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A Review on ParkMate - An Android-Based Smart Parking

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Abstract: *Urban areas face increasing challenges with vehicle congestion and inefficient parking systems, which result in user frustration, time wastage, and traffic bottlenecks. Traditional parking solutions often lack real-time availability tracking, transparent pricing, and effective user support. There is a need for a smart, automated parking management system that simplifies the parking process, reduces manual intervention, and provides real-time support to users. The aim of the project is to develop an Android-based parking system—ParkMate—that enables users to register, log in, select parking preferences, make secure payments, and access navigation and support features, all in one application. ParkMate was developed using a modular approach with technologies like Android Studio, Node.js, MongoDB, Razorpay API for payments, Google Maps for navigation, and a chatbot system for user assistance. The app follows an Agile development methodology and includes modules for booking management, user authentication, payment, and order history. The application provides a seamless flow from registration to payment, generates a receipt post-booking, enables real-time navigation to the selected parking area, shows remaining/advance booking time, and integrates a chatbot that resolves most user issues efficiently. ParkMate successfully addresses the major gaps in traditional parking systems by offering a comprehensive, easy-to-use, and real-time parking solution, improving user convenience and urban parking efficiency.*

Problem statement:-Urban drivers often face difficulties such as lack of real-time parking slot availability, manual and delayed payment methods, absence of navigation to parking areas, and no instant support, leading to inefficiencies and dissatisfaction.

Objective:-

To develop a smart, user-friendly parking solution that automates slot booking, integrates secure payment, enables real-time navigation, and provides instant support via chatbot.

Methodology: The system is developed using Android Studio for the frontend, with Node.js and Express.js for the backend. MongoDB Atlas is used as the cloud database. Razorpay is integrated for payment, Google Maps API for navigation, and Dialogflow for chatbot support. The development followed an agile methodology with iterative testing.

Key results:-The system successfully provided accurate slot booking, smooth payment integration, effective navigation, and prompt user assistance, significantly improving the user parking experience.

Conclusion:-ParkMate proves to be an efficient and scalable parking solution for urban environments. Its integration of automation, cloud services, and real-time support enhances convenience and sets the foundation for future improvements like slot-level navigation and EV charging support.

Keywords: *Smart Parking, Android App, Parking optimization, Online Payment, Razorpay, Booking Management, Navigation, Chatbot*

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