EE / CprE / SE 491 – sddec19-19
Printed Miniature Nutrient Sensors
Weekly 5 Report

4/1/19 - 4/5/19
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 3/14/19

This week we went around the table and all the group members updated Dr. Dong on their individual progress. Dr. Dong asked a few questions to each of us to make sure we knew the scope our individual contribution. Then we went around the table and individually asked questions to Dr. Dong to gain clarity on our tasks for the week. We discussed the issues with app stability and how the problems will be mitigated. We also discussed May deadlines for the sensor boxes. Finally we discussed the specific sensors that we were responsible for testing manufacturing processes on, and how to solve some of the issues with longevity in the sensor due to moisture penetration.

Weekly Group Meeting 3/13/19

This week in our meeting we changed our regular meeting time and place and met in the 491 classroom. We each discussed our progress in our individual projects and asked for advice and help on some issues regarding sensor box troubleshooting. We also discussed what we needed to know from Dr. Dong to continue making progress on our individual projects. We noticed some communication errors between the graduate students and Dr. Dong and we considered a few of the options we had to eliminate the confusion. We talked about how to write emails and who to address problems to and also who to include in the emails. Our group decided that it would be beneficial to have the instructions we are given to be put in writing and able to be viewed by all the relevant parties.

Past Week Accomplishments

Jonathan Hugen:

- Met with Yun cong who is my advising TA
    - Discussed ISM safety and talked about waste mitigation
    - Learned how to handle the solvents associated with the project
    - Discussed what type of problems are associated with each sensor iteration
    - Learned how to operate and program the micro-fluid dispenser
    - Got detailed explanations of problems associated with micro-fluid dispensing process
    - Started working with old prototypes to learn more about the current manufacturing problems.

Samuel Keely:

- Enumerated proposed features for the application
- Began designing interfaces for application
- Started work on database design and information storage requirements

Jeremy-Min-Yih Chee:

- Met with Xinran who is the graduate student overseeing the software component of our project.
    - Discuss the current functionality of the Microcontroller(MCU), App, and database source code.
    - Discuss about the current software-related issue.

- Read through the provided software design document to have the understanding design of the software.
- Worked on debugging the bluetooth aspect of the app.

Clayton Flynn:

- Attended weekly meetings
- Worked on Design Project
- Met with graduate student Yuncung
- Received a grid of pcb sensors with copper electrodes to practice printing, also received a couple gold and silver sensors
- Received instruction for preparing the sensor to be printed on

Ritika Chakravarty:

- Attended weekly meetings.
- Met with Xinran to go through the schematics of our homemade circuit (12W ADC).
  Met with Xinran to understand the logic behind the Arduino code, that helps the circuit box collect, store and transmit data from the needle point sensors.
- Met with Xinran to understand the types of tests and expected outputs from circuit boxes, during the debugging process.

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. 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.

Individual Contributions

Member	Projects	Hours	Total Hours
Jonathan Hugen	- Met with grad students for more project details - Practiced dispensing fluid on silicon wafer sensors - Practiced dispensing fluid on PCB sensors - Learned calibration methods for dispensing machine - Learned how to scale and rotate programs	4	18

	- Learned some simple problem troubleshooting for dispensing robot		
Samuel Keely	- Set up database through ETG - Discussed questions to ask Dr. Dong	2	10
Jeremy-Min-Yih Chee	- Attended weekly meetings with Dr. Dong and team meetings. - Contact grad students for software details. - Understand the software source code. - Learned ssl for database source code.	3	16
Clayton Flynn	- Attended weekly meetings - Met with graduate student Yuncung - Received a grid of pcb sensors with copper electrodes to practice printing, also received a couple gold and silver sensors - looked at manual for fluid dispenser	4	14
Ritika Chakravarty	- Attended weekly meetings. -Discussed questions to ask Dr. Dong. - Tested the a few circuit boxes by checking that: - The main on/off switch (on the body of the box) worked properly. - All circuit components were switching on when subject to an incoming voltage. - The input voltage always produced an output voltage (though the data may not be within our required levels of accuracy). - The microSD card in the Arduino recorded data for every test session it was subject to.	3	17

Plans For Upcoming Week

Jonathan Hugen

- Schedule times to meat 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
- Research printing materials and properties
    - UV stability
    - Heat Sensitive
    - Bonding strength
    - Nitrogen permeability
    - Mechanical/ thermal stability
- Get training on how to prepare batches of ISM
    - 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

Samuel Keely

- Design document
- Obtain and break down previous application versions
- Further elaboration of sensor data and storage methods

Jeremy-Min-Yih Chee

- Look through the source code provided by the graduate student.
    - Listen to feedbacks of the user and debug the software component.
    - Have full understanding of the software source code.
- Request a database from Etg and ensure that it is running.
- Optimize the provided source code in terms of stability.
- Add an error detection unit when the sensor failed.

Clayton Flynn

- Look at the fluid dispenser manual to better understand how it operates
- Research how THF will affecting bonding glue
- Research how to work with quickly evaporating fluids
- Receive ISM to practice printing

Ritika Chakravarty

- Continue working on debugging circuit boxes. Since more versions of the circuit box have been developed, debugging a few circuit boxes from each version will help me gain a better understanding of the working of the circuit box.
- Research methods to make the circuit box less sensitive to sudden fluctuations in voltages (which prompts the sensor to provide a small set of incorrect data with every fluctuation).

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.