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 -

This past week, I was able to meet with ETG to discuss our website. We as a team struggling with editing, saving, and updating our website. I was able to meet Tuesday afternoon to learn how to save our HTML changes, and the best work arounds for some issues I was experiencing. I was able to update members' information, link reports, and update our project's overview. This accomplishment allows us to compile our notes, reports, and other important information in the correct professional space.

I also ran through my first integration of the OxyGEN software and the Fluigent hardware controls. I learned how to control pressure on the Fluigent system's Flow EZ unit using the software available. Through this preliminary testing, I experimented with the different pressures' effects on the flow control, including too much pressure causing the liquid to bubble and lose printing accuracy, whereas too little pressure could lead to clogged pipes.

Caden and Astha, Hardware -

Discussed and researched various different LED boards for hardware upgrades. The current system uses a sheet of glass to act as a spacer between the LED board and the slide where the DNA is printed to prevent heat damage. We researched the LED board controls and read the manuals to optimize our current system. Additionally, we are looking to the possibility of replacing the LCD with a projector to help solve the current issues of head damage and light leaking when some areas should be black.

Colin and Evan, Software -

For the software side of it, we did more research on how we are going to create this GUI (what computer software we are going to use). We are going to build the GUI in PowerShell and we got

buttons created and created drop down list menus for the GUI. We got some good starting progress made and we will continue with that for this next as well.

Faculty Advisor/Client Meeting Recap -

This week we met in the lab with Professor Lu. We have dived deeper into the GUI including presenting our research and questions to our advisor for his guidance. We asked questions about flow control pressure, testing mechanisms, and next steps for implementing our desired changes.

Individual Contributions

Name	Contribution	Weekly Hours	Hours-to-Date
Caden Wortman	• Researched LED controls and manual • Researched projectors	2	7.25
Evan Walters	• Did more research on GUI • Started working on GUI	7	15
Colin Frank	• Did more research on GUI • Started working on GUI	7	14.5
Astha Upadhyay	• Researched LED controls • Researched alternate options	1	7.5
Anna Hackbarth	• Ran preliminary tests with OxyGEN software + performed hardware integration & control • Created team assignments • Set up meeting with ETG and learned how to update/edit the website	3.5	10.5

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, work with ETG
- Begin editing and reviewing 3D printing code
- Continue progressing on GUI
- LCD panel update
- Optimize the LED function

Conclusion:

This concludes our Week 8 report, we've learned a lot about the individual units of our project and have begun working on integration.