GUJARAT TECHNOLOGICAL UNIVERSITY

Chandkheda, Ahmedabad
Affiliated

NEW LJ INSTITUTE OF ENGINEERING AND TECHNOLOGY

A
Project Report
On

Detection of Drowsiness in Drivers

Under subject of
DESIGN ENGINEERING – 2B
B.E, Semester – VI
CSE (AI/ML)

Submitted by,

Group: 11

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Academic Year
(2022-2023)

CERTIFICATE

This is to certify that project work embodied in this report entitled "**Detection of Drowsiness in Drivers**" was carried out by below mentioned students at department of CSE (AIML) , NEW L J Institute of Engineering and Technology, Ahmedabad for partial fulfillment of the subject design engineering 2B. This project work has been carried out under my supervision and is to the satisfaction of department.

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INTERNAL GUIDE SIGN   **HOD SIGN**   **COLLEGE SEAL**

<u>ACKNOWLEDGEMENT</u>

I cannot express enough thanks to my support members for their continued support and encouragement: **Ms. Gayatri Pandi** (HOD), **Prof. Prakruti Parmar** (Guide). I offer my sincere appreciation for the learning opportunities to my support members.

The completion of this project could not have been accomplished without the support of the team members. A special thanks goes to my team members they help me to assemble the parts and gave suggestion about the project.

Besides, we would like to thank all the teachers who helped us by giving us advice and providing the material required. I would like to thank my family and friends for their support. Without that support we couldn't have succeeded in completing this project. At the end, we would like to thank everyone who helped and motivated us to work on this project.

ABSTRACT

The major aim of this project is to develop a drowsiness detection system by monitoring the eyes; it is believed that the symptoms of driver fatigue can be detected early enough to avoid a car accident. In such a case when drowsiness is detected, a warning signal is issued to alert the driver.

This detection system provides a noncontact technique for judging different levels of driver alertness and facilitates early detection of a decline in alertness during driving. In such a case when fatigue is detected, a warning signal is issued to alert the driver. The system also has additional feature of slowing down the vehicle if driver fails to respond to the alarm and ultimately stops the vehicle.

LIST OF FIGURES

LIST OF ABBREVIATIONS

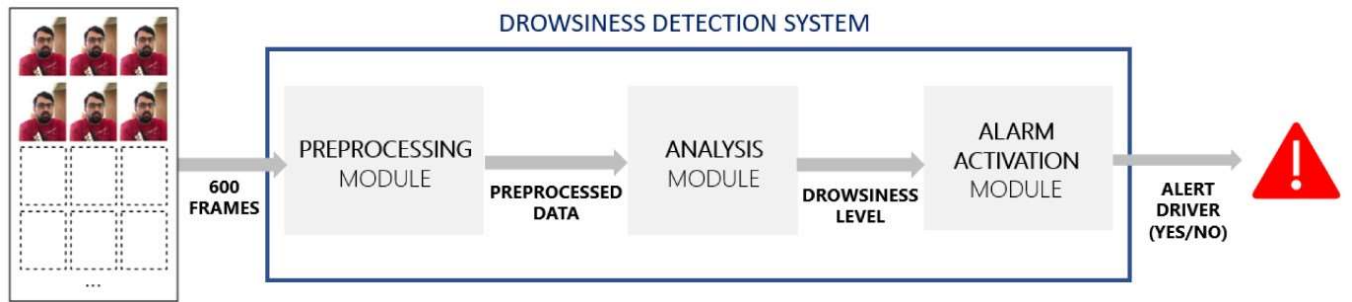|	
AEIOUS	Activities, Environment, Interaction , Objects , User
GPS	Global Positioning System
GIS	Geographical Information System
ISO	International Organization for Standardization
IEC	International Electrotechnical Commission

INDEX

Introduction 1.1

Phase 1: Reverse Engineering (RE): Selection and disassembling of art fact /component.

Figure 1. Snapshot 1

DROWSINESS DETECTION SYSTEM

600 FRAMES → PREPROCESSING MODULE → PREPROCESSED DATA → ANALYSIS MODULE → DROWSINESS LEVEL → ALARM ACTIVATION MODULE → ALERT DRIVER (YES/NO)

Phase 2: Disassembly / Analysis of the component / product / art fact / program and learning about the topic

1. List of Observed features:

- Map: A map through which users can see the location of car

- Camera: users can capture live pictures of person.

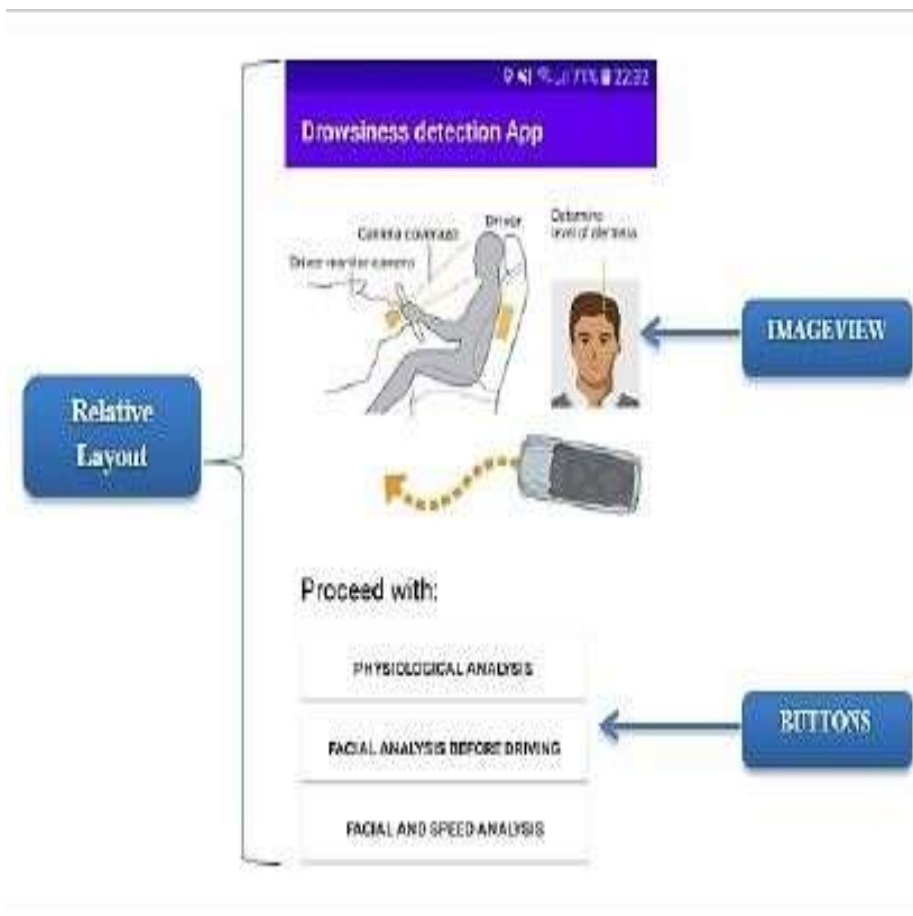- Alarm: to wake up the driver

The system uses a small infra-red night vision camera that points directly towards the driver's face and monitors the driver's eyes in order to detect fatigue. In such a case when fatigue is detected, a warning signal is issued to alert the drive

This application can be used by:-

Drowsiness detection is a safety technology that can prevent accidents that are caused by **drivers who fell asleep while driving**

2. Design Specification:

Figure 3. Layout Of App

Project Summary 1.2

Sr. No	Paper Title	Paper Author	Published Year	Summary
1.	Imagenet classification with deep convolutional neural networks. In: NIPS, pp. 1097–1105 (2012)	Krizhevsky, A., Sutskever, I., Hinton, G.E.	2012	We trained a large, deep convolutional neural network to classify the 1.2 million high-resolution images in the ImageNet LSVRC-2010 contest into the 1000 different classes. On the test data, we achieved top-1 and top-5 error rates of 37.5% and 17.0%, respectively, which is considerably better than the previous state-of-the-art. he neural network, which has 60 million parameters and 650,000 neurons, consists of five convolutional layers, some of which are followed by max-pooling layers.
2.	Deep face recognition. In: BMVC, vol. 1, p. 6	Parkhi, O.M., Vedaldi, A., Zisserma	2015	Mastering the laws of wildlife activities and family territory is an important task for wildlife protection, habitat restoration, and epidemic surveillance. Aiming at the shortcomings of traditional wildlife monitoring methods, an overall framework of wild animal satellite tracking system is proposed, and key technologies such as MEMS design, wearable methods, and big data platform development are discussed and practiced.

Introduction 2.1

Designing means involving goal-oriented processes. At the beginning of the design process only goals are known while at the end, both the goals and plans are known and that to with more clarity. Goal and plans involve together and they influencing each other. In designing process some goals are more important than others and similarly some plans are better than others. Designing does not guarantee that the design will work. Design thinking process:

- As per our subject in Gujarat Technology University we have a subject name Design Engineering.

- Design thinking is the cognitive process from which concepts emerge.

- Design thinking is related to, but different from problem solving, decision making, making creativity, sketching and prototyping.

- During Design thinking, the designer's attention oscillates between their understanding of a problematic context and their ideas for a solution.

- We have to find our area or field in which we want to do our project.

- We have observed that in this time Patients can't get proper health care. So, we came with the solution by the help of data mining system.

Project Summary 2.2

This work presents the development of an ADAS (advanced driving assistance system) focused on driver drowsiness detection, whose objective is to alert drivers of their drowsy state to avoid road traffic accidents. In a driving environment, it is necessary that fatigue detection is performed in a non-intrusive way, and that the driver is not bothered with alarms when he or she is not drowsy. Our approach to this open problem uses sequences of images that are 60 s long and are recorded in such a way that the subject's face is visible. To detect whether the driver shows symptoms of drowsiness or not, two alternative solutions are developed, focusing on the minimization of false positives. The first alternative uses a recurrent and convolutional neural network, while the second one uses deep learning techniques to extract numeric features from images, which are introduced into a fuzzy logic-based system afterwards. The accuracy obtained by both systems is similar: around 65% accuracy over training data, and 60% accuracy on test data. However, the fuzzy logic-based system stands out because it avoids raising false alarms and reaches a specificity (proportion of videos in which the driver is not drowsy that are correctly classified) of 93%. Although the obtained results do not achieve very satisfactory rates, the proposals presented in this work are promising and can be considered a solid baseline for future works

AEIOU Canvas

AEIOU is an investigative tool to help interpret observations gathered by ethnographic practices in the field. It is an Observations tool. AEIOU stands for 5 elements to be coded: Activity, Environment, Interaction, Object and User.

1. **Environment:**
   - Highways
   - Side ways

2. **Interaction:**
   - Human – camera
   - Human – Alarm
   - Argos Satellite - Mobile phones

3. **Objects:**
   - Satellite
   - Phones
   - Sensors
   - camera
   - Alarm

4. **Activities:**
   - Safety of Human
   - Save human lives

5. **Users:**
   - Truck drivers
   - Car drivers
   - Transport service
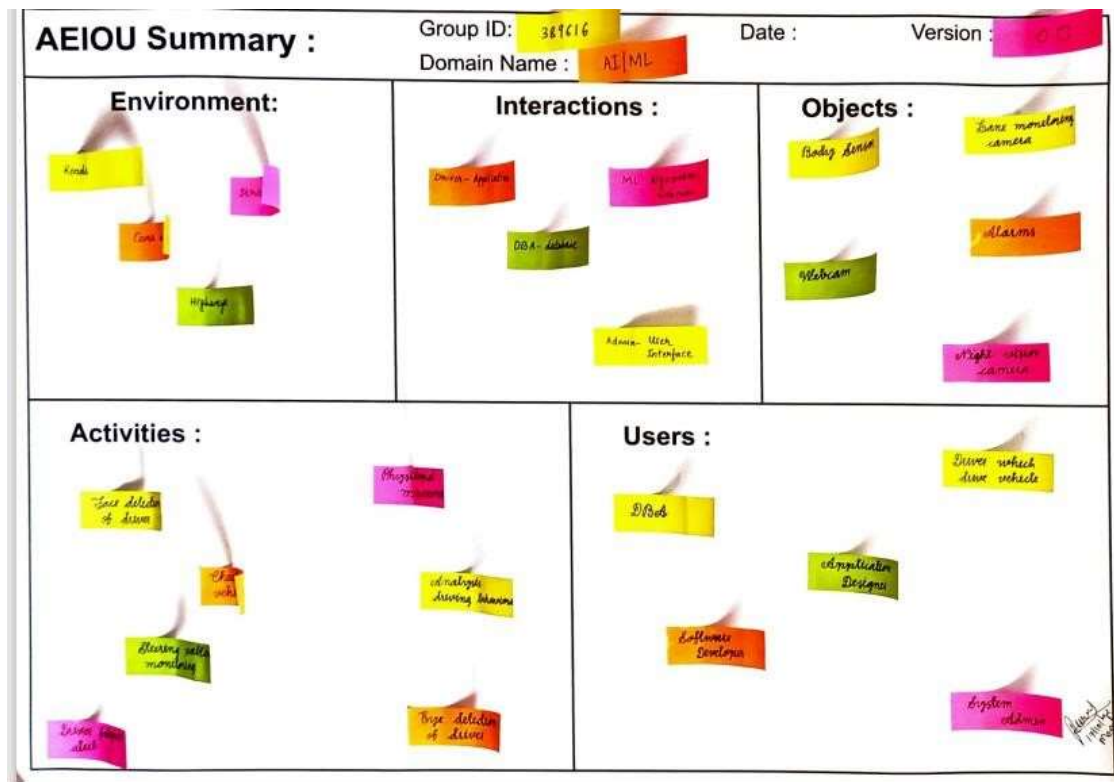
Figure 4. AEIOUS Canvas

Mind Map Canvas

Mind mapping was developed as an effective method for generating ideas by association. Mind mapping can be used for generating, visualizing, organizing, note-taking, problem-solving, decision-making, revising and clarifying your university topic, so that you can get started with assessment tasks. Essentially, a mind map is used to 'brainstorm' a topic and is a great strategy for students.
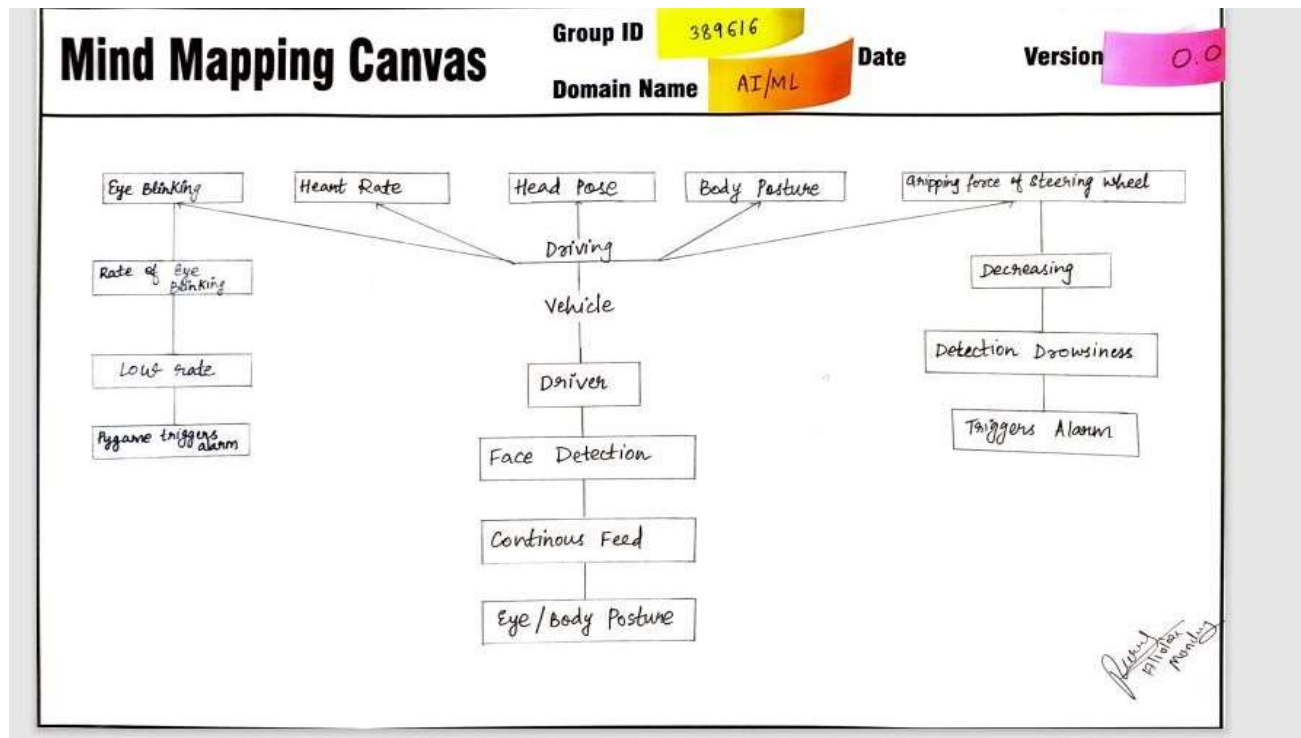

Figure 5. Mind Map Canvas

Empathy Canvas

Understanding the society is one of the biggest challenges for engineering students as till now they were making project on imaginary ideas. Understanding the domains of the problem in broader sense which emphasized on interacting with the people of your domain area which included more of casual talk rather than technical session. Here we would like to explain the aspects of this canvas with the help of the example taken up by our team.
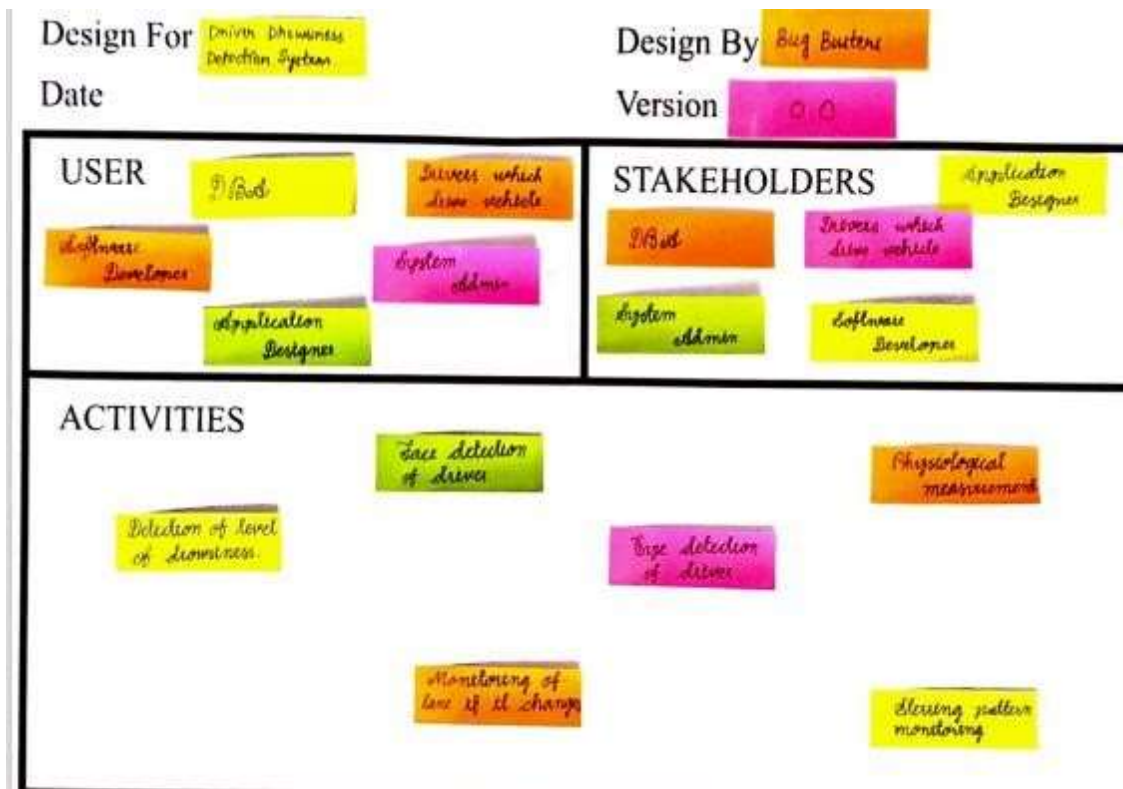
1. Users:

- DBA
- drivers
- System admin
- Stakeholders

2. Stack holder:

- Application designer
- Software Developers
- Technical Engineers
- Data Operators

3. Activities:

- Face detection
- Eye detection
- Detecting level of drowsiness
- Real-time location monitoring

Design For Driver Drowsiness Detection System

Design By Bug Busters

Date

Version 0.0

USER

9) Bot

Drivers which drive vehicle

Software Developer

System Admin

Application Designer

STAKEHOLDERS

Application Designer

9) Bot

Drivers which drive vehicle

System Admin

Software Developer

ACTIVITIES

Face detection of driver

Physiological measurement

Detection of level of drowsiness

Eye detection of driver

Monitoring of lane if it change

Steering pattern monitoring

STORY BOARDING

HAPPY

There was a situation in which the car driver showed abnormal behaviour which included in closing his/her eyes for a few seconds. Immediately an alarm sounded, which alerted the driver that he/she was drowsy. Due to ringing of this alarm, their life was saved

HAPPY

There was a situation in which the driver of the car was drowsy and suddenly, the car changed lanes. The speed of the car also was very high. The drowsiness detection system present in the car alerted the driver by ringing an alarm, and then driver controlled the car and saved his life

SAD

There was a situation which occurred when we checked for level of drowsiness in drivers. Usually 2 cameras are used, one for monitoring head movement and other for monitoring facial expressions. The camera used for monitoring facial expressions was not working properly. Due to this, we were not able to detect face and therefore we were not able to check level of drowsiness

SAD

There was a situation which occurred due to aging of the body sensor present on the drivers body. Here body sensors are used to measure parameters like brain activity, heart rate, head movements, etc. Due to aging of this body sensor, some adverse effects on the health of the driver were seen

Figure 6. Empathy Canvas

Ideation Canvas

A range of ideation techniques can be used to generate ideas and solutions, including sketching, prototyping, brainstorming, brain writing, worst possible ideas, and many others. A design process that focuses on generating ideas is called ideation.
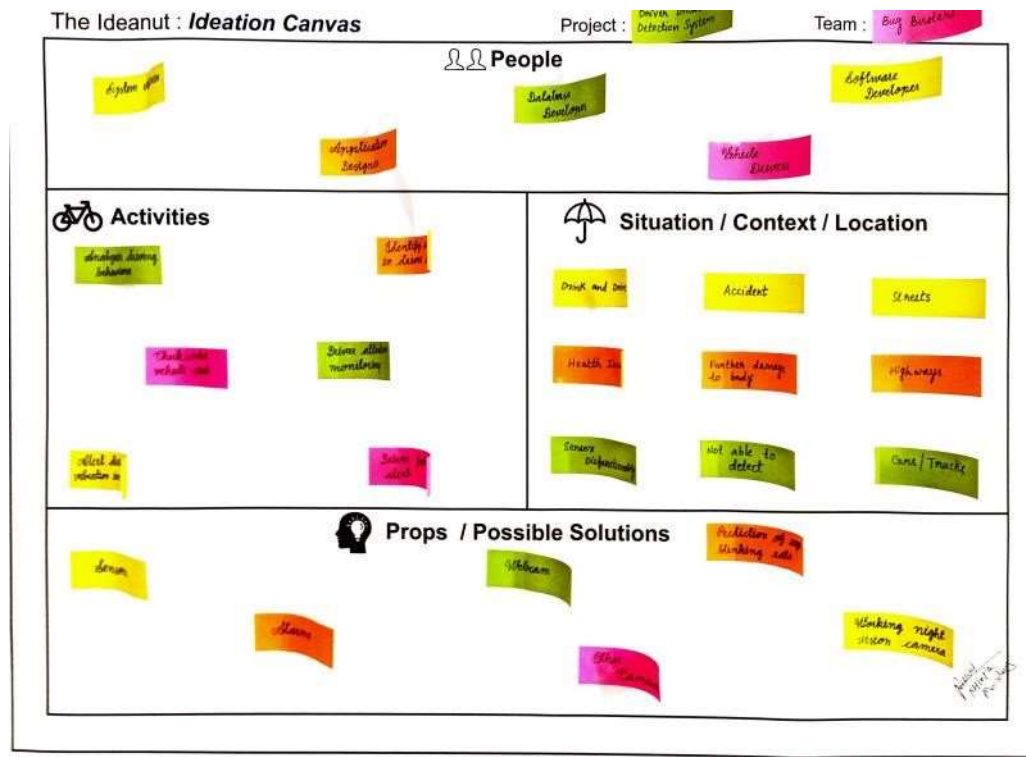

Figure 7. Ideation Canvas

Rough Prototype Model

Prototyping is often presented as a universal solution to many intractable information systems project problems.
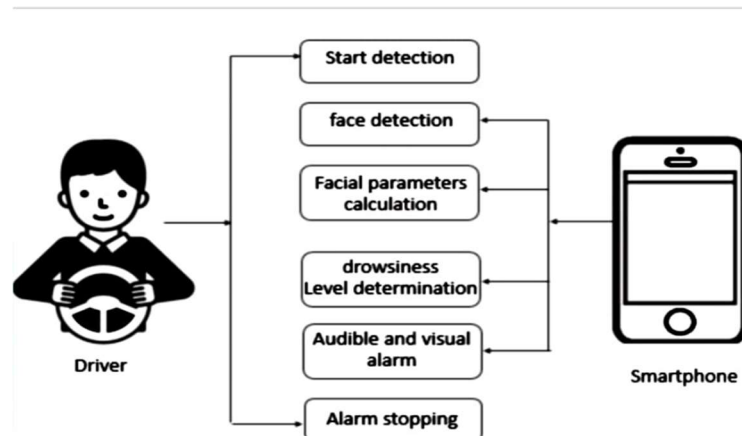

Figure 8. Prototype Model

Product Development Canvas

A product canvas is a planning tool designed to help build products that have a great user experience through a focus on feature development.
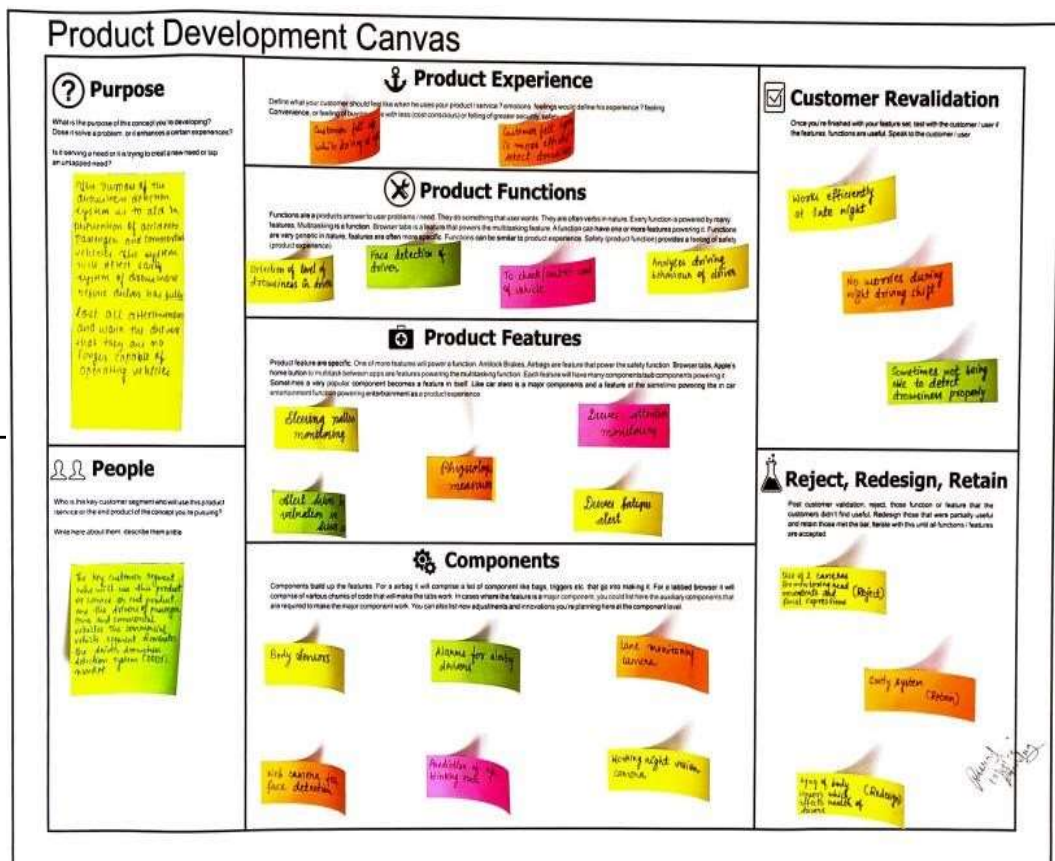
Figure 9. Product Development Canvas

1. **Tools/Methods/Theory/Application Process**
   - Face detection
   - Eye detection
2. **Applicable standards and design specification/ Principles & experiments**
   - ISO
   - IEC
3. **Software/Simulation/Skill/Mathematical Requirement**
   - Pygame, open CV
4. **Component materials strength(exploration – varieties/testing requirements)**
   - Camera, webcam

Learning Needs Matrix

First of all LNM canvas (LN Matrix) full form is the Learning Needs Matrix Canvas will help the student to identify the learning requirement at an early stage along with prioritization/time allocation for each learning priority.
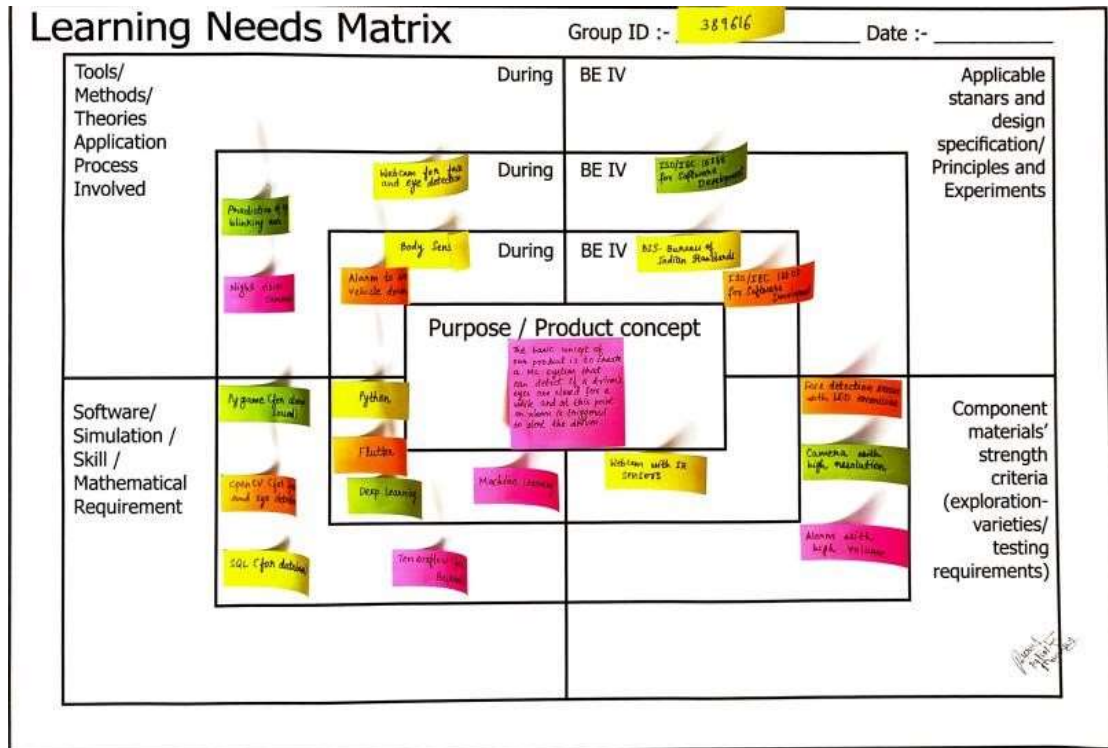
Figure 10. Learning Need Matrix Canvas

Feedback Analysis

Our team went on following observation with local villagers, field workers and farmers who lived near forest areas.

The certain problem they were facing due to wild animals were: ☐

Sudden appearance of wild animals. (i.e. Lions, Tigers, Elephants) Unaware about ways of controlling the situations.

- Impact local communities who depend on forest.
- Damage to agriculture crop.
- Loss of Human life.
- Livestock depredation impacts ecosystem and biodiversity.

The different feedback and the views they gave for
Detection of Drowsiness in Drivers are:

- It provides safety to human.
- This application is easy to access.
- As it is available in all regional languages, all can easily use and access it.
- As it provides alerts and notify, one can know about the presence of wild animals.
- They can easily handle the situation using **drowsiness system.**

Conclusion

The aim of this work was to design and implement a user-friendly driver monitoring and drowsiness detection application however, aimed at providing ease of use, availability, reduced cost and privacy since data was stored in the user phone before and while driving. The driver could be tested for drowsiness even before driving..

References

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