EE/CprE/SE 491 WEEKLY REPORT 02

Availability Prediction Based on Multi-Context Data

Week 2 Report

09/23/18 – 09/30/18

sdmay19-33

Client & Advisor: Goce Trajcevski

Team Members:

Justice Wright: Report Facilitator

Shane Impola: Scribe

Noah Chicchelly: Meetings and Communications Facilitator

Nick Schmidt: Software Systems Engineer

Tristan Anderson: Network Systems Engineer

Brendon McGehee: Hardware Systems Engineer

Weekly Summary

This week's emphasis was on narrowing the scope of the project. After floundering at the beginning of the semester we realized that our scope of just developing an occupancy detection and analytics network was far too broad. After conferring with our advisor we decided to narrow the focus to a restaurant based scenario, and we solidified many more points of uncertainty, such as assumptions we can make of both customers and clients interacting with our devices. The biggest breakthrough this allowed our team was the determination of what types of sensors would and would not be viable. With this in mind we were able to test the output and functionality of individual sensors, as well as the discuss how those sensors would ideally fit in with our database system, and how that interacts with our front-facing application.

Past Week Accomplishments

Researched and Implemented Other Occupancy Sensors - Brendon, Justice

- Brendon and Justice conducted research on other occupancy sensors that could be utilized for our applications. Decided on using not only a pressure sensor but also an IR and Ping sensor to detect customer occupancy at tables. Started three arduino coding sketches to analyze the outputs of sensors and decide on how to output whether or not a customer is seated.
- Brendon evaluated how the sensors could be used together to detect occupancy of seats instead of getting individual data from each sensor. Figured out how to use separate statements to check the output of each sensor and see if the outputs match or are different.
- Justice researched AWS and it's free offerings to determine whether or not our project could exist within these constraints. It was ultimately determined that this was probable and brought before the networking team as a prospect.

Organized and Designed Project Infrastructure - Noah, Shane

- Designed and planned out the flow of the project from back end to front end. Laid out the functionality we need on the server/database side of things. Decided and talked with group about specific endpoints that will be needed in the future. Currently have a starting point for all of these things and will continue to expand in the coming days and week.

- Looked into our options for implementation of server side functionality. Layed out preliminary database table structure. Started planning how we will be interpreting our raw data and how we will abstract it to be analyzed for prediction purposes.

Researched Data Structures and Data Analysis - Nick, Tristan

- Researched ways to structure large amounts of data to be calculated. Need to get further information on the structure of the databases/network to understand how this data will be usable and how it will be stored. Looked into basics of machine learning with respect to large data analysis, possible way to refine algorithm at a later point..
- Researched methods to analyze the data. Need bogus data to begin testing several methods time to complete and how close they'd be to the result. Plan to build algorithm to generate random data on who ordered what and how long it took them to leave, essentially simulate random ranges and see how close the predictions can get.
- Researched flutter development environment and how to use it to deploy apps natively to both iOS and Android.

Discuss Communication of Network, Software, and Hardware Components - Group

- Weekly discussion lead to a much more concrete vision for the project.
- With this vision in mind, we were able to discuss what data we could reasonably collect from a hardware standpoint, use that information to infer what time-points we could infer from quick analysis, determine what kind of back-end structure would be required to support such a system, and thus determine how our front-end offering would need to interact with the back-end.
- This solidified vision gave more purpose and direction to the individual teams, provided the working goal to get initial data communication between all three components up and running.

Hours Report

Team Member	Weekly Hours	Total Hours
Justice Wright	6	13
Shane Impola	6	13
Noah Chicchelly	7	13
Nick Schmidt	5	11
Tristan Anderson	6	13
Brendon McGehee	8	14

Upcoming Week

Justice and Brendon

- Finalize networking component used to transfer data from arduino to raspberry pi
- Find the most cost effective component for data transfer.
- Analyze how to use chosen component to communicate with raspberry pi and network component of project.

Noah and Shane

- Implement and start work on the server and database side of things.
- Get to a point where we can test queries with the frontend side of the project.
- Get to a point where we can simulate data analysis with dummy data.

Nick

- Begin testing and building basic GUI in Android Studio
- Build app to Send/Receive queries and program to send data to database.
- Further research managing calculations for large data-sets
- Research way to consistently grab/send data without overloading limited resources.

Tristan

- Find reliable radio receiver for the raspberry pi.
- Begin basic socket programming and UDP parsing programming for raspberry pi using C or Python.
- Draw up basic plans for a UDP packet protocol to send our data through our network.