SmartPark: Parking Management with Intelligent License Plate Recognition

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Problem Statement

Urban parking is often inconvenient, congested, and inefficient. Users struggle to find parking spaces, make payments, and have a smooth experience. Manual ticketing and payment systems are slow and error-prone, lacking technological efficiency.

What I Am Trying to Solve:

License Plate Recognition: Eliminate the need for physical tickets and enhance security.

Parking Space Allocation: Intelligently allocating available parking spaces to vehicles, ensuring efficient space utilization.

Hands-Free Payment (Future scope): Automatically charges users based on their parking duration.

System Components

License Plate Recognition (LPR) System: Identifying and recognizing the alphanumeric characters on the plates.

Camera System: To capture images of vehicles and their license plates as they enter the parking area.

Database: Stores information about registered users, their license plate data, parking space assignments, and payment details.

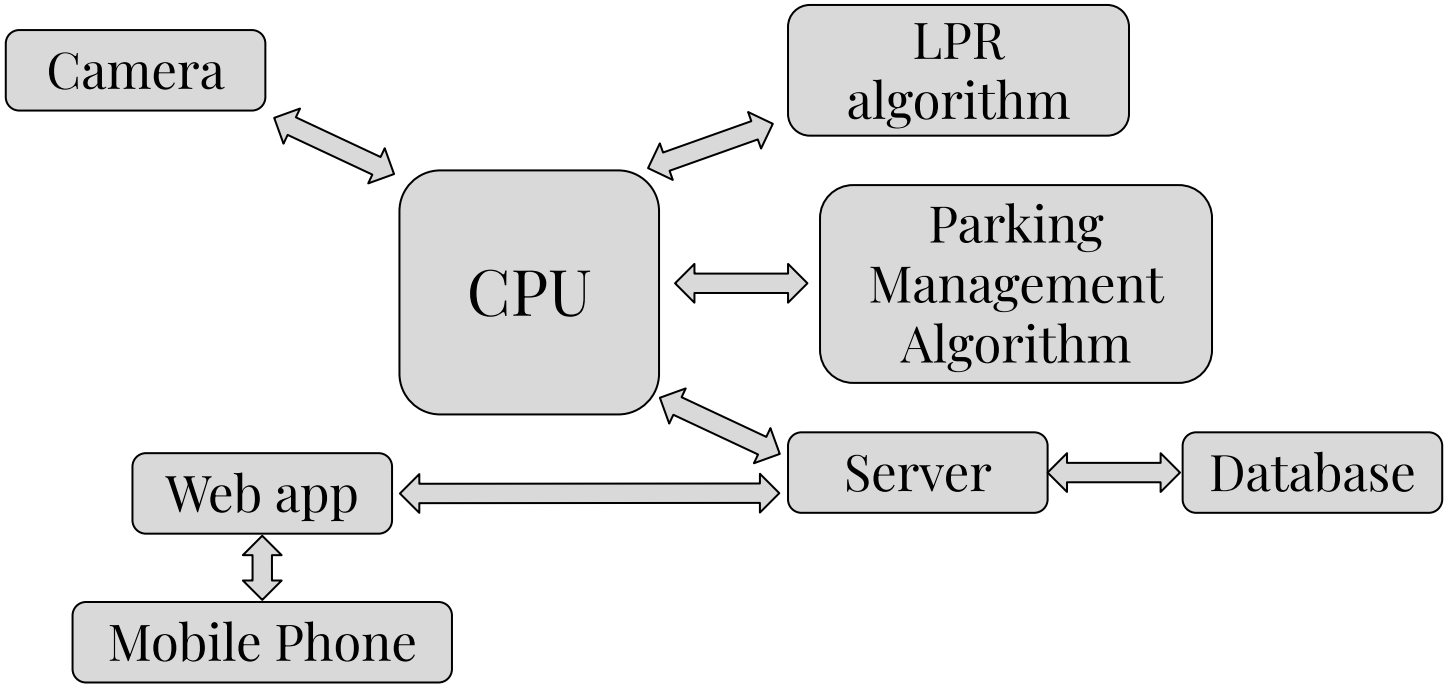
User Interface: Web application allows users to register their vehicles, view parking availability, make reservations.

Server: Hosts the web application

Parking Space Management: Optimizes parking space allocation.

Central Processing Unit: Processes the data received from cameras, manages the recognition of license plates, allocates parking spaces.

Interactions between Components



Tradeoffs in the Design

- This project only focuses on Entry management System. Exit requires another camera setup and is not considered now.
- Presence of card credentials of the user are only checked and payment APIs are not used for transaction.
- Parking Space Management algorithms allocates random space based on the free space data in database. In future, either sensors will be used or Computer vision algorithms will be used to detect free space.
- For entry gate control servo motor will be added based on the time availability

Tech Stacks

- **Web application:**

  HTML, CSS, JavaScript
- **Database Management System:**

  MongoDB
- **Server side script:**

  Node js
- **License Plate Recognition algorithm:**

  Python

Expected Challenges

- Accuracy of License Plate Recognition
- Integration Complexity
- Responsiveness of the web app

Timeline

Start date - 10/27/2023

Week 1 - Research on License Plate Recognition algorithm

Week 2- Implement LPR algorithm

Week 3 - UI and User authentication System development

Week 4 - System Integration and testing

End date - 11/26/2023