EVPowerStop - Electric Vehicle Station Finder and Slot Scheduler

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Abstract: *The rise of electric vehicles (EVs) signifies a pivotal shift towards sustainable mobility; however, the lack of accessible, real-time charging infrastructure continues to impede their widespread adoption. EV users often encounter challenges such as locating nearby stations, unavailability of charging slots, and inefficient navigation. To address these issues, this research presents EVPowerStop, a mobile-based solution that enables users to locate EV charging stations, book slots in real-time, and receive optimized navigation using geolocation services. The system is developed using Flutter for cross-platform support, integrated with Google Maps APIs for navigation, and utilizes the EV Charge Finder API to fetch real-time station data. A custom Node.js backend with MongoDB manages slot bookings, user data, and booking history. The mobile app securely handles session management through token-based authentication using SharedPreferences. The architecture ensures low-latency interactions, real-time availability checks, and a responsive user experience. The system was tested under varying network and device conditions and demonstrated reliable performance with booking conflict resolution and accurate navigation. The proposed model enhances EV accessibility and represents a scalable solution for smart mobility.*

Keywords: Electric Vehicles, EV Charging, Slot Booking, Flutter, Google Maps API, RapidAPI, Real-Time Navigation, Mobile Application, Node.js, MongoDB