

EE/CprE/SE 492 BIWEEKLY REPORT #4

Oct 12th 2022 – Oct 25th 2022

Group number: SDDEC22-12

Project title: Creating DNA from scratch for DNA-based data storage

Client &/Advisor: Meng Lu

Team Members/Role: Connor Larson/Software Engineer , Kyle Riggs/Software Engineer , Brandon Stark/Electrical Engineer , Nathan Armstrong/Electrical Engineer , & Lucas Heimer/Electrical Engineer

○ **Weekly Summary**

Finished modeling and printing the new LCD holder and housing. Finished interfacing the Arduino Nano with the LED light. Finished testing the power output of the LED through the new LCD screen. Testing of the microfluidic system was conducted and adjustments are continuing to be made for improvements to the overall efficiency.

○ **Past week accomplishments**

- Team Member 1 (Connor): Tried to test out code on the Fluigent machine. Was not able to get code to find the library. Tried to work with the library in Python and had the same results.
- Team Member 2 (Kyle): Created the ability to dynamically update between matrices in the software. Works for set sequences and set sizes, however.
- Team Member 3 (Brandon): Created new housing for the large LCD screen and made a new housing for flow cells on top of it. Finally configured Arduino to work with LED light. It now pulses on and off with 5 second intervals.
- Team Member 4 (Nathan): Used the power meter to determine the power going through the new LCD screen. After finding the values, I used that to calculate exposure time needed, as well as brainstorm ideas for cooling the LCD screen to avoid damaging it.
- Team Member 5 (Lucas): Repaired some issues with the microfluidic system. There was a leakage in the sealant of the flow cell as well as a major blockage in the tubing that needed to be fixed. Testing has resumed and attempted to do some testing with our code connected to the Fluigent controllers.

○ **Pending issues**

- Team Member 1 (Connor): Cannot get connection to Fluigent library.
- Team Member 2 (Kyle): Need to build upon the dynamic updates so it works with custom DNA sequences as well as custom matrix/cell sizes etc.
- Team Member 3 (Brandon): Determining a new idea for the heat sink on the LCD screen.
- Team Member 4 (Nathan): Finding a solution to the black spot that develops on the LCD

screen and a way to dissipate the heat from said spot.

- Team Member 5 (Lucas): A housing could be created to effectively set up the microfluidic system and aid in the overall flow of one component to the next. Solutions to be explored in the next few weeks.

○ **Individual contributions**

<u>NAME</u>	<u>Individual Contributions</u>	<u>Hours this week</u>	<u>HOURS cumulative</u>
Member 1 (Connor)	Develop and troubleshoot issue of being able to use Fluigent library	12	42
Member 2 (Kyle)	Dynamic matrix updating to test timing of printing.	12	42
Member 3 (Brandon)	LCD and flow cell housing. Arduino into the LED configuration.	12	42
Member 4 (Nathan)	Measured the power output through the LCD screen. Calculated exposure time needed.	12	42
Member 5 (Lucas)	Repaired major issues in the microfluidic system including sealing and blockage problems. Resumed testing and attempts at integrating with software.	12	42

○ **Plans for the upcoming week**

- Team Member 1 (Connor): Seek out help for installing and using the Fluigent library.
- Team Member 2 (Kyle): Going to try and get the dynamic updating to still work when there is a user customized DNA sequence as well as user customized matrix specifications.
- Team Member 3 (Brandon): Create housing for Arduino. Find out a way to reduce heat on the LCD screen. Make the LCD/LED system more neat and tidy.
- Team Member 4 (Nathan): Figure out a solution to the overheating problem of the LCD screen. Test or implement an overheating solution.
- Team Member 5 (Lucas): Continue to work with the software team to integrate our script to control the switches and pressure controllers. Begin the design of the housing for the microfluidic system.

○ **Summary of weekly advisor meeting**

Dr. Lu and the rest of the team discussed what we did the weeks before. We also discussed plans for moving forward on each part of the project. The hardware team needs to find a solution to the black spot that appears on the LCD screen, and finish printing everything

needed in the system. The microfluidic team needs to continue to run tests in preparation for trials with the actual biological molecules. Testing in coordination with the user interface will be conducted in the upcoming weeks.