Indoor Navigation with Smartphones

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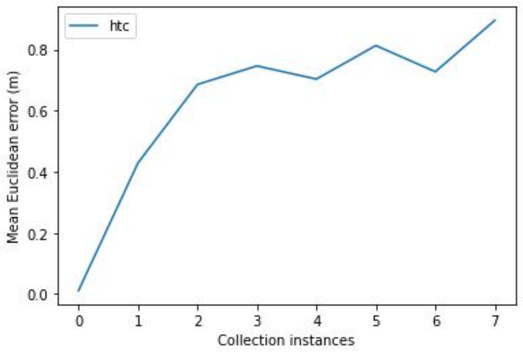
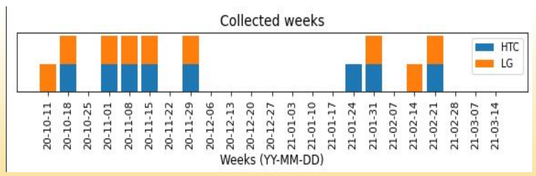
The Data Set:

- Over the duration of our project we collected data weekly
- The result is a Data set containing about 15 weeks of data with 2 devices along 2 paths in the CSU engineering building
- The dataset accurately portrays the temporal variance need to train better localization models





Overview:

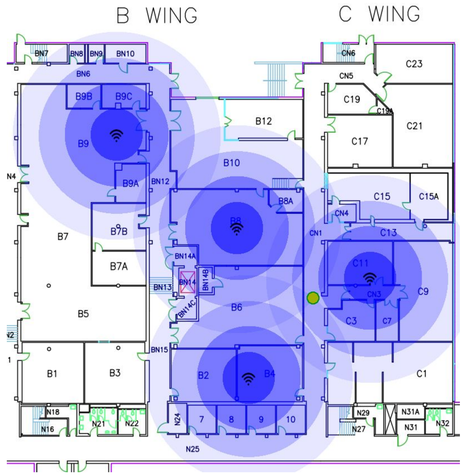
- GPS performs poorly indoors
- Need to use other sensors for navigating indoors
- Need to make considerations for limited computing power and limited energy.

Importance:

- The app would primarily be useful in locations with large buildings such as universities, hospitals, etc.
- Could be extended to robots. Previous teams investigated implementing the navigation technology in robots.

Our Goals:

- We attempted weekly data collection to see how fingerprints change over time
- We made steps to improve the application, such as implementing a fragment-based design, adding the ability to change between maps within the app, and to zoom in and out on the map.



Fingerprinting:

- Fingerprint: Record of signal strength to all Wireless Access Points - should be unique between locations
- Fingerprints recorded in initial training
- Training fingerprints used to train neural network

Dead Reckoning

- Taking fingerprints and running neural network is computationally expensive
- Use phone's other sensors (gyroscope, step sensor) to predict movement between fingerprints

The App:

- The app is used to perform both fingerprint collection and navigation
- Supports having multiple apps installed at once, as well as allowing the user to add new maps for training.
- Has a new fragment-based design to increase modularity
- Has settings for changing frequency of scans during navigation, as well as disabling them altogether