EE / CprE / SE 492 – sddec19-19
Printed Miniature Nutrient Sensors
Bi-Weekly Report 6

11/9/19 - 11/22/19

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 11/14/19 and 11/21/19

We only had one meeting in the last 2 weeks as Dr. Dong had to attend a PhD. thesis defense. We talked about what information he wanted from Jon and Clayton regarding the ISM and epoxy deposition. He wants the variable we used for speed, tip size, pattern, step-over, pressure, and several other parameters. He also wanted to know how the code that was written for the system's microcontroller and app. He wanted to know the functionality and limitations and what could be added in future years. He also asked for advice on a similar project that was being done by another Senior Design team. We arranged a time for the ISM deposits to be analyzed by a machine located in the Microelectronics Research Center. The machine measures the surface roughness to make sure that the surface is smooth to prevent mechanical stresses. The project discussions were wrapped up as we are nearing the end of our time with it.

Weekly Summary of Group Meeting 11/14/19 and 11/21/19

We discussed what will need to be updated for our final design document submission. The requirements for the poster were covered. The code bugs should be fixed over break and we will finish our final testing after. The app is mostly done but needs to have some additional features added. We are mostly satisfied with the results of the ism, so we will finish analysing the data for that portion of the project.

Past Two Weeks Accomplishments

Jonathan Hugen:
- Deposited ISM on over 200 more sensor pads
- Perfected the pattern and setup the robot for faster pattern application
- Used the Phase Contrast Microscope to collect images for analyzing
- Developed a cleaning operation for the dispensing tip
- Dispensed 2-part epoxy around previously deposited ISM
- 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:
-   Removed the bluetooth module from our design. Therefore, our design is currently relying on the cellular module for data transmission.
-   For implementation and testing purposes, design and implemented a standalone algorithm for data transmission.
-   Ran tests regarding the reliability of the data transmission of the cellular module microcontroller.

Clayton Flynn:
-   Attended weekly meetings
-   Deposited epoxy on around ism on wafer
-   Material was very viscous, but flowed and completely covered dot
-   Deposited less material to avoid covering the ism
-   Experimented with heating the epoxy to increase the curing speed.

Ritika Chakravarty:
-   Met with group for weekly meeting.
-   Prepped for first round of function generator testing.

Pending Issues

The time left to complete the project is getting pretty low. We are still waiting on the profiles of the ism for various dispensing patterns. The code also needs to be debugged, so we can finish our final testing. Otherwise, we are relatively confident that the project will be completed in time, and we will have a final deliverable.

Individual Contributions

Member	Projects	Hours	Total Hours
Jonathan Hugen	- Take photos of wafer under contrast microscope - Deposit epoxy coating around ISM deposits - Inspect the epoxy coatings and get them approved by Dr. Dong - Write report of findings for Dr. Dong - Experiment with baking epoxy deposits	22.5	87.5
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	- Integrate about 60% of the existing source code and fixed errors that appear during the integration process. - Implemented a standalone algorithm (Will be implemented with the existing source code) where it will switch on and perform relevant task (Collect readings, etc) at a specific time interval and transmit relevant data from the cellular module	18	85

	microcontroller to the cloud. - Perform tests on the stated algorithm to ensure that it is working accordingly.			
Clayton Flynn	- Attended weekly meetings - Deposited epoxy on around ism on wafer - Material was very viscous, but flowed and completely covered dot - Deposited less material to avoid covering the ism - Experimented with heating the epoxy to increase the curing speed.	21	79	
Ritika Chakravarty	- Met with group for weekly meeting. - Prepped for first round of function generator testing.	3	52	

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

Plans For Upcoming Week
Jonathan Hugen
- Work on preparing slides and organizing the data for our presentation
- Start a template for the poster
- Receive the results from the Le Wei from the profilometer
- Write up results from testing to report to Dr. Dong

Samuel Keely
- Server SQL foundation
- Arduino code check
- Application design

Jeremy-Min-Yih Chee
- Start to compiled data and relevant-design documents for the poster, industrial panel presentation, and final report.
- Continue integrating the existing code into the cellular module microcontroller.
- Create a fail-safe algorithm where the cellular module will save the readings into its microSD if the data transmission via cellular network fails. Once there's a successful connection, it will send the stored readings into the cloud.
- Run additional test on the reliability of the data transmission.

Clayton Flynn
- Analyze the profile to determine which pattern had the best result
- Work on poster for presentation
- Work on presentation for industry panel

Ritika Chakravarty
- Troubleshoot/ clear issues from the first round of testing and prep of second round of testing.
- Help prep poster for industry review panel.

Future Plans

The cell module code has a few bugs that need to be worked out. The app needs a couple features to be added. A graph for displaying the nitrate levels over time would be useful for the app. The system needs to be tested to ensure all the individual parts are working together. The ISM is still waiting to be analysed of a profilometer. The results need to be analyzed and will need to be reported to Dr. Dong. Also, Dr. Dong requested the results from our fluid deposition. The variables we used for accurate deposition were the goal of this portion of the project.