

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

Week 5 Report

October 18 - October 25

Team Members

Colin Cox — *Application/Software*

Wage Miller — *Control Box*

Jarrold Droll — *Sensors*

Rachel Hoke — *Sensors*

Scott Rowekamp — *Application/Software*

Tyler Thumma — *Control Box*

Summary of Progress this Report

Our group was split into 3 groups:

A) Sensors (Jarrod/Rachel)

B) Application/Software (Colin/Scott)

C) Control Box (Tyler/Wage)

A) Sensors

This week we completed lab chemical training through Iowa State's Environment Health and Safety Page. After completion of training we began creating some of the chemical solutions required for sensor fabrication. Most of our time was directed towards creating the PDMS protective membrane for the sensors. We then stored the extra PDMS according to the training we received.

B) Application/Software

We are looking into potential devices capable of implementing mesh networking technologies.

C) Control Box

This week we built a new version of the control box circuit in Multisim/Ultiboard in order to utilize both sides of the PCB. This new version is designed to be about $\frac{3}{4}$ of the size of the original, which will help in reducing the overall control box size. In order to achieve this we managed to put some capacitors and resistors on the other side of the PCB.

Pending Issues

A) Sensors

In order to create other solutions necessary for sensor fabrication, such as PEDOT and AgCl, we need the chemicals required to do so. There are currently pre-prepared solutions available but supplies could run dry in a couple weeks.

B) Application/Software

Still have no requirements from our client on how they want the app to work or what they want it to do.

C) Control Box

The only pending issue is that even though we have a functional design in Multisim, we are not 100% sure that this circuit will function as intended in real application. For this reason, we are going to consult our grad student about whether or not this design would be considered viable. We are looking on implementing Op-amps on both sides of the PCB.

Plans for Upcoming Reporting Period

A) Sensors

We plan on continuing the sensor fabrication process and document issues in the process as well as develop possible improvements.

B) Application/Software

We will continue to work with the client to determine what functionality is needed by our app.

C) Control Box

For the next week we plan on adding the voltage booster to our PCB design which will reduce the overall size further as we will not need two separate PCBs.

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
Colin Cox	Prototyped code for mesh network.	3	23
Wage Miller	Helped design new smaller version of control box circuit in Multisim	3.5	22.5
Jarrod Droll	Worked on sensor fabrication and Lab chemical training. Created some chemicals required for sensor fabrication.	3	23
Rachel Hoke	Worked on sensor fabrication and Lab chemical training. Created some chemicals required for sensor fabrication.	3	23.5
Scott Rowekamp	Researched technologies to transfer data wirelessly	3	21.5
Tyler Thumma	Designed new PCB for control box within Multisim/UltiBoard	3.5	19