

EE/CprE/SE 492 BIWEEKLY REPORT #6

Nov 9th 2022 – Nov 22nd 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

The design for the housing of the microfluidic system was completed and printed this week. Ongoing testing to filter out any additional frequent problems of the microfluidic system is also taking place. In an effort to reduce the heat exposure on the LCD screen, a glass piece is being fitted to the screen to dissipate some of the heat without having a significant effect on the intensity of light being exposed to the DNA nucleotides. On the software side, code is being developed to bypass the Arduino and have the computer directly turn the LED on and off using a trigger. The Fluigent code was completed as well as the UI design. Final touches to the array and matrix specifications are in the works.

Past week accomplishments

- Team Member 1 (Connor): This past week I spent researching how we will decide to implement turning the light on and off. The original idea was to use the Arduino Nano and have a script on it. We then changed to thinking we will control the GPIO of the Arduino to output the wanted values. After these thoughts, I came to the idea of using IO Stream to write values. This is currently the idea that I'm trying to get working. Aside from this, the driver code for the Fluigent device is developed, commented, and tested.
- Team Member 2 (Kyle): Started work on final presentation and demo code design. Adding in our array printing code with customizable matrix aspects. Software UI design work was completed as well.
- Team Member 3 (Brandon): Printed housing structure for microfluidic system. Received silicon oil and glass from Meng. Brought glass to Gilman in order to be cut so it could fit on the LCD screen.
- Team Member 4 (Nathan): Finished making the heat dissipation with glass and mineral oil. Finished printing housing structure.
- Team Member 5 (Lucas): Completed the design for the microfluidic housing and continued general testing to verify flow rate and timing of overall system cycle. Worked with Connor to test and verify the code to control the Fluigent system.

Pending issues

- Team Member 1 (Connor): Try to get the IO Stream working to send high and low signals to power a light.
- Team Member 2 (Kyle): None
- Team Member 3 (Brandon): Need code from Connor to control the LED switch via USB.
- Team Member 4 (Nathan): Need to finish printing everything and assemble it all.
- Team Member 5 (Lucas): Need to verify all components fit properly in the housing and then verify there are no frequently occurring issues in the microfluidic system.

○ **Individual contributions**

<u>NAME</u>	<u>Individual Contributions</u>	<u>Hours this week</u>	<u>HOURS cumulative</u>
Member 1 (Connor)	Research different ways to turn light on and off. Comment, test, and finalize Fluigent code.	12	66
Member 2 (Kyle)	Printing code merging with customizable matrix code. UI design	12	66
Member 3 (Brandon)	Printed microfluidic system housing. Cut glass. Got a USB specific cable.	12	66
Member 4 (Nathan)	Printed more stuff. Cut glass in Gilman. Thought of USB solutions	12	66
Member 5 (Lucas)	Completed the design for the microfluidic system and continued overall testing to verify full functionality and filter out any final issues	12	66

○ **Plans for the upcoming week**

- Team Member 1 (Connor): Continue to work on researching IO Stream and hopefully find a way to successfully control the light so we can start putting everything together.
- Team Member 2 (Kyle): Fix some bugs in regards to dynamically updating matrices when added with the printing code. Also will do some tweaks to UI design.
- Team Member 3 (Brandon): Print out new LCD and LED housing. Test heatsink with new cut glass and silicon oil. Test USB code from Connor.
- Team Member 4 (Nathan): Finish printing everything off and assemble it all together. Test system using photoresist to ensure the UV light is strong enough and system functions.
- Team Member 5 (Lucas): Complete a fit up for the microfluidic components. Continue testing the microfluidic system to refine the timing and flow rate.

- **Summary of weekly advisor meeting**

In our latest meeting with Meng Lu we discussed the method with which we will demonstrate our project. Since DNA is so small, it would be difficult to clearly show the panel what is happening. To show the functionality of our project we will use a photoresist to show how the system is working in the same manner as what is occurring during the DNA synthesis process. We also discussed issues with overheating the LCD screen and Meng was able to propose using an additional glass piece and absorbent material which will not affect the intensity of light, but greatly reduce the being exposed directly on the LCD screen.