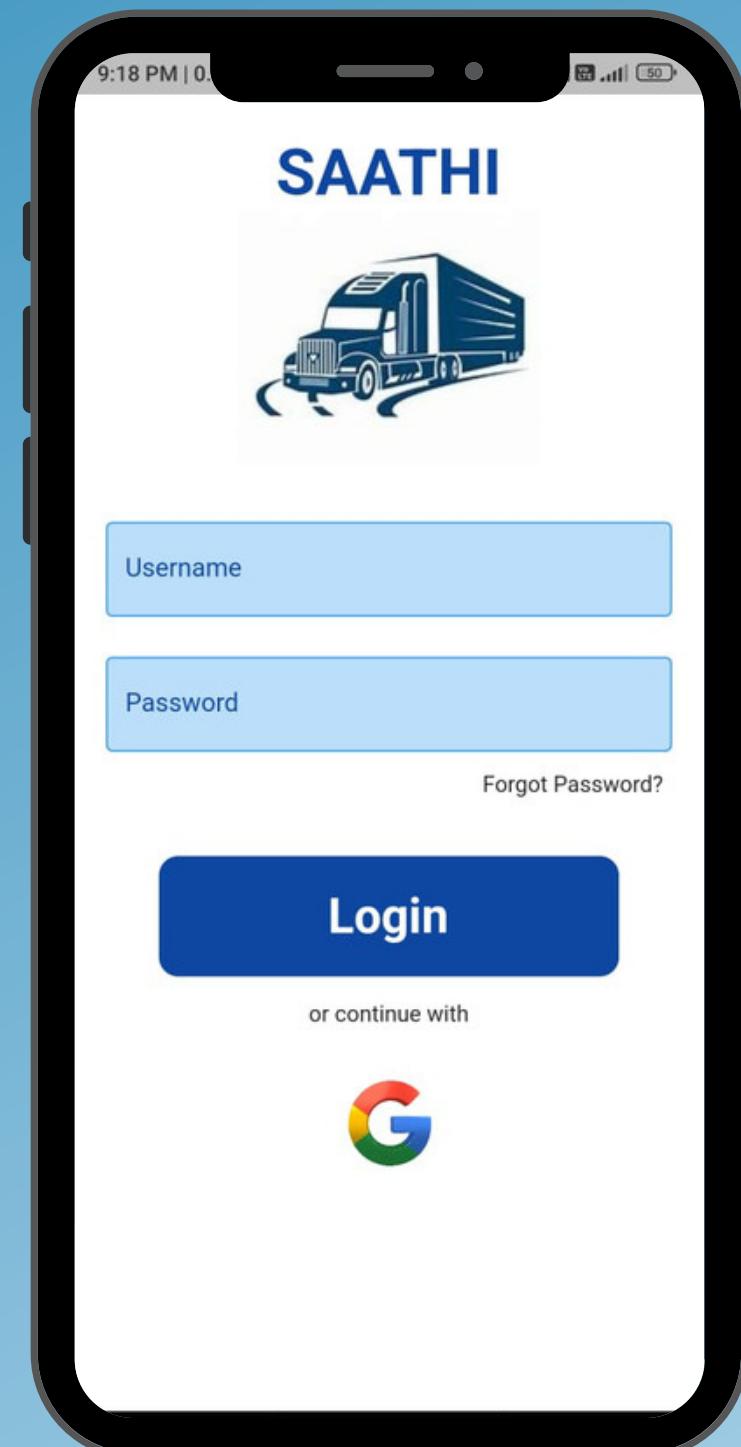




# KIET Group of Institutions, Ghaziabad

(An ISO – 9001: 2008 Certified & 'A+' Grade accredited Institution by NAAC)



## Project Presentation (KCS 753)

"Truck Driver Safety Assistance"

**Guide Name:** Prof. Arti Sharma (CS Dept.)

### Project Members:

- Anshul Nigam - 2000290120030-CS/4
- Abhinav Tripathi - 2000290120008-CS/4
- Nikita Jain - 2000290310115-CS/4

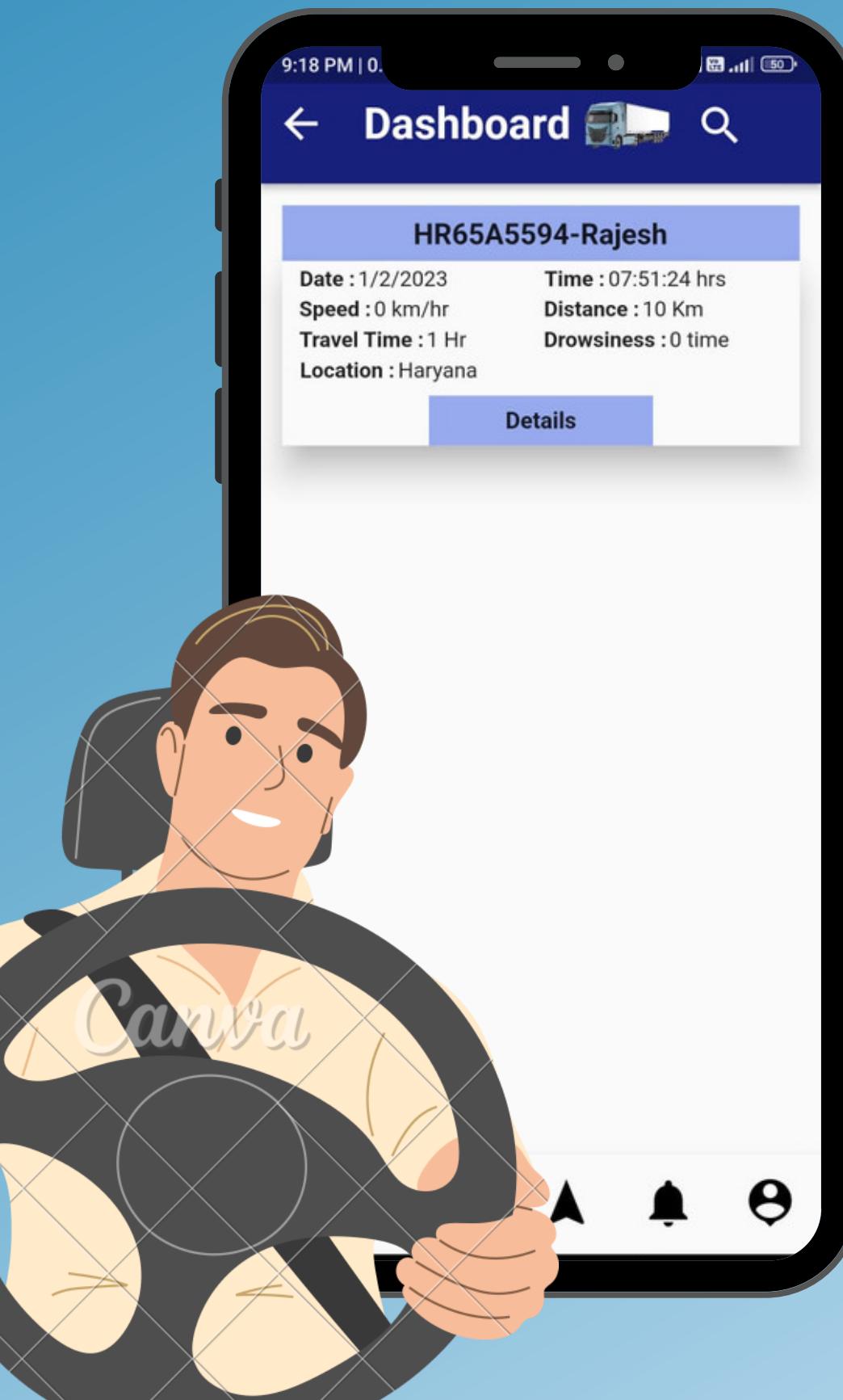
# Problem Statement

- Our main problem is accidents due to drowsiness, over speeding and driving hours.
- The shortage of drivers in the market led to overburdening of truck drivers with long working hours by the fleet owners, which caused fatigue and reduced the resting time.
- According to a survey on the status of truck drivers in India, over-speeding was stated as the major cause of road crashes by truck drivers as of February 2020.
- Fatigue and sleepiness were stated as the second major reason for road accidents among 38 percent of truck drivers in the South Asian country.



PAVAN KHEN

# Objectives

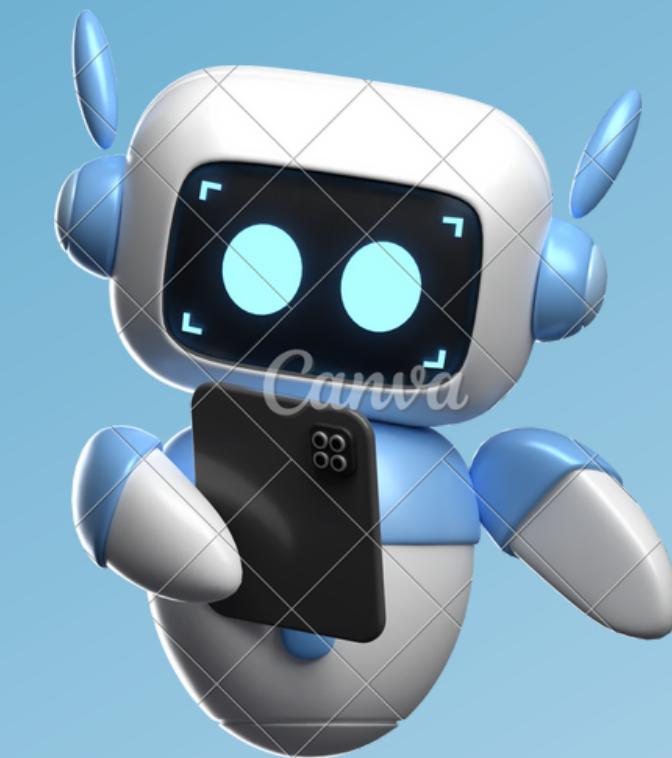


- **Improve** safety and welfare of truck drivers in India through real-time monitoring and analysis.
- **Reduce** accidents and **safety-related incidents** in the Indian trucking industry with **driver drowsiness** and **overspeeding detection**.
- Provide a dashboard with **real-time data** for truck owners to monitor driver behavior and vehicle performance.
- Transform the Indian trucking industry with **advanced safety features**, improved driver welfare, and enhanced vehicle performance in **Low-cost**.

**We introduced, Your Travel Saathi  
with support of Android and IoT Sensors**  
so that you Save yourself from accidents!



+



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## Internet of Things

- ESP32
- Eye Blink Sensor
- GPS Sensor
- MQ-2 Sensor

## Android

- Flutter
- Google Firebase

## **Additional Features**

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**Monitor what's inside Your Cargo Space**

never let your precious item get spoiled

**Never let Your drunk partner drive your vehicle**

Drink and Drive is prohibited!

**Know your limits**

slow down, no one is waiting for you

LITERATURE

SURVEY

# **Paper 1:**

## **Design of a Vehicle Driver Drowsiness Detection System through Image Processing using MATLAB**

**Publisher:** IEEE

**Authors:** Melissa Yauri-Machaca; Brian Meneses-Claudio; Natalia Vargas-Cuentas; Avid Roman-Gonzalez

**Year of Publication:** 2018

### **Summary**

The drowsiness in a driver can be observed by many facial changes which are: blinking of eye, moving head from side to side, and yawning. The most dominating factor considered here is blinking of eyes. A normal person blinks 15 times a minute while a drowsy person blinks 21 times approximately. Using the eye-detection code in MATLAB, the number of blinks are calculated in a time period after processing the image and making a matrix of the image.

All this work is done by a laptop and based on the set target of the software, in case of more than a specific number of blinks, an alarm will be triggered in order to inform the driver about staying focussed or to take a rest.

# **Paper 2:**

## Detecting Driver Drowsiness Based on Sensors: A Review

**Publisher:** MDPI

**Authors:** Arun Sahayadhas ; Kenneth Sundaraj ; Murugappan Murugappan

**Year of Publication:** 2012

### **Summary**

- In this research, the simulator of a car is used with the drowsy driver in order to maintain the safety of the driver. The drowsiness can be caused by: lack of sleep, time of the day and increase in duration of driving hours. All these factors were considered while performing experiments in the simulator. KSS drowsiness scale (1-9) was used to measure the amount of drowsiness where 1 is ideal condition and 9 is the most dangerous condition to drive.
- In vehicle based approach, Steering Wheel movement and standard deviation of lane positioning was used.
- In behavioral measure, blinking of eyes, movement of head from side to side and yawning was considered.
- In Physiological measures, various body signals like ECG, EMG, etc were used.

# **Paper 3: DRIVER DROWSINESS DETECTION SYSTEM**

**Publisher:** IEEE

**Authors:** Belal Alshaqaqi; Abdullah Salem Baquaizel; Mohamed El Amine Ouis; Meriem Boumehed; Abdelaziz Ouamri

**Year of Publication:** 2013

## **Summary**

- An algorithm to detect the state of an eye is implemented in this research paper. It is based on the Digital Signal Processor (DSP). Steps that follow are Face detection -> Eyes localization -> Eyes tracking -> Eyes state -> Driver state.
- In case the driver's eyes are found close for more than 5 consecutive frames, this means the driver is drowsy and an alarm is triggered.

## **Conclusion**

- In this project, the drowsiness is detected and informed if found.
- It is done via the IR camera that possesses the ability to see in low light conditions also. Hough Transform for Circles is used for the decision of the eyes states.
- Results are very accurate with a very low false-positive rate, which means the design is good and implementable.

# **Paper 4:**

## **Driver Drowsiness Detection using Eye-Closeness Detection**

**Publisher:** IEEE

**Authors:** Oraan Khunpisuth; Taweechai Chotchinasri; Varakorn Koschakosai; Narit Hnoohom

**Year of Publication:** 2016

### **Summary**

- Raspberry pi 3 along with Raspberry camera module was used to capture the image.
- The following methods were followed to get the proper eye closeness of the driver: Face Detection (Haar Cascade Classifier → Region of Interest → Eye Detection → Eye closeness detection → Geometrical rotation). Here, geometrical rotation is used to deal with the limitation of the Haar Cascade classifier and to get the tilt of the head of the driver.

### **Conclusion**

- Raspberry pi 3 was the cheapest option that was used and that can be further improved for faster calculations. The algorithm was first implemented to the photos captured by the mobile phones and then it was uploaded to Raspberry pi 3. It showed an accuracy of 99.85% based on the sample data which was quite good.
- Although for real-world applications, more improvements are needed.

# **Paper 5:**

## **Driver Drowsiness Detection**

**Publisher:** IEEE

**Authors:** K. Satish; A. Lalitesh; K. Bhargavi; M.Sishir Prem; T Anjali.

**Year of Publication:** 2020

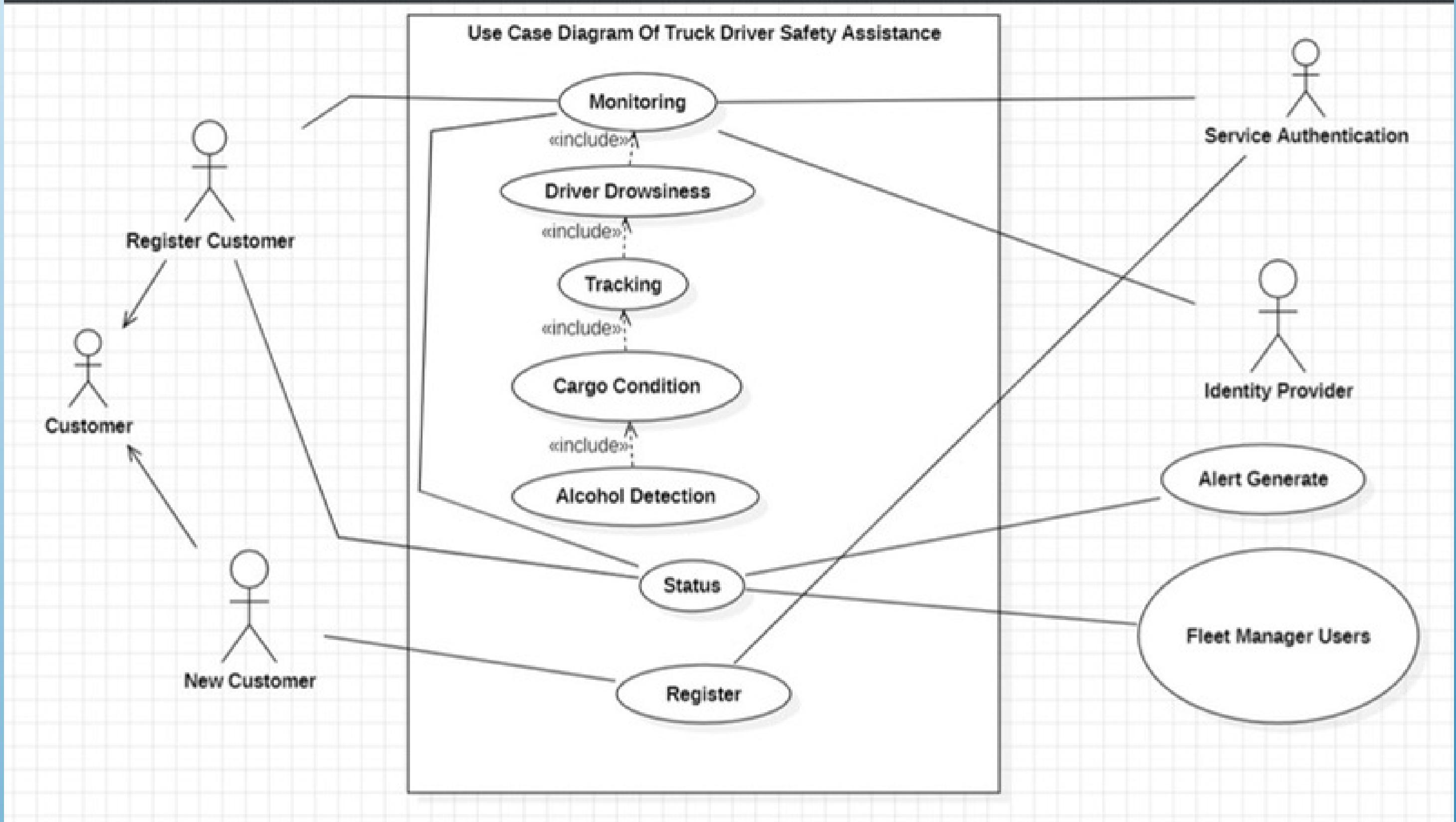
### **Summary**

- Data was collected while normal driving and analyzed. According to which a threshold value is set by the author which tells that whenever the eye blinking is above a specific rate and the pressure exerted on the steering wheel is less than a threshold value, an alarm will trigger itself, warning the user to focus on the road, in other case, the alarm will stay off.

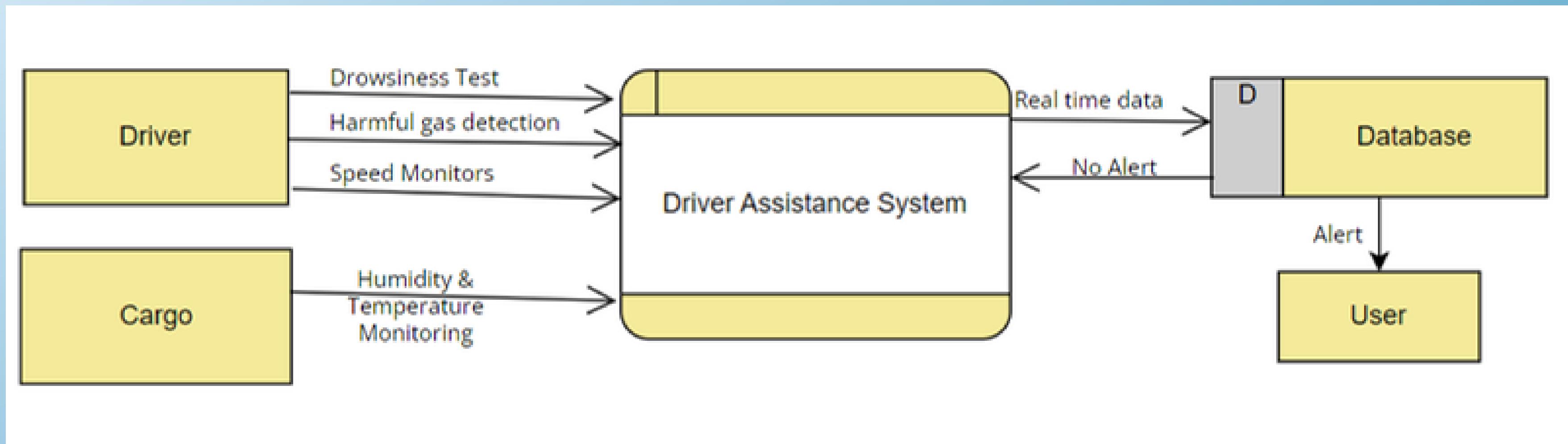
### **Conclusion**

- When compared to other methods and techniques where both the approaches (eye blinking and hand-pressure) were not being used together, it was found that this approach gives the correct result for around 96% of the time about the driver being drowsy. This is the highest among all the approaches. Only limitation is the hardware that is a little invasive in nature.

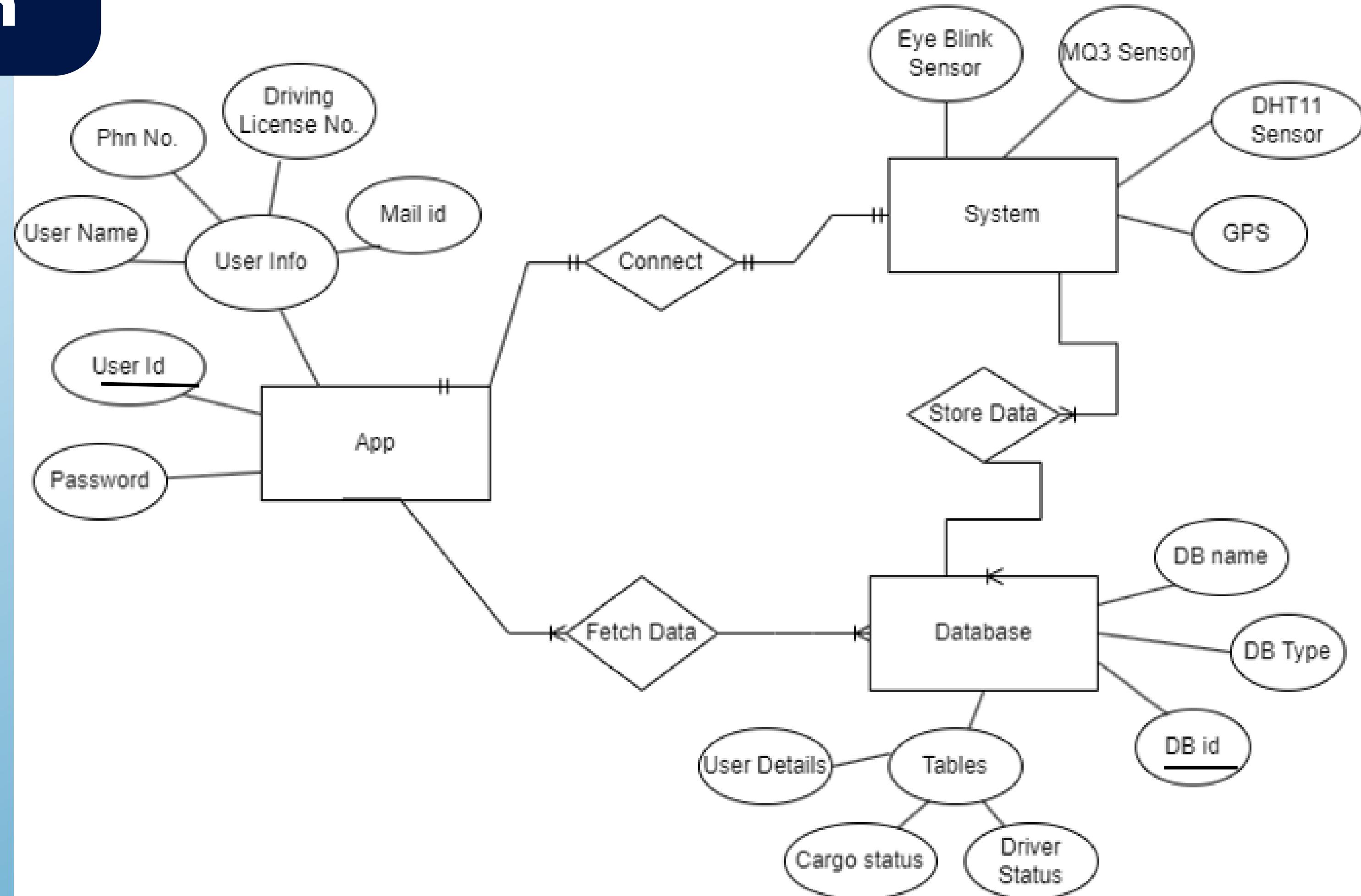
# Use Case Diagram



# Data Flow Diagram



# ER Diagram



# Work Flow

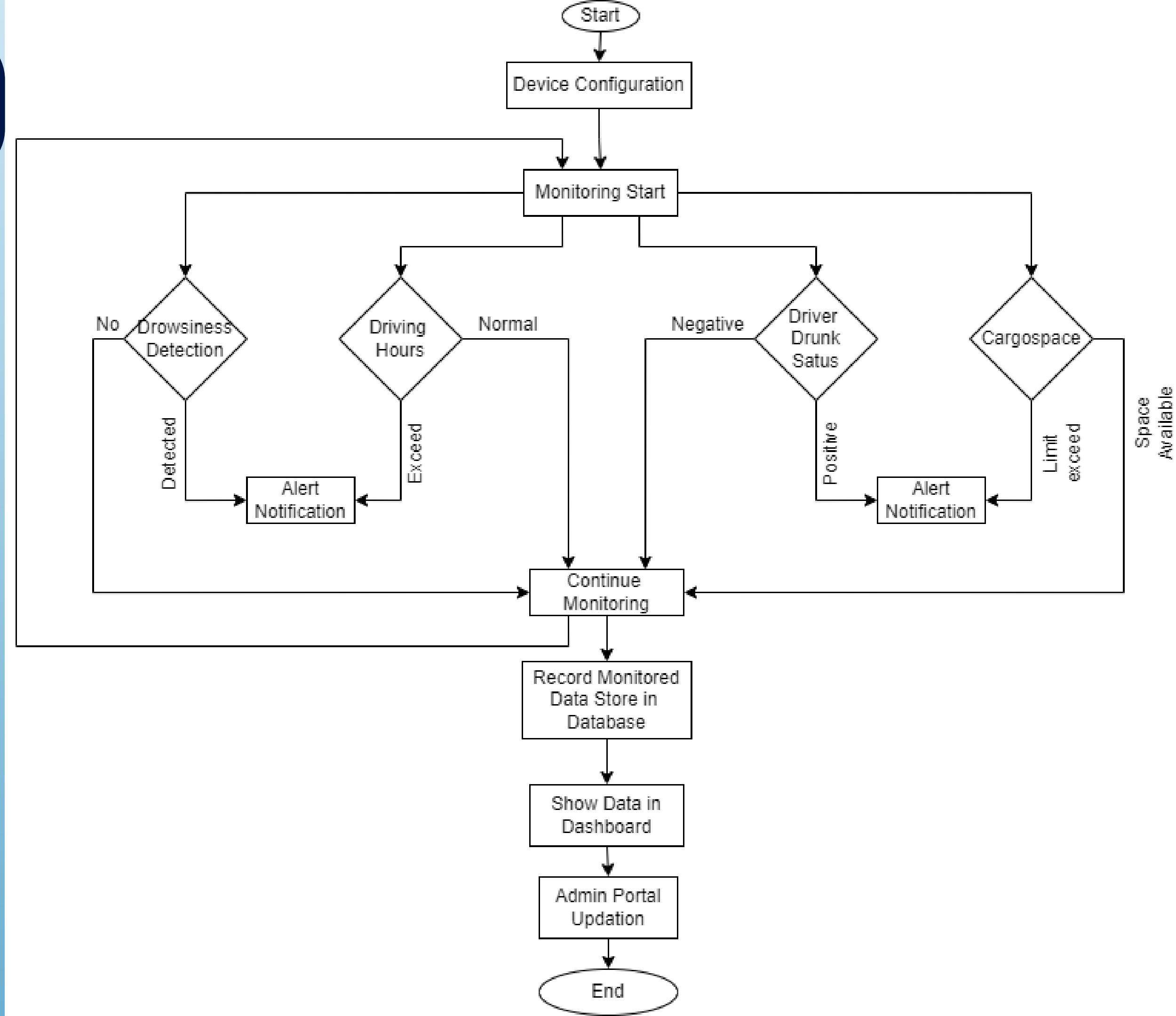
Sense Drowsiness

Send Alerts

Alcohol Detection

Gas Leakage

Overspeed Detection



# Patent Status

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Patent Draft Submitted 

- Approved by HOD and submitted to Dean R&D.

# Research Paper Status

- Submitted to various conferences

## Conference List

My Conferences (11)

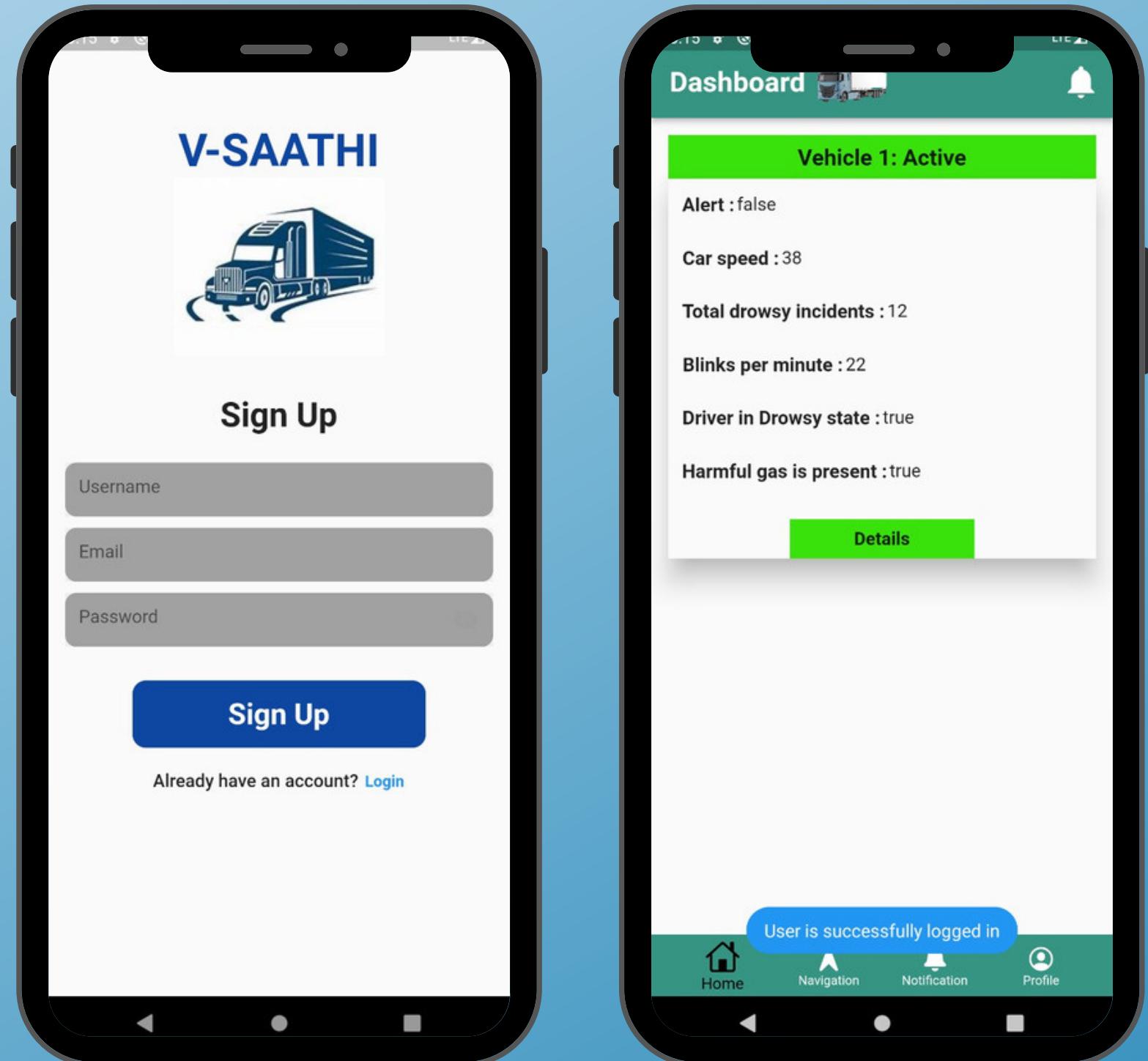
All Conferences

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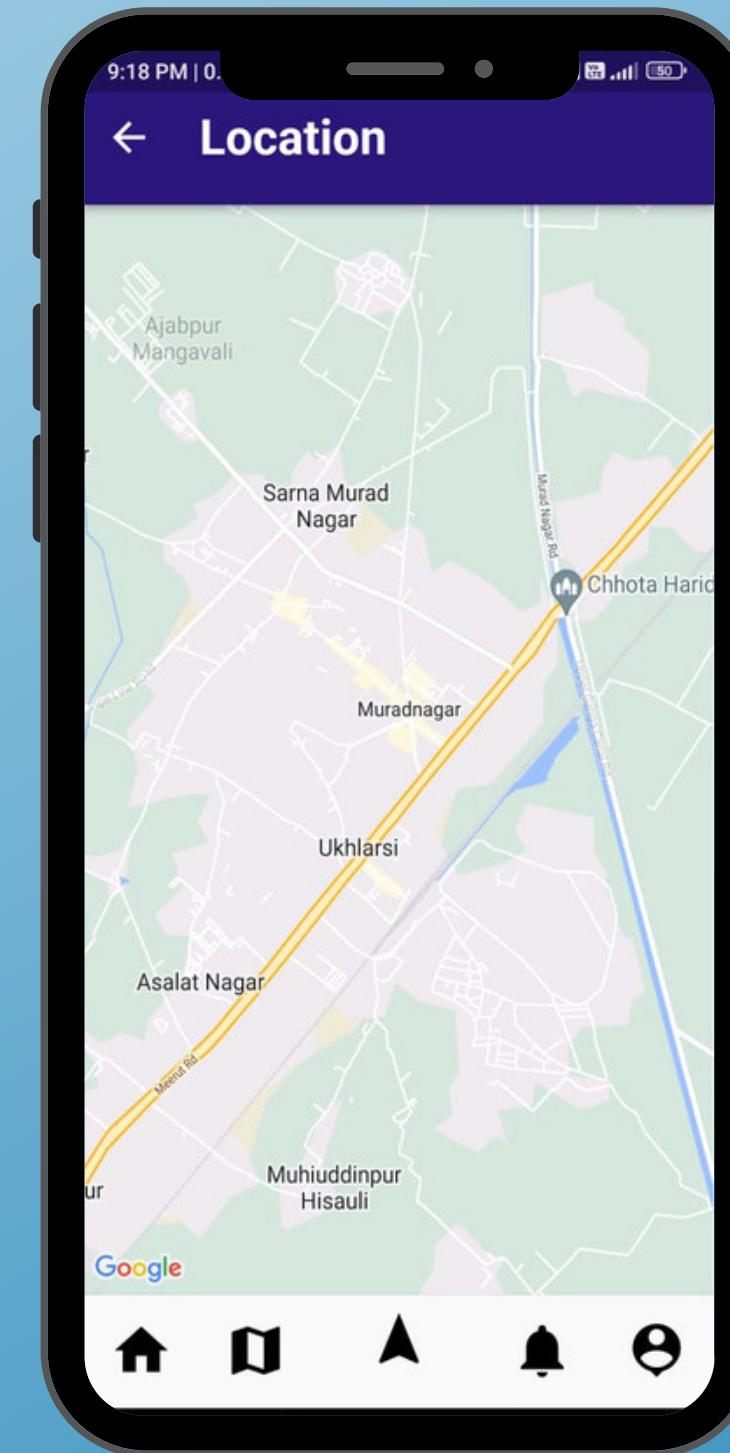
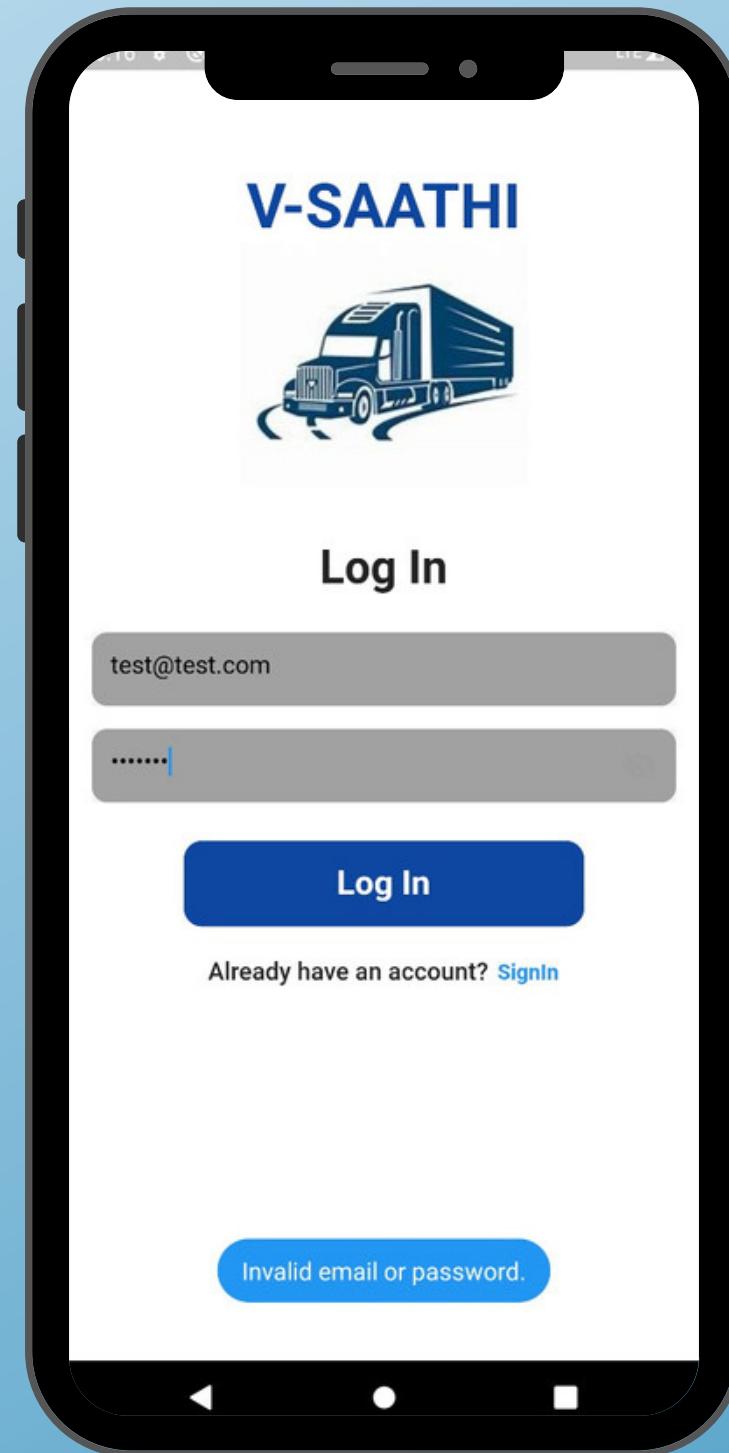
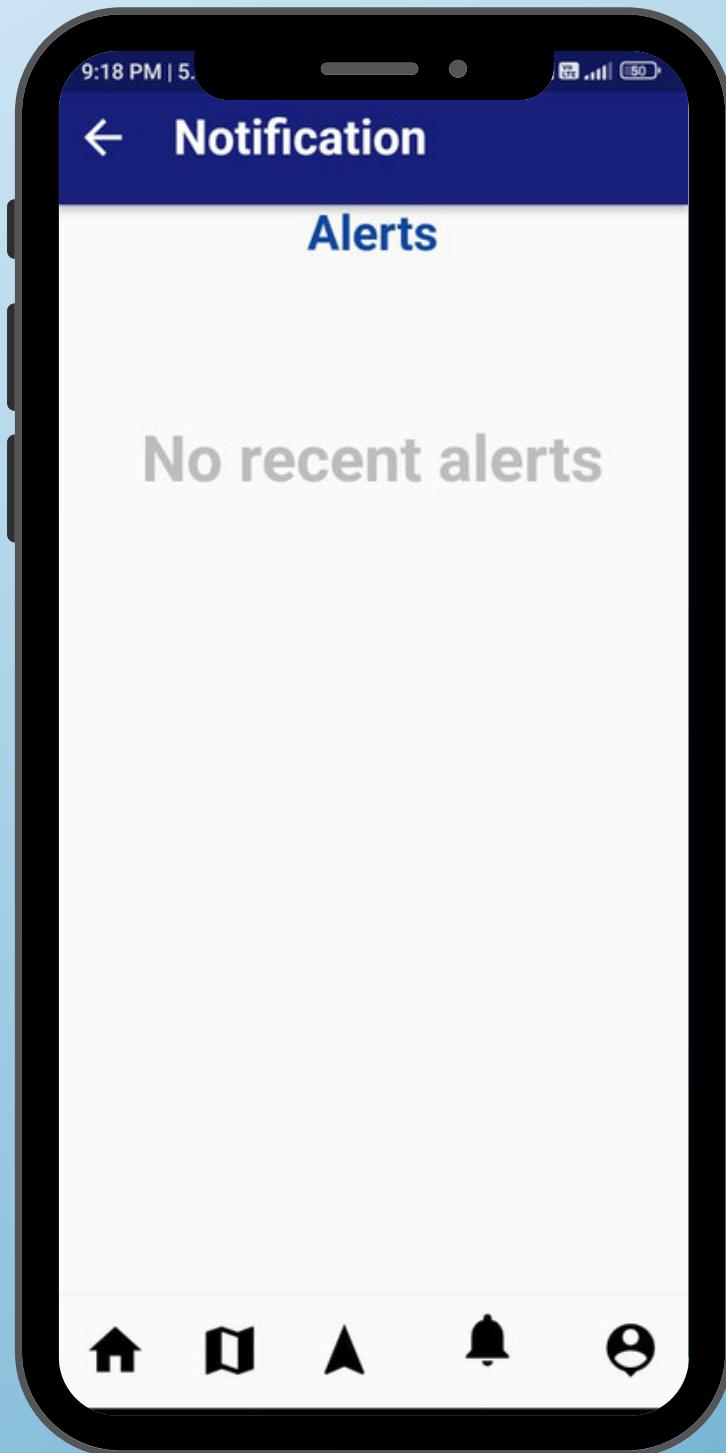
Name	Start Date	Location	External URL	Contact
2024 International Conference on Computing, Sciences and Communications(ICCSC)	10/24/2024	Ghaziabad (U.P.), India	<a href="https://iccsc.abes.ac.in">https://iccsc.abes.ac.in</a>	<a href="#">Email Chairs</a>
4th International Conference on Computing and Communication Networks (ICCCNet 2024)	10/17/2024	Manchester, United Kingdom	<a href="https://icccn.co.uk">https://icccn.co.uk</a>	<a href="#">Email Chairs</a>
International Conference on Control, Computing, Communication and Materials 2024	8/10/2024	Prayagraj, India	<a href="http://united.ac.in/Iccm2024/">http://united.ac.in/Iccm2024/</a>	<a href="#">Email Chairs</a>
International Conference for Intelligent technologies	6/21/2024	Hubballi, India	<a href="http://inconf.in/">http://inconf.in/</a>	<a href="#">Email Chairs</a>
5th International Conference for Emerging Technology	5/24/2024	BENGALURU, INDIA	<a href="http://www.inct.org/">http://www.inct.org/</a>	<a href="#">Email Chairs</a>
3rd International Conference on Advanced Communication and Intelligent Systems (ICACIS 2024)	5/15/2024	New Delhi, India	<a href="https://icacis.org/">https://icacis.org/</a>	<a href="#">Email Chairs</a>
4th International Conference on Advance Computing and Innovative Technologies in Engineering	5/14/2024	Greater Noida, India	<a href="http://icacite.com/">http://icacite.com/</a>	<a href="#">Email Chairs</a>
Fifth International Conference on Computing, Communication and Cyber Security	4/8/2024	Dehradun, India	<a href="https://www.ic4s.co.in/ic4s05v2/">https://www.ic4s.co.in/ic4s05v2/</a>	<a href="#">Email Chairs</a>
2nd International Conference on Disruptive Technologies	3/15/2024	Greater Noida, India	<a href="https://www.gibtm.org/gcdt-2024/">https://www.gibtm.org/gcdt-2024/</a>	<a href="#">Email Chairs</a>
2024 11th International Conf on Reliability, Infocom Technologies and Optimization (Trends and Future Directions) (ICRITO)	3/14/2024	Noida, INDIA	<a href="https://www.amity.edu/ait/icrito2024/">https://www.amity.edu/ait/icrito2024/</a>	<a href="#">Email Chairs</a>
5th 2024 IEEE International Conference on Computing, Power and Communication Technologies (IC2PCT)	8/22/2023	GREATER NOIDA, INDIA	<a href="https://ic2pct.co.in/">https://ic2pct.co.in/</a>	<a href="#">Email Chairs</a>

# Work Done

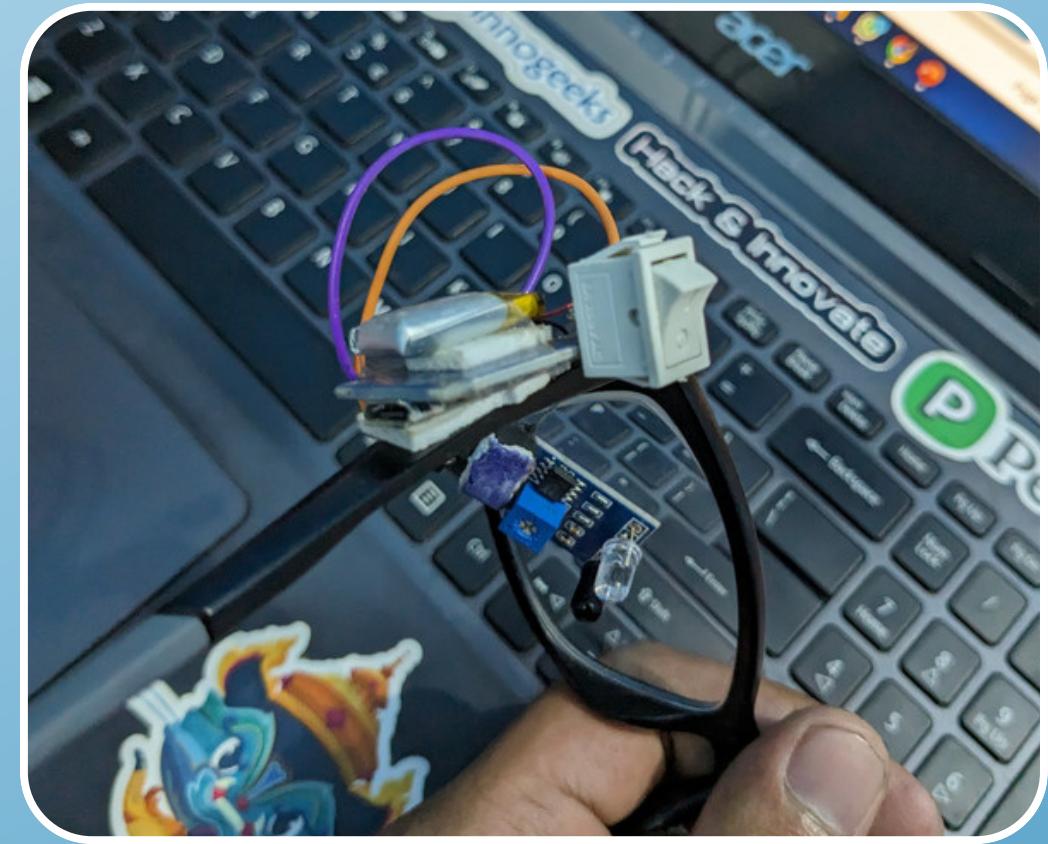
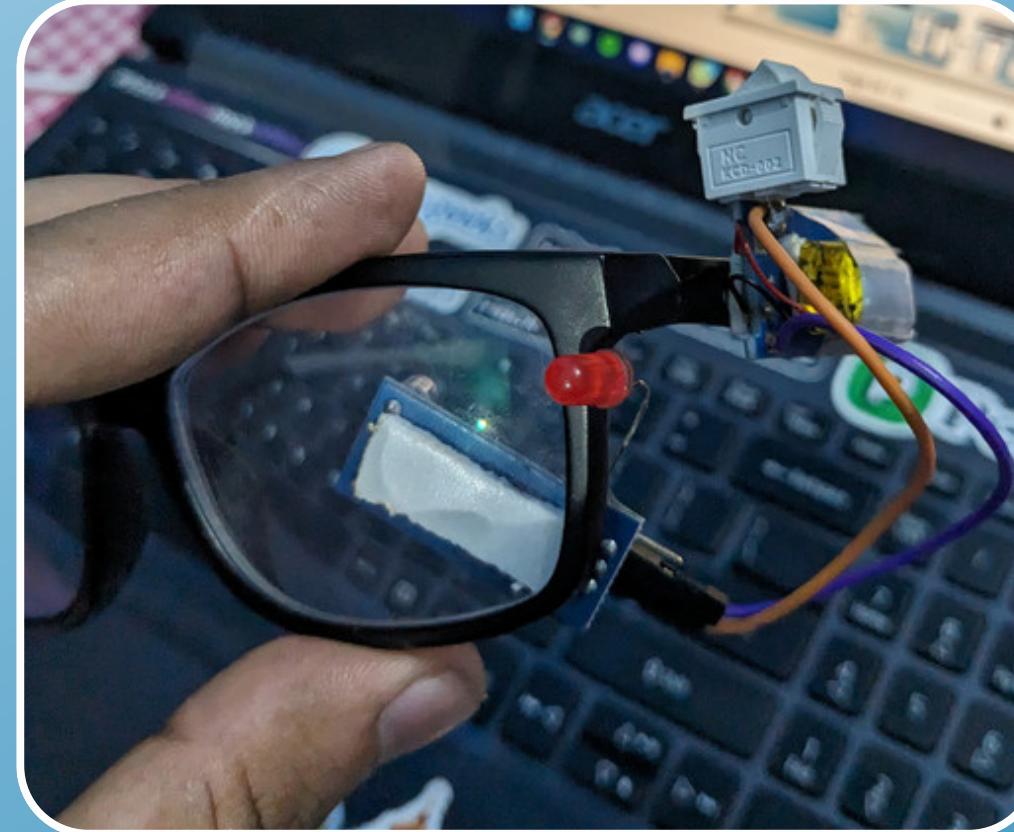
- Eye Blink Sensor 
- Firebase Initialization 
- Flutter App Design and Integration 
- Hardware Implementation 
- Enhancements 



# Work Done (contd..)



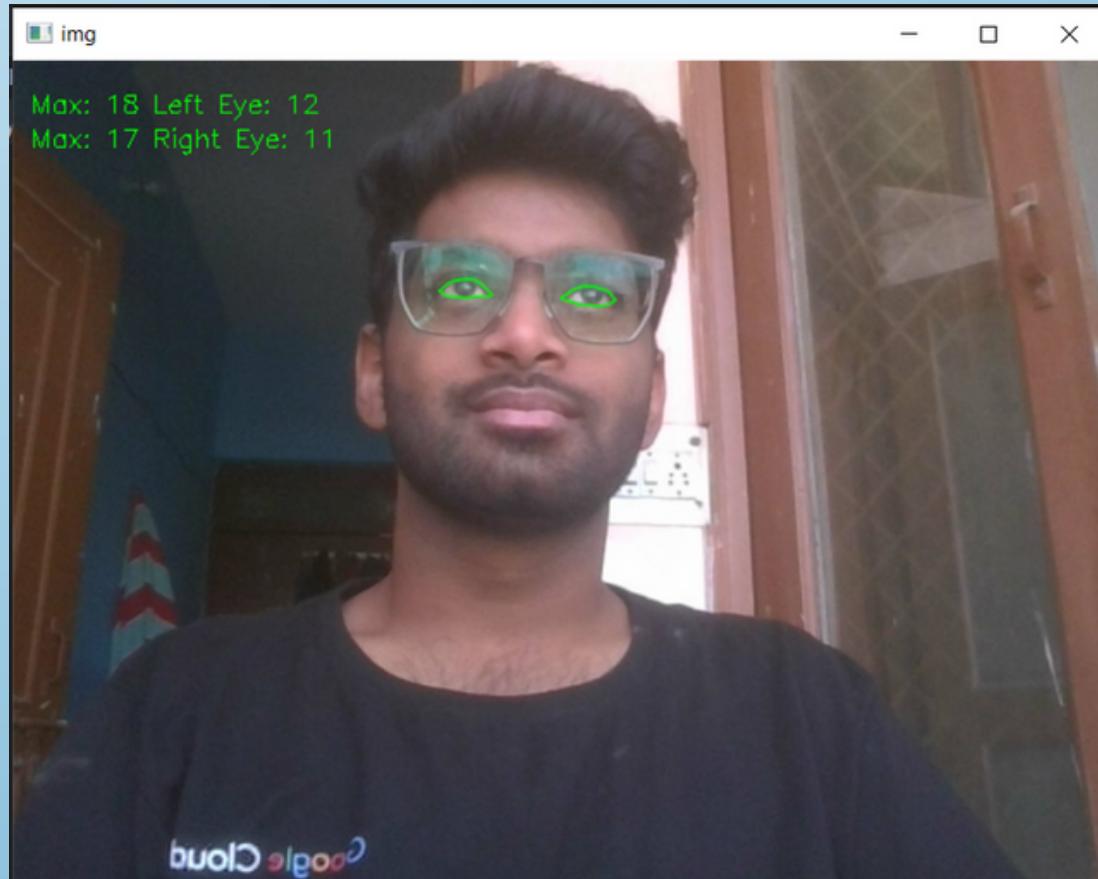
# Work Done (contd..)



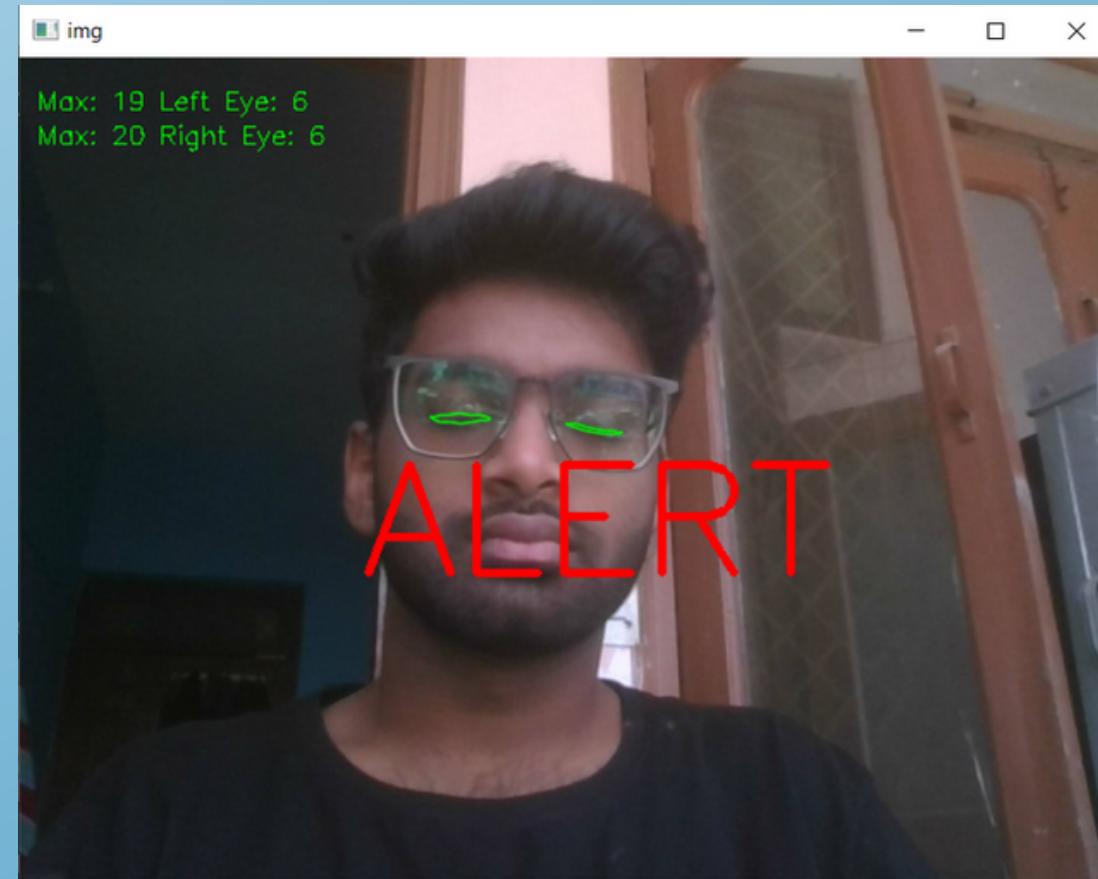
# Work Done (contd..)

When Advanced computational Powers are available (*Raspberry Pi4 or something more powerful*), then we can use **Mediapipe** and **OpenCV**-based Eye Detection Sensor.  
Doing so will increase the **cost factor** but the **throughput and efficiency** of the device will also be increased.

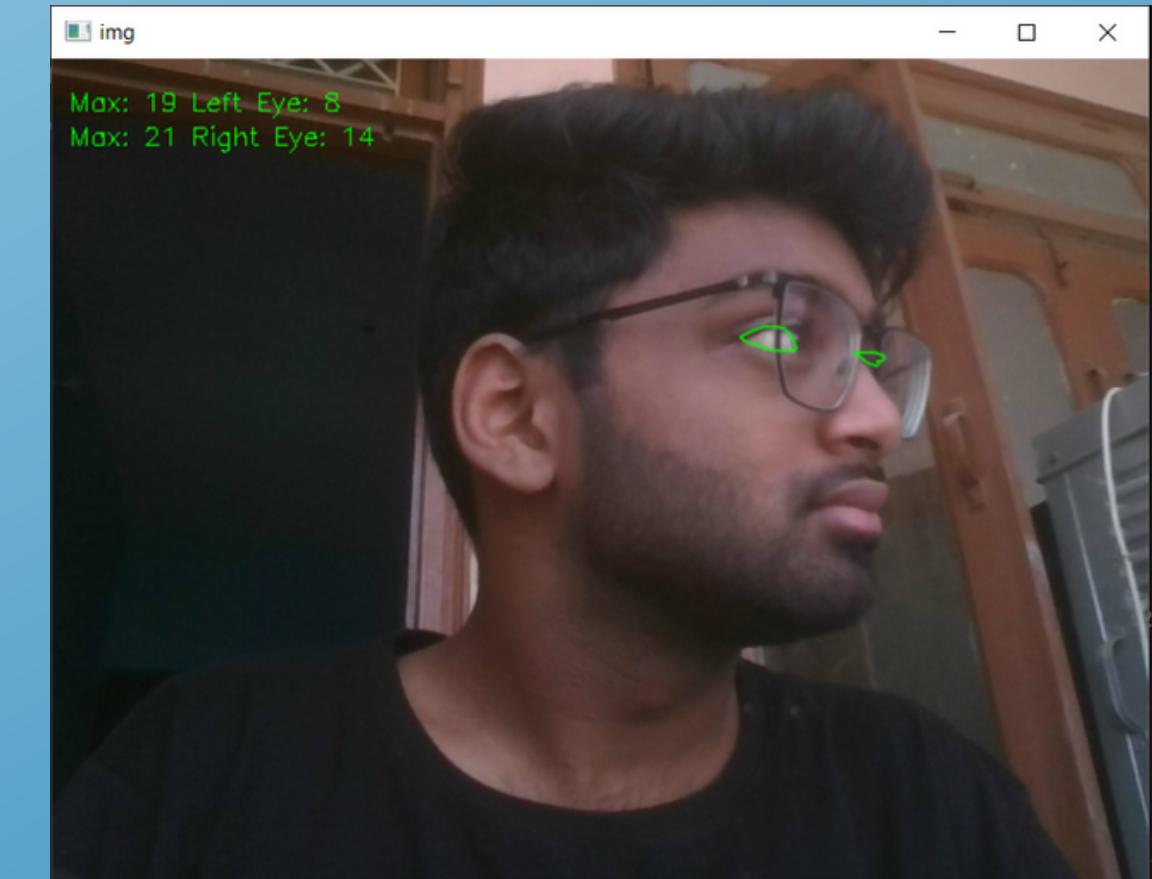
- When eyes open



- When eyes closed



- Detection when looking sideways



# Work Done (contd..)

## Firebase Structure:

- This data will be fetched from the Android app.
- Calculations will be done in-app and the data will be displayed in the dashboard.
- Information parameters will be updated as we scale.

The screenshot shows the Firebase Realtime Database console for a project named "Truck Driver Assistance". The database structure is as follows:

```
https://test-6cdd9-default-rtdb.firebaseio.com/
  +-- UserID
      +-- User1
          +-- CargoDetails
              +-- currHumidity: 21
              +-- currTemperature: 12
              +-- isOkay: true
              +-- isValid: true
              +-- setHumidity: 40
              +-- setTemperature: 20
          +-- Details
              +-- ChassisNumber: 13799731
              +-- Comments: "NA"
              +-- DateOfPurchase: "31 Mar 2019"
              +-- DrivingLicenseID: "UP32HV1379XA"
              +-- EngineNumber: "TVXHX4738277SA"
              +-- InsuranceValidUpto: "31 Dec 2024"
```

The database is located in the United States (us-central1).

# Business Approach



## **Our Customers**

- Truck Owners
- Fleet Managers
- Individuals

## **Our Model**

- Tier Based
- Subscription Based

## **Our Partners**

- Government of India
- Car Manufacturers
- Transport Sector

# References

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1. <https://ieeexplore.ieee.org/document/8596513>
2. <https://ieeexplore.ieee.org/document/6602353>
3. <https://ieeexplore.ieee.org/document/7907537>
4. <https://ieeexplore.ieee.org/document/9182237>
5. [https://www.researchgate.net/publication/233881105\\_Detecting\\_Driver\\_Drowsiness\\_Based\\_on\\_Sensors\\_A\\_Review#:~:text=We%20conclude%20that%20by%20designing](https://www.researchgate.net/publication/233881105_Detecting_Driver_Drowsiness_Based_on_Sensors_A_Review#:~:text=We%20conclude%20that%20by%20designing)

THANK  
YOU

**ASK YOUR DOUBTS**

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***anshul.2024cs1069@kiet.edu***