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NAGPUR.

VIGILEYE

MEGA PROJECT

Safeguarding lives with real time drowsiness detection

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SEMINAR ON MEGA PROJECT : VIGILEYE

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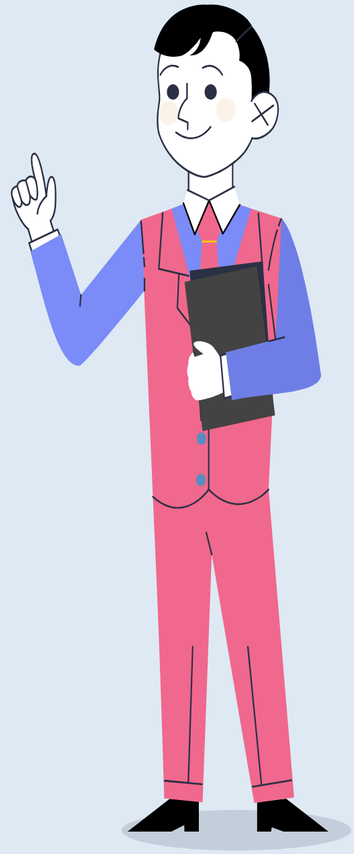

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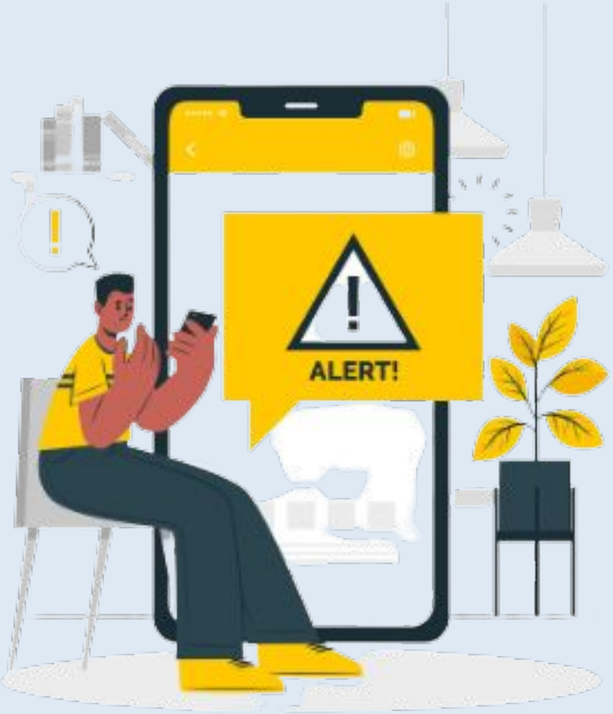
INTRODUCTION

VIGILEYE

VIGILEYE, an innovative application powered by cutting-edge AI technology, designed with a single, paramount objective: to detect drowsiness among drivers and prevent accidents, ultimately saving lives. Our platform harnesses the potential of artificial intelligence to be the unwavering guardian that never blinks, ensuring road safety like never before. VIGILEYE seeks to provide timely alerts and intervention measures, significantly reducing the risk of accidents caused by drowsy driving and saving countless lives on the road



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PROBLEM STATEMENT

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Drowsy driving poses a significant threat to road safety, leading to numerous accidents, injuries, and even fatalities worldwide.

The main challenge lies in detecting driver fatigue in real-time and taking preventive measures to avoid potential accidents.

Conventional methods of monitoring drowsiness, such as relying on drivers to self-assess their state or utilizing simple alarms, have proven to be inadequate and ineffective.

According to the survey done by 'The Times of India', nearly 40% of road accidents are caused by sleep deprivation. Fatigued drivers, long-duty driving are the major causes for the same.

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OBJECTIVES

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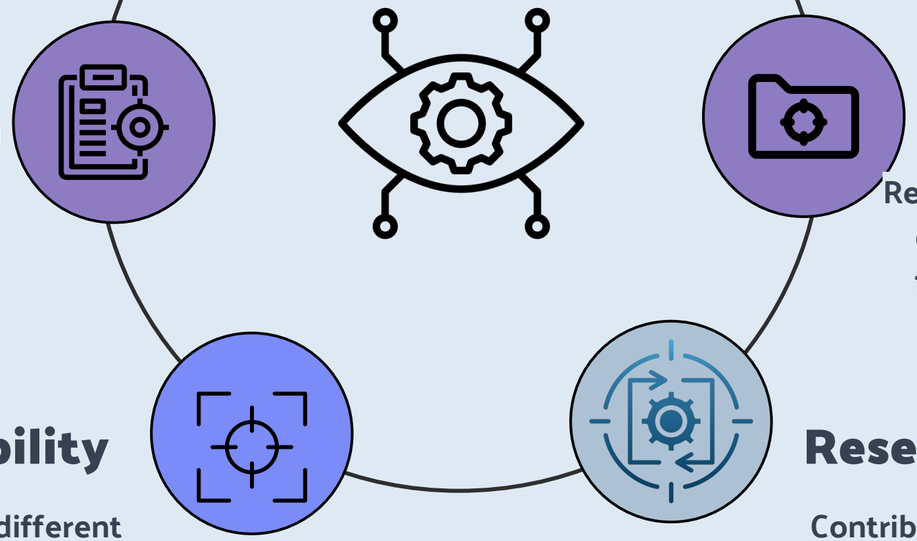
Accuracy

Create a robust AI model capable of accurately distinguishing between alert and drowsy states with a high degree of precision and sensitivity.

Safety enhancement

Improve road safety by integrating the drowsiness detection system into vehicles, helping prevent accidents caused by drowsy driving.



Real-time detection

Develop a real-time drowsiness detection system that can process input data promptly and provide timely alerts to the users.

Positive social Impact

Reduce the number of accidents and injuries caused by drowsy individuals, contributing to a safer and more secure society.

Adaptability

Ensure the system's adaptability to different environments, lighting conditions, and individual variations, making it suitable for various applications.

Research contribution

Contribute to the research and development of AI-driven technologies, particularly in computer vision, signal processing, and deep learning, with potential applications beyond drowsiness detection.

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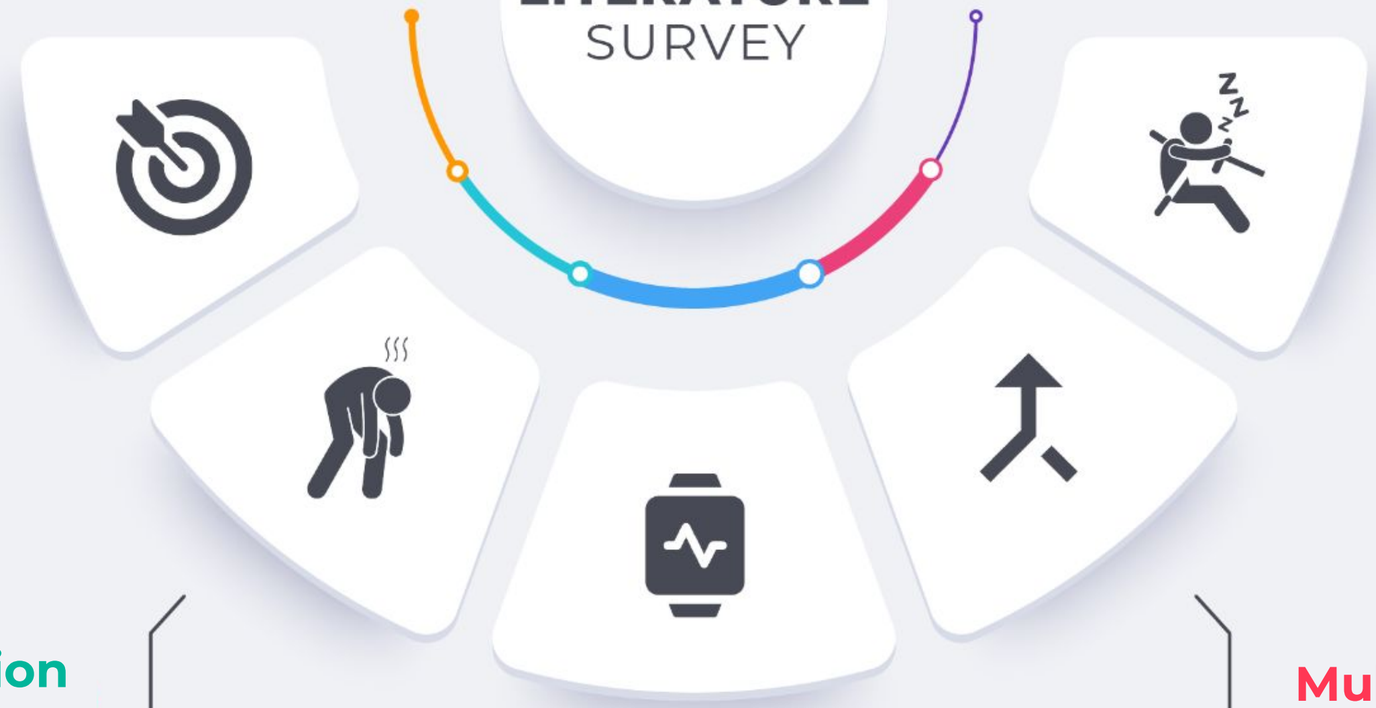
VIGILEYE

LITERATURE SURVEY



Prevalence and Impacts

An analysis of drowsy driving-related accidents and their implications on road safety.

Sleepiness Intervention

Transportation Research Part F: Traffic Psychology and Behaviour.

Fatigue Detection

Review of machine learning-based approaches for drowsy driver detection. Transportation Research Part C: Emerging Technologies.

Wearable Devices

Wearable sensors for real-time monitoring of driver fatigue.

Multi-Sensor Fusion

This paper focused on multi-sensor data fusion, combining information from video, ECG, and steering wheel movement sensors.

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PROPOSED SOLUTION

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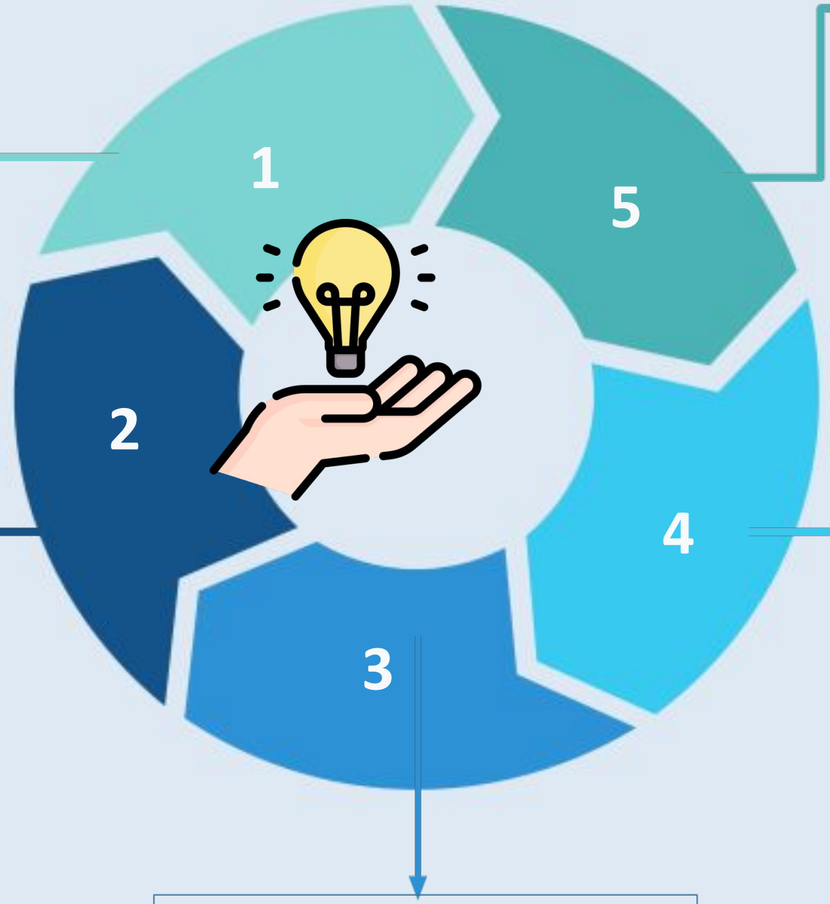
Integration with Fleet Management Systems

Integrating with a fleet management system involves connecting your software, application, or service to a third-party fleet management platform.

Real-time Monitoring

Real-time monitoring refers to the continuous and instantaneous observation and analysis of data as it is generated, allowing for immediate insights and actions based on current information.



Personalized Alert System

A personalized alert system is a notification system that delivers customized alerts and messages to individuals based on their specific preferences, needs, and interests

Multi-Sensor Integration

Multi-sensor integration refers to the process of combining data from multiple sensors to obtain a more comprehensive and accurate understanding of a given environment, system, or process.

Alert and Intervention

Alert and intervention systems are designed to detect specific events or conditions and provide timely notifications (alerts) to relevant stakeholders.

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FLOWCHART

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Drowsiness Detection System

Driver

Eye Camera

- Capture Video
- Analyze Frame

Sound Alert

- Emit Sound Alert

Drowsiness Detection API

- Process Video Frames
- Analyze Eye aspect Ratio

Drowsiness Alert API

- Sound Alert Activation

Alert Setting

- Configure Alert Threshold
- Set Alert sound and Volume

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DETAILED MECHANISM

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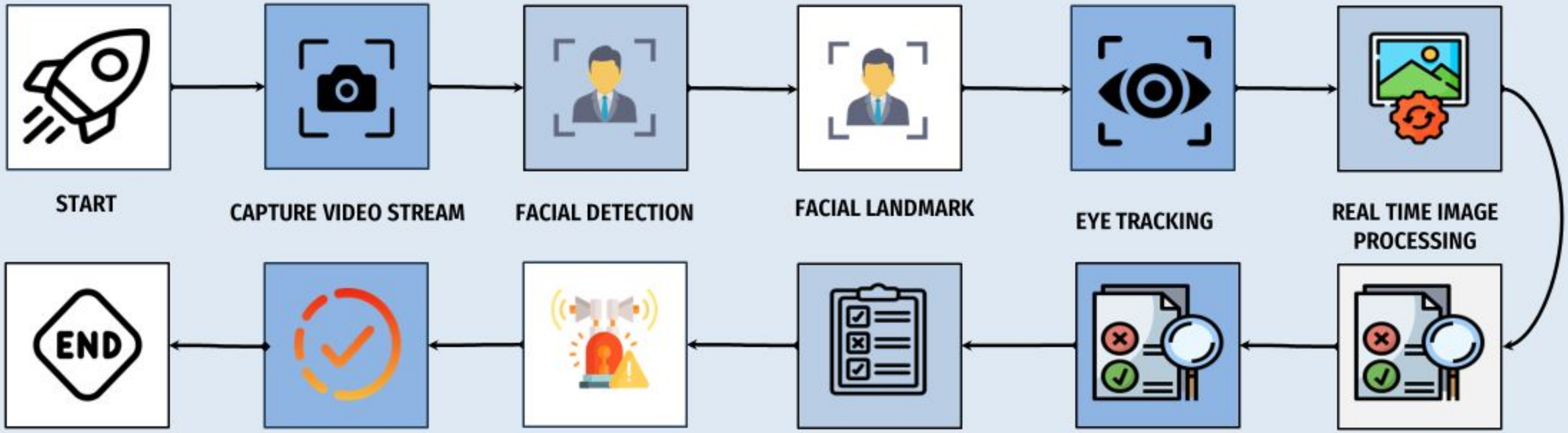

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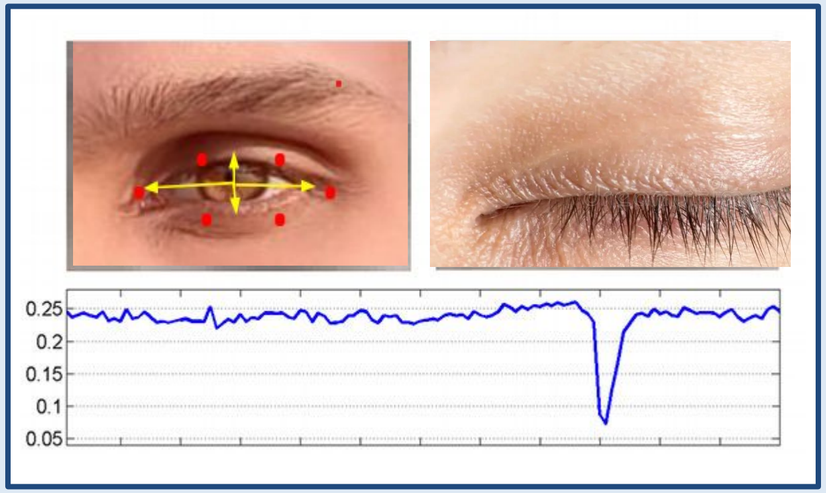

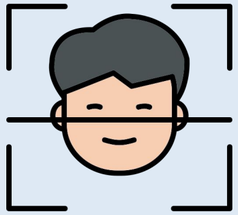

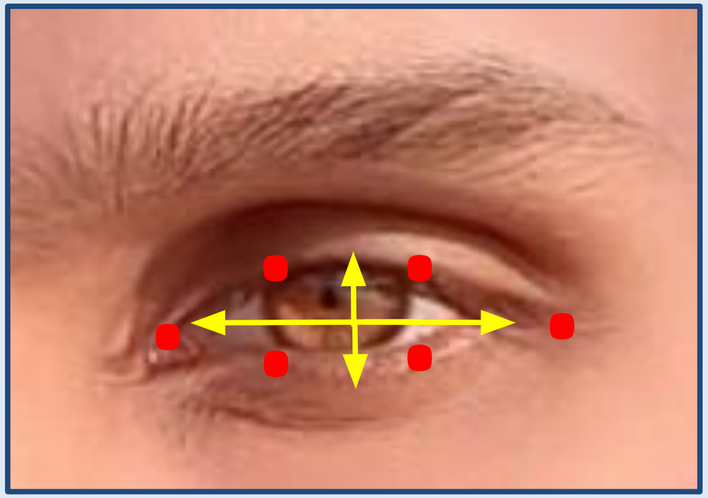

$$\mathrm{EAR} = \frac{\|p_2 - p_6\| + \|p_3 - p_5\|}{2\|p_1 - p_4\|}$$

5. Drowsiness Detection System using Eye Aspect Ratio Technique

Publisher: IEEE

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Python (Backend)

A Backend server-side language that works well with AI Frameworks & Libraries

JavaScript (Frontend)

A Frontend Client-side scripting language that provides the functionality to the Web Application

OpenCV (Libraries)

A powerful Computer Vision library used for image & video processing

HTML & CSS (Frontend)

Used for building the User Interface & Contents of the Web Application

Dlib (Libraries)

A C++ library with Python bindings used for face detection & facial landmark recognition

SOFTWARE REQUIREMENTS

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OUTCOMES

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Accident Prevention

The primary outcome is the prevention of accidents caused by drowsy driving.

Enhanced Road Safety

The implementation of an AI-powered drowsiness detection system contributes to overall road safety by reducing the risks associated with driver fatigue.

Real-time Intervention

By considering contextual information, such as time of day and driving conditions, the system offers more accurate drowsiness detection, reducing false alarms and enhancing its reliability

Contextually Aware Detection

The system's real-time alerts and safety mechanisms provide immediate intervention, giving drivers

Reduced Fatalities and Injuries

With the ability to detect and address drowsiness promptly, the project aims to reduce the number of fatalities and injuries caused by drowsy driving accidents, ultimately saving lives and preventing life-changing injuries.

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FUTURE SCOPE

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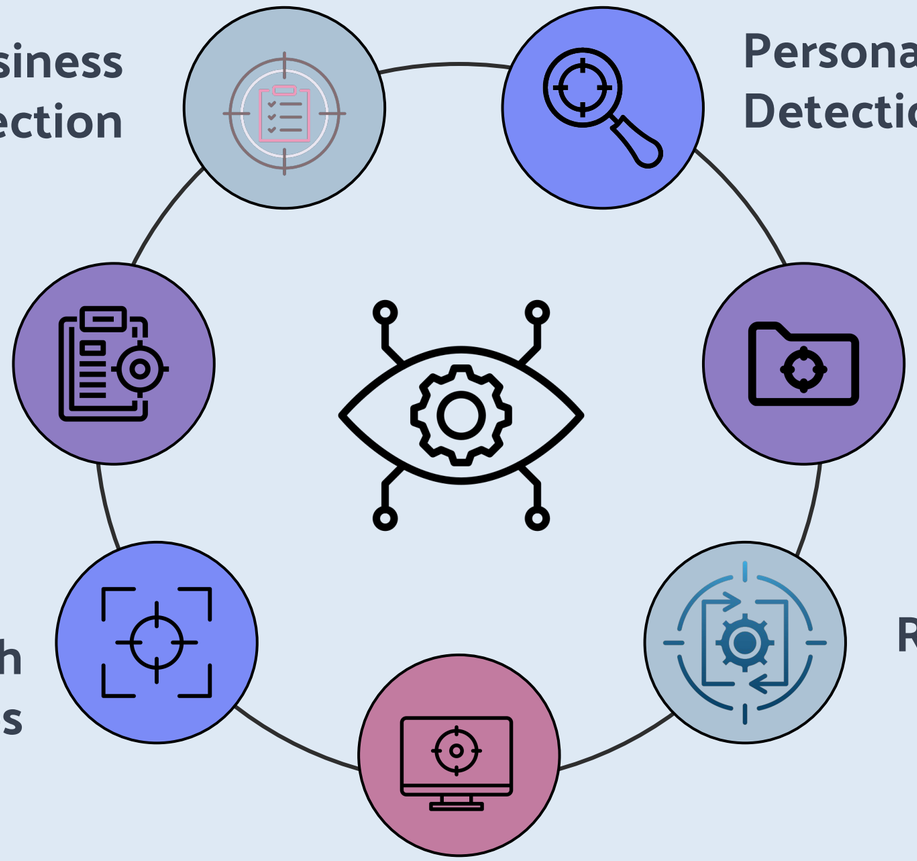

Multi-modal Drowsiness Detection

Personalized Drowsiness Detection

Edge Computing and Cloud Integration

Collaboration with Autonomous Driving Systems

Integration with Wearable Devices

Real-Time Driver Assistance

Driver Performance Analysis

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2. Hussain, S., Hussain, S. I., Jeon, M., & Oh, K. (2020). Driver drowsiness detection using machine learning-based methods: A review. Sensors, 20(1), 66.

3. de Sá, A. M., de Oliveira, A. A., Guedes, L. A., Alves, A. P., & Guedes, L. A. (2021). Evaluation of different approaches for real-time drowsiness detection. IEEE Access, 9, 62652-62664.

4. Tanwar, S., Bhardwaj, A., Tyagi, V., Kumar, N., & Rodrigues, J. J. (2020). A comprehensive survey on drowsy driving and drowsiness detection systems. Sensors, 20(4), 1164.

5.Real-Time Driver Drowsiness Detection System Using Eye Aspect Ratio and Eye Closure Ratio
Proceedings of International Conference on Sustainable Computing in Science, Technology and Management (SUSCOM), Amity University Rajasthan, Jaipur - India, February 26-28, 2019

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QUESTION AND ANSWER