Project Report: Parking Vehicle App

Project Title

Parking Vehicle App

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Abstract

The Parking Vehicle App is a full-stack web application designed to streamline the process of reserving, managing and monitoring parking spaces for vehicle owners and administrators. It provides a user-friendly interface for users to book parking spots in real-time and allows administrators to manage lots and monitor occupancy data efficiently. Built using Flask and SQLite, the app supports both user and admin roles with secured login and session management.

Technologies Used

- Frontend: HTML5, CSS3, Jinja2 Templates
- Backend: Python, Flask
- Database: SQLite3
- Security: bcrypt python package (for password hashing)

Features

User Module

- Signup/Login functionality with password encryption
- Dashboard displaying nearby or filtered parking lots
- Ability to search for parking by address or pincode
- Real-time booking of available parking spots
- Release parking and view parking history with cost calculation
- Edit personal profile and change password

Admin Module

- Add, edit or delete parking lots
- View and manage all parking spots
- See details of currently occupied spots

- View summary reports and occupancy statistics via bar charts
- View and manage registered users

Database Schema

Tables:

- users: Stores user details with encrypted passwords and revenue tracking
- parking_lot: Contains information about parking lot locations and capacity
- parking_spot: Represents individual parking spots linked to lots
- reserve_parking_spot: Records active and historical bookings including timestamps and cost

Key Functionalities Implemented

- Auto-increment spot allocation on lot creation
- Real-time status management: 'A' (Available), 'O' (Occupied), 'X' (Deleted)
- Dynamic pricing and cost computation using SQLite datatime functions
- Password hashing and authentication using bcrypt
- Admin-protected routes and role-based redirection

Security Features

- Password stored as bcrypt hashes
- Role verification using decorators
- No client-side exposure of sensitive endpoints
- Session-based authentication with no-cache headers

Future Enhancements

- Integration with payment gateways
- QR-based check-in/out at parking lots
- SMS/Email notifications for bookings
- Google Maps integration for location-based search
- Admin analytics dashboard using advanced data visualization

Conclusion

The Parking Vehicle App demonstrates how software can solve real-world logistical challenges efficiently. By digitizing parking management, the application simplifies both user experience and administrative overhead, paving the way for smarter urban mobility.