

Study for the Development of a Guidance and Information System Based on Wi-Fi for TU Wien

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SUMMARY

A guidance and information system based on Wi-Fi signals using fingerprinting for localization is currently under development for the whole University campus of TU Wien (Vienna University of Technology). In a first step, the availability, performance, and usability of Wi-Fi in selected areas of the University are analyzed. For this purpose, Wi-Fi received signal strengths (RSS) of the surrounding access points (APs) were measured in front of the main building of the University, in the library and in a large multi-storey office building called Freihaus under real conditions. The measurements were carried out in static, kinematic and stop-and-go mode with six different smartphones. In this paper, the kinematic measurements of users walking along predefined trajectories are analyzed. Kinematic measurements, however, pose much greater challenges than the usual static or stop-and-go measurements. The analysis of the system training measurements showed that there are sufficiently stable signals available everywhere on the campus to carry out a position determination using Wi-Fi fingerprinting. A probabilistic fingerprinting approach based on the Mahalanobis distance was then applied. The resulting deviations from the ground truth in the positioning phase were in the range of 1 to 3 m in the Freihaus office building. A significant dependence of the results in the kinematic mode, however, is caused by the duration of a single Wi-Fi scan. The durations were in the range of 2.4 to 4.1 s depending on the used smartphone. This can result in different accuracies for kinematic positioning, as fewer measurements along the trajectories for interpolation are available for a device with longer scan duration.

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