Pune Institute of Computer Technology
Dhankawadi, Pune

A MINI PROJECT REPORT ON DRIVER DROWSINESS DETECTION SYSTEM

SUBMITTED TOWARDS THE PARTIAL FULFILLMENT OF THE REQUIREMENTS OF

THIRD YEAR SEMESTER II OF ENGINEERING
(Computer Engineering)
SUBMITTED BY

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Under the guidance of
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DEPARTMENT OF COMPUTER ENGINEERING
Academic Year 2019-20

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Pune Institute of Computer Technology

Dhankawadi, Pune-43

CERTIFICATE

This is to certify that the Mini-Project report entitled

"DRIVER DROWSINESS DETECTION SYSTEM"

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is a bonafide work carried out by students under the guidance of Dr. A. R. Buchade towards the partial fulfillment of third year Computer Engineering Semester II, Academic Year 2019-20 of Savitribai Phule Pune University.

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Internal Guide

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Place:
Date:

ACKNOWLEDGEMENT

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I also sincerely convey my gratitude to Dr. R. B. Ingle, Department of Computer Engineering for his constant support, providing all the help, motivation and encouragement from beginning till end to make this project a grand success.

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Abstract

With the development of Web 3.0 and M2M communications, there has been a huge shift towards automating the devices. Web of Things and IoT have emerged as a result to provide smart solutions to day to day problems.

One such issue where IoT is being implemented is the automobile sector. IoT sensors can be used to calculate many real time measures of the automobiles. Geo-tracking, speed sensors, security systems, remote controls etc are some applications.

A major issue which causes accidents is driver drowsiness. IoT approach can be used to create smart detection systems to prevent hazards caused by driver drowsiness. We have built a level-1 IoT system for this purpose using Raspberry Pi and OpenCV

Keywords

Raspberry Pi, OpenCV, Drowsiness Detection System, IoT, Yawn Detection

1 INTRODUCTION

With the development of Web 3.0 and M2M communications, development of smart devices has been on the boom. Automobile sector has been an important shareholder in this information and embedded systems revolution. With the development of smart embedded devices for cars to the manufacturing of driverless cars like Tesla, IoT devices have many applications in this sector.

In todays world, drivers are an important part of the economy of a system. From driving cars to airplanes, trucks delivering gasoline or driving personally, safety of the driver is an important issue. Given the amount of traffic increasing day by day, it becomes even more crucial to adhere to the safety of the drivers. Usually during long journeys or when one is tired, one may tend to fall asleep. This is a major cause many road accidents. So it is essential to create a system that alerts the drivers when they are about to fall asleep.

The proposed driver drowsiness and yawn detection system is one such solution to partially solve the issue and make the system smart. Using machine learning and OpenCV, video analysis can be done to note the eye and mouth readings.

Threshold levels are set and beep alerts are sent to the driver when he closes his eyes or yawns. This system also sends email alerts and daily report logs. Raspberry Pi is used with camera modules for the working project.

2 MOTIVATION

In our country there are a lot of accidents happening on the road due the miscalculations and faults of drivers. In a country where public transports is in the heart of the economy, safety cant be compromised. Thus this mini project is an attempt to embed IoT devices into automobiles and use them to warn the drivers for drowsiness and yawns.

3 PROBLEM DEFINITION AND SCOPE

3.1 Problem Definition

To develop an effective system to send alerts to drivers for yawn and drowsiness using OpenCV and RaspberryPi

3.2 Scope

The project model can be used in personal vehicles or commercial transportation automobiles for the safety purpose. System can be customized to specific alert messages and alarms as needed.

4 SYSTEM DESIGN

4.1 Working of System

- Start the tkinter app on machine/ mobile.
- User registration and login
- Start recording the driver using webcam/ camera module.
- Alarm on yawn or drowsiness detection OpenCV image processing.
- Save the data to SQLite Database.
- Send email for specified date.

Figure 1: Raspberry Pi 3

5 MODULE INFORMATION

5.1 Components-

- Raspberry Pi- Raspbian OS
- Python App - tkinter
- Camera Module / Web cam.
- SQLite Database for local analysis.
- Report generation in app.
- Email facility to report based on date.
- Login and registration.

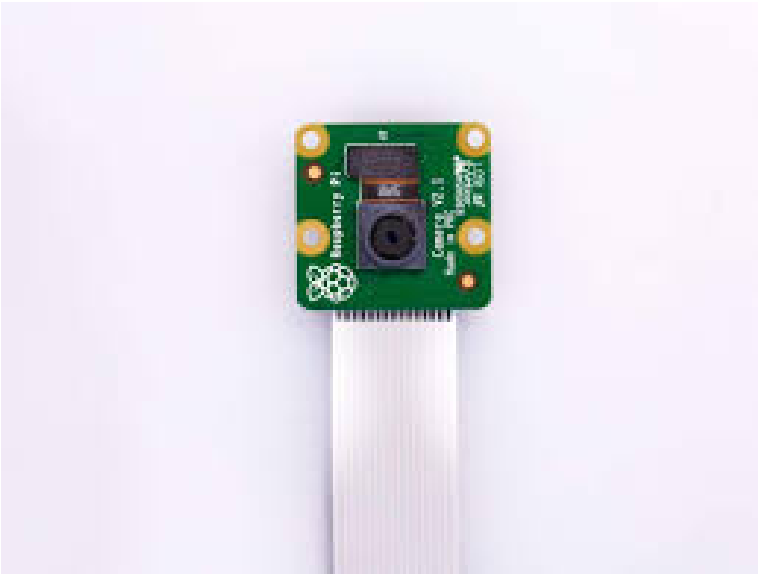

Figure 2: Camera Module

6 IOT DESIGN METHODOLOGY STEPS

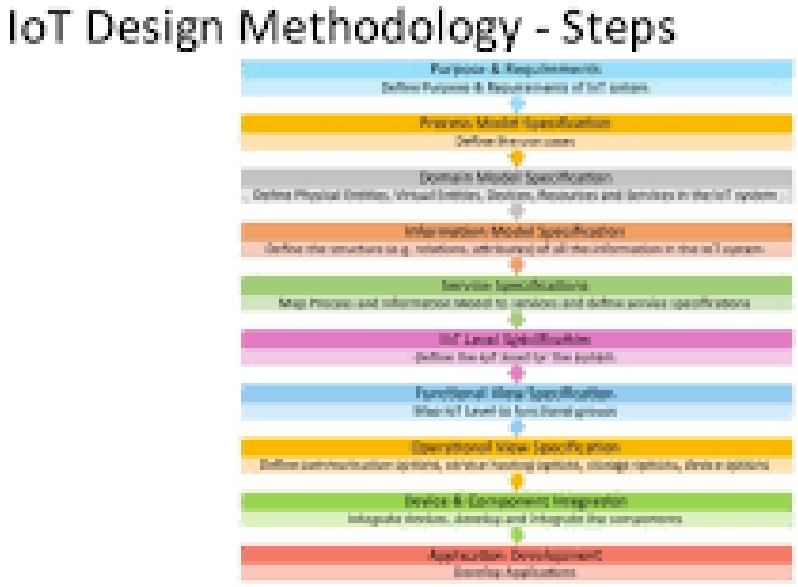

Figure 3: IoT Design Steps

6.1 Step 1: Purpose and Requirement Specification

- To send alerts to drivers for drowsiness and yawn.
- Automatic behavior detection using video processing.
- Send alerts and detailed reports.
- Local data storage and analysis.
- Local python application with authentication feature.

6.2 Step 2: Process Specification

Use case-

- If eyelid distance less than threshold, send drowsiness alert.
- If mouth is wide open than threshold, send yawn alert.

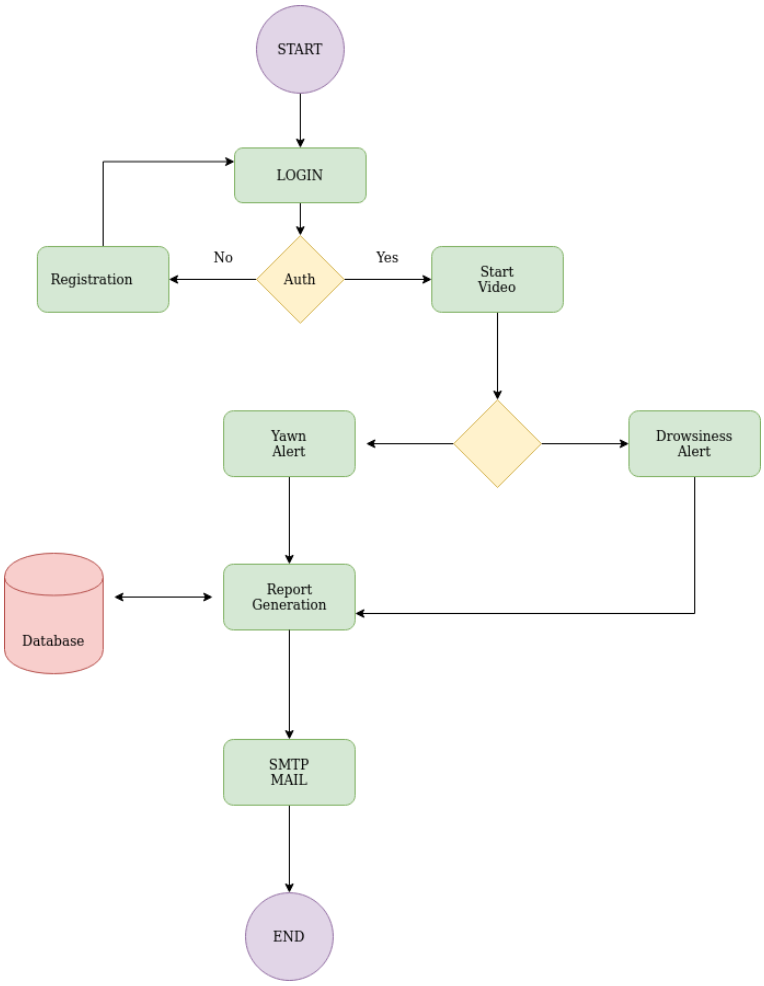

Figure 4: Process Specification

6.3 Step 3: Domain Model Specification

- Physical entity- Driver, Car, Detection System
- Virtual entity- Capture of real time video.
- Device- Raspberry Pi, Camera module, phone/PC.
- Resource- Python libraries, OpenCV .
- Service- Python app for interaction, SMTP mailing service, local information storage.

6.4 Step 4: Information Model Specification

Structure /attributes

- Physical entity- Driver, Car, Detection System
- Virtual entity- Capture of real time video.
- Device- Raspberry Pi, Camera module, phone/PC.
- Resource- Python libraries, OpenCV .
- Service- Python app for interaction, smtp mailing service, local information storage.

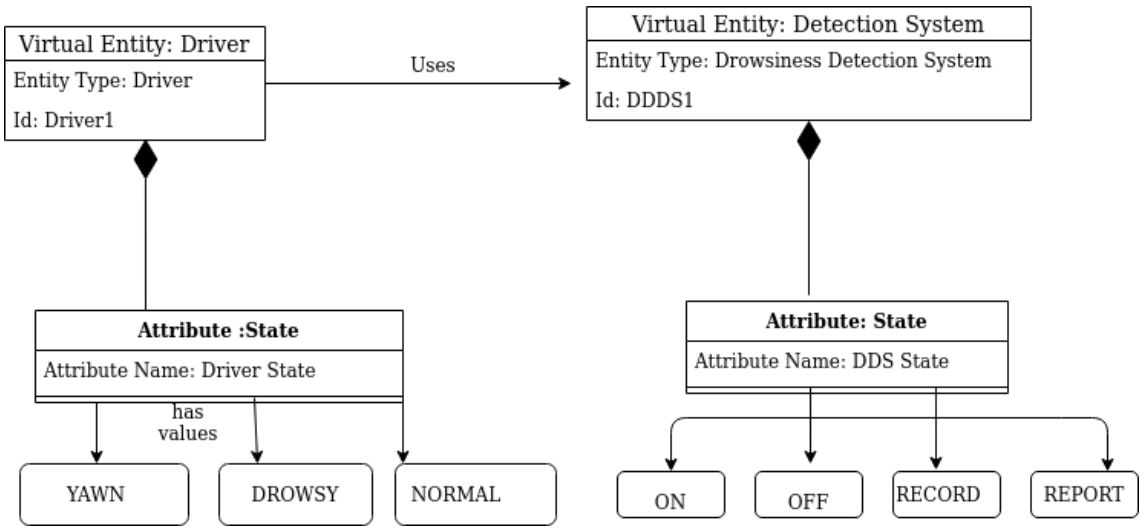

Figure 5: Information model

6.5 Step 5: Service Specification

- The camera module is used to record real time video of driver and analyse for drowsiness.
- Alert if eyes are closed or yawns.
- Mail service based on user input of date.

6.6 Step 6: IoT Level Specification

IoT Level 1 deployment.

- Local storage and analysis of date- SQLite
- Local application for control- tkinter python app.
- Single device node and controller.
- Remote access to RaspberryPi using phone/PC over WiFi

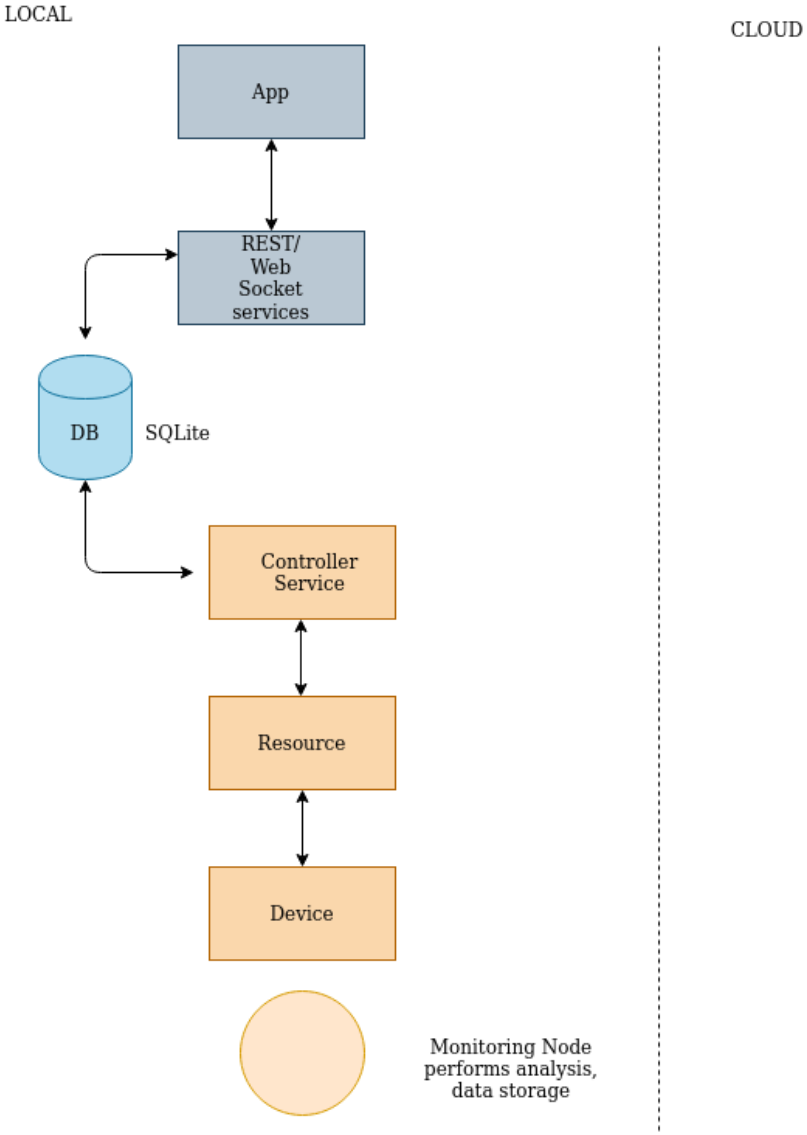

Figure 6: IoT Level 1

6.7 Step 7: Functional View Specification

- Driver starts the app.
- New user registration or login authentication.
- Start the video capturing through app and camera module.
- Send email based on date provided by user.
- Report generation using local data analysis from SQLite.

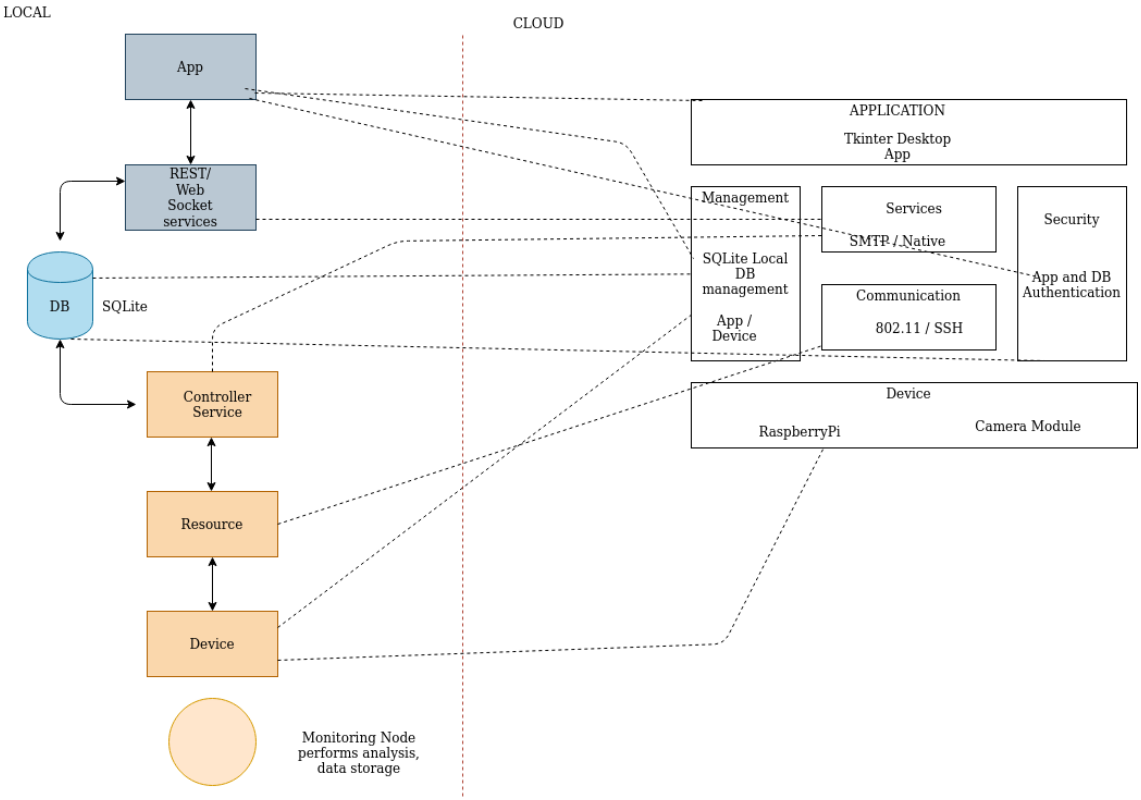

Figure 7: Functional View

6.8 Step 8: Operational View Specification

- App deployment using Python tkinter.
- Database - SQLite local storage.
- SMTP mailing servie.
- User authorization and registration.
- 802.11 WiFi and SSH to control device remotely from phone or PC.

6.9 Step 9: Device and Component Integration

- The camera module is used to record real time video of driver and analyse for drowsiness.
- Alert if eyes are closed or yawns.
- Mail service based on user input of date.

Figure 8: Device

6.10 Step 10: App development

IoT Level 1 deployment.

- Local storage and analysis of date- SQLite
- Local application for control- tkinter python app.
- Single device node and controller.

- Remote access to Raspberry Pi using phone/PC over WiFi

Figure 9: Tkinter App

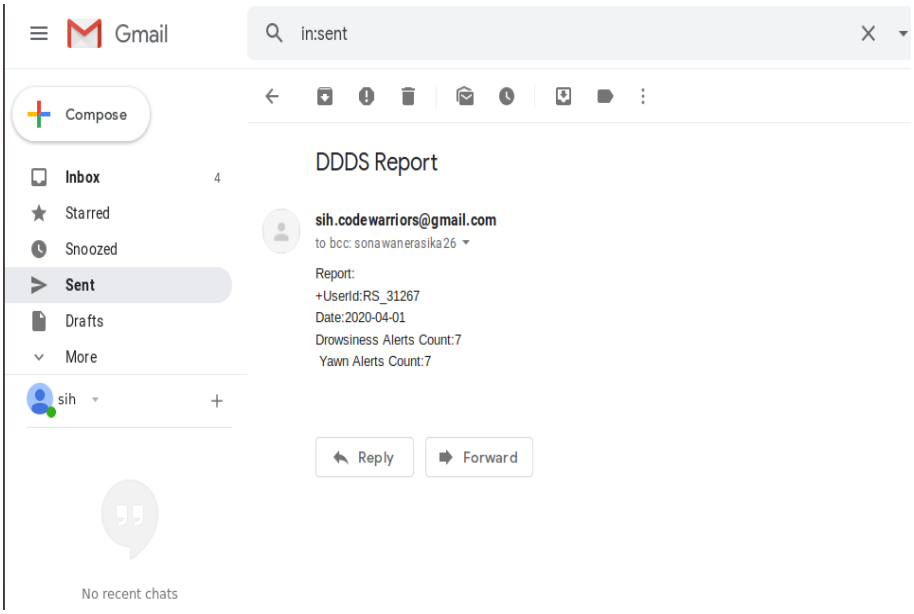

Figure 10: Report Generation

7 CIRCUIT DIAGRAM

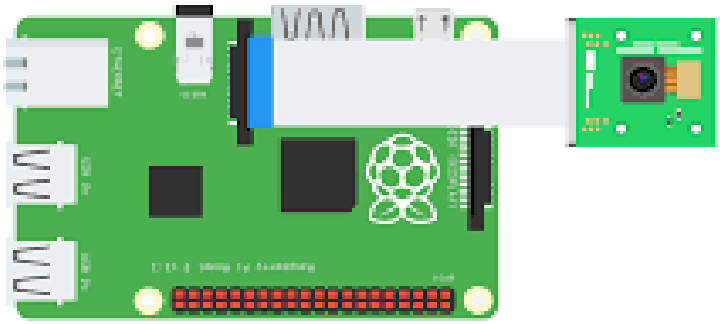

Figure 11: Ckt

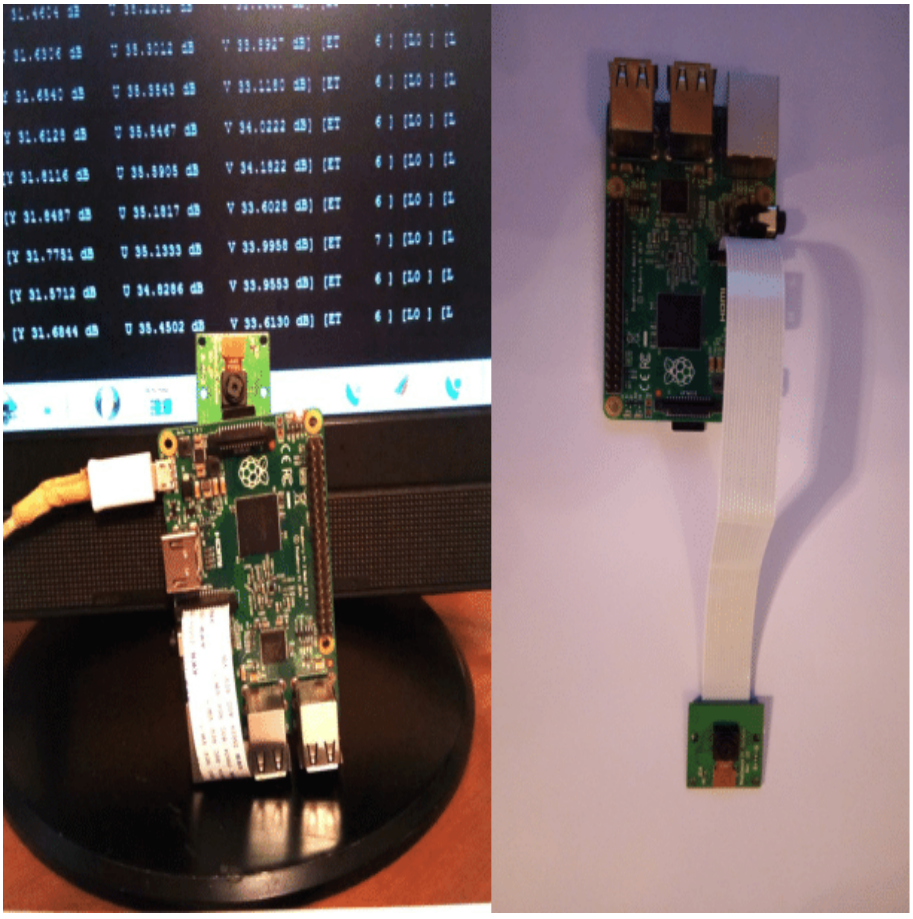

Figure 12: Working

8 CONCLUSION

8.1 Conclusion

Implemented the driver drowsiness detection system using RaspberryPi and camera module. OpenCV was used to analyse videos and python app to send messages.

8.2 Future Scope

Can be integrated with speed, lane change detection modules to make a wholesome automobile smart device integration. Basic framework can be used to monitor drowsiness during meetings,classes etc.

9 References

References

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[2] OpenCV documentations. *https://opencv.org/*

[3] Tkinter documentation. *https://docs.python.org/2/library/tkinter.html*

[4] Driver Drowsiness Detection System using OpenCV-PyImage *https://www.pyimagesearch.com/2017/05/08/drowsiness-detection-opencv/*

10 SCREENSHOTS

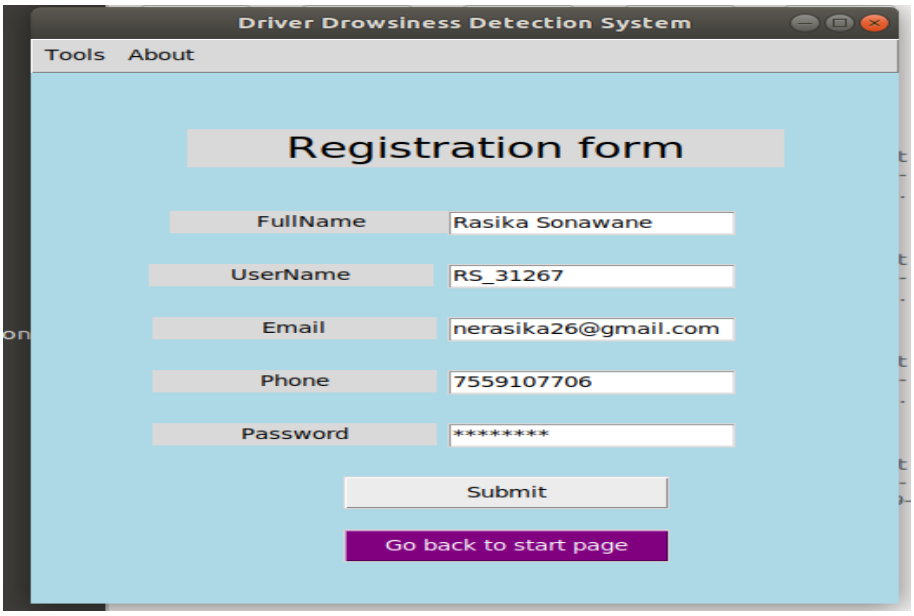

Figure 13: Registration

Figure 14: Authenticated Login

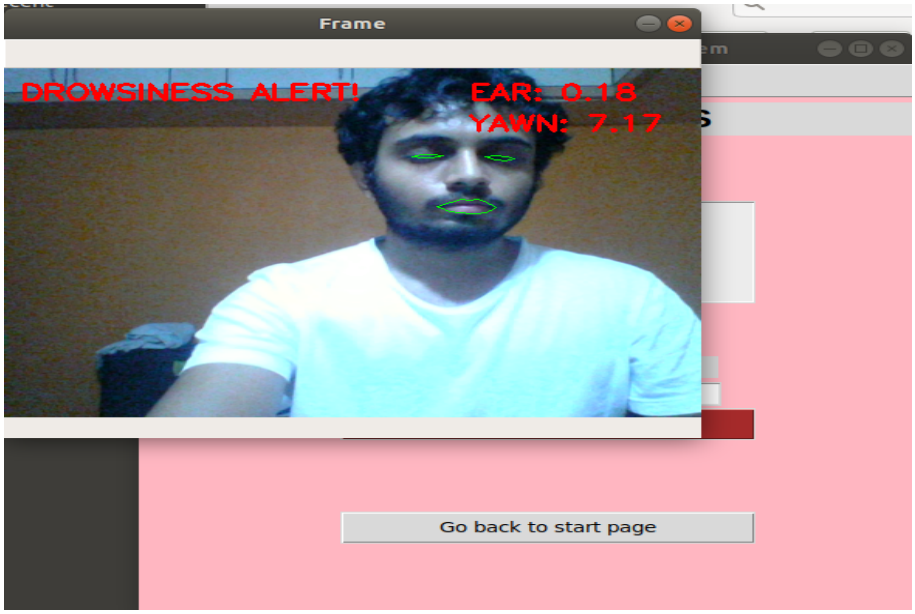

Figure 15: Alert

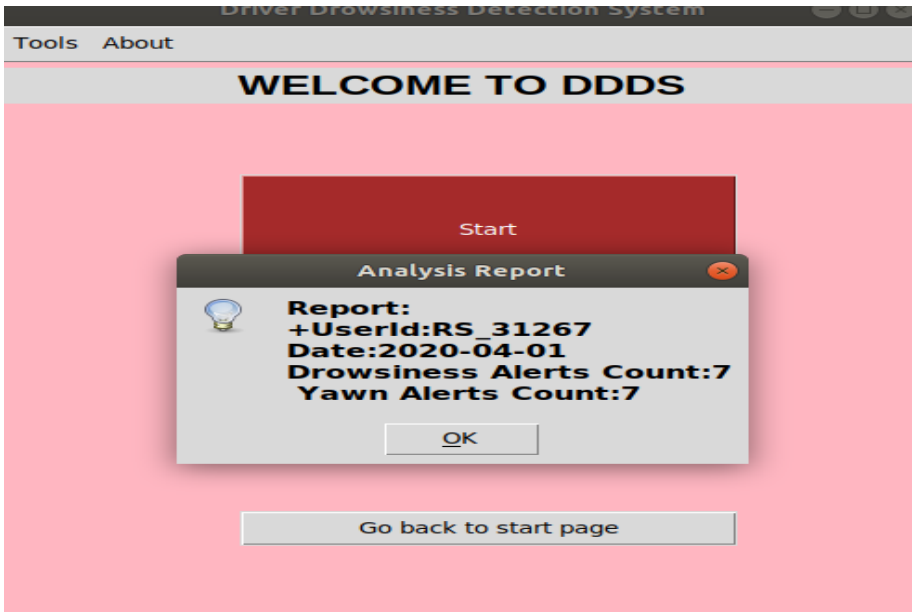

Figure 16: Report Mailed

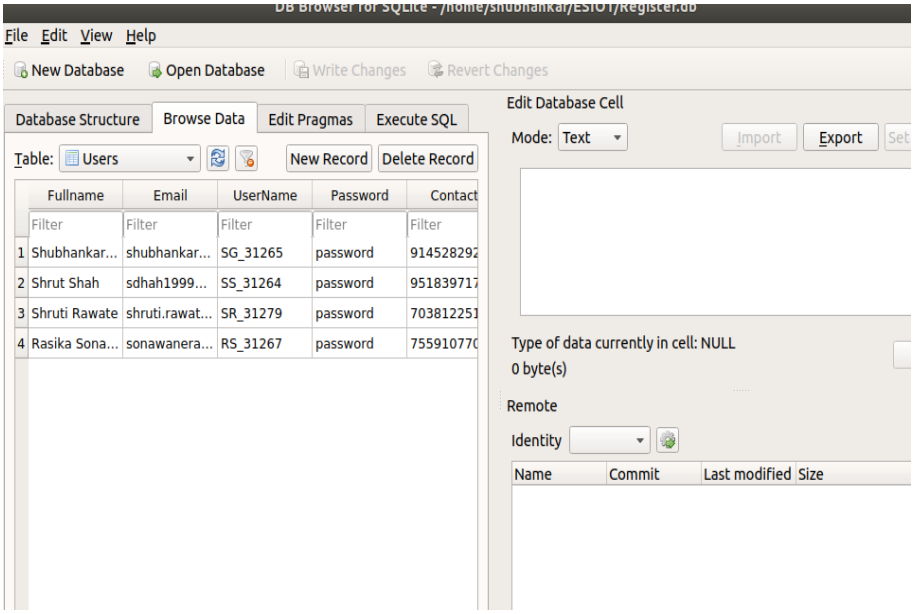

Figure 17: Local storage and analysis

11 CODE

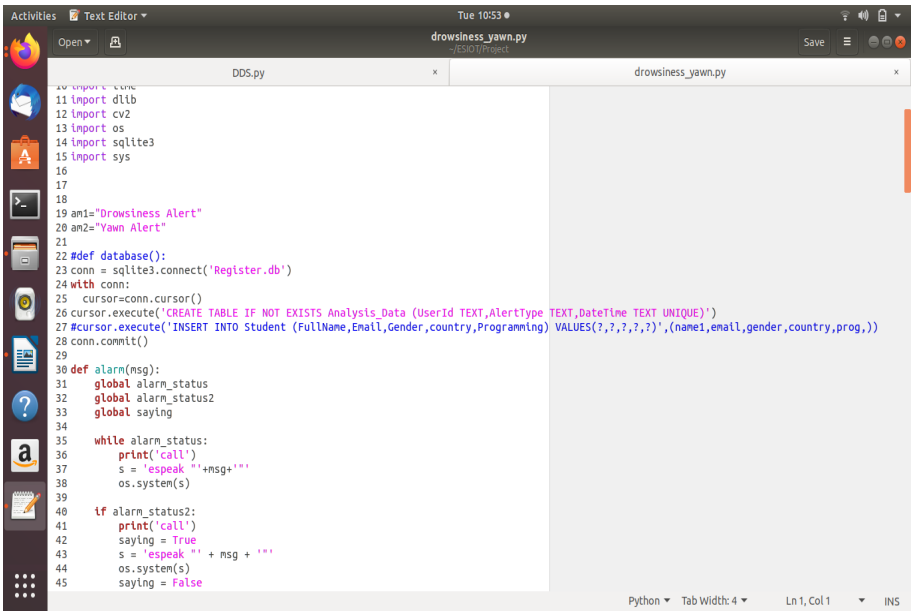

Figure 18: Code snap 1

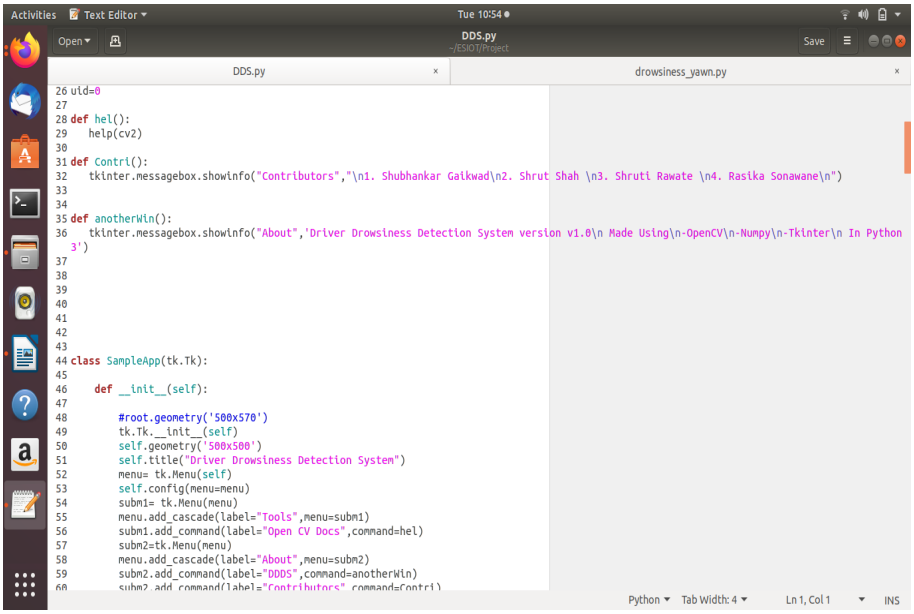

Figure 19: Code snap 2