Parking Management with Intelligent License Plate Recognition

Nithish Kumar Saravanan

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.

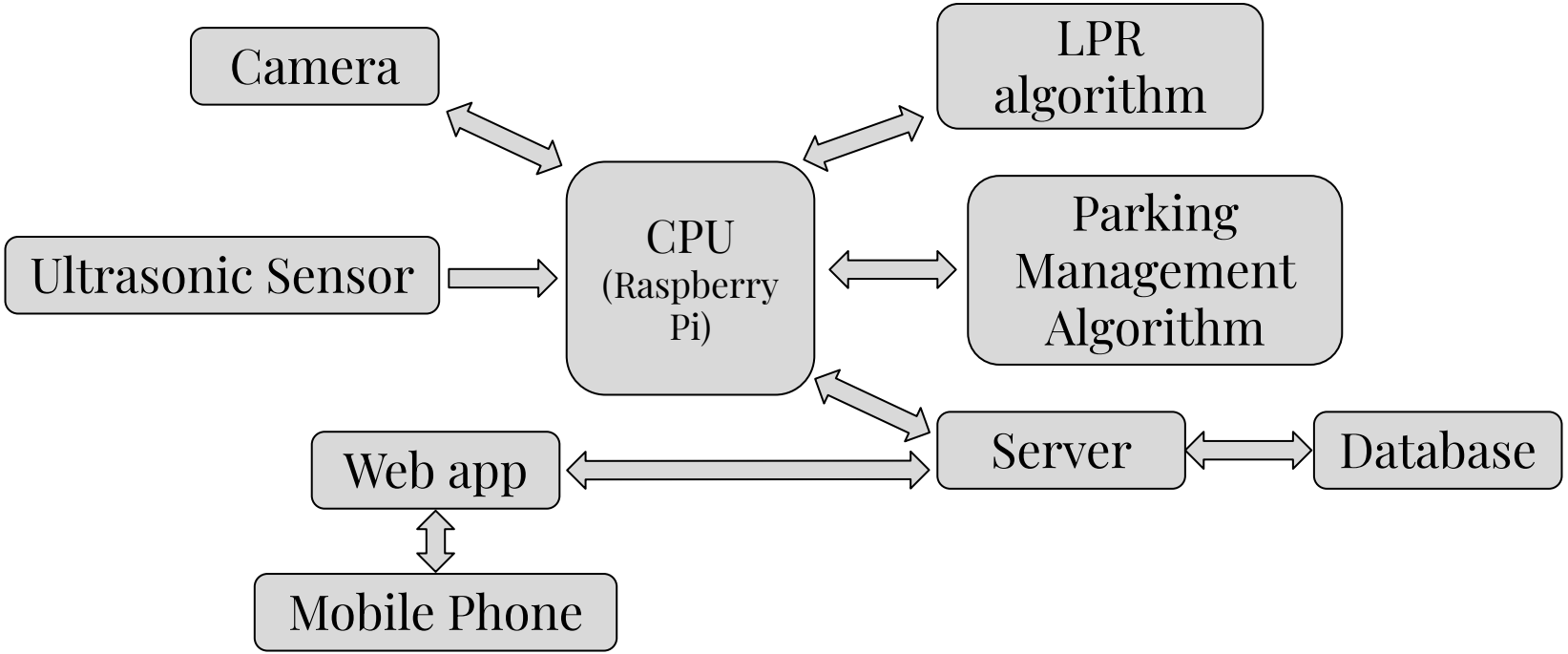
User Interface: Web application allows users to register their vehicles, view parking availability, make reservations.

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** and **Exit management** System. Only one camera setup will be used for both the systems.
- 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.
- Presence of card credentials of the user are **only checked** and **payment APIs** are **not used** for transaction.

Tech Stacks

- **Web application:**

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

  MongoDB Atlas
- **Server side script:**

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

  Python
- **Atlas CRUD operations:**

  Python, Node js

Expected Challenges

- Accuracy of License Plate Detection with feature rich background
- Accuracy of License Plate Recognition complex characters
- CRUD operations using two different drivers - Python and Node js at the sametime.
- Responsiveness of the web app

Timeline

Start date - 10/27/2023

Week 1 - Research on License Plate Recognition algorithm

Week 2- Implement LPR algorithm and basic CRUD operations in Atlas

Week 3 - UI and User authentication System development

Week 4 - System Integration and testing

End date - 11/26/2023