

# EE / CprE / SE 491 – sddec19-19

## Printed Miniature Nutrient Sensors

### Weekly 5 Report

4/15/19 - 4/19/19

**Client** : Dr. Liang Dong

**Faculty Advisor** : Dr. Liang Dong

#### Team Members

Jonathan Hugen - Manufacturing and Testing

Samuel Keely - Software and App Development

Jeremy-Min-Yih Chee - Software and App Development

Clayton Flynn - Manufacturing and Testing

Ritika Chakravarty - Circuit Design

#### Weekly Advisor Meeting 4/19/19

Due to Dr. Dong's schedule, we had a short meeting with him this week.

#### Weekly Group Meeting 4/16/19

This week in our meeting we changed our regular meeting time and place and met in the 491 classroom. We discussed what we needed to know from Dr. Dong to continue making progress on our individual projects. We also discussed our grade on the Design Document and we tried to draw comparisons to the Project Plan. We did well on the Design Document and we did poorly on the Project Plan, so we discussed ways of incorporating pieces of the Design Document into the Project Plan and discussed the areas where we still needed great improvement.

#### Past Week Accomplishments

Jonathan Hugen:

- Met with Yun cong who is my advising TA
  - Discussed ISM safety and talked about waste mitigation
  - Discussed my responsibilities for making the ISM
  - Stayed in communication with Dr. Dong about another batch of ISM for testing
  - Started working with old prototypes to learn more about the current manufacturing problems.

Samuel Keely:

- Application Optimization
- Server design work
- Verification of code used for Arduino system

Jeremy-Min-Yih Chee:

- Attended weekly meetings
- Started optimizing the app
- Researched on the possibility of changing the server's source code to PHP.

Clayton Flynn:

- Attended weekly meetings
- Worked on Design Project

- Met with graduate student Yuncung
- Practiced depositing the ISM in the copper electrodes
- Practice working with the solvent evaporating

Ritika Chakravarty:

- Attended weekly team meeting.
- Research methods to fix discrepancies between input and output voltage.

### Pending Issues

We are still waiting to gain access to the greenhouses North of the ISU campus. Our sensors will be tested in the greenhouse. We should be setting up a short tour of the lab in the following weeks. Email communication from now on must be more structured and thought out to include all the relevant parties when discussing a problem, or discussing project details. We are starting to accumulate some communication errors that drastically affect the responsibilities expected of us. We are getting two sets of conflicting information from the grad students and Dr. Dong and we need a system to eliminate confusion. At the moment we are still waiting for the chemicals to make another batch of ISM (ion selective membrane) for testing. Without ISM, the testing that requires ISM is at a standstill. The image shown on the right is the only ISM that we left and the batch is too viscous to be able to print. The cost of the material would be equivalent to around \$300-400 for a vial that size.



### Individual Contributions

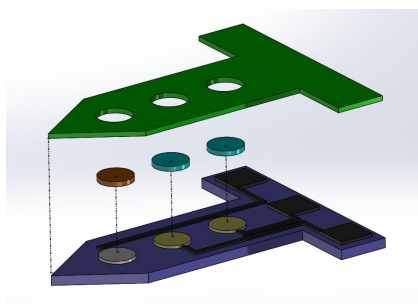
Member	Projects	Hours	Total Hours
Jonathan Huguen	<ul style="list-style-type: none"> <li>- Discussed strengths and weaknesses in Project Plan</li> <li>- Discussed what we need to change for final Project Plan</li> <li>- Met with grad students for more project details</li> <li>- Practice dispensing fluid on silicon wafer sensors</li> <li>- Practice dispensing fluid on PCB sensors</li> <li>- Practice machine calibration</li> <li>- Learn how to scale and rotate programs</li> <li>- Learn some simple problem troubleshooting for dispensing robot</li> </ul>	1	19
Samuel Keely	<ul style="list-style-type: none"> <li>- Develop Server prototypes</li> <li>- Get Prev. server revisions running for summer testing</li> <li>- Discussed questions to ask Dr. Dong</li> </ul>	2	15
Jeremy-Min-Yih Chee	<ul style="list-style-type: none"> <li>- Attended weekly team meetings.</li> <li>- Update the current version of the source code so that it can run on the simulator.</li> <li>- Research on different API to improve bluetooth connection.</li> </ul>	2	20
Clayton Flynn	<ul style="list-style-type: none"> <li>- Attended weekly meetings</li> <li>- Met with graduate student Yuncung</li> <li>- Practiced depositing the ISM in the copper electrodes</li> </ul>	2	16

	- Practice working with the solvent evaporating		
Ritika Chakravarty	- Attended weekly team meeting. - Continue working with Xinran (graduate student) to understand possible ways in which data accuracy can be guaranteed.	1	19

## Plans For Upcoming Week

### Jonathan Huguen

- Schedule times to meet with TA to start writing programs for micro-fluid dispensing machine
  - Read through instruction and setup manual
  - Practice scaling and rotation calibration and more simple programming
- Get training on how to prepare batches of ISM
  - Still waiting on chemicals to come in for batch preparation
  - Get trained on how to measure viscosity using rotary viscometer
  - Get training on how to handle THF solvent
  - Get training on how to adjust viscosity
- Work on revising final Project Plan
- Write a program for the fluid dispensing robot to coat the top of the silicon sensor with epoxy (shown in green) and the gold pads with ISM (shown as light blue dots).



### Samuel Keely

- Server SQL foundation
- Arduino code check
- Application design

### Jeremy-Min-Yih Chee

- Look through the source code (microcontroller, server, app) provided by the graduate student.
  - Have full understanding of the functionality and interaction between the different source code.
- Continue optimizing the provided source code in terms of stability.
- Continue calibrating the interval where the app will refresh and retrieve the data information from the sensor.
- Compile question to ask alumni who worked on the project regarding the source code.

### Clayton Flynn

- Look at the fluid dispenser manual to better understand how it operates
- Practice working with the evaporating ISM in the dispenser
- Practice sealing the ISM to the sensor with the bonding glue

- Start testing the printed sensors

### **Ritika Chakravarty**

- Continue researching methods to reduce the discrepancies between voltage fluctuations and accuracy of data, without changing the structural components of the circuit.
- Ask Xinran and Dr.Dong about the same.

### **Future Plans**

We will soon be gaining access to the lab and greenhouse to test our sensors. We will also have to establish a better communication system to eliminate any possibilities of miscommunication between our team, the graduate students and Dr. Dong. Apart from that, we will continue working on our individual goals for next week.