EECS589 Project Proposal
Branden Ghena

Wearabouts - Semantic Localization through Wearable Devices

Project Team: Branden Ghena

Motivation: Indoor localization is a tremendously useful service for building control systems. Many applications in the area of energy efficiency and occupant comfort could be made possible with accurate information on the occupants of the building and their locations. Rather than the absolute location measurement provided by systems like GPS, room-level localization is sufficient to enable these services. While this type of information would be useful, the question remains, how do we obtain it?

Proposal: People and their devices are becoming intrinsically tied together. A smartphone already accompanies its user for most of the day. Devices for health monitoring, such as the Fitbit, actually incentivize users to keep them on their person. We propose that these wearable devices can be used as a proxy for their owner, and that by monitoring device communications, we can provide a room-level localization service.

The proposed system uses router-type hardware to do passive location inference based on network communications. By monitoring the MAC layer unique addresses of wireless transmissions, the devices nearby to the router can be determined. This is a twist on the normal method of localization. Instead of running localization operations on the power-constrained and processing-limited devices themselves (such as GPS, WiFi mapping, or inertial methods), our system uses powered infrastructure for detection. By connecting this system with other notifications of user location such as RFID door entry, devices and their users can be automatically correlated. We envision this system as a network service that could be automatically provided by future wireless router technologies.

Project Plan:

- Late October
  - Fully functional infrastructure for detecting WiFi and Bluetooth devices
  - Data collection of Bluetooth devices across several rooms
- Mid November
  - Characterization of system accuracy
  - Automatic device owner detection
- Late November
  - Prepare paper
  - MobiSys'15 registration
- Early December
  - Presentation for class
  - Paper for class
  - MobiSys'15 submission