

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

Week 7 Report

November 3 - November 10

Team Members

Colin Cox — *Application/Software Engineer*

Wage Miller — *PCB/Electrical Engineer*

Jarrod Droll — *Sensor Design Engineer*

Rachel Hoke — *Sensor Design Engineer*

Scott Rowekamp — *Application/Software Engineer*

Tyler Thumma — *PCB/Electrical Engineer*

Summary of Progress this Report

A) Sensors (Jarrod/Rachel)

Throughout this reporting period we attempted to fabricate another sensor in the lab. We used the same process and design in order to gain a better understanding on how the fabrication process is currently performed. In our previous attempt we did not give the FeCl_3 enough time to create a chemical reaction. We decided to give the FeCl_3 more time during this fabrication attempt, however after 10 seconds both electrodes turned from the original silver color to a dark grey, almost black. We decided to remove the chemical after 10 seconds due to this and check the sensor conductivity. In this fabrication attempt the chemical reaction occurred very rapidly and burnt out the electrodes on the sensors resulting in no conductivity.

B) Application/Software (Colin/Scott)

Developed test application that communicates with the mesh networks. We were able to get the mcu. The app communicates over a wireless network to the network to the coordinator.

C) Control Box (Tyler/Wage)

This week we did research on the Voltage Booster to implement this on our PCB. We found the Voltage Booster which is currently being used on ada fruits website. We then implemented the circuit design from their website onto our PCB within Ultiboard.

Pending Issues

A) Currently we observed some challenging areas throughout the fabrication process, and the main issue is stemming from the chemical change from Ag to AgCl by applying FeCl_3 . It varies from sensor to sensor the amount of time required to make the Ag to AgCl chemical reaction.

B) Waiting on requirements.

C) Some challenges we faced was that after implementing the power booster onto our PCB was that it wasn't properly converting over to a gerber file needed to have the PCB printed. We are currently looking into how to fix any of the issues with this new implementation.

Plans for Upcoming Reporting Period

A) We plan on attempting another sensor fabrication but will observe the color of the electrodes during the chemical reaction period to determine how long to leave the FeCl_3 on the electrodes.

B) Continue with application development.

C) Clear up any issues with the conversion between a Ultiboard to a gerber file. Also, next time we are going to be looking at different battery which is smaller to help reduce the size of our control box.

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
Colin Cox	Continued research on mesh network capable devices.	3	26
Wage Miller	Worked on implementing the Voltage Booster onto the PCB and started research on using new battery.	4	26.5
Jarrold Droll	Continued fabrication of sensors. Documented errors found during the fabrication processes. Develop possible alternatives to correct this problem.	3	26
Rachel Hoke	Continued fabrication of sensors. Documented errors found during the fabrication processes. Develop possible alternatives to correct this problem.	3	26.5
Scott Rowekamp	Worked on app and 3D printing.	3	24.5
Tyler Thumma	Worked on implementing the Voltage Booster onto the PCB and started research on using new battery.	4	23