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Abstract title:

Evaluation of UWB and Wi-Fi Cooperative Localization Performance in Indoor Environments

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Localization capabilities are nowadays standard features in mobile devices and the determination of the real-time location of a mobile user is essential for the majority of Location-based Services (LBS) and other navigation applications. Indoor precise navigation, however, is still a great challenge. The members of the joint IAG (WG 4.1.1) and FIG (WG 5.5) Working Groups on Multi-sensor Systems have undertaken several measurement campaigns to evaluate current available sensors and technologies. In a number of studies new concepts for indoor localization, particularly for personal mobility applications were proposed leading to a considerable improvement of localization performance. This contribution reports about a series of experiments conducted in an indoor lab setting at TU Wien, Austria. The employed techniques included Ultra-wide Band (UWB) and Wireless Fidelity (Wi-Fi). For UWB positioning a commercial system was employed and for Wi-Fi positioning received signal strengths (RSS) were recorded with an in-house developed smartphone application. In addition, the inertial sensor measurements from the accelerometers, gyroscope, magnetometer and barometric pressure sensor in the smartphones were recorded with this App. The performance evaluation consisted of a system calibration and both static and kinematic tests. In these navigation trials, four smartphone users were moving cooperatively along predefined trajectories. One user had enabled the hotspot function on his device enabling the other users of the group to measure the RSS for the derivation of inter-nodal ranges between them for a Cooperative Positioning (CP) solution. Useful insights regarding system calibration and sensors' deployment geometry effect are derived.