# Bachelor's Thesis

« Room-Based WiFi-Localization using Machine Learning »

Background

Navigation devices and smartphones which rely on GPS signals have found their way into our daily lives already some time ago. However, inside buildings these technical helpers do not work properly. There is a lot of research going on trying to provide reliable indoor positions. But still it cannot be foreseen which technology will be able to provide this service nor when it might be available.

Nevertheless, in the Institute of Telematics there is already research going on to provide indoor navigation for smartphones. Emphasis is put on how maps may look like, how routing technologies can be used, and how these components can be combined into a smartphone application to be used by consumers.
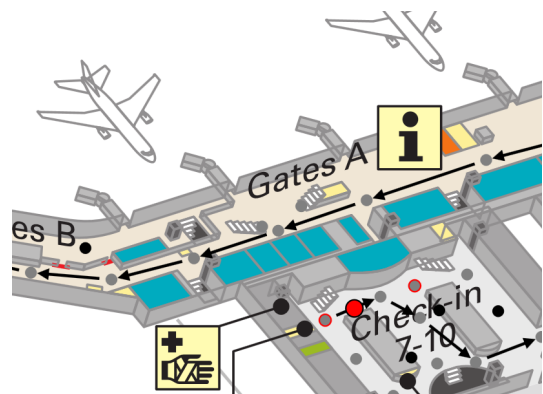
For test purposes we require a localization technology which provide a rough position estimation indoors. First evaluations have shown that a WiFi-based approach will be sufficiently reliable for a room-based localization.

Work description

The goal of this work is to evaluate, enhance, and implement our localization approach and possibly develop an alternative.

In a first step, existing research needs to be analyzed. Next, our approach will be theoretically described and afterwards tested practically. For the theoretical part, different machine learning algorithms have to be evaluated and detailed. Since localization shall be performed on smartphones, performance issues need to be considered. An existing tool for working with floor plans can help with the practical part.

The final goal is to create of proof-of-concept Android app, which features a learning phase and a localization mode. For learning, the own position has to be manually chosen on a map. After learning is completed, the app shall show the own position on the map by merely performing a single WiFi scan.

Using the app, reliability of the approach and the average error shall be evaluated. A comparison between different hardware platforms is also possible, evaluating whether learned data can be shared between devices.

Requirements

Knowledge of Java and Android; optionally SVG and machine learning

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