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Summer research Internship (2024)

Parking-Space Management System

Technologies to be Used in Implementation

Frontend Development: HTML, CSS, JavaScript, React.js

Backend Development: Python (Django)

Database: MongoDB / PostgreSQL

Real-Time Data: WebSockets / Firebase

Mapping and Navigation: Google Maps API.

Notifications: Twilio API (cloud communications platform used for sending SMS notifications.)

Cloud Services: AWS / Google Cloud

OpenCV: Used for video processing and computer vision tasks.

Mask R-CNN: deep learning framework for object detection and segmentation.

Matplotlib: A plotting library for the Python used in the code for displaying images

(These libraries together enable the functionality of the real-time parking management system, allowing it to process video, detect parking spaces, and notify users when a space becomes available. **)**

Hardware to be Used:

High-resolution IP cameras: Capture the real-time video feed of the parking area.

Wi-Fi Routers / Ethernet Switches: To ensure stable and high-speed connectivity for streaming video feeds from cameras to edge devices and from edge devices to the cloud.

(User Stories)

For Users:

User Sign Up:

- As a user, I want to sign up using my email address.

- As a user, I want to sign up using Gmail accounts so that I can create an account and start using the features.

User Log-In:

- As a registered user, I want to log in using my email and password or social media accounts so that I can access my account and personalized features.

Forgot Password:

- As a registered user, I want to be able to reset my password if I forget it so that I can regain access to my account .

Viewing Real-Time Parking Availability

- As a user, I want to see real-time information about available parking spaces, so that I can find a spot to park my car quickly and easily.

- Available parking spaces should be clearly marked and easy to identify.

Navigate to Open Parking Spots:

- As a user, I want to get navigation directions to available open parking spots so that I can reach them without hassle.

Get notifications for vacant spots:

- As a user, I want to receive notifications when a parking spot in my desired area becomes available so that I can park there promptly.

View the Parking Availability Map:

- As a user, I want to view a map showing real-time parking availability so that I can easily see where spots are open.

Mark Occupied Spots:

- As a user, I want to mark filled vacant spots so that the information remains accurate.

- As a user, I want to see if someone else has marked a spot as occupied recently so that I can avoid potential conflicts.

Share parking spot information:

- As a user, I want to share information about open parking spots with friends or family so that they can benefit from it too.

View parking history:

- As a user, I want to view my parking history so that I can keep track of where I parked and when.

Profile Management:

- As a user, I want to receive alerts about safety issues or incidents in the parking area so that I can make informed decisions.

Rate Parking Experience:

- As a user, I want to rate my parking experience after each use so that I can provide feedback to improve the service.

Find nearby amenities:

- As a user, I want to see nearby amenities (e.g., restrooms, shops) on the parking map so that I can plan my stops.

Parking lot owner / Middleman:

Sign up:

- As a parking lot owner / middleman, I want to sign up to create an account and start managing my parking lot.

Log in:

- As a parking lot owner / middleman, I want to log in so that I can manage my parking lot's availability and monitor usage.

Update Parking Availability:

- As a parking lot owner / middleman, I want to update the availability of parking spots in real-time so that users have accurate information.

Monitor parking lot usage:

- As a parking lot owner / middleman, I want to monitor the usage of my parking lot so that I can understand occupancy trends.

Receive Reports of Issues:

- As a parking lot owner / middleman, I want to receive reports of issues such as incorrectly marked spots or maintenance needs so that I can address them promptly.

Send Notifications:

- As a parking lot owner / middleman, I want to send notifications to users parked in my lot for important updates, such as maintenance or safety alerts.

Integrate with security systems:

- As a parking lot owner / middleman, I want to improve security systems via cameras so that I can ensure the safety and security of the parking area.

Optimize parking space allocation:

- As a parking lot owner / middleman, I want to optimize the allocation of parking spaces for different types of vehicles (e.g. compact cars, trucks, and EVs) so that I can accommodate a variety of users.

- As a parking lot owner / middleman, I want to dynamically allocate spaces based on real-time demand so that I can maximize occupancy.

Facilitate Communication:

- As a parking lot owner / middleman, I want to facilitate communication with users for any queries and feedback.

Manage event parking:

- As a parking lot owner / middleman, I want to manage parking during events by temporarily reserving spots or adjusting availability to accommodate increased demand.

Review user feedback:

- As a parking lot owner / middleman, I want to review user feedback to identify areas for improvement and enhance the parking experience.

Set custom parking rules:

- As a parking lot owner / middleman, I want to set custom parking rules for different zones so that I can manage my lot effectively.

Manage multiple lots:

- As a parking lot owner / middleman, I want to manage multiple parking lots from a single dashboard so that I can streamline operations.

For Admins/Developers:

Sign Up :

- As an admin or developer, I want to sign up to create an account and manage the system's backend.

Log In:

- As a registered admin or developer, I want to log in so that I can manage and maintain the features and user data.

Maintain system uptime.

- As an admin, I want to ensure everything runs smoothly and is available 24/7 so that users have reliable service.

Update Features:

- As a developer, I want to update and add new features based on user feedback so everything remains useful and relevant.

Monitor system performance:

- As an admin, I want to monitor system performance and resolve any technical issues quickly for smooth functioning without any interruption.

Ensure data security:

- As a developer, I want to implement robust security measures to protect user data so that their information is safe and secure.

Provide technical Support:

- As an admin, I want to provide technical support to users so that any problems can be resolved swiftly.

Manage user accounts:

- As an admin, I want to manage user accounts, including resetting passwords and handling account issues, so that users can access their accounts without trouble.

Manage API integrations:

- As an admin, I want to manage and monitor API integrations so that external services function smoothly.

Conduct user Research:

- As an admin, I want to conduct user research and gather feedback so that we can continuously improvise.