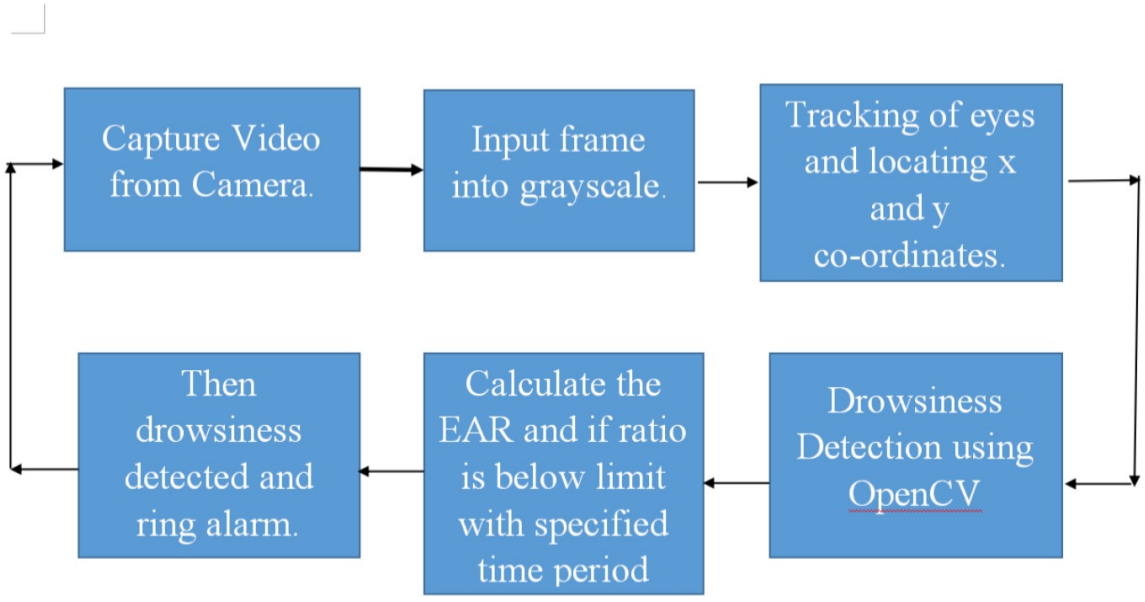

Figure 3.1: System Design

3.4 Hardware/Software Requirement

Hardware

3.4.1 Web-Camera (8MP)

3.4.2 Intel Core i5-8400 2.8 GHz 6-Core processor.

Software

3.4.1 Python 3

3.4.2 Open CV

3.5 Implementation Details

The video camera inserted firstly captures the frames. These frames are then converted into the gray-scale images. After conversion eyes are located using euclidean method. The 'x' and 'y' co-ordinates of eyes are located. Eye Aspect Ratio(EAR) is calculated using these x and y co-ordinates . And if the ratio is below the threshold limit within specified time period. Then drowsiness is detected . After detection of drowsiness alarm rings and the driver is made aware about his drowsiness. Again after ringing of the alarm this process is again repeated by again capturing the frames.

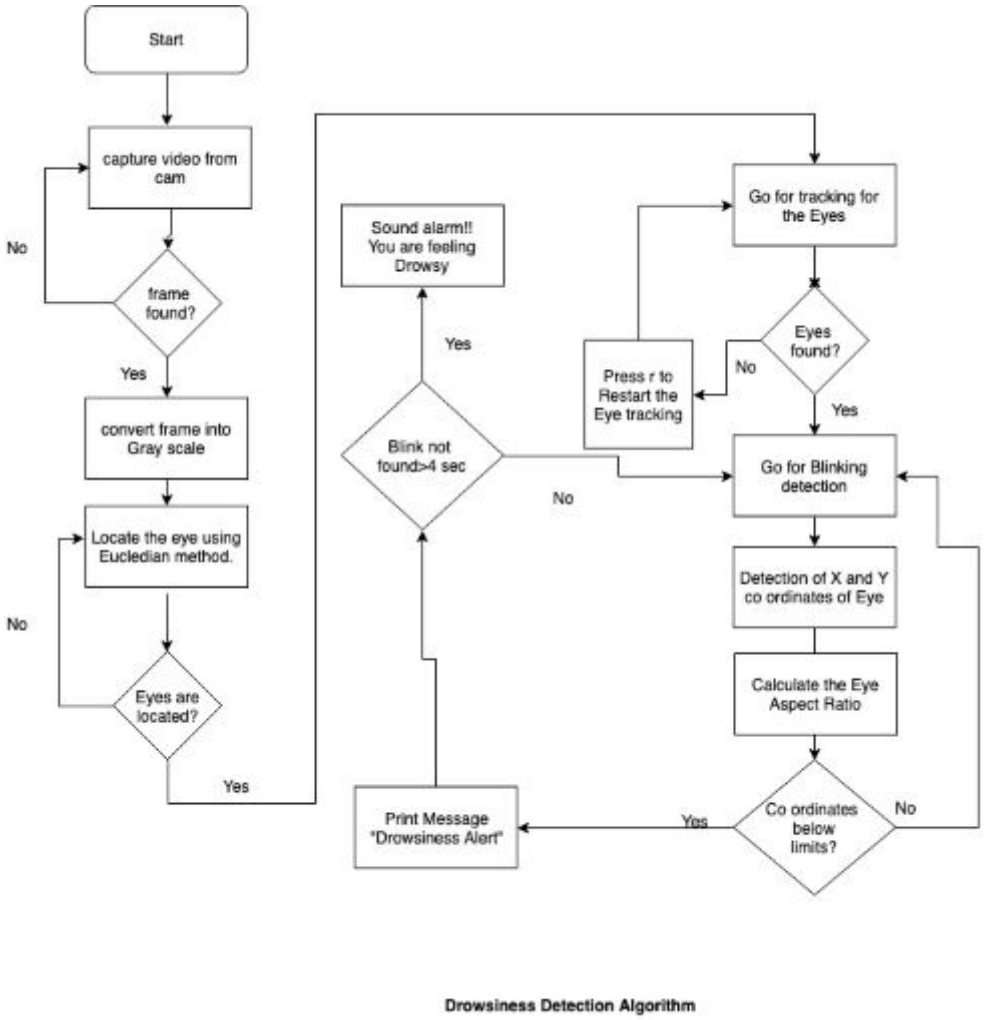

Figure 3.2: Drowsiness Detection Flow Chart

Chapter 4

Results and Discussion

4.1 Result and Analysis

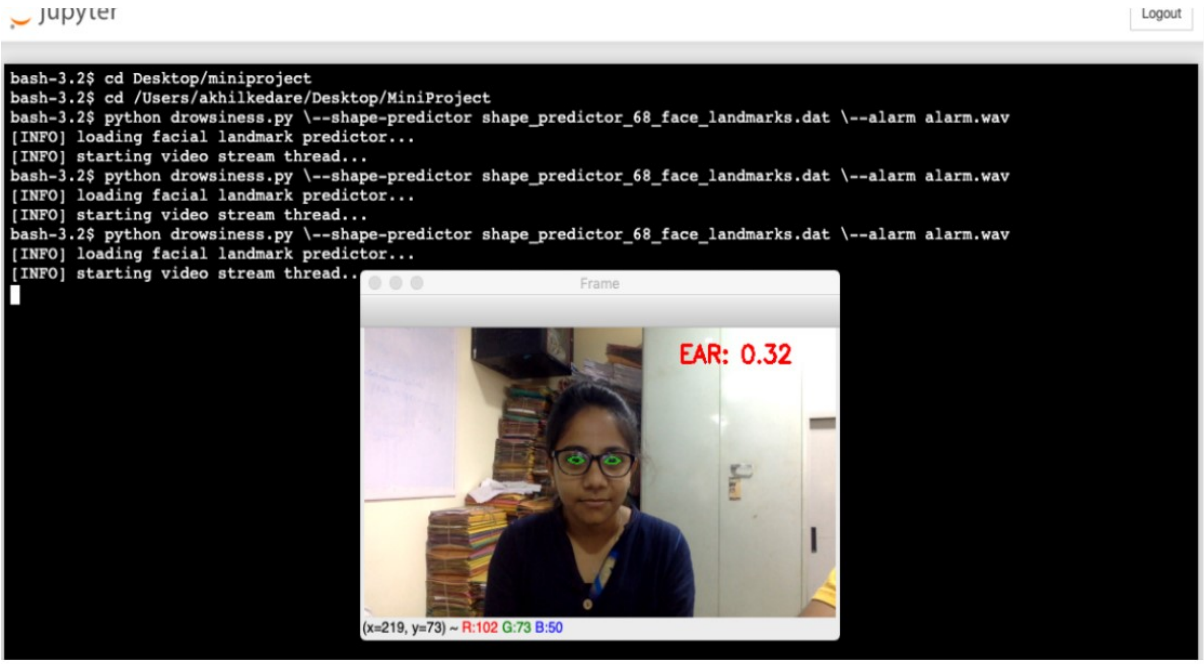

Figure 4.1: Detecting eyes(with spectacles)

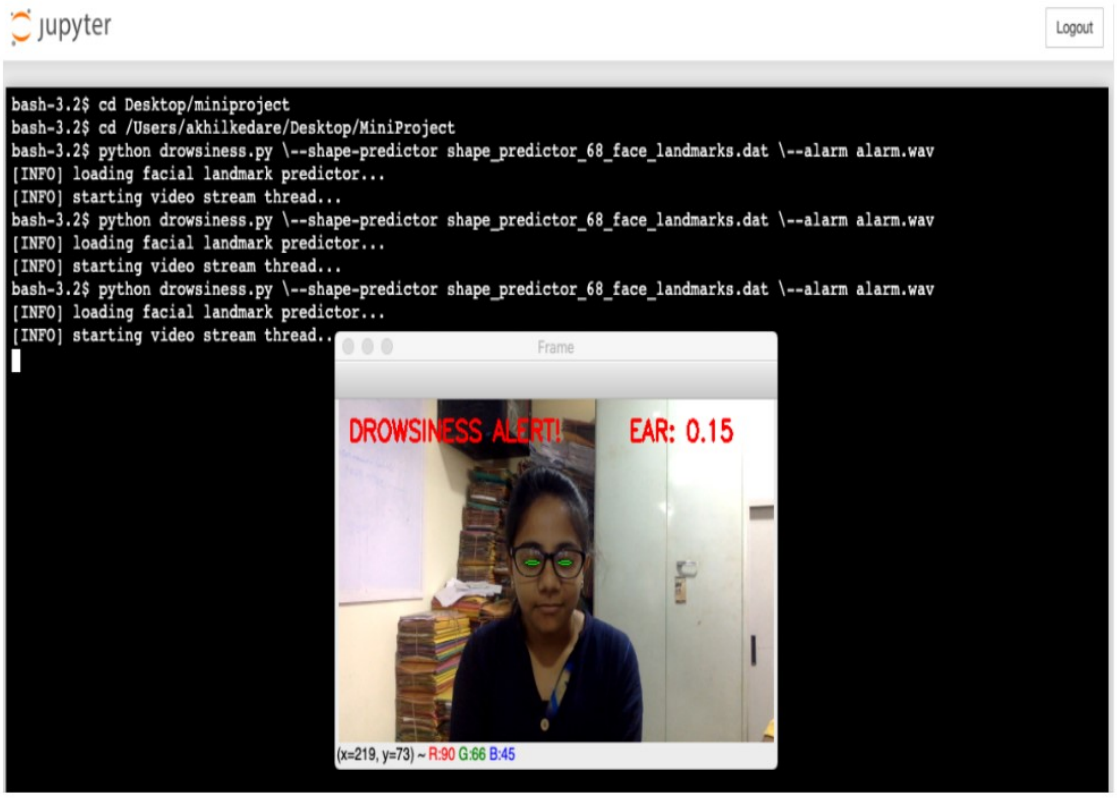

Figure 4.2: Drowsiness detected(with spectacles)

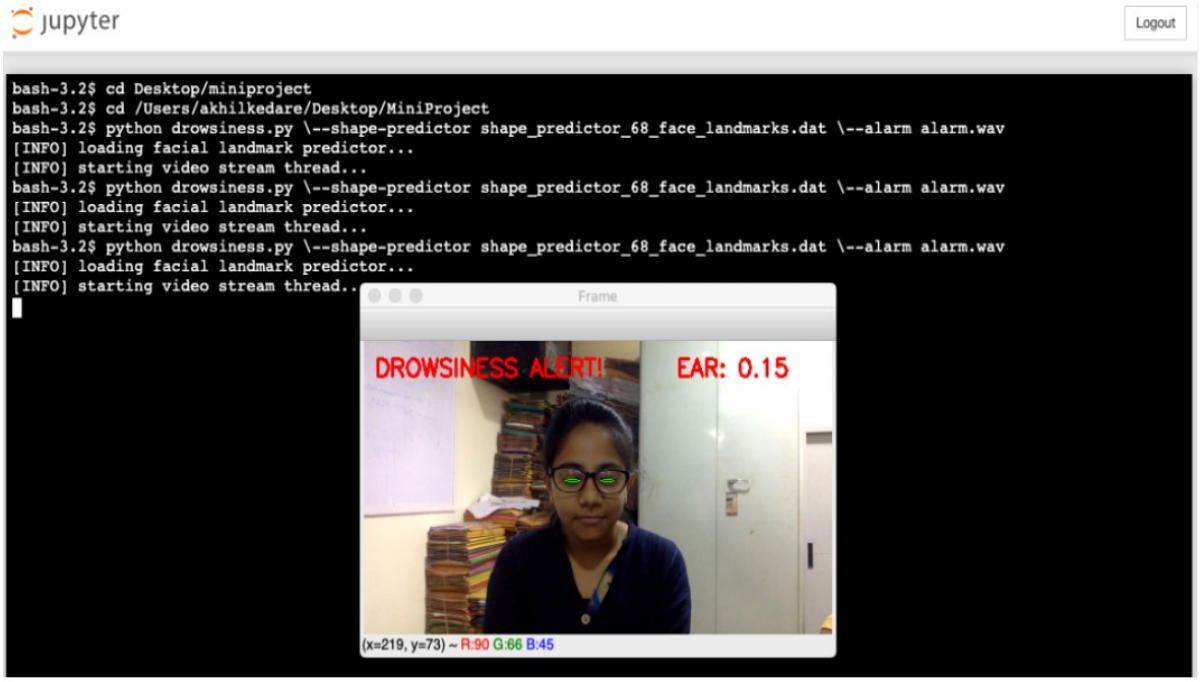

Figure 4.3: Drowsiness alert

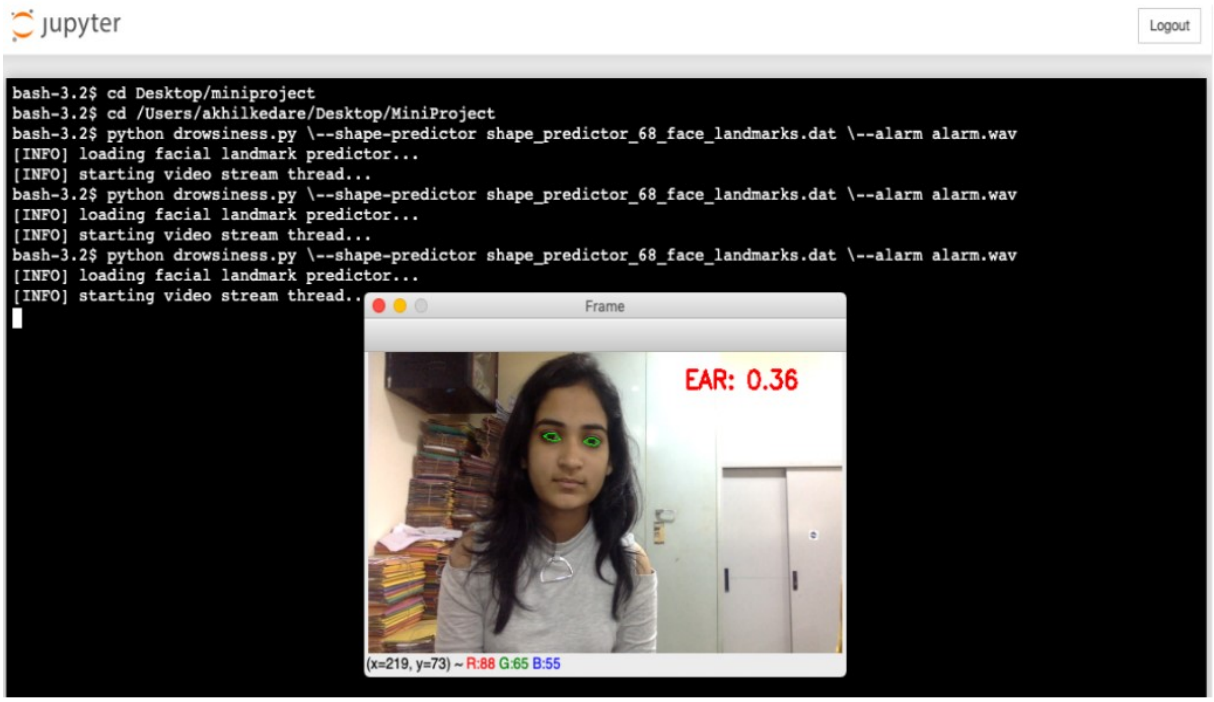

Figure 4.4: Detection of eyes(without spectacles)

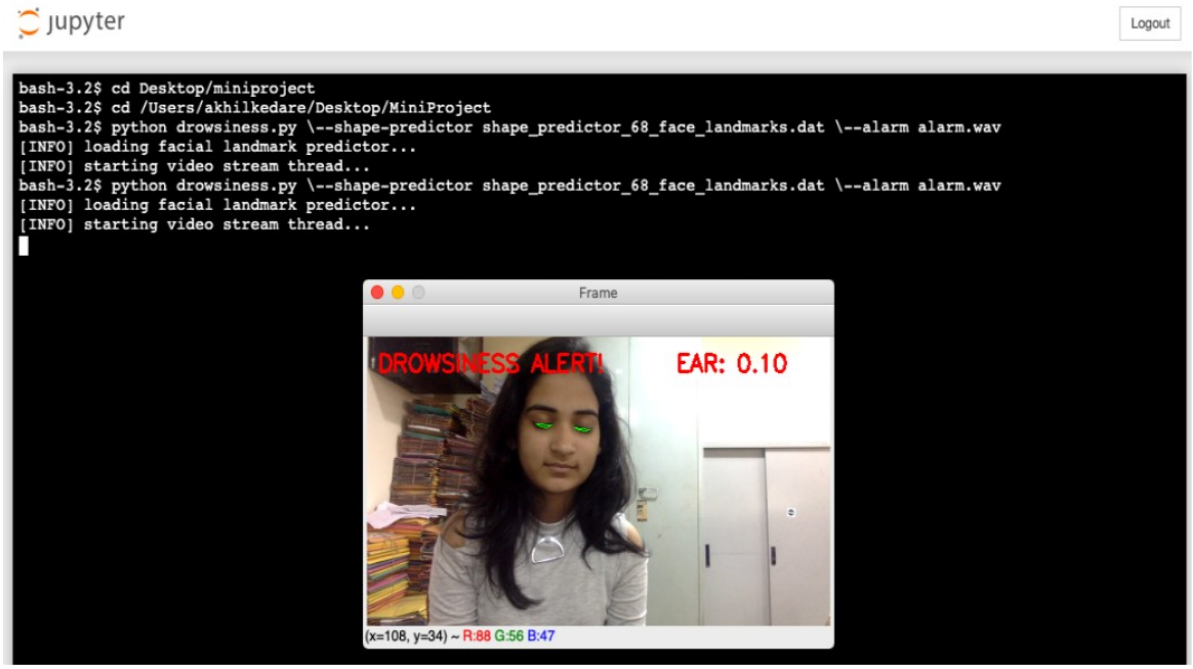

Figure 4.5: Drowsiness detected(without spectacles)

Chapter 5

Conclusion and Future Works

Our system is designed for detecting drowsiness detection for in the real time. The application is implemented in python using OpenCV library in Windows environment with a single camera view. The methods we presented for video surveillance system shows promising results under good lighting conditions. The details about the eye status is obtained through image processing algorithms, which offer a non-invasive approach to detect drowsiness without any annoyance and interference.

The use of OpenCV can help us to implement seatbelt safety detection in this project which will not require any additional hardware or software additionally it can be used for many safety and security models such as unlocking car using face detection etc.Future scope also includes alerting the driver's registered emergency mobile number through text message whenever the system alarm rings.

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Acknowledgments

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