EE/CPRE/SE 491 - sdmay29
Automating Inventory Management & Routing through Sensor Networks
Week 9 Report
11/5/18 - 11/11/18
Client: Jimmy Paul
Faculty Advisor: Goce Trajcevski

Team Members:
David Bis - *Meeting Facilitator*
Hanna Moser - *Meeting Scribe*
Adam Hauge - *Report Manager*
Sam Guenette - *Public Relations*
Ben Gruman - *Resource Acquisition*
Noah Bix - *Documentation Manager*

Past Week Accomplishments
This week was spent working on the first proof-of-concept prototype. TA feedback for the project plan or design document has not been given to the team at this point, so further documentation work has been stagnant this week.

- **Sensor Network** - Adam
    - Improved the way which we get data from each sensor
        - Packets sent from sensors now includes sensor data
        - Python script has separate handling functions for both sensor types
    - Improved method in which connections are made
        - Sensors will wait for a timer event to make a connection
        - Master raspberry pi no longer requests connection with sensors
    - Weight sensor gives live updates
        - Weight sensor sends live data to master raspberry pi
- **Network Setup** - Adam
    - Researched methods of implementing automatic hardware setup without requiring a monitor
        - Static IP addresses can be used for the raspberry pi server
            - This will allow sensors to be setup without needing to find a new IP address to connect to
        - Wifi information can be setup in the raspberry pi boot files before booting for automatic network connection
            - All SD cards can include network data before being loaded onto system
    - Attempted to implement static IP address method onto Raspberry Pi
        - Left unable to make a connection with sensors
            - Unsure if error comes from programmer error or from Iowa State network

- **Refactored API Design** - David, Sam
  - Refactored the API Design to better suit requirements of the front-end and incorporate database redesign
    - Endpoints include combination of GET, POST, PUT, and DELETE
      - GET is for getting data
      - POST is for uploading data
      - PUT is for updating existing data
      - DELETE is for deleting data
    - A few endpoints do not have their logic implemented yet, but complete implementation should be capable of satisfying all front-end use-cases
    - Back-end modifications made for pulling and analyzing information
    - Refactored back-end
- **Refactored Database Design** - Sam, David
  - Added new tables into database
    - pantryData - tracks historical and current data of pantry inventory
      - Most recent entry is the current inventory
    - Preferences - manages client thresholds for each product
  - Refactored *product* table so that primary key is string rather than number
    - Enables use of SKU/UPC numbers as the primary keys
    - Ensure that if a SKU/UPC begins with a zero (i.e. 030….), the zeros are not truncated
- **Researched ESP8266** - David
  - Researched implementation of Raspberry Pi with various ESP8266 chips
  - Concluded that Raspberry Pi can connect to multiple ESP8266 by using MQTT
    - Pi acts as MQTT Broker
    - ESP8266 chips publish their sensor readings over MQTT protocol
    - Python scripts on master Raspberry Pi subscribe to published sensors
- **Researched Sonar Sensors** - Noah
  - Researched different types of sonar sensors that would fit our project best
  - Chose HC-SR04 model due to its minimal cost and popularity
    - Found a large amount of helpful tutorials on how to use this particular sensor
    - With all of these resources available, this should make it very easy to use
  - Also researched ways to mount the sensor to the ceiling.
    - There are a few different premade mounting brackets available that we can make use of
    - We can also design our own if necessary
- **Discussed Options for Weight Sensor Calibration** - Ben, Hanna
  - Determined two options for calibration
    - Calibrate to weight and include unit weight in database
      - Plan to create a regression or tabular reference for universal ADC-to-weight interpretation

- Plan to create a script that sets the current weight of the sensor to zero and adjusts reference or regression accordingly
    - Calibrate directly to inventory units
        - Would require a unique regression/reference for each product
- **Researched Data Updating Without Refreshing Page** - Hanna
    - Currently, data is only updated when the refresh button is selected
    - Research on StackOverflow and the ReactJS documentation shows an easy way to alter the current code so that data is updated without having to refresh the page
- **Researched Option for Real-Time Filter** - Hanna
    - For data display page there will be a real-time filter to allow for focusing on specific data
        - As different filter options are selected the data being displayed should immediately update
    - React InstantSearch
        - Completed several tutorials to better understand functionality
        - InstantSearch available through npm
        - Need to add InstantSearch component
            - Will bootstrap app
            - Connects to Algolia
            - Synchronizes widgets
        - Algolia is third party instant search
            - 14 day free trial
            - $35/month for essential version
    - In-house real-time search
        - Container component that will make API calls
        - Stateless, functional component to display results
        - Several available tutorials and documentation for guidance
- **Updated Screen Sketches** - Hanna
    - Continued to update screen sketches for data display and device setup pages
        - Based off of feedback from teammates and client
            - Improvements/changes to features on current sketches
            - New features to add to achieve all wanted functionality

Pending Issues
- **Static IP Addressing** - Adam
    - Attempt at implementing static IP address was unsuccessful
        - Unsure if error was caused in implementation or if Iowa State wifi network does not allow static IP addressing

Plans for Upcoming Reporting Period
- **Final Presentation** - All
    - Presentation date scheduled for Tuesday, December 4 at 11:30am

- **Design Document** - All
  - Design Document feedback is expected to be given at the beginning of upcoming reporting period
    - Improvements will be made from now until the end of the month
    - Revision 2 will be posted to team website by December 2nd, 2018
- **Finish Implementing API endpoints** - David
  - Implement remaining API endpoint logic
  - Include error handling if invalid query data is sent
- **Build Weight Scale** - Ben
  - Acquire materials for weight scale prototype construction
    - Screws, nuts, wood
- **Prettify Data Display page** - Hanna
  - Currently just raw data being displayed
  - Move all data into boxes as indicated in screen sketches
  - Data needs to update every so often
    - Currently have to refresh page to update data

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
David Bis	API Refactor Database Refactor ESP8266 Research	7	68
Hanna Moser	Updated Screen Sketches Weight Sensor Design Researched Real-Time Search	7	64
Adam Hauge	Sensor Network Network Setup	8	70
Sam Guenette	API Refactor Database Refactoring Back-end refactoring Continued implementation for automated shipping order.	7	67
Ben Gruman	Weight Sensor Design	3	39
Noah Bix	Sonar Sensor Research	5	57

Gitlab Activity Summary

\-

Action: pushed to branch master, Sat Nov 10 2018

Author: dsbis

Action: pushed to branch master, Sat Nov 10 2018
Author: dsbis

Action: accepted merge request !6, Sat Nov 10 2018
Author: dsbis

Action: pushed to branch master, Sat Nov 10 2018
Author: dsbis

Action: opened, Sat Nov 10 2018
Author: dsbis
Title: Integrate Back-End API Endpoints

Action: pushed to branch dbRefactor, Sat Nov 10 2018
Author: guenette

Action: pushed to branch dbRefactor, Sat Nov 10 2018
Author: guenette

Action: opened, Sat Nov 10 2018
Author: guenette
Title: merge request !6

Action: pushed to branch dbRefactor, Sat Nov 10 2018
Author: guenette

Action: pushed to branch dbRefactor, Sat Nov 10 2018
Author: guenette

Action: pushed to branch dbRefactor, Sat Nov 10 2018
Author: guenette

Action: pushed to branch master, Mon Nov 5 2018
Author: ahauge

Action: pushed new branch weightSendData, Mon Nov 5 2018
Author: guenette

Action: pushed to branch master, Mon Nov 5 2018
Author: ahauge

Action: pushed to branch master, Mon Nov 5 2018
Author: ahauge

Action: pushed to branch master, Mon Nov 5 2018
Author: ahauge

Action: pushed to branch master, Mon Nov 5 2018
Author: dsbis

Action: pushed to branch master, Mon Nov 5 2018
Author: ahauge

Action: pushed new branch Network, Mon Nov 5 2018
Author: ahauge

Action: pushed to branch sockets, Mon Nov 5 2018
Author: ahauge

Action: pushed to new branch dbRefactor, Mon Nov 5 2018
Author: guenette

Action: opened, Mon Nov 5 2018
Author: dsbis
Title: Acquire ESP wireless chip

Action: opened, Mon Nov 5 2018
Author: dsbis
Title: Select ESP wireless chip

Action: opened, Mon Nov 5 2018
Author: guenette
Title: Refactor Database (Bar-code Id)

Action: pushed to branch master, Mon Nov 5 2018
Author: Ben Gruman

Action: closed, Mon Nov 5 2018
Author: dsbis
Title: Microcontroller Data Transcription

Action: closed, Mon Nov 5 2018
Author: dsbis
Title: Build API to access data from database

Action: opened, Mon Nov 5 2018
Author: guenette
Title: Front-End View

Action: closed, Mon Nov 5 2018
Author: guenette
Title: Model Relational Setup

Action: closed, Mon Nov 5 2018
Author: guenette
Title: Database to Model Migration

Action: closed, Mon Nov 5 2018
Author: Ben Gruman
Title: Establish Database Connection for Remote Access

Action: opened, Mon Nov 5 2018
Author: Ben Gruman
Title: Establish Database Connection for Remote Access

Action: opened, Mon Nov 5 2018
Author: guenette
Title: Database to Model Migration

Action: closed, Mon Nov 5 2018
Author: guenette
Title: Database to Model Migration

Action: opened, Mon Nov 5 2018
Author: nbix20
Title: Register Company Back-end

Action: closed, Mon Nov 5 2018
Author: guenette
Title: Get data from barcode scanner on Raspberry Pi

Action: closed, Mon Nov 5 2018
Author: guenette
Title: merge request !4

Action: closed, Mon Nov 5 2018
Author: nbix20
Title: Implement Barcode Scanner into Raspberry Pi