EE 491: Senior Design

sddec23-05

DNA Data Storage

Jan. 2023 – Dec. 2023
Client: Professor Meng Lu
Faculty Advisor: Professor Meng Lu

Team Members:

Colin Frank - Software, 3D printing code, Microsoft's IDE

Evan Walters – Software, 3D printing code, Microsoft's IDE

Caden Wortman – Hardware, General

Astha Upadhyay – Hardware, 3D printer chassis, etc.

Anna Hackbarth – Flow Control, hardware

Past Week Achievements:

Anna, Flow Control -

Researched clear vinyl tubing needed to upgrade the pressurized piping currently used. The needed size is approximately 0.8mm (about 0.03 in) of interior diameter tubing. This particular size is just big enough to allow a decent flow of liquid through, avoid kinks, and flow at a reasonable pressure. The trouble becomes finding tubing of this size as it is not widely produced or needed in the United States. The goal is to find and purchase the ideal tubing by the end of the week.

Experimented more with OxyGEN to gain a better understanding of valve control with the FlowEZ system. Once a better understanding is reached, I can start working with Fluigent's software development kit (SDK) to integrate the valve control directly into the GUI being developed by Colin and Evan.

Astha and Caden, Hardware -

Further researched LED projectors at the suggestion of Professor Lu, planning a meeting to work in the graduate student office as there are some helpful resources that we need to see according to our faculty advisor.

Colin and Evan, Software -

Started on the GUI and got some basic functionality started with it. Talked in depth more with Professor Meng Lu about what he wanted the GUI to do and now we know the next steps that we need to take to continue making progress with the GUI. Our code will generate the image and send it to the projector which is what will be displayed on the microarray. We will also incorporate the flow cell on the GUI as well and it will simultaneously do both at the same time.

Faculty Advisor/Client Meeting Recap -

During our faculty meeting with Professor Meng Lu, we discussed questions about hardware and software needs. There was an in-depth review and discussion of the GUI software being developed, we received the next steps and suggestions. We established the next steps with our LED board issues including setting up a meeting to visit the Graduate Student Office for continuation purposes. Lastly, we discussed questions we had on flow control including how to integrate the flow control system with our GUI software development using the manufacturer's software development kit.

Individual Contributions

Name	Contribution	Weekly Hours	Hours-to-Date
Caden Wortman	• Further researched LED projectors	1	8.25
Evan Walters	• Continued to work on GUI	4	19
Colin Frank	• Continued to work on GUI	2	16.5
Astha Upadhyay	•		7.5
Anna Hackbarth	• Researched clear vinyl tubing • Downloaded Fluigent's SDK • Read through FlowEZ and Fluigent system operation manuels • Conducted additional tests with OxyGEN • Continued to update website • Began piecing together design talk and presentation	2.5	13

Next Steps:

As a team and with our advisor's input, we've decided on the next steps:

- Setup regular separate meeting times to meet in the lab and dissect the 3D printer and process
- Improvements in flow cell design
    - Order more piping as we are out of supplies
    - Begin writing integrable code with the software development kit
- Begin editing and reviewing 3D printing code
- Continue progressing on GUI
- LCD panel update
- Optimize the LED function

Conclusion:

This concludes our Week 9 report, we've learned a lot about the individual units of our project and have begun working on integration. We've communicated with third party sources like ETG for assistance with ordering physical components and asking questions.