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# **Parking Booking System**

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Abstract: This research paper explores the implementation of a Parking Booking System using Java for backend processing, HTML, CSS, and JavaScript for the frontend, and MySQL as the database. The paper discusses the challenges of urban parking, existing solutions, and how a technology-driven approach can optimize parking management. The proposed system integrates real-time booking, availability tracking, and payment processing to enhance user convenience and efficiency. The experimental results show that it effectively reduces congestion and enhances parking allocation. Future advancements such as AI-driven predictions and IoT integrations are also discussed.

Keywords: Parking management system, real-time parking, Java, slot reservation, parking booking system, urban mobility

# I. INTRODUCTION

# 1.1 Background

Urbanization has led to an exponential increase in vehicles, causing severe parking issues. Conventional parking management systems are inefficient, resulting in wasted time, increased congestion, and negative environmental effects. Smart parking systems aim to address these issues through automation and real-time monitoring.

The increasing number of private vehicles has put immense pressure on urban parking infrastructures. Without effective parking solutions, cities experience problems such as:

- Increased fuel consumption due to excessive vehicle idling.
- Rising pollution levels.
- Traffic congestion, which impacts daily commuting time and road safety.
- According to a report by INRIX (2023), drivers spend an average of 17 hours a year searching for parking, costing over \$345 per driver in wasted time and fuel.

### **1.2 Problem Statement**

Manual parking management leads to inefficiencies such as:

- Difficulty in finding available parking spots.
- Increased traffic congestion and fuel wastage.
- Security concerns regarding unauthorized vehicle parking.

A smart parking system can provide a real-time solution to parking challenges by enabling users to reserve spots online, track availability, and make digital payments.

### 1.3 Objectives

The objectives of this research are:

- To develop a smart parking system using Java, MySQL, and web technologies.
- To provide a real-time parking slot booking mechanism.
- To analyse the impact of automated parking on urban mobility.
- To integrate secure and contactless payment systems.
- To reduce environmental pollution by minimizing vehicle idle time.

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24



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#### Volume 5, Issue 10, May 2025



#### **II. LITERATURE REVIEW**

A review of existing smart parking solutions shows that most systems rely on RFID, IoT, and cloud-based platforms. However, many fail to integrate real-time user booking and optimized allocation.

Several studies indicate that digital parking solutions have helped reduce congestion by up to 40% in high-traffic urban areas. The use of real-time parking availability and reservation systems has demonstrated effectiveness in cities such as San Francisco, Tokyo, and Amsterdam.

Previous works, such as those by Smith et al. (2023) and Kumar et al. (2022), emphasize the role of IoT and AI in parking solutions. However, these systems often require high-cost infrastructure changes. The proposed Parking Booking System aims to deliver similar benefits using cost-effective web-based solutions.

Tuble 1. Comparison of Existing Systems vs Troposed Solution				
Feature	Existing IoT Systems	Proposed Web-Based System		
Real-Time Booking	Partial	Yes		
Infrastructure Cost	High	Low		
Mobile Compatibility	Varies	Fully Supported		
Scalability	Medium	High		
Integration Ease	Complex	Simple		

Table 1. Comparison	of Evisting	Systems ve	Proposed	Solution
1 a D C L C O H D a H S O H	OF EXISTING	OVSICILIS VS	FTODOSCU	SOLUTOIL

### **III. SYSTEM DESIGN**

#### 3.1 System Architecture

The Parking Booking System is designed using a three-tier architecture:

- Frontend: Built with HTML, CSS, JavaScript for user interaction.
- Backend: Java-based system handling logic and database operations.
- Database: MySQL for storing user data, reservations, and payment details.

The system follows a modular approach for easy maintenance and scalability. The architecture consists of:

- User Module: Manages user authentication and maintains user profiles.
- Booking Module: Manages slot availability and reservations.
- Admin Panel: Provides parking operators with insights into parking utilization.

#### Figure 1: System Architecture Diagram









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Volume 5, Issue 10, May 2025





# 3.2 Technologies Used

- Java: Manages business logic and backend functionalities.
- HTML, CSS, JavaScript: Creates an interactive and responsive UI.
- MySQL: Stores parking slot availability, user data, and transactions.
- Servlets & JSP: Handles request-response cycle between frontend and backend.

### **IV. IMPLEMENTATION**

# 4.1 Frontend Development

User Interface: Login, Slot Selection, Payment Gateway. CSS Frameworks: Bootstrap for responsiveness. JavaScript Validations: Ensures secure and error-free user input. Screenshot 1: User Dashboard





First Name		Middle Name		Last Name	
Date of Birth	dd-mm-yyyy	Gender	Male O Female O	District	Select v
Address		City		Email Id	
Jobile No		UserName		Password	

Screenshot 2: Booking Interface







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Volume 5, Issue 10, May 2025



Home Available Parking Area		Efficient Parking Management and Fare Collection System					
My Bockings	SR.NO	PARKING AREA NAME	ADDRESS	PRICE PER HR.	SLOT NUMBER	STATUS	ACTION
- my bookings	1	Wakad Parking Area	Pune	45	01	Booked	
7	2	Wakad Parking Area	Pune	45	02		
Logout	3	Wakad Parking Area	Pune	45	03	Book	
	4	Wakad Parking Area	Pune	45	04		

4.2 Backend Development

Java Servlets and JSP manage client requests and server responses.

RESTful APIs allow interaction with the database.

Payment Integration: Secured online transactions via UPI, credit card, and PayPal.

#### 4.3 Database Design

User Table: Stores user details.

Parking Slot Table: Keeps track of available and booked slots.

Transaction Table: Manages payments and reservations.





### V. RELATED WORK

Several parking management systems have been developed to ease the pressure of parking in urban environments. However, such systems frequently lack real-time tracking features and sophisticated reservation functionalities. For instance, existing solutions often rely on static data that fails to reflect the real-time availability of parking slots, which can lead to booking conflicts and wasted space.

Research in **smart cities** and **IoT-based systems** has highlighted the need for real-time data to improve urban mobility. However, the integration of such technology into traditional parking systems is still limited, making this project a crucial step toward enhancing parking management in real-world settings.







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#### Volume 5, Issue 10, May 2025



Volume 5, Issue T0, May 2025

# VI. RESULTS & DISCUSSION

The system was tested using simulated user interactions in a real-world scenario. Results show:

30% reduction in parking search time.

50% improvement in space utilization efficiency.

Secure and automated transactions, reducing payment fraud.

Table 2: Impact of Smart Parking on Traffic Congestion

		-
Metric	Before System Implementation	After System Implementation
Average Parking Time	15 min	5 min
Traffic Congestion	High	Low
User Satisfaction	Moderate	High

### 5.1 User Feedback

A survey was conducted with 80 participants.

85% found the system easy to use.

90% reported reduced parking time.

88% preferred digital payment over cash.

# VII. CONCLUSION & FUTURE SCOPE

# 7.1 Conclusion

The proposed Parking Booking System efficiently manages urban parking through real-time booking and secure transactions. The system successfully addresses parking challenges and enhances user convenience.

# 7.2 Future Enhancements

- Integration of AI-driven predictive analysis for slot availability.
- IoT-based real-time parking sensors for enhanced accuracy.
- Mobile application support for better accessibility.
- Blockchain-based security for transaction verification.
- Dynamic pricing models based on demand.

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# **APPENDICES**

Appendix A: Data flow Diagrams







Figure 6: Data Flow diagram DFD2









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#### Volume 5, Issue 10, May 2025



# **APPENDIX B: OVERALL DESIGN**



# Figure 8.1: Activity Diagram (User Activity)



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Figure 8.2: Activity Diagram (Parking Owner Activity)









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#### Volume 5, Issue 10, May 2025



#### Volume 5, 1550e 10, May 2025

# **APPENDIX C: TABLE DEFINITIONS**

User Table	Slot Table	Transaction Table
user_id (PK)	slot_id (PK)	transaction_id (PK)
name	location	user_id (FK)
email	is_available (BOOLEAN)	slot_id (FK)
password		payment_status (VARCHAR)

# **Appendix D: Screenshots**

Login Page Booking Interface



