

SE 491-sdmay19-27

Smartphone Tracking App for Microsoft HoloLens

Week 9

3/10/19 - 3/31/19

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:

This week the re-calibration method was changed from the idea of using trilateration, to just using a set of eight Nexus 7 tablets to monitor a 2m perimeter in hallways and at hallway corners. This is because the Nexus 7 speakers do not reach far enough to cover large distances inside Durham. About the greatest distance we can achieve consistently is ~2m. The Android app is also working to implement the Gyroscope instead of the Compass for more accurate readings. The compass suffers from electromagnetic disturbance due to its use of the magnetometer in determining geographical north. The server side is creating a demo for us to integrate websockets into the application. The frontend has worked out filtering by date on the website.

Pending Issues:

Hololens geolocated floor plan is blurry. The re-calibration service has not been integrated with the other components of our project yet, we still have not implemented websockets, or the gyroscope.

Past Week accomplishments

- Travis Harbaugh
 - Create a parser that can parse all the data that is sent from the database and store it so it can be visually showed the actual path that was walked
 - Meet with the client to see if there is any way to fix the floor plan rendering problem. The solution was to leave the geolocated image on the map and create an outline of the exterior and interior of the building to show where the 3d avatar is working in the building
 - This was achieved by gathering exterior longitude and latitude points round durham from openstreetmap and then using AutoCad software to calculate the distance on the floorplan and then translate that into world coordinates and then render it on the map
 - An IOS app that can gather a person's current location and display longitude and latitude so that I can get an more actually starting position to start the avatar for the demo
 - Meet with the client and the backend team to discuss what endpoints are need so that the hololens can show user location walking in real time
 - Meet with Andrew to discuss
 - Integrate and test visualization with the android application to get real time updates on the hololens
 - Tested the avatar movement and walk/idle animation state.
 - I created a event handler that would allow the game manager and the RethinkDatabase script to send requests and user new Location data. I also created an interface that would allow the game manger to send the correct user location data to the correct avatar. This would allow to have multiple avatars walking through durham 3d model.
- Ben Homes
 - I realized that our Nexus 7 speakers are not strong enough to project much farther than a couple meters inside of Durham. This led me to change our sound re-calibration setup, instead of using any type of trilateration, I will setup the eight Nexus 7 tablets to monitor a two meter perimeter. These perimeters will be in hallways and at the corners of hallways, because at these positions, it is guaranteed that the sound emitted from the phone will be heard as a user walks past
 - Each Nexus 7 tablet maintains an adjacency list of the tablets immediately next to it, once a user reaches a tablet's perimeter, that tablet will continue to emit sound until the user leaves the perimeter, once this happens, the tablet gets the adjacent phones from the adjacency list, and connects to them with Bluetooth Sockets so they can begin sending sound. The user continues walking around, and the tablets essentially track the user along the path
 - I also setup RealmDB on the android app so that steps get saved locally into the phone before being sent over the websocket
- Anthony House
 - Created a socket demo for the front-end. Made examples for Jose to use and modify

- Created a socket stream for newly added data to send directly to the server
- Stream for both ben and ryan
- Removed examples created for cory
- Created http requests to filter data through GET requests for travis
- Ryan Quigley
 - Looked into and implemented gyroscope as a replacement for compass readings
- Jose Lopez
 - Can now receive data display in real time
 - Now you can choose which session to play, no longer locked into playing the newest one
 - Can now stop the displaying of steps prematurely
- Cory Johannes
 - Worked on creating a system of zones to correct tracker when it would be going through walls/making illegal movements

Individual Contributions:

| Team Member | Contribution | Weekly Hours | Total Hours |
|---------------|--|--------------|-------------|
| Ben Holmes | Added adjacency list to Bluetooth Service for Nexus 7 phones, also added Realm DB so all data is stored locally on the phone before being sent over a websocket. | 12 | 52 |
| Anthony House | Created functions for other team members to satisfy application needs. | 6 | 23 |
| Ryan Quigley | Implemented gyroscope heading detection. | 8 | 44 |
| Jose Lopez | Real time now works. Can choose which session to play. Took a lot longer than I thought. | 10 | 40 |

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|-----------------|---|----|-----|
| Travis Harbaugh | <p>Created a parser to gather the user location data from the server.</p> <p>Created a liner render to visually show path that was walked from the data collected from the mobile application.</p> <p>Created the layout of the building interior and exterior of the durham building by using linerender.</p> <p>Create the avatar animation and movement script. I also created the Gamemanager script that receive the the real time updates from the database.</p> <p>IOS application to gather locations that openstreetmap doesn't provide.</p> | 62 | 117 |
| Cory Johannes | Zoning work. | 6 | 26 |

Plans for Next Week:

- Travis
 - Work on testing section of the final report.
 - Work on importing the executable to the hololens.
- Anthony House
 - Start working on Java socket demos so we can stream information from the android clients
- Ben Holmes
 - Testing on different paths with Nexus re-calibration points
- Cory Johannes
 - Continue working on zoning algorithms
- Ryan Quigley

- Correct the sending of JSON data to prevent lost data
- Jose Lopez
 - Display True paths dynamically
 - Display any user not just Ryan