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Accurate Indoor Localization and Path Guidance Using WiFi Fingerprinting Techniques

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Abstract: *In moment's connected geography, indoor navigation is essential for delivering superior user gests in extensive and intricate surroundings similar as hospitals, shopping promenades, airfields, and university premises . Traditional GPS-based positioning systems often fall short indoors, struggling to deliver reliable accuracy due to signal degradation and physical obstructions. This study presents a robust Wi-Fi-based indoor navigation system that leverages fingerprinting and machine learning algorithms to precisely predict a user's location within a building. The system effectively collects Wi-Fi signal data (Received Signal Strength Indicator, RSSI) from existing access points and seamlessly matches this information with a pre-trained model to accurately determine real-time user positioning. A dynamic floorplan interface is employed to not only visualize user movement but also to provide efficient, destination-oriented routing. Notably, this system operates without the need for extra hardware and is designed to continuously adapt to changes in the environment, maintaining optimal performance at all times with its superior scalability and precision, the proposed method is a reliable and transformative solution for advancing smart indoor environments.*

Keywords: Indoor Positioning, Wi-Fi Fingerprinting, RSSI, CSI, Real-time Localization, Floorplan Navigation

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