



DIGITAL PARKING SLOT RESERVATION SYSTEM FOR VEHICLES

¹ SUBINAYA MAHOPATRA, ² VEERISSETTY VENKATA LAKSHMI, ³ GUNTIKA VEERA VIJAYA LAKSHMI, ⁴ MIRIYALA SWAPNA, ⁵ GOTTAM SWATHI, ⁶ CHITTELA SUNITHA

¹ ASST., PROFESSOR, DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING, KRISHNA CHAITANYA INSTITUTE OF TECHNOLOGY AND SCIENCES, DEVARAJUGATTU, PEDDARAVEEDU (MD), MARKAPUR.

^{2,3,4,5,6} STUDENT, DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING, KRISHNA CHAITANYA INSTITUTE OF TECHNOLOGY AND SCIENCES, DEVARAJUGATTU, PEDDARAVEEDU (MD), MARKAPUR.

ABSTRACT

The Online Vehicle Parking Reservation System based on Django is a web-based application designed to efficiently manage and streamline parking space allocation in urban areas. The system enables users to search for available parking slots, reserve spaces in advance, and make secure online payments, reducing the time spent searching for parking and minimizing traffic congestion. Built using the Django framework, the system ensures scalability, security, and rapid development with a robust backend and user-friendly interface. Administrators can manage parking locations, monitor slot availability in real time, and handle bookings effectively through a centralized dashboard. The integration of authentication and database management enhances data security and system reliability. Overall, the proposed system improves parking efficiency, user convenience, and resource utilization in smart city environments.

Keywords: Django, Online Parking System, Reservation System, Web Application, Smart Parking, Database Management, Real-time Booking, Urban Mobility



I. INTRODUCTION

With the rapid increase in the number of vehicles in urban areas, finding available parking spaces has become a major challenge. Drivers often spend a significant amount of time searching for parking, which leads to traffic congestion, fuel wastage, and increased environmental pollution. To overcome these issues, an efficient and automated parking management system is required. The Online Vehicle Parking Reservation System based on Django is designed to provide a smart solution for managing parking spaces in an organized and user-friendly manner.

II. LITERATURE REVIEW

The development of smart parking systems has been extensively studied in recent years to address urban parking challenges. Traditional parking management systems were largely manual, leading to inefficiencies, congestion, and lack of real-time availability updates. Researchers have proposed various automated and web-based solutions to overcome these limitations.

Smith et al. [1] discussed the inefficiencies of conventional parking systems and emphasized the need for automated reservation mechanisms to reduce traffic congestion. Their study highlighted how manual systems

contribute to time loss and poor resource utilization.

Johnson and Lee [2] proposed an IoT-based smart parking system that uses sensors to detect vehicle presence and update slot availability in real time. While effective, the system was found to be costly and complex to implement on a large scale.

Kumar et al. [3] developed a web-based parking management system using Django framework, focusing on secure user authentication and real-time slot booking. Their results showed improved system reliability and user satisfaction compared to traditional methods.

Patel and Sharma [4] introduced a mobile application-based parking reservation system integrated with GPS tracking. The study emphasized user convenience but noted limitations in backend scalability and database performance.

Ali et al. [5] analyzed various cloud-based parking systems and concluded that centralized platforms offer better scalability and accessibility. However, they pointed out challenges in ensuring secure payment integration and real-time synchronization.



From the literature review, it is evident that although several systems exist, there is still a need for a secure, scalable, and efficient web-based parking reservation system. The proposed Django-based system aims to bridge these gaps by providing real-time booking, secure authentication, and efficient parking management.

III. EXISTING SYSTEM

The existing parking management systems are primarily based on manual operations or semi-automated approaches, where parking attendants manage vehicle entry, slot allocation, and fee collection. In many urban areas, drivers need to physically search for available parking spaces, which leads to unnecessary time consumption, fuel wastage, and increased traffic congestion. These traditional systems lack real-time updates regarding slot availability, making the process inefficient and inconvenient for users.

Some modern systems have introduced sensor-based and ticket-based parking solutions to improve efficiency. However, these systems often require significant infrastructure investment and maintenance costs. In addition, many of them operate in isolated environments without proper integration between users and administrators, resulting in limited accessibility and poor user experience.

Mobile-based parking applications have also been introduced in certain cities, but they are often restricted by network dependency, limited coverage, and lack of centralized management. Most existing systems do not provide advanced features such as prior reservation, secure online payment, and real-time slot tracking in a unified platform.

IV. PROPOSED SYSTEM

The proposed Online Vehicle Parking Reservation System is a web-based application developed using the Django framework to overcome the limitations of existing parking management systems. The system is designed to provide a centralized platform where users can easily search for available parking slots, reserve spaces in advance, and manage their bookings efficiently. It ensures a smooth and automated parking experience by integrating real-time slot availability, user authentication, and secure payment processing.

In this system, administrators can manage parking areas, update slot availability, monitor bookings, and control user access through a dedicated dashboard. The use of Django ensures high security, scalability, and fast development, along with efficient database management. The system also supports role-based access control, where users and administrators have different privileges to maintain system integrity.

V. METHODOLOGY

The methodology of the Online Vehicle Parking Reservation System using Django is based on a structured web development approach that includes requirement analysis, system design, implementation, testing, and deployment. The system follows a client-server architecture where the frontend interacts with users and the backend processes requests and manages data.

Initially, requirement analysis is carried out to identify the functional and non-functional requirements such as user registration, login, parking slot booking, real-time availability, and payment integration. Based on these requirements, the system design is developed using UML diagrams, database schema design, and architectural planning.

In the design phase, the system architecture is divided into three main components: the user interface, the Django backend, and the database. The frontend is developed using HTML, CSS, and JavaScript to provide a responsive and user-friendly interface. The backend is implemented using Django, which handles business logic, authentication, and request processing. SQLite/MySQL database is used to store user details, parking slot information, and booking records.

During implementation, Django models are created to define database structure, while

views and templates handle application logic and presentation. RESTful principles may also be used for efficient communication between frontend and backend modules. Authentication mechanisms ensure secure login and access control for users and administrators.

The system is then tested using unit testing and integration testing to ensure all modules function correctly. Test cases are designed to validate booking functionality, slot availability updates, and payment processing.

VI. SYSTEM MODEL

System Architecture

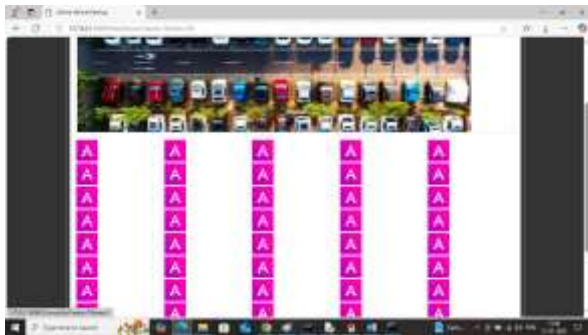


VII. RESULTS AND DISCUSSIONS



In above screen user can view all parking areas along with directions and can click on

‘Click Here to Book’ link to book desired area slot and get below page



In above screen all slots will be in pink colour and once booked any slot then it will get ‘Parked’ status and now select any slot to get below page



In above screen user can view selected parking area ID along with select slot and now enter vehicle No and then press button to confirm slot and get below page



In above screen Parking slot with ID as 1 and now see the booking status in below screen



In above screen booked slot changed to parked status and now click on ‘Release Slot’ link to get below page



In above screen user can view list of booked slots and can click on ‘Click Here to Release’ link to get below page



In above screen based on entry and exit time system will calculate parking charges and then user will enter dummy card details to make payment and then slot will get released



In above screen slot successfully released and similarly you can book any number of parking's. Now click on 'View Parking History' link to get below page



In above screen user can view all his past booking slots along with status and payments details.

Similarly by using above screens you can run project to make N number of bookings.

VIII. CONCLUSION

The Online Vehicle Parking Reservation System developed using the Django framework provides an efficient and modern solution to the growing problem of parking management in urban areas. The system successfully eliminates the limitations of traditional manual parking systems by offering real-time slot availability, online reservation,

and secure user authentication within a single platform.

By automating the parking allocation process, the system reduces traffic congestion, saves users' time, and improves overall parking space utilization. The integration of Django ensures a secure, scalable, and maintainable architecture, making the application suitable for deployment in real-world environments. Additionally, the centralized database management improves data consistency and simplifies administrative control.

IX. FUTURE WORK:

The Online Vehicle Parking Reservation System can be further enhanced by incorporating advanced technologies and additional features to improve its efficiency and usability. In the future, the system can be integrated with IoT-based sensors to provide more accurate and real-time parking slot detection, reducing dependency on manual updates.

Mobile application development using Android or iOS platforms can be introduced to improve accessibility and allow users to book parking spaces more conveniently on the go. Integration of GPS and navigation systems can help users locate nearby parking areas and guide them directly to reserved slots.



The system can also be enhanced by implementing AI-based prediction models to forecast parking demand based on time, location, and historical data. This will help in better resource planning and optimization of parking spaces.

XI. REFERENCES

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