System Vision Document

1. Problem Description

University parking areas frequently suffer from **disorganization, congestion, and inefficient manual verification processes**.
Students and faculty often spend unnecessary time searching for available parking spots, while attendants must manually verify vehicle permissions—resulting in delays, long queues, and increased chances of human error.

Although the university has already installed **smart sensors**, these devices remain **underutilized** and are not integrated into daily parking operations.
The lack of a **unified, automated system** leads to wasted time, reduced efficiency, and an overall poor user experience.

The proposed **Automated University Garage Management System (AUGMS)** directly addresses these issues by offering a **digital, automated solution** that manages the entire parking process—from vehicle registration and verification to **real-time parking space monitoring**—all through seamless integration with the university's existing sensors.

2. System Capabilities

1. **User Registration** – Collects and stores student and faculty details such as name, university ID, car model, and license plate.
2. **Automated Entry and Exit Verification** – Matches incoming vehicle data with registered records to grant or deny garage access.
3. **Real-Time Occupancy Tracking** – Utilizes the existing sensor infrastructure to monitor and update parking space availability continuously.
4. **Live Parking Display** – Presents up-to-date parking data to both users and administrators through intuitive web dashboards.
5. **Service Management** – Manages requests for optional on-site services such as EV charging and car cleaning.
6. **Activity Logging** – Records vehicle entries, exits, and service usage to maintain accurate operational history and support future analysis.
7. **Scalability and Flexibility** – Designed with a modular structure that allows adaptation for various environments, including corporate offices, residential complexes, and public parking facilities.

3. Business Benefits

Category	Benefit
Efficiency	Reduces congestion and manual effort by automating vehicle entry, exit, and real-time tracking processes.
Time Saving	Enables students and faculty to locate available parking spots instantly, eliminating the need for manual searching.
Security	Enhances safety by using automated verification to prevent unauthorized access and human error.
Resource Utilization	Maximizes the use of existing smart sensors and university infrastructure, minimizing additional costs.
User Satisfaction	Improves the overall parking experience with convenience-focused features like EV charging and car cleaning.
Scalability	Designed for easy adaptation and expansion to suit corporate, residential, or public parking environments.

4. Project Scope

In Scope:

- Student and faculty vehicle registration.
- Automated verification and gate access.
- Real-time monitoring of available and occupied spots.
- Administrator and user dashboards for system management and data display.
- Management of optional on-site services, including EV charging and car cleaning.
- Integration with the university's existing sensor infrastructure.

Out of Scope:

- Mobile application development (planned for a future phase).
- Integration with third-party sensors beyond the current university system.
- Online payment and parking reservation systems (future upgrade).
- AI-based predictive analytics for parking trends (future version).

5. Expected Outcome

By implementing the **Automated University Garage Management System (AUGMS)**, the university will establish a **modern, efficient, and secure** parking management experience for both students and staff.

The system will **reduce delays**, **streamline operations**, and **maximize the use of existing smart sensor technology** to ensure real-time accuracy and reliability.

In addition, AUGMS will serve as a **foundation for future smart campus initiatives**, supporting continuous innovation, sustainability, and digital transformation across the university.