A Hybrid Approach for Indoor Mobile Phone Localization

Motivation

• Indoor mobile location tracking needed for many location-based apps, especially given the rapidly growing smartphone adoption.
• But practical and easily deployable solutions for indoor location still being researched.

Our Approach

1. Exploit built-in smartphone sensors (e.g., accelerometer, compass) to do dead reckoning.
   - Naturally enables continuous location tracking.
   - Energy efficient.
   - Explored already, but mostly for outdoor environments [1, 2].
   - Dead reckoning in indoor environments relatively more challenging.
   - Needs reliable anchor points every now and then to keep location error under check.

2. WiFi fingerprinting to leverage existing WiFi infrastructure and WiFi interfaces common on phones.
   - Not suitable for continuous location tracking coz WiFi scans power hungry and time consuming.

Hybrid approach that combines dead reckoning and WiFi fingerprinting to retain their best aspects.

- Dead reckoning using machine learning based activity recognition, speed estimation and map matching.
- Crowdsourced WiFi fingerprinting to avoid a priori training data collection.
- Hybrid approach in action below.

Preliminary Results

• Implemented our hybrid localization system on Android Nexus One phones and using Google App Engine as back-end.
• Results from early evaluation in Informatics Forum Bldg at Univ. Of Edinburgh.

References