Department of Information Technology

A.P. Shah Institute of Technology

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UNIVERSITY OF MUMBAI

Academic Year 2019-2020

A Project Report on

DRIVER DROWSINESS AND ALERT SYSTEM

Submitted in partial fulfillment of the degree of
Bachelor of Engineering(Sem-7)
in
INFORMATION TECHNOLOGY
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Under the Guidance of
Prof.Anagha Aher

1.Project Conception and Initiation

1.1 Abstract

Drowsy driving is one of the major cause for road accidents. Hence, detection of drivers fatigue and its indication is an active research area. Therefore, in this study, a low cost ,real time drivers drowsiness detection system is developed with acceptable accuracy. In the developed system, a front camera of drivers cell phone records the video and drivers face is detected. For this, eyes, nose and mouth are detected to improve the area of interest using Google Vision API. For creating an app android studio alternative b4a is used. When the drowsiness is detected, then the driver is alerted by audio.

1.2 Objectives

- It can be used for the safety of driver while driving which reduces accidents and detects drowsiness of the driver.
- To generate alerts to the driver by playing loud music.
- To enhance the safety of the driver.
- To monitor driver fatigue and alert him\her when drowsiness situation is detected.
- To capture the frames from video and detect drowsiness.

1.3 Literature Review

Sr. No.	Title and Author of the paper	Advantages	Drawbacks
1	Driver Drowsiness Monitoring System using Visual Behavior and Machine Learning Authors- Ashish Kumar, Rusha Patra	Using facial points, drowsiness is detected. It uses HOG algorithm. Machine Learning is used which gives more accuracy.	Uses webcam which requires high level image processing to focus the visuals.
2	An Accurate ECG Based Transportation Safety Drowsiness Detection Scheme Authors- Kwok Tai Chui, Kim Fung Tsang, Hao Ran Chi, Bingo Wing Kuen Ling, and Chung Kit Wu	HOG(Histogram of oriented gradient) algorithm is used. Sensors are used for detection.	The required computational power of the system is low enough for the real time application.

1.3 Literature Review

Sr. No.	Title and Author of the paper	Advantages	Drawbacks
3	Eye Gaze Tracking Based Driver Monitoring System Authors: Annu George Mavel, J.E Judith, Sahal P, Steffy Ann Kuruvilla	Face And Eye Detection is done. Along with audio, steering vibration warning is also given to the driver	This project uses Raspberry Pie which needs more power supply and uses sensors which increases the cost of the product.
4	A Multimodal System for Assessing Alertness Levels due to Cognitive Loading Authors: Anwesha Sengupta , Anirban Dasgupta, Aritra Chaudhari	Low Cost.	Use Sensors for detecting drowsiness

1.4 Problem Definition

- The main purpose of this project is to develop an application for drowsiness of the driver.
- Nowadays more accident occurs in vehicles due to drowsiness. That's why this system is proposed for reducing accidents.
- We are implementing a system where the app will capture the video of driver's face on basis of image processing techniques. After drowsiness detection alerts will be send to the driver.
- Instead of using hardware components like webcam, we will be implementing on mobile app.

1.6 Technology stack

- Google Vision API

    It allows developers to easily integrate vision detection features within applications, including image labelling, face and landmark detection.

- B4A

    Alternative of Android Studio. It describes as Rapid development tool. Used for application development.

1.7 Benefits for environment & Society

- Helps to avoid crashes caused by fatigue by drivers to take a break in time.
- Warns the driver of drowsiness and sends alert.
- To ensure the safety of the driver.

Gantt Chart & Project Timeline Chart

WBS NUMBER	TASK TITLE	TASK OWNER	START DATE	DUE DATE	DURATION (Wee k)	PCT OF TASK COMPLETE
1	**Project Conception and Initiation**					
1.1	Research paper search	Saylee,Riya,Yashashree	7-10-19	7-26-19	3	100%
1.1.1	Research paper finalization	Saylee,Riya	7-10-19	7-26-19	3	100%
1.2	Project Title	Saylee,Riya,Yashashree	7-10-19	7-26-19	3	100%
1.3	Abstract	Riya	8-23-19	8-30-19	1	100%
1.4	Objectives	Saylee	8-23-19	8-30-19	1	100%
1.5	Literature Review	Riya	8-23-19	8-30-19	1	100%
1.6	Problem Definition	Saylee,Yashashree	3-23-18	8-30-19	1	100%
1.7	Scope	Yashashree	8-23-19	8-30-19	1	100%
1.8	Technology stack	Saylee,Riya,Yashashree	8-23-19	8-30-19	1	100%
1.9	Benefits for environment	Riya	8-23-19	8-30-19	1	100%
1.1	Benefits for society	Yashashree	8-23-19	8-30-19	1	100%
1.11	Applications	Saylee	8-23-19	8-30-19	1	100%
2	**Project Design**					
2.1	Proposed System	Saylee,Riya,Yashashree	9-19-19	9-27-19	1	100%
2.2	Design(Flow Of Modules)	Riya	9-19-19	9-27-19	1	100%
2.3	Activity Diagram	saylee	9-19-19	9-27-19	1	100%
2.4	Use Case Diagram	Yashashree	9-19-19	9-27-19	1	100%
2.5	Description Of Use Case	Yashashree	9-19-19	9-27-19	1	100%
2.6	Modules	Saylee,Riya,Yashashree	9-19-19	9-27-19	1	100%
2.6.1	Module-1	Saylee,Riya	9-19-19	9-27-19	1	100%
2.6.2	Module-2	Yashashree	9-19-19	9-27-19	1	100%
2.6.3	Module-3	Riya,Yashashree	9-19-19	9-27-19	1	100%
2.6.4	Module-4	Saylee,Riya,Yashashree	9-19-19	9-27-19	1	100%
2.7	Preparation Of Report	Saylee,Riya,Yashashree	9-19-19	9-27-19	1	100%
3	**Project Implementation**					
3.1	Module-1	Saylee,Riya,Yashashre	10-18-19	11-24-19	6	100%
3.2	Module-2	Saylee,Riya,Yashashree	8-6-19	10-15-19	4	100%
3.3	Module-3	Saylee,Riya,Yashashree	12-20-19	3-20-20	4	100%
3.4	Module-4	Saylee,Riya,Yashashree	1-6-20	2-24-20	4	100%
4	**Results and Analysis**					
4.1	Analysis Of Results	Saylee,Yashashree	4-25-20	4-30-20	2	100%
4.2	Graphical Representation	Saylee,Yashashree	5-4-20	5-6-20	2	100%
4.3	Report Preparation	Saylee,Riya,Yashashree	10-5-20	5-15-20	1	100%

Timeline headers:

PHASE ONE — WEEK 1, WEEK 2, WEEK 3
PHASE TWO — WEEK 4, WEEK 5, WEEK 6
PHASE THREE — WEEK 7, WEEK 8, WEEK 9
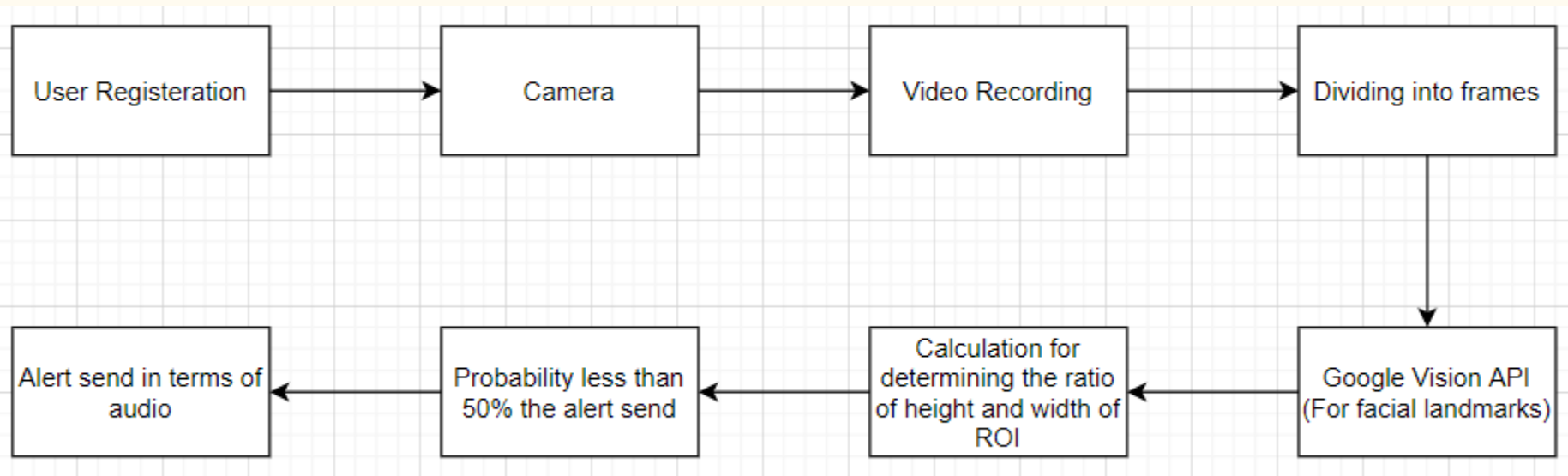PHASE FOUR — WEEK 10, WEEK 11, WEEK 12
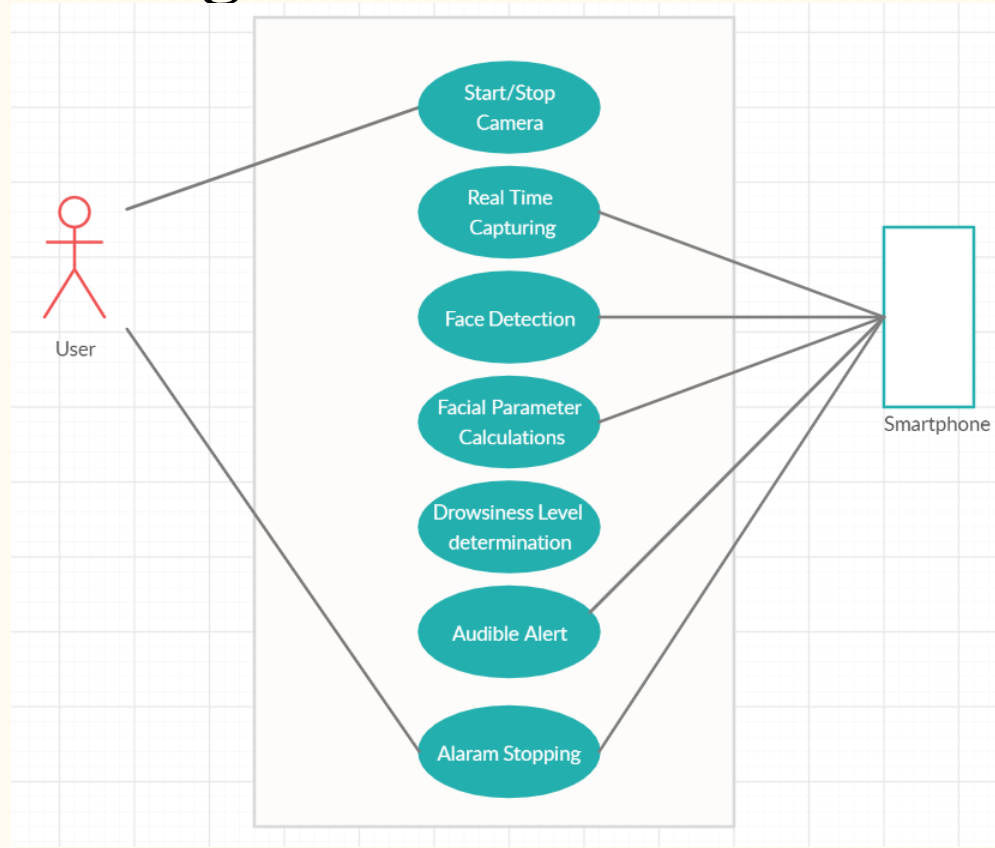
(Days: M T W R F)

2. Project Design

2.1 Proposed System

- In this we have proposed a mobile application for detection of driver's drowsiness. When the application starts, it asks for camera permissions.
- Video recording starts, it is done in frames.
- These frames are extracted using google vision api features.
- The region of Interest(like-eye, mouth, nose) is extracted and calculation is done for determining the ratio of height and width of the region.
- The probability of region of interest is calculated.
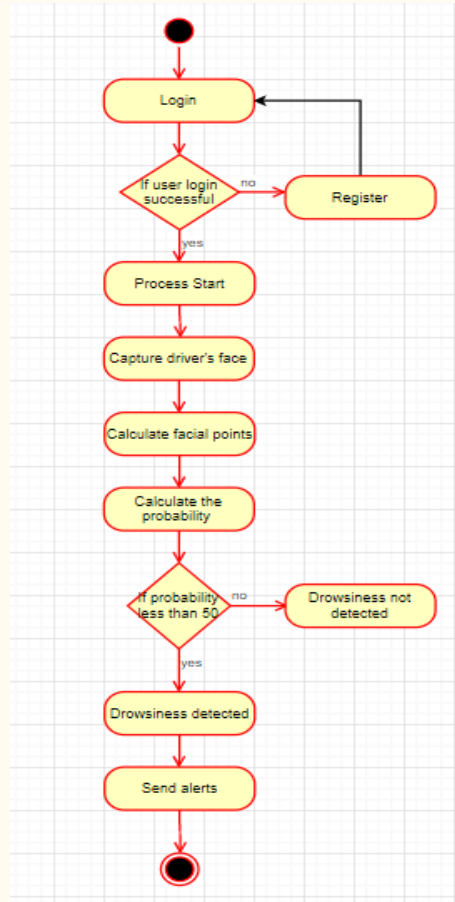- If the probability is less than 50% then alert is send.

2.2 Design(Flow Of Modules)

```
┌──────────────────┐     ┌──────────────────┐     ┌──────────────────┐     ┌──────────────────┐
│                  │     │                  │     │                  │     │                  │
│ User Registeration│ ──→ │     Camera       │ ──→ │ Video Recording  │ ──→ │ Dividing into frames│
│                  │     │                  │     │                  │     │                  │
└──────────────────┘     └──────────────────┘     └──────────────────┘     └──────────────────┘
                                                                                    │
                                                                                    ▼
┌──────────────────┐     ┌──────────────────┐     ┌──────────────────┐     ┌──────────────────┐
│ Alert send in terms of│ ← │ Probability less than│ ← │ Calculation for  │ ← │ Google Vision API│
│      audio       │     │ 50% the alert send│     │ determining the ratio│     │(For facial landmarks)│
│                  │     │                  │     │ of height and width of│     │                  │
│                  │     │                  │     │       ROI        │     │                  │
└──────────────────┘     └──────────────────┘     └──────────────────┘     └──────────────────┘
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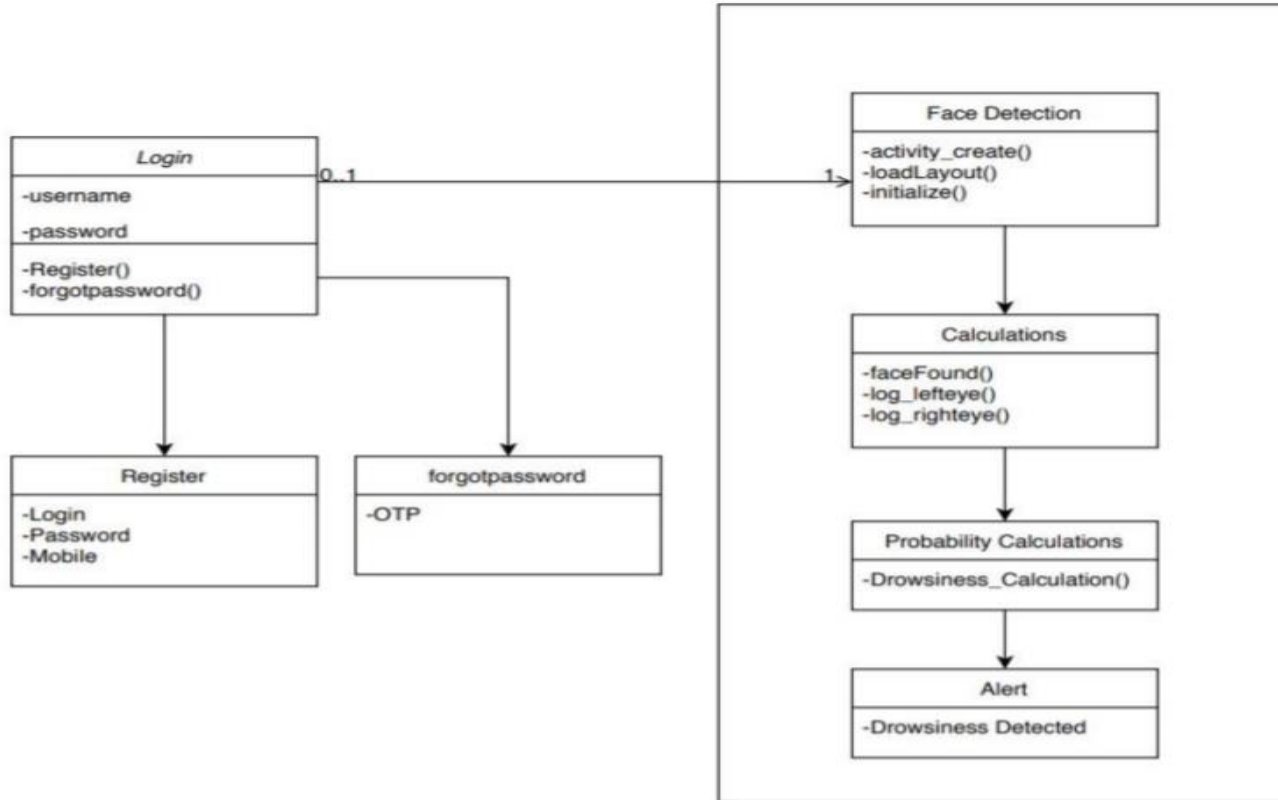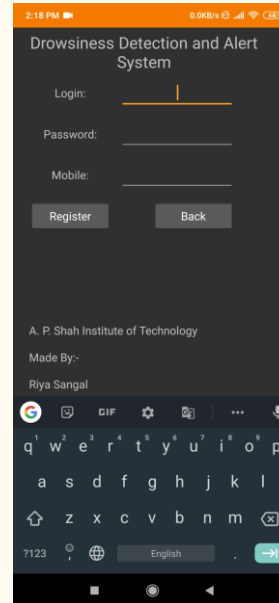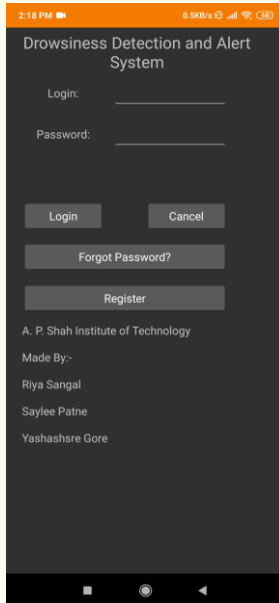
# 2.3 Use Case Diagram

2.4 Activity Diagram

2.4 Class Diagram

2.5 Module-1: Registration of User

● The first thing after opening the app is, user must login to its account. If user is new then he/she should register first.
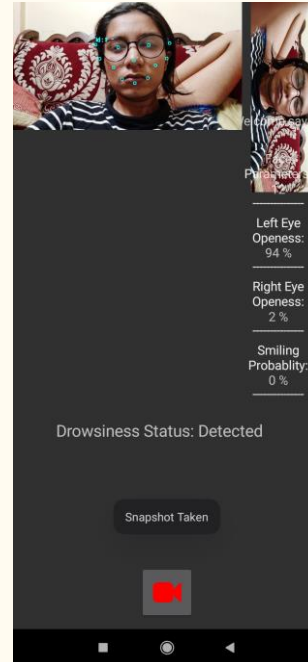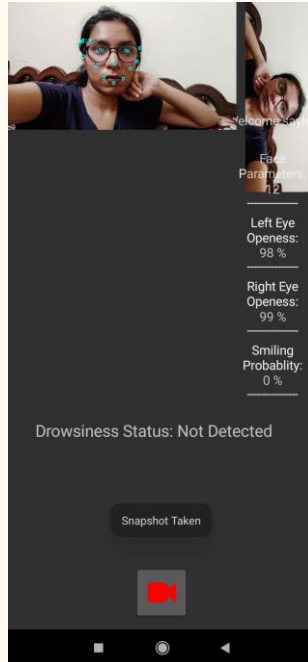
Module-2: Google Vision API

- It has libraries to easily integrate vision detection features within applications, including image labelling, face and landmark detection.
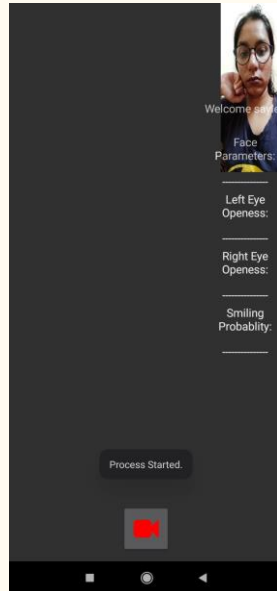
Module-3: Drowsiness detection

- Alert send when drowsiness is detected or else not.

3.Future Scope

Future Scope

- Using Pressure sensor on the steering alarm, Automatic braking System can be set in case of drowsiness.
- By using wireless Technology if the driver gets drowsy an alert message can be sent to a selected person's mobile by using GSM module along with the alarm in vehicle.
- Development of a hybrid microcontroller for a vehicle which also consists of a alcohol detector which will sense is the driver is drunk and would not start the vehicle.

Conclusion

- We have proposed a mobile app which will be helpful in drowsiness detection.
- The app captures the video of drivers face in frames and Google Vision API will be applied on these frames.
- No use of sensors
- Application will be free of cost , hence cost is very much effective.
- When the frames are captured and calculation is done on the region of interest (eg. eyes) to determine the ratio of height and width of the region and on that basis detection is done and if the probability is less than 50% then alerts are sent.

References

- Ashish Kumar and Rusha Patra, "Driver Drowsiness Monitoring System using Visual Behaviour and Machine Learning", IEEE, 2018
- Annu George Mavely, J.E Judith, Sahal P A, Steffy Ann Kuruvilla, "Eye Gaze Tracking Based Driver Monitoring System", IEEE, 2017
- Kwok Tai Chui, Kim Fung Tsang, Hao Ran Chi,Bingo Wing Kuen Ling, and Chung Kit Wu, "An Accurate ECG Based Transportation Safety Drowsiness Detection Scheme", IEEE, 2016
- Anwesha Sengupta, Anirban Dasgupta, Aritra Chaudhuri, Anjith George, Member, IEEE, Aurobinda Routray, Rajlakshmi Guha, A Multimodal System for Assessing Alertness Levels due to Cognitive Loading, IEEE 2016

Thank You