EE/CprE/SE 491 WEEKLY REPORT 8
10/31/2024 – 11/7/2024

number: ***sdmay25-17***

Project title: ***Microbial Pill Sensor***

Client &/Advisor: ***Dr. Meng Lu***

Team Members/Role:
Roles still subject to change as we transition from research to design phase.

- ***Wes Ryley:*** Data Transmission Design Lead
- ***Rakesh Penmetsa:*** Bacteria Housing Design Lead
- ***Alex Upah:*** Biosensor Design Lead
- ***Cade Kuennen:*** PCB Design Lead

Weekly Summary

This week, the team worked towards finalizing the component identification and decompositions for the project's custom PCB implementation. Due to Dr. Lu (our client and advisor) being sick, we were unable to meet with him to have project-related questions answered. Due to this, we were unable to completely finish the part decomposition for the Photodetector portion of the design, but have made good strides in understanding what components from the ESP32-C3 will need to be carried over to our custom PCB design. The team has also started deeper discussions on what the housing design will look like as well as steps for familiarizing ourselves with 3D design and printing. In addition, the development of the GUI and processing has begun, with the goal of creating functional data processing first and the interface plots and other data displays the following week.

Past week accomplishments

Team:

- The team has almost completed the part decomposition of the breadboard prototype
    - Was unable to complete the optical sensor decomposition due to not being able to get our questions answered in an advisory meeting this week
    - Were able to finalize the parts decomposition of the ESP32-C3.

Cade Kuennen:

- Plan to assist Alex in the finalization part decomposition for the optical sensors PCB
- Plan to start putting together a KiCad schematic (and possibly layout as a stretch goal) for the ESP32-C3 microcontroller portion of the custom PCB implementation

Alex Upah:

- Worked on the identification of components for LED and photodetection components

- Reviewed available filter and optical lensing options on Digikey
    - Available options fall outside of our size requirements, so further discussion about alternatives will need to be had
    - Custom options are very expensive, which will not work for our product.

Wes Ryley:

- Determined that the best software for data processing and GUI would be PySimpleGUI.
    - Browser based software application.
    - Simple GUI functionality
    - Python script
- Data Processing:
    - Scan for an input, this would in the following week be converted to the BLE connected input.
    - Convert photocurrent into a correlated concentration.
    - Conversed with Dr. Lu to understand what other details should be displayed, such as calculated Light Intensity, battery life when interconnected, and temperature monitoring when implemented.

Rakesh Varma:

- Working on cell design of the cell

Pending issues

Team:

- Need to get questions about the optical sensor portion of the part decomposition answered in the next weeks advisory meeting

Cade Kuennen:

- Will go get the ESP32-C3 dev kit from Dr. Lu so we can start another round of prototyping with the dev kit that will be closer to our final product design

Alex Upah:

- Need to discuss additional optical components such as lensing and filtering with Dr. Lu

Wes Ryley:

- How to transfer BLE collected data into the processing.

Individual contributions

NAME	**Individual Contributions** *(Quick list of contributions. This should be short.)*	**Hours this week**	**HOURS cumulative**
Cade Kuennen	Worked on and finalized part decomposition of ESP32-C3. Assisted in trying to finalize part decomposition for the optical sensor PCB. Worked on lightning talk, design document, and weekly report.	7	50

Alex Upah	Extensive work examining different available photodetecting, LED, filters and lensing components. Extensive work on the design document this week.	8	47.5
Wes Ryley	Started development on a function processing unit once data is transferred. Started development on plotting the data in a functional GUI.	6	48
Rakesh Varma	Working on the cell design of pill	7	43

Plans for the upcoming week

Team:

- Revise our breadboard prototype to utilize the ESP32-C3 instead of the ESP32 Lily-Go
- Finalize part decomposition and component identification for the optical sensor portion of the custom PCB implementation.

Cade Kuennen:

- Start creating a schematic for the microcontroller layer of the PCB electronics in KiCad
    - Potentially start on PCB layout if this gets completed
- Start creating a schematic for the optical sensor layer of the PCB electronics in KiCad if the team is able to complete the decomposition and component identification.

Alex Upah:

- Continue to work on examining PD and other optical components.
- Discuss lensing and filtering components with Dr. Lu to gain clarity on further design decisions.

Wes Ryley:

- Establish a BLE connection between the processing Python script and the microcontroller.
- Connect the Processing to an interface that can be run through a laptop. This is expected to take two weeks.

Rakesh Varma:

- The goal of next week is to design the cell layout ready to be 3d printed

Summary of weekly advisor meeting

Due to our advisor coming down with sickness and them not wanting to risk spreading the sickness to the rest of the team, we did not hold a weekly advisory meeting for this week. Instead, the team got together to discuss more about part decomposition and component selection to try and get these tasks closer to being completed.