



International Journal of Innovative Research in Science Engineering and Technology (IJIRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 8.699

Volume 14, Issue 4, April 2025

Car Parking Application

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ABSTRACT: Nowadays, vehicle parking has become a significant issue in urban areas due to the shortage of parking spaces. Finding a suitable parking spot during rush hours in metropolitan regions is often difficult and frustrating. To address this problem, the paper titled “**Smart Parking System Using Android Application**” proposes an efficient solution aimed at reducing traffic congestion in roads, multi-storey buildings, and malls caused by the unavailability of parking spaces.

The proposed application simplifies the process of parking slot reservation by allowing users to view available parking areas in real-time and check whether a space is available. If an empty slot is found, users can book it for a specific time period. The system also displays the nearest available slot based on the user's location using GPS technology.

The primary goal of the project is to utilize parking spaces efficiently while minimizing traffic congestion. This is achieved through a **cloud-based smart parking application** that offers real-time monitoring, slot booking, and enhanced services to end users. Additionally, it reduces the administrative workload for parking lot managers by automating the tracking and allocation process.

KEYWORDS: Android-based application, Parking management, Geolocation services

I. INTRODUCTION

The **Android-based Parking Management Application** aims to address the growing parking challenges in urban areas caused by the rapid increase in vehicle density. Traditional parking methods often lead to traffic congestion, frustration, and inefficient use of available space. This project offers a smart and user-friendly solution by integrating technologies like geolocation services, real-time slot availability tracking, and secure digital payments. Users can easily locate, reserve, and pay for parking spaces through a mobile app, while parking providers can manage their facilities, monitor slot usage, set pricing, and track revenue through a dedicated dashboard. Designed for scalability and efficiency, the application bridges the gap between parking demand and supply, with future enhancements like IoT integration and predictive analytics poised to further improve urban mobility and resource management.

II. LITERATURE SURVEY

Urban parking management has become a growing concern due to the rising number of vehicles in metropolitan areas, prompting the development of geolocation-based and real-time data-driven solutions. Research emphasizes that systems utilizing GPS for locating nearby slots and real-time updates significantly enhance user decision-making, reduce congestion, and improve parking efficiency. The integration of IoT and sensors for automated slot tracking has been shown to offer accurate availability information, though high costs limit adoption in smaller regions. Mobile applications with user-friendly interfaces, secure digital payments, countdown timers, and automated billing are proven to increase user satisfaction. From the parking provider's perspective, studies highlight the importance of tools for dynamic pricing, slot management, revenue tracking, and analytics-driven decision-making to optimize operations. While existing systems face challenges in scalability and adaptability,

the proposed Android-based parking management application addresses these issues by incorporating real-time geolocation, secure payments, dual-entity control, and a scalable architecture.

III. OBJECTIVE

1. To develop an Android-based platform that enables users to easily locate, book, and pay for parking slots in real-time.
2. To utilize GPS and geolocation services for displaying nearby available parking areas based on the user's current location.,
3. To provide a real-time parking management system for parking owners to add, update, and monitor slot availability and revenue.
4. To implement a secure digital payment gateway for automated billing based on parking duration, ensuring transparency and ease of transaction.

IV. TOOLS AND TECHNOLOGY

Due to software project we used Android studio

DESCRIPTION

Android Application Development:

Android Studio is the primary platform for building our parking management application. It serves as the user interface that connects drivers with available parking spaces. The app uses Java/Kotlin for core functionality and XML for designing intuitive user interfaces that display real-time parking availability and process secure payments.

Firebase Realtime Database:

Firebase acts as the cloud-based backbone of our system, storing and synchronizing parking slot data across all users in real-time. It enables instant updates when spaces become occupied or available, ensuring drivers always see current information. Firebase also handles user authentication securely and sends push notifications for booking confirmations and reminders.

Google Maps API:

The Google Maps API integrates with our application to provide precise geolocation services. This allows the system to display nearby parking facilities visually on a map interface, calculate optimal routes to available spaces, and provide distance estimates to help users make informed parking decisions.

Payment Gateway Integration:

Our system incorporates secure payment processing through established APIs like Stripe and Razorpay. These gateways handle all financial transactions within the app, encrypting sensitive data to protect user information while providing seamless payment experiences for parking fees.

Backend Server:

The Node.js/Django server forms the logical core of our parking management system. It processes reservation requests, manages user accounts, coordinates between the mobile app and database, and ensures all components communicate effectively. This server-side logic enables the complex operations behind simple user interactions.

Database Management:

MySQL/MongoDB databases store all critical system information including user profiles, parking location details, reservation histories, and transaction records. These databases maintain organized, quickly accessible information that powers the application's functionality while ensuring data integrity and security.

Web Socket:

The Web Socket protocol maintains persistent connections between the app and server, enabling instantaneous updates about parking space status changes. This technology ensures users see real-time availability without manual refreshing, creating a dynamic and responsive experience.

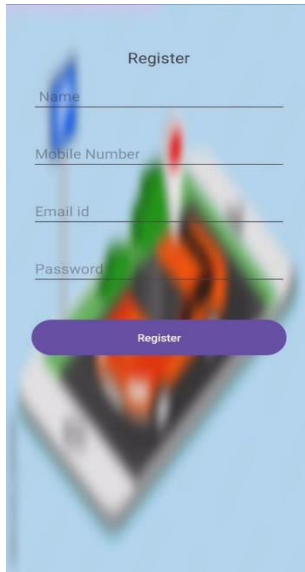
Volume 14, Issue 4, April 2025

|DOI: 10.15680/IJIRSET.2025.1404513|

V. MODEL

5.1 MODEL

5.1.1 UI-REGISTER, HOME-PAGE, LOGIN PAGE



Register

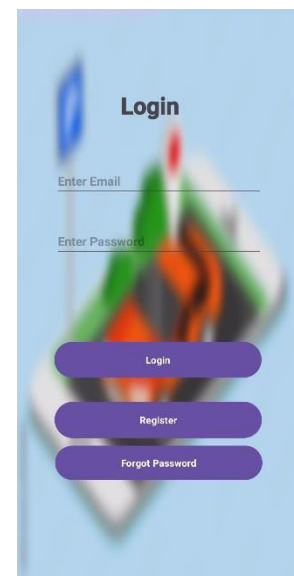
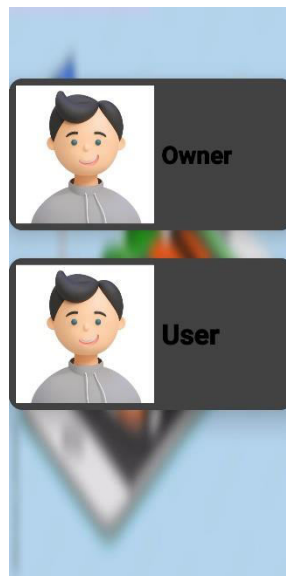
Name

Mobile Number

Email id

Password

Register



Login

Enter Email

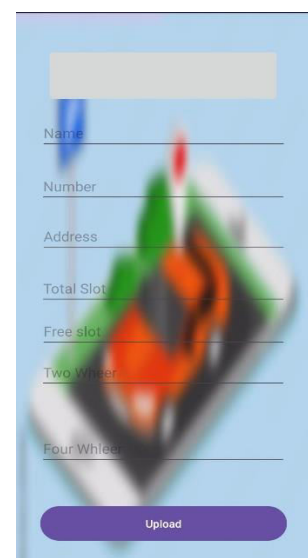
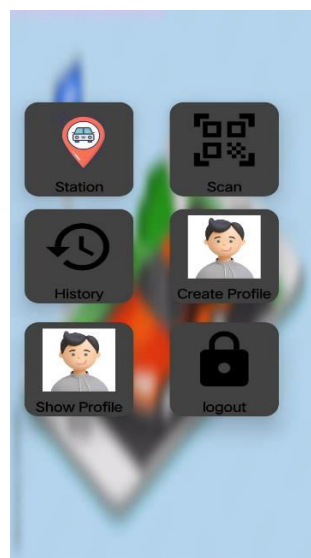
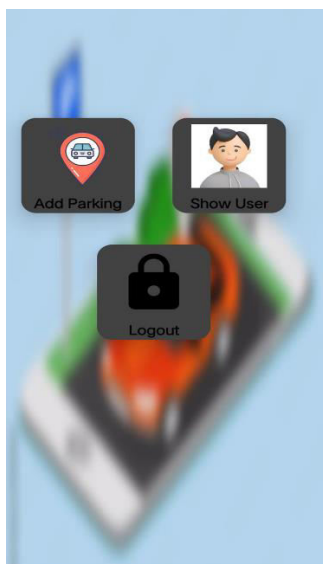
Enter Password

Login

Register

Forgot Password

5.1.1 UI FOR OWNER AND USER



Name

Number

Address

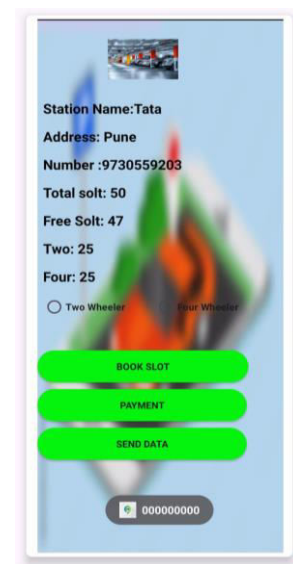
Total Slot

Free slot

Two Wheeler

Four Wheeler

Upload



VI. ADVANTAGES AND APPLICATIONS

6.1 ADVANTAGES

- **Real-time slot availability** – Eliminates parking search time.
- **Automated payments** – Secure, cashless transactions.
- **Reduces traffic congestion** – Cuts unnecessary vehicle movement.
- **Scalable & future-ready** – Supports IoT/AI upgrades.

6.2 APPLICATION

- The system can be used in various Parking Area.

VII. CONCLUSION AND FUTURE SCOPE

The Smart Parking System revolutionizes urban parking management by leveraging cutting-edge technologies to address key challenges. By combining real-time sensor data with a user-friendly mobile interface, the system eliminates the frustration of finding parking spaces while reducing traffic congestion and emissions. Its automated payment processing ensures seamless transactions, benefiting both drivers and parking operators. The scalable architecture not only meets current urban mobility needs but also provides a foundation for future technological integration. This solution represents a significant step toward smarter, more sustainable cities by optimizing parking space utilization and improving overall transportation efficiency.

The system's potential for growth includes integrating advanced IoT sensors and AI algorithms to enable predictive parking availability and dynamic pricing models. Future developments could focus on supporting autonomous vehicles with self-parking capabilities and expanding into a comprehensive urban mobility platform by linking with public transit and ride-sharing services. Additional enhancements may involve implementing blockchain for secure transactions, adding augmented reality navigation for parking guidance, and expanding globally with multi-language support. These innovations will further position the Smart Parking System as an essential component of next-generation smart city infrastructure, continuously adapting to emerging transportation trends and technologies.

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