Online Parking Booking System

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Abstract — Rapid urbanization and the exponential growth of vehicles have created serious parking management challenges in cities, including traffic congestion, fuel wastage, environmental pollution, and user inconvenience. Conventional parking systems are manual and lack real-time information, leading to inefficient utilization of parking resources. "This paper proposes an Online Parking Booking System", a web-based platform that allows users to search nearby parking locations, check real-time slot availability, reserve parking spaces in advance, and perform secure online payments. The system also provides an administrative module for parking operators to manage slots, pricing, and bookings efficiently. The proposed system significantly reduces parking search time, improves parking space utilization, and enhances urban mobility.

Keywords: Smart Parking, Python, MySQL, Real-time Booking, Urban Mobility

I. Introduction

Finding an available parking space in urban areas has become one of the most frustrating problems for drivers. A significant portion of urban traffic congestion is caused by vehicles searching for parking spaces. Traditional parking systems do not provide real-time slot information and rely on manual management. The Online Parking Booking System is designed to overcome these challenges by providing a platform where users can check parking availability, book slots in advance, and navigate directly to the reserved location using GPS. This system enhances convenience for users while improving parking space management for administrators.

II. Literature Review

The development of smart parking systems is widely studied as a crucial component of smart city infrastructure. Previous research highlights that transitioning from manual parking management to automated and web-based systems significantly reduces human error and improves administrative efficiency. Studies also indicate that real-time visibility of parking slot availability plays a vital role in minimizing roadside congestion, especially in densely populated urban areas. Further research emphasizes the importance of user-centric system design and intuitive visualization to enhance user adoption of smart parking applications. In addition, reservation-based parking models have been shown to optimize space utilization through effective resource allocation strategies.

Beyond traditional parking research, the methodologies employed in high-precision medical imaging offer significant potential for enhancing slot detection accuracy. For instance, an iterative method utilizing stacked deep learning operations was shown to enhance complex image analysis [13]. Similarly, the use of clinical-grade statistical reviews of image processing models [14] and comprehensive evaluations of intelligent systems [15] provide a robust framework for handling noise and variable lighting—challenges that are directly relevant to real-time parking grid visualization and automated occupancy detection.

III. Proposed Model

The proposed Online Parking Booking System is designed to simplify parking management by integrating user authentication, real-time slot availability, and reservation functionality into a single web-based platform. The system operates through multiple interconnected modules to ensure efficient booking and management of parking resources.

The User Module allows users to register and log in to the system. After successful authentication, users can access the dashboard to view available parking slots and book a suitable slot. The Admin Module is responsible for managing parking slots, monitoring booking activities, and maintaining slot availability. The Database Module, implemented using MySQL, stores user credentials, vehicle details, booking records, and real-time parking slot status. Additionally, the Navigation Module assists users in locating their reserved parking slots.

The complete operational workflow of the system is illustrated in Fig. 1. The flow begins with system initiation, followed by user authentication. If the user is not registered, the system redirects the user to the registration module before allowing login. Once authenticated, the user accesses the dashboard, selects an available parking slot, and completes the booking process, after which the system terminates the session.

IV. System Architecture

The architecture consists of a User Interface, an Application Server built with Python, and a MySQL Database. The operational logic follows a sequence where the user logs in, searches for a location, and the system fetches real-time slot data. Upon selecting a slot and processing the payment, the reservation is updated in the database and a confirmation is sent with navigation details.

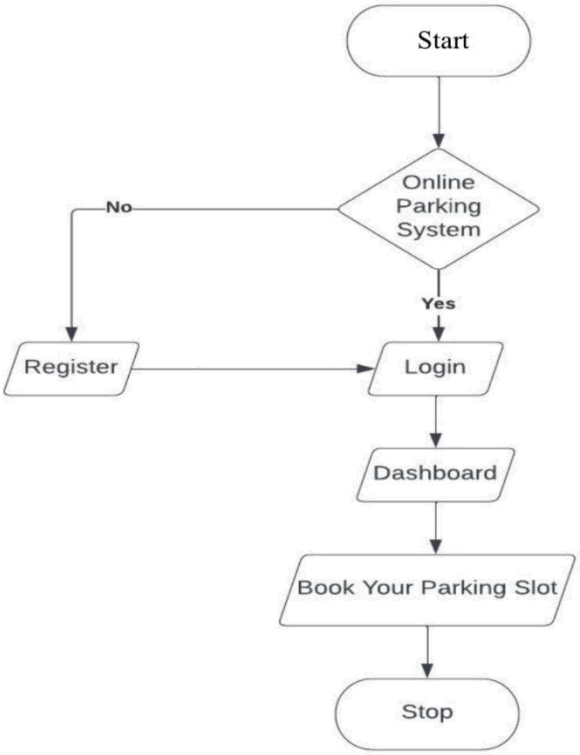

Fig. 1: Flowchart of the Online Parking Booking System.

V. IMPLEMENTATION

The system is implemented using:

- Frontend: Web interface
- Backend: Python
- Database: MySQL
- APIs: Google Maps API for navigation
- Payment Integration: Online payment gateway

The database continuously updates slot availability to prevent double booking. The developed system provides a user-friendly graphical interface for login, registration, parking management, and real time slot visualization

A. User Authentication and Registration

The system ensures secure access through an authentication layer. New users must provide their name, email, car number, and password to create an account, as shown in Fig. 2 and Fig. 3.

Fig. 2. User Login Interface.

Fig. 3" User Registration Portal.

B. Slot Selection and Real-time Visualization

Once logged in, users can select their preferred date and car number to initiate a booking Fig. 4. The core of the system is the live parking grid Fig. 5, which uses colour coding to represent occupied (red) and available (white/green) slots, preventing double-bookings.

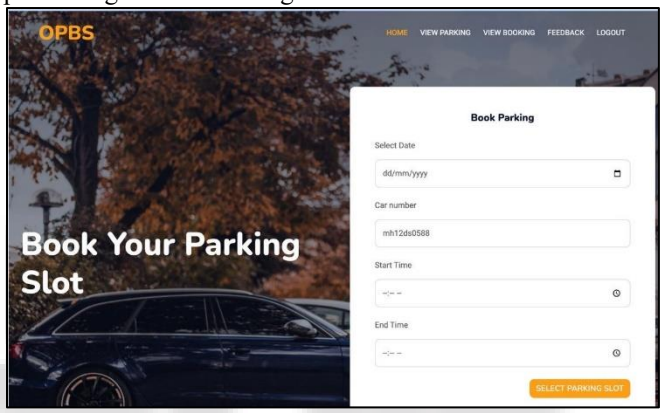

Fig. 4" Reservation Details Form

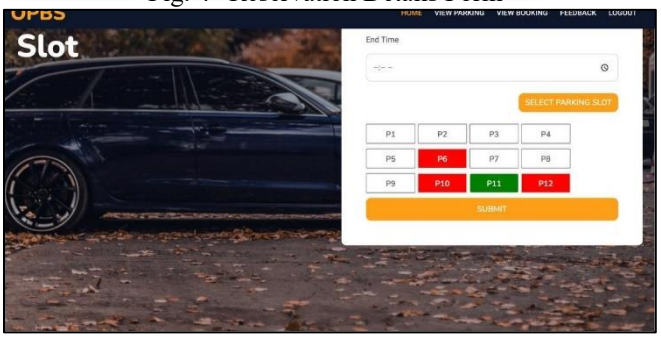

Fig. 5: Real-time Slot Availability Grid.

C. Payment and Booking Management

To finalize the reservation, the system provides an integrated payment gateway supporting Credit/Debit cards and UPI via QR code scanning Fig. 6. After a successful transaction, users can view and manage their active bookings through a dedicated dashboard Fig. 7, which displays the car number, slot ID, and specific time duration.

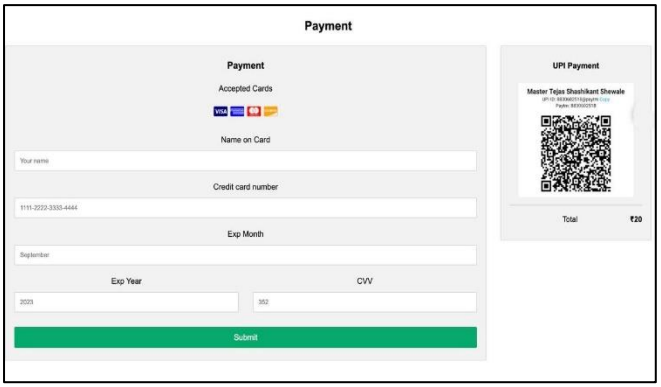

Fig. 6: Secure Multi-channel Payment Gateway.

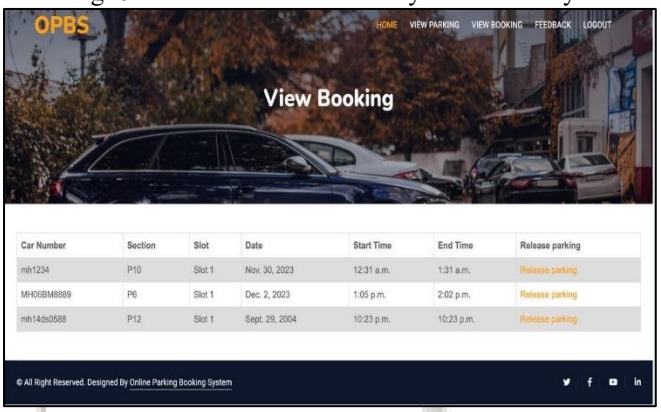

Fig. 7: User Booking Management Dashboard

VI. RESULTS

The system was tested in a simulated parking environment with multiple users attempting simultaneous bookings. The system successfully handled real-time updates and prevented slot conflicts.

Parameter	Traditional Parking	Proposed System
Search Time	10–15 Minutes	1–2 Minutes
Real-time Data	Not Available	Fully Integrated
Space Utilization	Inefficient	Optimized
Traffic Impact	High Congestion	Reduced Cruising

Table I. Performance Comparison

The results indicate that the proposed system significantly reduces search time and improves traffic flow.

VII. CONCLUSION

The Online Parking Booking System provides an efficient solution to modern urban parking problems by enabling real-time availability, advance booking, GPS navigation, and secure payments. The system contributes to reduced congestion and fuel savings. Future enhancements will involve integrating hardware sensors for automated occupancy detection.

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