

## *EE/CprE/SE 491 WEEKLY REPORT 01*

### *Availability Prediction Based on Multi-Context Data*

#### *Week 1 Report*

**Start of Project – 09/08/18**

**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 marked the beginning of our involvement with this project. After being officially assigned this project we organized a meeting with our client and advisor Dr. Trajcevski to gather a deeper understanding of the project, our goals, and any constraints or considerations he felt should be known. The takeaway from this meeting was that while the outline gave the confines of a restaurant we were truly developing a system for gathering, storing, and analyzing occupancy data in the abstract. The analytics done on the data would be a part of the end result of the project but are not necessarily as vital as being able to collect, store and manipulate the data. With this in mind our client advised us to begin researching occupancy sensors and to come back with a few options or ideas for our next meeting. The week to come was filled with individual research and collaborative discussion towards this end.

#### *Past Week Accomplishments*

Researched Force-Based Occupancy Sensors - Justice, Brendon, and Noah

- Justice and Noah worked independent of each other, trying to bring in a multitude of options to Brendon for analysis. While other options were explored by both parties, it was decided by both that some sort of load cell based system to be placed under seats would work best for this application.
- Noah and Justice conferred with each other and advocated which sensors they thought most worth exploring and why before forwarding that information on to Brendon.
- Brendon conducted further research on these sensors, investigating their datasheets and determining if they would be practical fits for our envisioned system. He also did some individual research to determine if there were any sensors not initially brought to him that he wished to explore further.

Researched Microcontrollers - Shane and Tristan

- Shane and Tristan researched microcontrollers in a similar manner to the way Justice and Noah researched sensors, individually first and then coming together for collaboration. The initial direction was merely something that could help process multiple pressure sensors with room for expandability to other types of sensors ranging from optical, thermal, or even RFID.
- Tristan was specifically given the task to make sure whatever microcontroller was agreed upon would be easy to fit with a respectable network interface to easily store the data online.

- Shane was tasked with determining the controller to table ratio. This meant factoring in realistically how many sensors we could allot per table as well as determining the cost/benefit analysis of scaling the controller to handle multiple tables or stay at a 1:1 ratio. It was ultimately decided that a 1:1 ratio was the only feasible solution at this time.
- Ultimately it was decided to use the Elegoo EL-CB-001 due to its relatively cheap price, nearly 5 dollars less per unit than an arduino, and the fact that Tristan had positive first-hand experience using one.

Research and Plan Data Processing - Nick

- Being in charge of the data-analytics realm of this project Nick's job was to research effective methods for working with large data sets. This research will be ongoing and adapt as new challenges present themselves, but general best practice primers and intro to large analytics articles were read this week in preparation for the semester to come.
- Language determination was a large factor this week. After speaking with multiple team members and comparing against the information he uncovered during the earlier mentioned research it was decided that the analytics will be done primarily in Java. This decision was reached for a multitude of reasons. Firstly, everyone on the team including Nick felt Java was their most proficient language. Secondly, Nick had stumbled upon the book Big Data Analytics with Java, and was finding it a useful resource in the planning stages.

Discuss and Debate Initial Project Vision - Group

- The goal for the end of the week was to come to the next meeting with a suggested price per unit and list of parts proposed for initial pressure-based occupancy sensors. Individual research was presented, critiqued, and finalized. It was agreed upon that we would use Chenbo Load Cells (4 per unit) with an accompanying ADC module to feed data into the Elegoo EL-CB-001 which put our initial price per unit at \$22.81.
- Ideas for other desired data points such as arrival of food or bill were discussed. Sensors to accommodate gathering such data points were suggested. It was believed RFID on waiters or in check units could work for either event, though pressure sensors could be manipulated to provide arrival of food at the very least. It was widely contested whether or not human interaction would be necessary as to not skew data from such sensors and the discussion was tabled with the intent to discuss it with our advisor at the next meeting.

*Hours Report*

<i>Team Member</i>	<i>Weekly Hours</i>	<i>Total Hours</i>
Justice Wright	7	7
Shane Impola	7	7
Noah Chicchelly	6	6
Nick Schmidt	6	6
Tristan Anderson	7	7
Brendon McGehee	6	6

## *Upcoming Week*

Summary: Our end of week meeting with our advisor coupled with some last minute input from Dr. Zambreno following our lightning talk showed us we need to refocus and are potentially thinking about our project in the wrong light. A heavy emphasis was placed on narrowing the scope of the project to have more defined deliverables. This will require a lot of group action.

### **Group**

- Narrow the scope of the project.
- Try to move to an agile model
- Breakout individual assignments much more in-depth
- Gather a list of assumptions to develop under to avoid meetings where these prohibit progress
- Develop testable scenarios to show trackable progress
- Develop a timeline for project progress.

### **Shane and Tristan**

- Research hosting and data structures for sensor data.
- Develop a plan for data accumulation/pipeline.
- Work on implementation of a small scale model for proof of concept.

### **Justice and Brendon**

- Finalize sensor requirements/vision and ensure they align with desired event logging.
- Find the most cost effective sensors to achieve these goals.
- Get ready to purchase equipment necessary to produce one unit for initial feasibility testing.
- Draft designs and test scenarios for our initial prototype.

### **Noah and Nick**

- Catch Noah up to speed on Nick's research and current plans for analytics.
- Develop clear goals and paths to them. What do we know, what do we want to know, and how do we bridge this gap?
- Work with Shane and Tristan to make sure our infrastructure will support the needs of this team.
- Work on generating dummy data to perform initial tests and proof of concepts.