

Investigation of location capabilities of four different smartphones for LBS navigation applications

Guenter Retscher
Institute of Geodesy and Geophysics
Vienna University of Technology
Vienna, Austria
gretsch@pop.tuwien.ac.at

Tobias Hecht
Institute of Informatics
Vienna University of Technology
Vienna, Austria

ABSTRACT

Smartphones provide communication convenience for people in their daily life but also offer location and navigation functionalities as well as opportunities to collect data for scientific research. Conventionally, for tracking and trip recording the location determination of the user relies mainly on GNSS. In challenging urban and indoor environments where GNSS signals are frequently blocked or not available a GNSS receiver may not be able to provide sufficient coverage for tracking of a user. In addition, carrying an additional GNSS receiver may impose some additional burden to individuals. The use of smartphones has the advantage that no additional device has to be carried by the user. Most importantly, also additional sensors such as WiFi as well as a digital compass and accelerometers are integrated into the smartphone. The integration of GPS/WiFi mobile devices, wireless communications and other positioning technologies, as well as geographic information and mapping systems are the basis for tracking applications. MEMS-based accelerometers in the smartphone can be used to determine the current movement state of the user, e.g. standing, walking, or fast moving in a car or public transportation. In addition, the digital compass can provide the orientation of movement. The research study discussed in this paper covers combined indoor/outdoor environments in a building and its surroundings of the Vienna University of Technology. In the tests four different smartphones have been investigated, namely an Apple iPhone 4, a Samsung Galaxy SII, a HTC EVO 3D and a Nokia X7. One main objective of the presented tests is to assess the quality of the data provided by the sensors in smartphones. The test results show the feasibility of using smartphones for tracking in LBS and other navigation applications.

KEYWORDS: Indoor/outdoor positioning with smartphones, LBS, indoor navigation, trip recording, MEMS-based sensors, accelerometer, digital compass and gyro, WiFi fingerprinting.