

sddec18-17: IoT Remote Monitoring Mobile App for Commercial Appliances

Week 7 Report

March 24 - April 2

Team Members

John Fleiner — *Android Development Lead*

Ben Young — *iOS Application Lead*

Thomas Stackhouse — *Backend Lead*

Hongyi Bian — *Hardware Test*

Yuanbo Zheng — *Meeting Facilitator*

Casey Gehling --- *Meeting Scribe / Backend developer*

Team Members

Greiner Jennings Holdings

Taylor Greiner

Connor Jennings

Faculty Adviser

Goce Trajcevski

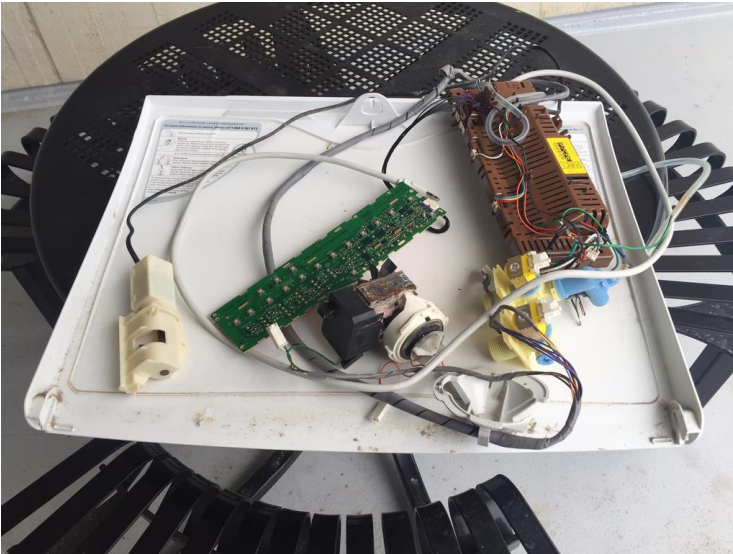
Summary of Progress this Report

Now that the mobile development team has agreed on a final UI design, the android and iOS mobile application have begun interfacing designs. The end result is to form a nearly identical look between the android and iOS application. The process is expected to take two weeks including this week. We are currently at 50% completion. The hardware team discovered several “bugs” or issues with the raspberry pi not always responding to AWS commands, all of which were fixed. A bash script was then written and ran on the raspberry pi so that an email would automatically be sent to the team with the raspberry pis assigned IP address. Last week, the backend team looked into deploying the backend server on to AWS. This week, a deployment plan has been decided upon. We will be using an EC2 instance running Red Hat x64 Linux. This EC2 instance will be a micro version and have 1 gb of ram. This was chosen so that a very minimal amount of money will need to be spent by the client, as this is the free option that is available due to the type of AWS account we are using.

Pending Issues

Our last status report indicated two pending issues: receiving a washing machine controller and receiving a portable washing machine.

We were able to obtain from our clients several washing machine components for a Full-Sized Fisher & Paykel GWL 15 Washing Machine. Attached below is an image of the components received.



Our current pending issues as of this week include obtaining a Portable Washing Machine. It was mentioned in earlier status reports that our team would be receiving a Best Choice Products SKY2767 Portable Washer from our clients. For that reason, our team planned to turn on the portable washing machine through AWS IoT via mobile app for our Panel Presentation Demo. Until we are able to receive the portable washing machine, we will need to utilize the components pictured above to turn a washing machine switch on/off.

A second pending issue that our team is facing is determining a method for measuring power draw of the component. Our hardware team is currently researching the components that we have received to see how we may measure power.

Plans for Upcoming Reporting Period

Front-End

For the upcoming reporting period, the mobile development team will continue to work towards finalizing the integration between the Android and iOS UI. In addition, the mobile team will analyze data of Des Moines, IA exported from openstreetmap.org to determine possible xml parsing methods for storing data.

Back-End

For the upcoming status report, the back end team will be focussing on getting the back end project deployed on AWS using an EC2 instance, and verifying that it works for the mobile development team's needs.

Hardware

The hardware team will be looking into the received washing machine components to determine the best method for measuring power. The plan is to apply the found method to a portable washing machine.

Summary of Weekly Adviser Meeting

During our weekly advisor meeting, the mobile team provided Goce Trajcevski with a demo of the current version of the Android and iOS mobile app. Our advisor was intrigued by the use of Google Maps to display laundromat locations near the user. He felt that our application could make use of shortest path algorithm and time-based path algorithms to make the best use of customers time. A customer may not use the mobile application to reserve a machine, but they may want to use the app for its map-based features. For example, a customer runs a washing machine for 30 minutes. During the 30-minute wait time, the user want to visit an ATM. The application could potentially make use of that 30-minute window to find ATM machines near the laundromat that the user may stop by. The idea can be expanded far beyond ATMs. The data needed to

calculate routes can be obtained from [OpenStreetMap.org](https://openstreetmap.org).

During our meeting, our advisor also asked that we capitalize on security by looking into AWS Security and by referencing IEEE Raspberry Pi Security documents. All references must be updated and added to our project plan. It was also asked that we look into security for embedded sensors and control-boards.

To prepare for the Panel Presentation, we were asked to include at least 2 slides related to testing and security to display our proactive considerations. We were also asked to generate map data for a metropolitan city to display that we are considering scalability issues.

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
John Fleiner	<p>To prepare for our in-class demo, I worked with the iOS Development Lead to begin UI integration. The goal of this week was to begin forming a nearly identical look between both the iOS and Android mobile application. iOS offers built-in animations for sliding menus on/off the screen from any direction (from bottom, from top, from left, from right). However, android only supports left menu sliders. The iOS application created a clean way to utilize the map screen and display the reservation form. To do so, the reservation form slides in from the bottom and overlays $\frac{3}{4}$ of the screen. To mimic this type of functionality, I implemented the SlideUp-Android library which allows developers to add slide effects to any view.</p> <p>Maps Activity (Screen): Laundromats are represented by markers placed on Google Maps. If a marker is clicked, then a display menu bar animates in from the bottom and displays the name of the clicked laundromat along with its address. The menu also has an appliance button that can be clicked. Once clicked, the reservation form animates in from the bottom and overlays $\frac{3}{4}$ of the screen. From this screen, users may enter the form data to reserve a set of appliances.</p>	11	87
Ben Young	<p>To get ready for the class demo I went through my code and tested various aspects such as the api calls to login/register a user. In the map controller and I finished the reserve view form so that a user can reserve a certain number of washers and dryers on a given</p>	5	60

	<p>date. In iOS you can use autolayout which allows you to set anchors for UIViews and when you are changing these to perform animation you can run into issues, so i ran some tests to make sure that no anchors were conflicting when I started to move UIViews.</p>		
Thomas Stackhouse	<p>This week I worked on finishing the plan for deploying the back end on to AWS. We chose a micro EC2 instance because it was free for 750 hours of operation a month (31.25 days), so that our client does not spend much money on something that is not being constantly used. Red Hat x64 Linux was chosen as the operating system for the EC2 instance because it was lightweight and is a common industry deployment operating system, so any security issues will be patched quickly due to the large amount of other companies using Red Hat Linux.</p>	5	57
Hongyi Bian	<p>Since last week we were able to apply the relay system to a lamp in house which represented as our “wash machine”, this week we focused more on the MQTT protocol as well as our socket implementation. The Python script running on the raspberry pi had several issues regards to not responding and error when resolving messages. So we tried to fix those problems in the early of the week.</p> <p>The other thing we have done to the raspberry pi is writing a bash script on the raspberry pi so that it will automatically send us an email with its dynamic assigned IP address every time it boots up. This was a big issue when we try to use the pi under campus network (using DHCP assigning IP addresses and changes in different department buildings).</p>	12	55
Yuanbo Zheng	<p>Last week, we successfully connect a home lamb with a relay system, after we provided a 110V home supply. We can turn on/off a lamb by AWS cloud remotely. Since we have a presentation last week, our hardware team demo this part to our teammates to show that the connecting issue works well right now. And we finally received the washing</p>	10	57

	<p>machine component which is a portable washing machine. What we need to do is to test if the washing machine can be turn on/off as the lamb does last week. Besides, I started to work with the research on the security of our project. I learned the AWS Certification Manager which is a service to let us provision, manage the Secure Sockets Layer/Transport Layer Security for use with our AWS service with our Raspberry Pi. We need to make sure that our AWS cloud can identify our Raspberry Pi so it will not be hacked like if someone sends other signal to control our Raspberry Pi, we need to avoid these things.</p>		
Casey Gehling	<p>This week I had to do some rework from the previous week on the query that I implemented to find all available appliances at a specific location over a defined period of time. I misinterpreted what our mobile team was requesting and was returning slightly different results that were expected. I also edited the login functionality at the request of mobile team. That was pretty much it for development as our advisor requested we wrap up development and begin tuning our project plan and design document in preparation for the final presentation -- thus I began putting some time into the design document by researching more in depth the pros and cons of our design decisions.</p>	7	53