

# SE 491-sdmay19-27

## Smartphone Tracking App for Microsoft HoloLens

### Week 1

11/24/18 - 11/30/18

Client: Optical Operations

Faculty Advisor: Daji Qiao

### Team Members:

Ben Holmes - *Android Development*

Anthony House - *Website Development/Security*

Ryan Quigley - *Database Admin*

Jose Lopez - *Website Development*

Travis Harbaugh - *Hololens Development*

Cory Johannes - *Report Management*

### Summary:

1. We focused on Time Dilation of Arrival
2. Tested two different setups for implementing time dilation of arrival
3. Trilateration of access point RSSI signals
4. Scaled Durham map to Canvas model (1218.15px by 750px)
5. Created Pedestrian Dead Reckoning demo in Durham

### Pending Issues:

- More accurate setup for Time Dilation of Arrival
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### Past Week accomplishments

- Travis Harbaugh -
  - Design doc
    - 2.1.3 Process Flow
    - 2.1.4 Mobile Application
    - 2.1.6 HoloLens
    - 3.1 Interface Specifications
    - 3.2 Hardware and Software
    - 3.5 Process
    - 3.6 Results
    - 4.1 Conclusion

- Project Plan:
  - 2.5.2 Process Flow
  - 2.5.2 Mobile Application
  - 2.5.4 HoloLens
  - 2.13.2 IEEE Standards
- Ben Homes
  - Time Dilation of Arrival (2 setups)
    - Tracked phone is client
    - Tracked phone is server
  - Uses Bluetooth RFCOMM sockets to communicate between devices
  - Distance estimates through time delays between hearing frequency on each device
- Anthony House
  - Define tasks for end of the year presentation.
  - Create a gantt chart for the next three weeks
  - Worked on architecture designs
  - Create API for the data transfer.
  - Created a client side service file for getting data from the api
  - Created the server side api for getting data
  - Created dummy data for non production users
  - Configured server for new api
  - Updated weekly report 9 summary and blockers for re-grade
- Ryan Quigley
  - JSON objects are created from the steps.
    - Include: user, heading, distance, and time.
  - JSON objects are stored in list and sent to the api.
  - Improved step tracking algorithm mostly implemented.
    - Constants unspecified by the research paper are all that's left.
    - Testing must be done to estimate what they should be.
- Jose Lopez
  - Scaled Durham demo
  - Worked with Cory to incorporate heading and drawing location.
    - When getting within range of a bluetooth beacon, it will turn blue, and then back to grey when the user gets out of range.
- Cory Johannes
  - Assisted Jose in incorporating heading more fully into canvas drawing location
  - Finding articles/android docs for how to get distance from WiFi networks
    - Android WifiManager class has method getConnectionInfo() gives current wifi connection as WifiInfo class, which has function getRssi() method. Rssi used in Travis' method for determining distance from bluetooth, so this may be a way to use the same algorithm, or use it as a basis.
  - CSS for index.html
  - Researched trilateration
    - created function that could take parameters and use it for localization

- Made html file to demo the trilateration function

### Individual Contributions:

Team Member	Contribution	Weekly Hours	Total Hours
Ben Holmes	Time Dilation of Arrival	8	83
Anthony House	Stated Above	12	53
Ryan Quigley	Send step info to api Initial improved step length structure complete.	8	51
Jose Lopez	Worked on the scaled Durham demo and the canvas visualization of tracking.	8	40
Travis Harbaugh	Updated Project plan and design document	20	136
Cory Johannes	Created css doc for index.html Finding ways to use wifi routers for localization Created function and demo for trilateration	12	43

### Plans for Next Week:

- Add Trilateration measurements to Canvas, so that we can visually track trilateration location estimates using the access points.
- Reduce errors in orientation estimations by using the Gyroscope. The rotation vector sensor utilizes the magnetometer, which is prone to error. We wish to bypass this error by starting with an initial orientation estimation, and determining new orientations by adding Gyroscope angle offsets to current orientations.
- Streamline the Time Dilation of Arrival setup. We have a basic version working with about 10ms of error. We would like to reduce this error associated with our measurements.

- Position bluetooth beacons within Durham setup. We need to define exact locations for our 5 bluetooth beacons. Should they go in front of doors, stairwells, open areas?