EE/CprE/SE 491 WEEKLY REPORT 4
10/3/24 - 10/10/20

*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 we worked towards getting components identified from last week onto a breadboard to start prototyping our system. To do this, we acquired a TSL_2591 photodetector (PD), LilyGO TTGO ESP32 microcontroller (MCU), and an LED and connected them together on the breadboard as shown below:
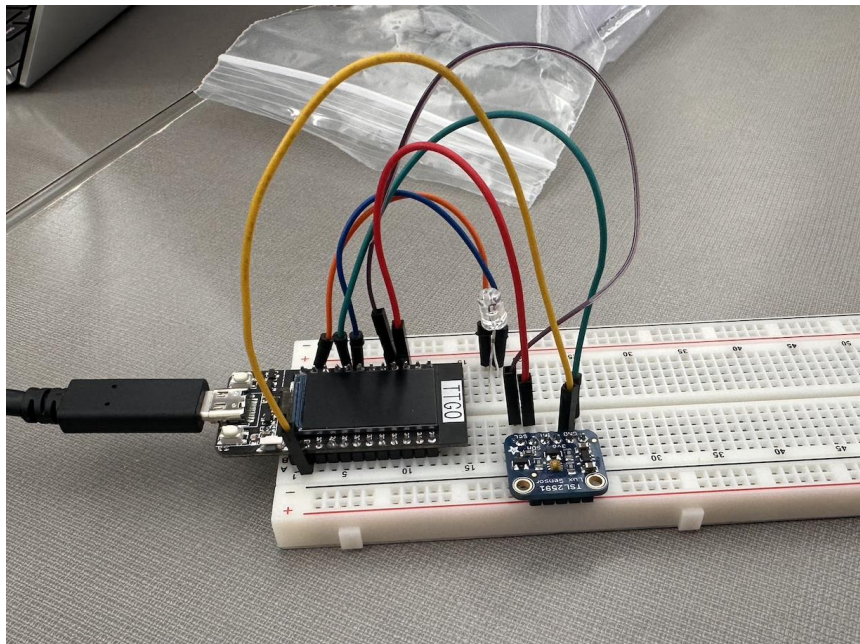
Through this testing, we were able to get the LED to turn off and on as well as read in information captured by the PD. This tells us that the components we are working with are functionally able to complete the task for our project and could potentially work for our PCB implementation of the project as well.

Past week accomplishments

Team:

- Set up Arduino IDE and are now able to program MCU on board, resulting in being able to light up LED. Obtained correct libraries and related source code for working with our components through Arduino IDE.

Cade Kuennen:

- Reviewed datasheet for LilyGO TTGO ESP32 and TSL 2591 Lux Sensor to gain the required knowledge of how they operate and will communicate with one another. Watched YouTube videos compiled by the group to help streamline the understanding of the components needed to progress in our project.
- Contributed to troubleshooting and set up of the Arduino IDE
- Started compiling YouTube tutorials on how to create PCB housings, import PCB renderings into a housing model, and how to complete ray tracing light simulations using Fusion 360

Alex Upah:

- Upon obtaining the Lilygo ESP32 T-Display Board and the TSL 2591 Lux Sensor, reviewed the available data sheets to generate an understanding of the components we will be using. Reviewed online videos related to set up and use of the components to generate better understanding of how to use components.
- Helped and contributed to troubleshooting and set up Arduino IDE environment for communicating to MCU.

Wes Ryley:

- Created the code through the Arduino Software for the Lilygo ESP32 Board that we are using for the predesign testing phase. This code includes the Library Imports needed for wiring and Bluetooth, the initialization of all pins and functions, and the program that will be used to operate the hardware.
- In addition, planned to adapt the code to the new ESP32-C3 chip for later in the design phase. This involves remapping the pins across the board as well as looking into the Bluetooth functionality and power usage from the new MCU.

Rakesh Penmetsa:

- Worked on fusion 360 on how to create shapes and add shapes on fusion 360 and researched on the Required libraries for the project. And trying to figure out how to add libraries based on the components.

Pending issues

Team:

- Throughout the week, we struggled with the use of the correct libraries and properly setting up Arduino IDE environment. Through group troubleshooting and the help of our faculty advisor Dr. Lu, we were able to fix this issue and get the Arduino IDE properly configured for our specific ESP 32 board.

Wes Ryley:

- When transferring from Devkit to our custom PCB design, how will we know how to plan the circuit to ensure the components aren't at risk of being damaged or failing during operation.
- Figure out the libraries that will be used for the BLE side of the prototype.

Individual contributions

NAME	Individual Contributions *(Quick list of contributions. This should be short.)*	Hours this week	HOURS cumulative
Cade Kuennen	Helped troubleshoot code errors and Arduino setup. Worked on class documents and presentations. Read into data sheets for project-related components. Started researching how 3D modeling and housing design will be done in Fusion 360.	8	24.5
Alex Upah	Helped contribute to setting up of Arduino IDE to communicate with MCU on ESP32 board. Reviewed datasheets for ESP32 as well as TSL 2591 Lux Sensor. Also reviewed videos for setting up and using components. Helped troubleshoot related errors with Arduino IDE. Completed related coursework and assignment for the course for the week.	8	21.5
Wes Ryley	Created code for the testing board. Looked into how the application of the code would work on a new ESP32-C3 MCU.	8.5	22
Rakesh Penmetsa	Worked on the Fusion 360. Researched on how to add libraries to fusion 360	5	19

Plans for the upcoming week

Team:

- Take the data collected from the PD and send it via Bluetooth to a Bluetooth enabled device.
- Start thinking about how we are going to do the post processing of this data.

Cade Kuennen:

- Create a more descriptive system sketch detailing pin outs of the ICs in our system.
- Create a schematic for our breadboard prototype board for documentation.

Alex Upah:

- Continue to help Wes with the Arduino programming and helping troubleshoot errors. Plan to contribute to development of the Bluetooth transmission.

- Spend further time looking into the github source code to understand programming and sensor library.

Wes Ryley:
- Continue to develop the code and research into the libraries that could be used for controlling PD response signals and the BLE system required for our project.
- Look into the compatibility of the current code to the prototype that we aim to create.

Rakesh Penmetsa:
- To help in making the bread board design and Arduino code. And work on the Fusion 360

Summary of weekly advisor meeting

Prior to our weekly advisor meeting, we had spent the week troubleshooting multiple errors related to correctly setting up our Arduino IDE environment to program our ESP32 board. With the help of Dr. Lu during our meeting, we were able to resolve the errors and use Wes's previously developed code to get the LED to turn on during the meeting. However, we were initially unable to get the photodetector to properly read the data and spent the rest of the meeting time trying to resolve this error with Dr. Lu. Upon the completion of the meeting, Dr. Lu told us to talk to his graduate student who would be able to provide us with the proper library and source code for the photodetector component.

Throughout the meeting, we also discussed the use of Bluetooth to transmit data. Wes mentioned that he had found an application that allows for the transmission of data via Bluetooth, which Dr. Lu found interesting and said he would think more about using in the future.