

sdmay18-38: Smart Wireless Ag Sensors for Measurement of Soil Water Contents

Week 9 Report

November 20 - November 28

Team Members

Colin Cox — *Software Developing*

Wage Miller — *Circuit Board Designer*

Jarrod Droll — *Sensor Design and Research*

Rachel Hoke — *Sensor Design and Research*

Scott Rowekamp — *Software Developer*

Tyler Thumma — *Circuit Board Designer*

Summary of Progress this Report

Sensor

After multiple sensor fabrication attempts we spent time during this report session developing alternate designs for the sensor that will make applying chemicals throughout the fabrication process easier. The current design for the sensors involve a rectangular strip of silver that chemicals are deposited on. The rectangular shape makes it difficult to evenly distribute chemicals on each electrode. By adding a circular pad at the bottom end of each electrode you would be able to apply a drop of the required chemical on each electrode. Another possible solution would be to have a circular pad at the end of the working electrode and having the reference electrode curve around the working electrode. One error we see with this design is it will be difficult to put chemicals on only the reference electrode. Although by using a 3D printer to print a divider for between the electrode this problem could be avoided.

App

Started developing an application that communicates to a dedicated sensor box. We decided to develop the initial app in android. The app communicates with the dedicated sensor box using Low Energy Bluetooth. We are using an open source application as a reference as this is what our client suggested we do.

Control Box

Now that we have a potential alternative battery as well as our circuit designed, we began looking at the costs associated with actually fabricating our circuit. We currently have a budget of around \$2,000, so we are exploring the possibility of outsourcing our PCB and having it made by a professional company. This would eliminate potential soldering and assembly errors. One problem associated with this is that we would be able to deliver far fewer control boxes than if we were to assemble them ourselves. As of right now we think that outsourcing our PCB would result in an overall cost ranging somewhere between \$200-\$250. If we were to solder it ourselves, the cost would only be about \$100 per unit.

Pending Issues

Sensor

When reviewing our designs, we can have some potential problems with designing a new barrier for separating the electrodes when applying the separate chemicals. At the start of next semester, we will finalize a new design for the sensors and can then work on fabrication of it and the application for getting rid of the step that is created during the coper step.

Control Box

The only pending issue is deciding whether or not we would be capable of soldering our PCB ourselves or

whether we should get it outsourced to a professional company.

App

Our web application needs to be tweaked to work with the data set we our pulling from the control box.

Plans for Upcoming Reporting Period

Sensor

We plan on discussing our possible solutions with our faculty adviser, as well as discuss the problems we found during the sensor fabrication process. Through this review and research, we will be able to determine more of a set time line and steps for next semester. We are exploring our testing options during the next reporting period.

Control Box

For the upcoming report period, we plan on meeting with our client/adviser and seeing if they think it is a good idea to use more of our budget for assembly of the control box or if they think we should attempt to solder the components ourselves.

App

Continue devolving both the web api and android application.

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
Colin Cox	Developed Android Application	2	31.5
Wage Miller	Researched total costs of circuit fabrication comparing doing it ourselves to getting the PCB professionally soldered and assembled	2	31
Jarrod Droll	Researched new design concepts for sensors	2	29.5
Rachel Hoke	Researched new design concepts for sensors	2	30
Scott Rowekamp	Developed Android Application	2	30
Tyler Thumma	Researched total costs of circuit fabrication comparing doing it ourselves to getting the PCB professionally soldered and assembled.	2	27.5