

## EE/CprE/SE 491 Weekly Status Report 12

Dates: 4/16/18 – 4/20/18

Group #: 5

Project: Micro-Electro-Mechanical Systems (MEMS) Based Sensing System for Soil Conditions Monitoring

Client: Dr. Halil Ceylan

Advisor(s): Shuo Yang and Dr. Yang Zhang

### Team Members:

Nathan Coonrod (Report Manager)

Kyle Kehoe (Communications Manager)

Jacob Verheyen (Meeting Facilitator)

David Severson (Web Master)

Sok-Yan Poon (Timeline Manager)

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### Weekly Summary

Collected resistance measurement data from our DAQ prototype, in which two different tests were performed:

- 1) Sampled various resistance data points between 100-400 Ohms using a decade box connected to one of the temperature channels to test accuracy of DAQ readings when compared to multimeter reading.
- 2) At a constant resistance of nominally 250 Ohms, we placed our DAQ prototype in a temperature chamber and swept the temperature from extreme cold temperature limit (-42 degrees Celsius) to an extreme hot one (49.5 degrees Celsius) to observe if the measured resistance readings would fluctuate heavily due to temperature.

Both tests described above were promising, however we expect to improve upon the results of the first test for better accuracy.

Started assembling our third prototype PCB. Surface mount soldering was done by team members and slight modifications to the board design will be worked on to get the board completely functional.

Further research was done in software development to see how to implement interrupts to wake the microcontroller from sleep mode and sample a reading at appropriate intervals based on a user specified sampling rate in a config.txt file.

## Past Week Accomplishments

- Kyle: Assisted with collecting and recording resistance measurement data from our DAQ prototype and soldering surface mount components for prototype. Updated Arduino code and project documentation for final presentation.
- Nathan: Testing of resistance circuit accuracy and temperature dependency
- Jacob: Collected resistance data using our DAQ and compared it to values obtained using DMM. Assisted with testing our prototype over a wide temperature range. Assisted with updating final presentation/other documentation.
- David: Soldered components onto the first prototype board. Assisted with updating final documents and plans. Showed Kyle how I solder, and taught him methods I use.
- Sok-Yan: Updated project schedule, working on final presentation slides and practiced with team members. Researched about sensor recreation process.

## Pending Issues

We are actively working to implement capacitance measurement circuitry on our third prototype along with resistance measurement circuitry. Will probably have to continue work on it at the beginning of next semester.

## Individual Contributions

<b>Name</b>	<b>Contribution</b>	<b>Hours This Week</b>	<b>Hours Cumulative</b>
Kyle	Assisted with collecting and recording resistance measurement data from our DAQ prototype and soldering surface mount components for prototype. Updated Arduino code and project documentation for final presentation.	5	46
Nathan	Testing of temperature accuracy and temperature independence	5	45
Jacob	Collected resistance data using our DAQ and compared it to values obtained using DMM. Assisted with testing our prototype over a wide temperature range. Assisted with updating final presentation/other documentation.	5	42
David	Soldered components onto the board. Assisted with documentation. Taught Kyle how to solder.	5	48
Sok-Yan	Updated project schedule, working on final presentation slides and practiced with team members. Researched about sensor recreation process.	5	44

### Plan for Coming Week (4/23/18 - 4/27/18)

Since it is DeadWeek at Iowa State, we will give a final presentation of our project to a faculty panel on 4/23/18. In addition, we will give a similar presentation to available stakeholders of the project on 4/26/18 to give them an idea of where we are at in the project and next steps to take for Fall Semester 2018 in EE 492.