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**Peer-to-Peer based indoor localization using smartphones: A wi-fi RSSI and fingerprinting algorithm approach**

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The evolution of smartphones with advanced wireless communication network capabilities has accelerated the adoption of Indoor Positioning Systems (IPS). These IPS desire to predict the position or location of various wireless devices. The (GPS) remains the widely adopted Location-Based Services (LB Global Positioning System) application for positioning and navigation in an outdoor setting. However, GPS is inefficient indoors due to the line-of-sight requirements to the satellites. The indoor environment is harsh with multipath effects that cause occlusion between the GPS receiver and transmitter. Short range technologies such as Wi-Fi are gaining popularity indoors to alleviate GPS as an alternative technology. However, Wi-Fi infrastructure can be costly. This paper presents a cost-effective localization solution that utilizes Android smartphones as the sole requirement, eliminating the need for additional hardware. The proposed IPS solution uses a fingerprinting algorithm and employs a Peer-to-Peer (P2P) localization approach to reduce the cost implications of Wi-Fi. Only the received signal strength indicator (RSSI) measurements from Wi-Fi Direct and allied devices are used as input during both the offline and online stages of the fingerprinting process. The proposed IPS developed an Android mobile application in Java programming using Android Studio, with SQLite and Firebase real-time Database for storage. We have tested the system in real-time and evaluated its performance; the system produced a high accuracy of 93.33% for monitoring.