

CPRE 491
Oct 10, 2024

Weekly Report 5

Advisor: Professor Meng Lu

Group: 22

Members:

- Sajjan Patel (Fullstack Software)
- Daniel Karpov (Data Processing)
- Jay Patel (Data Processing)
- Ty Beresford (Fullstack Software)
- Chuck Mallek (Physical & Electrical Design)

Project: CyVital

Project Purpose: CyVital project is dedicated to providing modular hardware in the form of sensors and its corresponding software counterpart to read, analyze and display data seen within the sensors. The hardware-software will be used for the Biomedical Engineering Lab, so it must be created so that students, professor(s) and TA(s) can use it with ease.



Languages:

- Graphical User Interface: Python
- Backend Data Analysis: Python

System:

- Configuration: Universally modular
- Open Sourced: GitHub Repository

License:

- For educational purposes through Iowa State

Weekly Summary

Group Success:

As a group, we have finalized our GitHub workflow and begun developing prototype graphical user interfaces. We are exploring better data types / programmatic methods to handle large data transfers. Due to previous GitHub issues, [.gitignore] and [install.bat] have been created to reduce overall overhead within the repository.

Individual Roles:

Sajan Patel Hours: 6 Cum. Hours: 23 Issues: N/A	Researched possible Python APIs for integration into our project. Look into how to change analog output from sensors into digital for display on the computer. Look into different GUI solutions and how we want to incorporate the data analysis into our program.
Daniel Karpov Hours: 6 Cum. Hours: 23 Issues: N/A	Worked on connecting the DAQ to our computer and running a python script that reads that data. Researched into some more softwares that might be useful for reading sensor data. Ran into a block since most of the software used is only for windows machines and 3 of us use macbooks so we had to find a workaround which we did.
Jay Patel Hours: 6 Cum. Hours: 23 Issues: N/A	Developed and pushed a successful python test script for connection and reading raw analog value from the DAQ. Also created my own testing branch to begin development on further testing and data processing scripts for the project.
Ty Beresford Hours: 6 Cum Hours: 28 Issues: N/A	I automated some features of the GitHub repository; in the directory, I added an [install.bat] to localize all downloads to one location. Due to some fetch / pull / push issues, I have rewritten the [.gitignore] file to improve workflow during those processes. For my own branch work, I have begun to explore data caching, since the rate of transfer is significantly higher than the frame rate any GUI library uses. Multithreading with mutexes seems to be the #1 option for maintaining consistent framerate.
Chuck Mallek Hours: 6 Cum Hours: 23 Issues: N/A	I worked on connecting the heart rate electrode sensor to the ADC DAQ and helping the software coders figure out how to get the physical DAQ sensor to detect on our own GUI. I also researched how to detect, measure, and display a heart rate signal to our solution.

Advisor Meeting

No advisor meeting; Professor Meng Lu had other obligations and continued our work from previous weeks.

Room to improve:

- N/A

The Good:

- N/A

Upcoming Week

Upcoming Group Success:

As a group, we plan on developing base API code methods and classes. This stage of development will be vital, as the rest of the following code will adhere to the base rules set within the CyVital API.

Upcoming Individual Roles:

Sajan Patel	Help set up the Python environment and start the foundation of the project from the software side with the group. Look into more solutions on how to implement USB-C cable into our programs and how it will affect the software aspect of our project
Daniel Karpov	We will try to get our first sensor data to show up on our local machines. We will have to use the sensor api in order to read the data correctly and then depending on what type of sensor we are going to be using, we are going to have to edit a code to work for the specified sensor.
Jay Patel	Will work with Daniel to work on getting a continuous sensor value to process and register on our own custom program. Will do further research on the api library available in order to modify and specify sampling rates and output voltages for the DAQ.
Ty Beresford	I will investigate TensorFlow's GitHub data management. TensorFlow is a machine-learning repository that can handle large volumes of data without much overhead. By introducing similar methods, CyVital should be able to handle data analysis, graphical user interface and raw data transfer simultaneously.
Chuck Mallek	This week, I will figure out how to get a heart rate displayed on the pre-built DAQ software with the chip I received from our client last week. Afterward, I will help the software side of the project implement this with pre-built API and with the research I did on determining heart rate.