Android based Indoor Wi-Fi Positioning System
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1 Introduction

The goal of this project is to build an android based indoor wifi positioning system. Indoor use of wireless systems poses one of the biggest design challenges. It is very difficult to design an "RF friendly" building that is free from multipath reflections, diffraction around sharp corners or scattering from wall, ceiling, or floor surfaces. The indoor signal propagation problem is resolved by receiving a collection of signal strength measurements that improves localization accuracy. Most of the existing system that offer indoor localization services use different wireless technologies like Bluetooth, WiFi, signals from cellular towers and ZigBee. The methods using WiFi are more ubiquitous in most public buildings. We have also chosen WiFi as our wireless technology.

2 System Design

The Wifi localization that was considered in our project is Wi-Fi Trilateration[1]. This estimates the distance between the user and the transmitter. This distance is used as the radius to draw a circle from the transmitter to the user. Then by getting the intersection of circles the localization of the user is determined. This technology uses the strength of the signals to estimate the distance of the user from each of the transmitter. This method requires at least three access points to estimate the distance. The signal strength depends on the distance between transmitter and receiver and also the random noise comes in effect.

2.1 Description of system architecture:

The system is designed by following client server architecture. The wifi access points serves as the server and any wifi based mobile device running android operating system serves as a client.
3 Related Work

There are many existing indoor positioning systems available in the market, but very few among them are Wi-Fi based systems. Indoor GPS, an Android app is one among them. This app locates the current position of the device based on the start and end points calibrated by moving inside the building. This app is not very efficient as it does not use trilateration and hence not very accurate. Indoor atlas is another indoor positioning system which makes use of Earths magnetic field instead of Wi-Fi. More information about indoor positioning related work can be found in the below references.

References


https://www.indooratlas.com/

[4] Indoor GPS, Google Play Store

[5] SubPos - A ”Dataless” Wi-Fi Positioning System
https://www.youtube.com/watch?v=m3yo97_1XFI

4 Current Status and Plan

As of now we are successful in creating an Android app which could get basic details from the user like, building name, choose existing Wi-Fi access points inside the building and store them in the database. Going forward, we plan to allow users to create and calibrate some points inside the building so that he could find his relative location with respect to the already calibrated points. For this we have to do distance calculation of the user’s location using the Received Signal Strength (RSS), making use the Android Wi-Fi Manager API. We plan to achieve this by the end of April.