

Report for Indoor Localization

Li Yuanxi

1. Purpose

This report is written to introduce our study and our work.

2. Studies done

(1) Definition of indoor localization

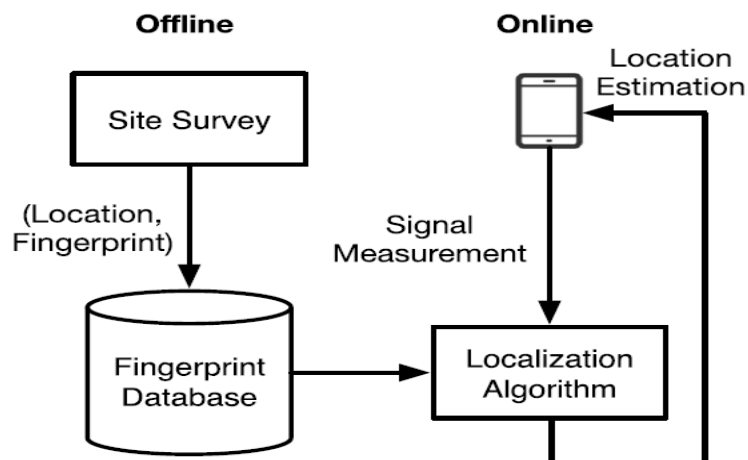
It is a system to locate objects or people inside a building using radio waves, magnetic fields, acoustic signals, or other sensory information collected by mobile devices.

(2) Indoor localization methods

Many methods are introduced in indoor localization. We mainly studied two methods, RADAR and Wi-Fi Fingerprint-Based method.

RADAR is An In-Building RF-based User Location and Tracking System. It uses signal strength information gathered at multiple receiver locations to triangulate the user's coordinates. Triangulation is done using both empirically-determined and theoretically computed signal strength information. There are basically 2 ways, empirical method and radio propagation model. The empirical method is able to estimate user location with a high degree of accuracy. The median error distance is 2 to 3 meters, about the size of a typical office room. The main limitation of the empirical method is that significant effort is needed to construct the SS data set for each physical environment of interest. Furthermore, the data collection process may need to be repeated in certain circumstances, e.g., when a base station is relocated. The propagation model is cost effective in the sense that it does not require detailed empirical measurements to generate a signal strength map and consequently has a low set up cost.

Traditional outdoor localization relies on the trilateration and triangulation, which requires line-of-sight measurement. Such schemes do not work well indoors with obstacles and room partitions. Without assuming line-of-sight, Wi-Fi fingerprinting, a process of signal collection and association with indoor locations, has become a promising approach.



basic operation of Wi-Fi fingerprint based indoor localization

In this figure, we show its basic operation. In the offline phase, a site survey is conducted to collect the vectors of received signal strength indicator of all the detected Wi-Fi signals from different access points at many reference points of known locations. Hence, each reference point is represented by its fingerprint. All the received signal strength indicator vectors form the fingerprints of the site and are stored at a database for online query.

3. Our work

We Cooperated with Foxconn and our precision reaches 3m. Also, our server connects with mobile phone terminal successfully and met BLE precision requirements.

4. Future work

Server stress tests scheme are required, and anti interference ability should be improved, and our system is going to be transplanted to a new server.