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

Week 3 Report
February 11 - February 17

Team Members

John Fleiner — *Mobile Application Development Lead*
Ben Young — *Hardware Lead*
Thomas Stackhouse — *Backend Lead*
Hongyi Bian — *Hardware Test*
Yuanbo Zheng — *Meeting Facilitator*
Casey Gehling — *Scribe/Backend Developer*

Client

Greiner Jennings Holdings
Taylor Greiner
Connor Jennings

Faculty Adviser

Goce Trajcevski

Summary of Progress this Report

The past week marked the second week of the development phase for our team. The iOS developers continued development on the mobile reservation system. Currently, the iOS application acts as a form where users may select from a list of locations → select from a list of appliances → select from a list of times on a calendar day. Several changes were made to the lists to accommodate requested changes. The android application made significant development progress as there is now an internal login system (which will eventually need to be pushed to a server) that the iOS application is lacking. The android application also has a calendar screen, however interaction with the calendar still needs to be implemented. The backend team is continuing to work with generating test data that can be accessed via API endpoint. Currently, all data is being stored internally on the mobile applications and that information needs to be moved to an external source for access.

Pending Issues

iOS Merging
One of the current issues that the iOS team is facing involves merging two iOS branches. The reason for that is due to a file called main.storyboard. Main.storyboard is a special file that allows for drag-and-drop user interface design. Unfortunately, when two developers perform different changes to the storyboard and then push to gitlab, the storyboard becomes corrupt because it doesn't know how to combine designs. Despite the merge issue, it can easily be overcome by assigning tasks that involve different storyboard elements (or different screen) rather than having two developers work on the same screen.

Second, there is a conflict between the iOS developers and apple standards and practices. One of the developers uses storyboard development for the user interface (which is a iOS standard) and one of the developers has disabled the storyboard to programmatically design the user interface. We are facing the challenge of merging two branches, one with a storyboard enabled and one with a storyboard disabled.

Hardware
It was also mentioned in last weeks status report that one of our pending issues included obtaining the

hardware and software components for our project. We have obtained AWS IoT Web service login credentials so that we may begin looking into the implementation of AWS IoT. However, we were unable to obtain a raspberry Pi from our client during during our last client meeting and the Arduino Yun that we requested has been discontinued and is no longer available. We plan to receive the raspberry Pi from our client while they are in town this upcoming week. Rather than using both an Arduino and a Raspberry Pi, the plan is to move ahead with only a raspberry pi unless otherwise requested.

Washing Machine Storage
The end goal of our project is to be able to control a washing machine through a mobile application. To do so, our client would like for us to perform testing using a fully-functional washing machine. Due to the size constraints of a washing machine, we will need a centralized location to store the appliance. Our clients mentioned the possibility of reserving space at the Iowa State Research Park. If that is the case, our team will need to be directed to an appropriate contact to make that happen. In the meantime, we are researching washing machine control boards for our client to purchase as it is much easier to handle in terms of movability.

Plans for Upcoming Reporting Period

Last week in our plan for the upcoming reporting period we mentioned that the hardware would begin interfacing the microcontroller/single-board computer with the washing machine control board under the assumption that we receive an arduino Yun and a raspberry pi. Since we were not able to obtain those items for the current reporting week, those plans will carry into this week. We plan on obtaining a raspberry pi on Monday, February 19th. At that time, the hardware team will begin working with c to write code for the raspberry pi. Interfacing will be on hold until a washing machine controller is obtained. The Android mobile application will continue to see improvements as our team aims to get caught up with the iOS version. Improvements include adding an expandable listview to the application and to add interaction with the calendar. The iOS mobile team will be working towards merging user interface elements into a single application. The backend team will continue working towards finding a way to generate test data so that an API endpoint can be given to the mobile teams to retrieve data.

It is also important that our teams spends time this week working on the pending issues mentioned above. The iOS team will need to find resolution between their development differences so that one set of standards are followed. Research will also need to be conducted on the type of washing machine controller we'd like to use for testing until a washing machine

Summary of Weekly Adviser Meeting

Our weekly advisor meeting this week was very different from the normal weekly advisor meeting. Our advisor is advising two other teams from Senior Design 491 and three teams from Senior Design 492. One of his 492 teams has been working on a project called *Smart Laundry*. *Smart Laundry* is a project that uses sensors connected to a laundry machine to record usage statistics. According to the initial understanding of the project scope, our advisor believed that there may be some overlap in requirements and that our two teams may want to collaborate. The goal of the weekly advisor meeting was to meet with our team, our client, our advisor, and the 492 *Smart Laundry* team to discuss the possibility of team collaboration or sharing of ideas and processes. From the meeting, it was identified that our clients expectations are to control the internal washing machine controller rather than to attach hardware to read data usage. Furthermore, the *Smart Laundry* team uses an Esp 8226 rather than a *raspberry pi* which is something that our team will look into. Since our clients end goal is to buy laundromats and implement our mobile application, our Advisor recommended reviewing other pricing models than the ones originally described by our client. Goce Trajcevski also asked that we look into Apache Spark and python as a method for data analytics.

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
John Fleiner	Last week, our Android team spent time watching Android Studio tutorials and looking back at previous course projects to familiarize themselves with Android Studio. The android developers also happen to be our hardware engineers (Cpr E). It was expected that we'd receive a raspberry Pi from our client so their was allocated preparing for the beginning stages of hardware interfacing. To help keep both mobile platforms up-to-date with each other, I switched over from iOS development to Android development. iOS development is vastly different than Android development so it's important to clarify some of the keywords that I'll be using. In iOS, a view or screen is called a ViewController. In Android, a view or screen is called an activity. I created an activity called activity_login that provides both a user registration and login form. Currently, both forms use an email sign-on, but can be easily modified if our client prefers a sign-on method. Second, I created an activity called calendar_activity that contains a calendar view. Initially, it was our impression that a user would be able to view a calendar, select a day, and then select a time for that day to reserve a washer or dryer. However, if a user isn't expected to be able to reserve machines long in advance, a calendar may not be required. It is also important to note that in comparison to xcode, android studio provides pre-built support for login registration forms and for calendars while xcode does not. That essentially means that Android provides a foundation or starting point, including layout or UI design while xcode doesn't. To help design both applications to act and feel similar, I have begun developing screen sketches that both ios and android platform teams can follow to ensure similarity. From an iOS standpoint, I created a six digit random-number generator or authenticator to be used in the future reservation lock system. It is expected that the authenticator	12	38

	may change depending on how we decide to tackle the hardware aspect of the reservation lock. For now, it was based off of the Google Authenticator. Our client also requested that instead of having a list of appliances labeled #1 - #n, we label and order appliances according to machine-type or size (for example, small, medium, large washers). I created a tableview (iOS list) representing the request above.		
Ben Young	This last week I continued work on the iOS application. I added functionality that when a user taps a washer or dryer another view controller will be pushed onto the stack and show various information about the machine they have selected such as if it is a washer or dryer, what type of washer or dryer (small, medium, or large), if the machine is in use, if the machine is reserved or if the machine is available. This coming week I will continue work on the iOS application with adding the login form and also merging my branch with the other iOS developer in our group. I also will start on the hardware side of the project because our client said he would be getting us the hardware components sometime this week.	6	24
Thomas Stackhouse	This week, my main goal was to get the database set up and working so that we may start creating individual test data for the mobile developers. I did get an embedded H2 database set up in our project, created a schema file for the database, and set up the service and repository layers to support saving and creating basic Reservation objects. These Reservation objects are to reserve washing machines at specific times, and the test data will allow the mobile developers to populate the reservation times in the mobile application. However, there is a problem with the test data insertion (and possibly the schema, need to look into this) where the test data is not being added to the database upon startup. I will continue to work on this, and plan on fixing the test data insertions and will further expand the functionality of reservations throughout this week.	6	20

Hongyi Bian	Besides on showing up to the meetings, this week I was more focused on the preparation of hardware components. Digging into the raspberry Pi 3 and did some researches on what types of work need to be done through our project, hardware wise. Since the hardware components have not yet come, based on the client's suggestions, I have also looked at some washing machine boards in case there's a need. Other than hardware researches, I also did some Android studies on making a calendar page and selecting a specific date & time. Although I will be shifting towards more on hardware components later, I think it's still a good experience for me to do some mobile stuff.	6	18
Yuanbo Zheng	This week we've had a meeting with our client and a 492 team which is doing a pretty similar project with us. I believe they can give us some hints to do that. After that, we've discuss to use the raspberry Pi 3 as our hardware component to do our project. Besides the meeting, I've spent some time to search for that hardware and watch the video on how to use that. Since we just confirmed which hardware we should use, we may get the raspberry pi 3 in a couple days after our client buy this online. Because of that, I was still working with the development on android studio. I spent time to read the calendar stuff from the android developer APi and watch some tutorial video online. Then I can use the calendar.getInstance() method to return a current date and time, this will help our customer to reserve the washing time from the mobile. When they select the date, it will display on the top of our temporary UI. We may share our progress to the other two partners in our team after we received the raspberry Pi 3 and start to work with that microcontroller.	7	22
Casey Gehling	This week I worked on trying to create some test data within spring boot using native services to eventually allow the mobile developers to pull from the server, simulating about half of the overall life cycle of our project. The lead backend developer has a different way to go about creating test data,	7	23

	but I found a tutorial online and have been attempting to use JPA as previously mentioned. Once I have test data generated (which would happen each time the server is spun up), I will be able to provide API endpoints for the mobile developers to retrieve the data. Thus, once all test data is created/handled, we will be able to sit down with the mobile developers and define (or generate a rough outline) of what an API will look like -- basically the main functionality that will be needed coming to and from the mobile application as well as to and from the hardware controller.		