

EE / CprE / SE 492 – sdddec19-19

Printed Miniature Nutrient Sensors

Bi-Weekly Report 2

9/29/19 - 10/11/19

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 10/3/19 and 10/10/19

Advisor meetings for the last two weeks had been cancelled due to Dr. Dong's other commitments. However, we were able to contact him via email, regarding issues we came across in the past two weeks..

Weekly Summary of Group Meeting 10/3/19 and 10/10/19

The last 2 weeks, our group discussed a problem with pinouts (I/O) on the arduino. We found a few products that we may need to purchase such as a breakout I/O expander to increase the amount of serial data ports on the board. We still may be using Bluetooth along with cellular devices and the amount of pins required is more than the arduino has. We also need to add a battery gage sensor to the sensor box to be able to transmit the charge on the battery to the app. We also discussed some power saving techniques and found a few features on the cell module and arduino that may make this possible.

Past Two Weeks Accomplishments

Jonathan Hugen:

- Received our first test wafer
- Made a plan for securing the wafer to the robot
- Discussed a few methods for maintaining repeatability on our wafer
- Programmed a spiral in and spiral out pattern for the fluid dispenser
- Researched different coordinate systems used in programming to make it parametric.
- Familiarized ourselves with some of the tools used to prepare the fluids for dispensing
- 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 group meetings to discuss current project status, and future goals.
- Successfully set up the cellular module.

- Found candidate (Zapier) for connecting the cellular module with the database.
- Successfully implemented and set up a testing database.

Clayton Flynn:

- Have dot array for analyzing profile of the ISM layer
- Programmed pattern for fluid dispenser
- Met with group for weekly meetings
- Researched methods for repeatable programs

Ritika Chakravarty:

- Met with group for weekly meeting.
- Researched various battery sensor meters to fit into our circuit box.
- Brainstormed ways to fit the battery sensor in circuit box despite space constraints.

Pending Issues

We are still waiting on funding for our cellular network plan. We are having communication issues with our advisor and the graduate students who are helping us with this project. Our advisor has been cancelled the last 2 meetings and his email responses have been very short. We are lacking in depth discussions that we need to answer many questions that still remain with this project. He has been helpful but he has also been very hard to get a hold of. As for integrating the battery reader module, we need to buy an I/O expander for our arduino to accommodate for more serial data pins. We also need to implement the power saving techniques that were discussed in our weekly last meetings

Individual Contributions

| Member | Projects | Hours | Total Hours |
|---------------------|--|-------|-------------|
| Jonathan Hugen | <ul style="list-style-type: none"> - 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 | 7 | 33 |
| Samuel Keely | <ul style="list-style-type: none"> - Develop Server prototypes - Create Server side interface for database - Implement Database design - Discussed questions to ask Dr. Dong | 3 | 15 |
| Jeremy-Min-Yih Chee | <ul style="list-style-type: none"> - Successfully set up the cellular module. Currently, it can send data via email and SMS. - Found best candidate (Zapier and webhook) for connecting the cellular module with the database. - Worked on getting the cellular module to connect with the database with Zapier and webhook acting as its medium. | 8 | 40 |
| Clayton Flynn | <ul style="list-style-type: none"> - Have dot array for analyzing profile of the ISM layer - Programmed pattern for fluid dispenser | 3 | 25 |

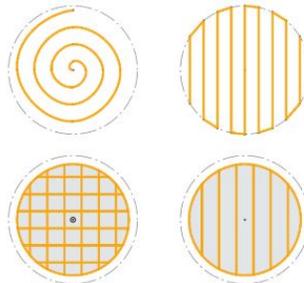
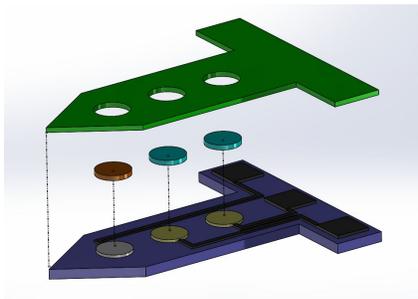
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|--------------------|--|---|----|
| | <ul style="list-style-type: none"> - Met with group for weekly meetings - Researched methods for repeatable programs | | |
| Ritika Chakravarty | <ul style="list-style-type: none"> - Met with group for weekly meeting. - Researched various battery sensor meters to fit into our circuit box. - Brainstormed ways to fit the battery sensor in circuit box despite space constraints. | 4 | 20 |

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

Plans For Upcoming Week

Jonathan Hugen

- Incorporate sub-routines to make pattern application a more automated process
- Make an excel chart to map progress in our testing phase
- Use 2 different coordinate systems into our program to make it more parametric
- Try to find the rough starting parameters for testing
- Dial in at least 1 variable (tip height, tip breakaway, travel speed, etc.) during our testing
- Get trained/introduced to the atomic force microscope
- Learn how to use fiducial marks to make angular adjustments to our program



Samuel Keely

- Server SQL foundation
- Arduino code check
- Application design

Jeremy-Min-Yih Chee

- Continue working on getting the cellular module to successfully transfer data to the database and stores it in there.
- Research on getting the battery level readings of the sensor box from the box itself to the app.
- Research and optimize mongoDB in such a way that it fits our design criterias.

Clayton Flynn

- Work on improving dispensing pattern
- Set up table to record different dispensing patterns to maintain organization
- measure profiles of the patterns using profilometer

- Determine dest parameters to use(speed, acceleration, pressure)

Ritika Chakravarty

- Order the battery sensor meter and other necessary equipment to attach the sensor to the Arduino.
- Test ways to fit the battery sensor in circuit box.

Future Plans

We will be continuing to work on improving our parts of the project. The bluetooth module is taking up a large amount of box real estate. Because the bluetooth and the cellular module are fulfilling the same role it we are considering removing the bluetooth. This should also help improve the current power constraints. A battery sensor is being ordered to measure the battery life remotely. The sensor patterns are analyzed for performance. The server is in the process of being improved. Dr. Dong will no longer be on travel and weekly meeting will resume.