Allen Nguyen

Port of Japanese Friendship Garden Android app
Haiku Hunt into iOS

Update for July 9nd
Week 2

Prime internship in Osaka, Japan

In collaboration with BPOC, PRIME, NICT, ISID, & Japanese Friendship Garden
Project Overview

- Deployment of iBeacons on iOS platform
  - Two main objectives
    - 1.) Port Android Haiku Hunt application written by Jesus Rios of PRIME 2013 onto iOS
    - 2.) Map user location using iBeacons
  - Possible future uses:
    - Delivering data to users when they reach a certain location
    - Monitoring user location
Progress for This Week

- Followed up on a few of Dr. Haga’s suggestions
  - Making a graph of predicted distance values (based off of RSSI, which is the signal strength of the iBeacons) to have a sense of how much they fluctuate
  - Measured RSSI values over time at .5 second intervals for a duration of 50 seconds for each trial.
    - Subsequent trials increased the distance by .5 meters. 0.0 meters was the 1\textsuperscript{st} trial, 5.0 meters the last.
  - Tried mapping location by trilateration (using distances from known points to calculate location). Used a grid of iBeacons at known coordinates in the X-Y plane
Problems Encountered

- Using a grid a good starting point; however, the grid has no effect on curbing fluctuations in iBeacon signal strength (which translates to distance measured)

- Single iBeacons much too inconsistent to be reliable, as shown by RSSI/distance samples. Need to explore other approaches further to try and restrict RSSI/distance to a less dynamic range

- Too many external factors resulted in extreme spikes/dips in signal strength like orientation of device, direction user is facing, Bluetooth waves easily absorbed by human body or reflected by walls/obstructions, etc. => adverse effect on predicted distance
Plans for Next Week

- Explore possible workarounds to increase iBeacon consistency in signal strength
  - Cluster multiple iBeacons
  - Sample RSSI over time before using an averaged RSSI in distance calculations
  - Other approaches?
Sample of RSSI/Predicted Distance at Various Actual Distances

X axis is distance predicted from RSSI values in meters

Y axis is actual distance from iBeacon in meters

Actual distance: 4.5
Predicted: distance 7.8xx
Grid Location Mapping

Distance from user to beacon A: 1.934194
Distance from user to beacon B: 0.969393
Distance from user to beacon C: 1.220394

Estimated Location
X: 0.862590
Y: 1.700346
Cultural Appreciation

Osaka Aquarium
Acknowledgements

- Dr. Gabriele Wienhausen
- Dr. Jason Haga & Vivian Haga
- Dr. Shinji Shimojo
- Tomoaki Takata
- Teri Simas, Jim Galvin, Madhvi Acharya
- PRIME alumna Haley Hunter-Zinck
- NICT
- ISID
- BPOC
- PRIME
- Japanese Friendship Garden
- National Science Foundation