SE 492-sdmay19-27

Smartphone Tracking App for Microsoft HoloLens

Weeks 2-3
01/20/19 - 02/03/19
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:

The goal this week was to continue progress on the components of our project. For the mobile team they were given the task to create a test plan that would measure the 1-meter accuracy of the path worked in Durham. For the HoloLens it was to continue to make progress on the visual display of the building and avatars in augmented reality. For the backend team the goal was to move our database from MongoDB to rethinkDb so we can begin to store the data gathered from our application, and also so we can begin working on setting up websockets for communication between the database and the hololens. A service was also added to the android application which holds all code for the Bluetooth recalibration.

We should mention that Time Dilation of Arrival was scrapped because our Android phones didn't have the processing power to make accurate predictions (The client phone was not always able to receive the Bluetooth signal, create a timestamp, and identify the following sound frequency to within 1 m/s as was necessary), instead we will use a method of sending multiple frequencies, and using the frequencies to determine how close an individual may be. Generally the lower frequencies will travel farther than the higher frequencies. Using this we should be able to either perform some rough trilateration, or at least separate the building into multiple zones.

Pending Issues:

Some issues which need to be worked out are implementing the rethinkDB on the client's server so our team can start recording the location data on their system. For the HoloLens the scaling of the building is not in the correct location of the map. For the canvas visual display we need to be able to map multiple routes, and for the Bluetooth recalibration we need to be able to connect and reconnect between phones

over and over. The current bluetooth recalibration can only make one initial connection, and once the individual leaves the range of the bluetooth connection the connection is lost, and does not reconnect when they come together again.

Past Week accomplishments

- Travis Harbaugh
  - Create C# scripts that will Geolocate the 3d model of Durham on Mapbox map
  - Scaled the Durham model down but its location and will need to get the center of the building so it will be in the correct location
  - Worked with the Client to fix the elevation error of the building when geolocating it the map. Discussed the test plan for tracking individuals protectory in Durham
  - Edit script to fix the Field of view on the camera to solve screen position out of view frustum issue
  - Worked on the windows building setting in unity. It turns out that I was having problems creating an executable for the HoloLens. I had to install a previous version to allow the HoloLens feature to be enable
  - Started to create UI Menu for the HoloLens that will load the construction site and adjust controller settings
    - Created Sliders and Buttons
- Ben Homes
  - Added a service to the android app which runs in the background and uses Bluetooth to communicate with local phones. Currently is only able to make one initial connection, and not able to reconnect once the connection is lost
- Anthony House
  - Researched node libraries for trilateration
    - https://www.npmjs.com/package/node-trilateration
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  - Decided we're not using signal propagation, so no research done on that
  - Starting looking into rethinkdb
  - Set up local centos server. Decided against it after finding limitations in virtual machines
  - Got logged into rethink instance. Found out it's not running centos
- Ryan Quigley
  - Worked on developing a test plan for the step tracking portion
- Jose Lopez
  - Worked on test plans with Cory, Ryan, and Travis. I documented the materials, setup, and the sequence of actions to be executed
- Cory Johannes
  - Met with Ryan to discuss test plans
  - Talked with Travis about preparing 3D model of Durham for Hololens

Individual Contributions:

Team Member	Contribution	Weekly Hours	Total Hours
Ben Holmes	Added background Bluetooth service to app.	12	12
Anthony House	Trilateration research Rethink stuff.	4	4
Ryan Quigley	Mapped out test plan routes.	4	4
Jose Lopez	Worked on test plans with the team.	2	2
Travis Harbaugh	Geolacted the 3D model of durham on Map Box. Debugged elevation error on mapbox and windows build setting for the hololens Started to create UI Menu.	19	19
Cory Johannes	Worked on test plans and coordinating efforts with Travis on modeling Durham.	2	2

Plans for Next Week:

- Travis Harbaugh
    - Continue to work on the HoloLens UI Menu that will allow to navigate to the correct work site and adjust the control and sound setting
    - Load 3D avatars into the map and have them move around in the map. Try to solve the building scaling issue
    - Plan on creating different zones that the user can switch to for monitoring different zones
- Ben Holmes
    - Work on getting the sound recalibration implemented, right now the bluetooth service runs in the background and can connect with phones, but does not send sound

- ○ I will plan for next week to have the phones connect, and send a single tone across the Bluetooth connection
  - ○ In the weeks following I will adjust the tone from just one frequency to a series of four different frequencies which can be used to give a rigid estimate of distance
  - ○ I will also adjust the code in the Bluetooth service so that it can reconnect to a Bluetooth server after the connection has been destroyed
- ● Anthony House
  - ○ Work on getting rethinkDB implemented
- ● Ryan Quigley
  - ○ Work on improving the step tracking algorithm and gathering user location data in Durham. Updating the test plan for user tracking
- ● Jose Lopez
  - ○ Work with Ryan on gather data working test paths in Durham
- ● Cory Johannes
  - ○ Work on creating floor plans for 3d model of Durham