EE / CprE / SE 492 – sddec19-19
Printed Miniature Nutrient Sensors
Bi-Weekly Report 2

9/15/19 - 9/28/19

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 Summary of Advisor Meeting 9/19/19 and 9/26/19

In the meetings over the last two weeks, Dr. Dong discussed some of the logistics issues with obtaining test sensors for experimenting with thin film pattern application. Dr. Dong We also showed him our PIRM slides so he could understand where we were struggling with our project. We also discussed the data plan that will be setup for field testing.

Weekly Summary of Group Meeting 9/19/19 and 9/26/19

We practiced for PIRM 1 to make sure everything was covered and we would take the right amount of time to present our slides. We also discussed the general progress everyone was making in their part of the project. We had to schedule an early morning meeting outside of the normal time to finish up our slides for the PIRM presentation. At this point in our project, group meetings are less necessary because each member knows what they need to accomplish and how to get it done.

Past Two Weeks Accomplishments

Jonathan Hugen:
- Met with Dr. Dong and a few of the graduate assistants helping with the project
- Reviewed the programming guide for the fluid dispensing robot
- Practiced for PIRM
- Learned some automation methods of using imaging software for printing patterns on sensors
- Attended weekly meetings

Samuel Keely:
- Application Optimization
- Server design work
- Database design and interface specification
- Verification of code used for Arduino system

Jeremy-Min-Yih Chee:
- Attended weekly advisor and group meetings to discuss current project status, presentations, and future goals.
- Successfully set up the cellular module.
- Research on potential candidates for connecting the cellular module with the database

Clayton Flynn:
- Attended weekly meetings
- Had first PIRM presentation
- Received sensors to deposit material
- Prepared dispensing patterns

Ritika Chakravarty:
- Met with advisor.
- Met with group for weekly meeting.
- Researched methods to improve the Bluetooth capabilities of Arduino.
- Prepared slides for circuit design for PIRM 1.
.

Pending Issues

As of now, we are waiting on a cellular network plan to start implementing cellular communications into our project. This will need to be arranged with Dr. Daniels and the paperwork for how this is budgeted will have to be completed before that stage of the design can proceed. We are also still waiting for a batch of water resistant coatings that will be applied to the sensors that protect the ISM layer from getting damaged. We are also waiting for the sensors that we can use to practice coating with to be stripped of the current coating that is on them. The chemicals used to strip the coatings are semi-dangerous so the graduate assistants will be doing that part for us. As for integrating the battery reader module, we are currently researching the best candidate at adafruit to find the module that fits the criteria for our project.

Individual Contributions

| Member	Projects	Hours	Total Hours
Jonathan Hugen	- Practice dispensing fluid on silicon wafer sensors - Practice dispensing fluid on PCB sensors - Learn how to scale and rotate programs - Learn How to setup marks and reference locations - Learn how to do sub-routines	3	26
Samuel Keely	- Develop Server prototypes - Create Server side interface for database - Implement Database design - Discussed questions to ask Dr. Dong	3	15
Jeremy-Min-Yih Chee	- Successfully set up the cellular module. Currently, it can send data via email and SMS. - Work on presentation slides - Research on potential candidates for connecting the cellular module with the database. Currently, the best candidate is webhook.	6	32
Clayton Flynn	- Worked with adjusting program to multiple sensors - Prepared dispensing patterns for even distribution	3	25

Ritika Chakravarty	- Met with advisor. - Met with group for weekly meeting. - Researched methods to improve the Bluetooth capabilities of Arduino. **-** Prepared slides for circuit design for PIRM 1.	3	3

The total hours in the above table includes the hour from CprE/EE/SE 491.

Plans For Upcoming Week

Jonathan Hugen

- 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).
- Incorporate sub-routines to make pattern application a more automated process.
- Work with a graduate student to manufacture a large array of sample sensors to practice on.
-Get trained/introduced to the atomic force microscope
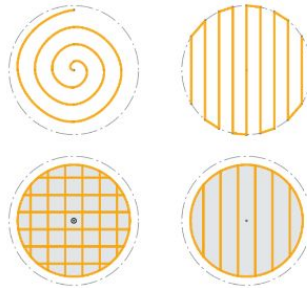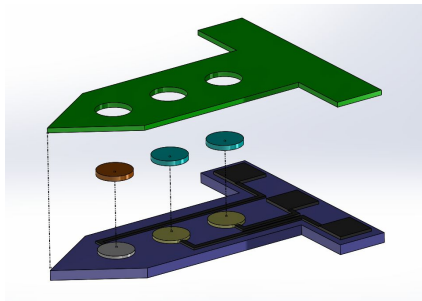
Samuel Keely

- Server SQL foundation
-Arduino code check
-Application design

Jeremy-Min-Yih Chee

- Work on connecting the cellular module to the database via webhook.
- Research on getting the battery level readings of the sensor box from the box itself to the app.

Clayton Flynn

-Work on improving dispensing pattern
-Experiment with removing the needle more gently from the surface
- Measure profiles of the material deposited

Ritika Chakravarty

- Continue working on improving battery capacity of the sensor such that the Bluetooth does not shut down when the battery reaches 50%.
- Buy battery meters for circuit boxes.

Future Plans

We will soon be testing integral parts of our system to pin-point the exact areas we need to focus on to complete our project. The app for the project will be redesigned and needs some additional features. The app needs to have a method to track the battery life of the sensors to help with power issues. The battery is causing transmissions to fail when on low power, so we will need to address this issue. The coatings that need to be deposited onto the sensors is a straightforward task but it appears that this will require an organized method of testing that will be traceable. The different patterns will be recorded to find the best profile. There are also many other parameters to consider besides the pattern like the tip remove, speed and pressure.