

**CPRE 491**  
**Oct 10, 2024**

# Weekly Report 6

**Advisor:** Professor Meng Lu

**Group:** 22

**Members:**

- Sajan 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: 29 Issues: N/A	Assisted Ty in setting up small Tensorflow models on a separate computer. To avoid conflicting with other branches existing in our repository, this has remained local within my own system.
Daniel Karpov Hours: 6 Cum. Hours: 30 Issues: N/A	Worked on creating a sample dataset that we will be able to use without having to always use a sensor live. This will allow us to be able to work from home. I also worked on getting the data to output from the python script that we wrote so we can eventually put all that data into a GUI.
Jay Patel Hours: 6 Cum. Hours: 23 Issues: N/A	Continued developing backend test scripts for the data acquisition library to research the best approach to data acquisition methods. Also joined Chuck and Ty in testing and troubleshooting the HR sensor for data input issues.
Ty Beresford Hours: 6 Cum Hours: 34 Issues: N/A	During this period, I joined Jay and Chuck to analyze usages for HR sensor; due to some internal issue, output is not correctly being output. In terms of pure software, digital sensor processing has begun; it still requires more work, but initially sensors for buttons work correctly.
Chuck Mallek Hours: 6 Cum Hours: 29 Issues: N/A	We tried to hook the heart rate sensor to the DC power supply and feed the output to the ADC DAQ for analysis. This was unsuccessful since we received no data output on the pre built DAQAMI software. We are working closely with our client to resolve this issue.

# Advisor Meeting

Professor Meng Lu provided great detail on how to interpret information output by the DAQ; in Discord, Professor Meng Lu has provided us with the actual scientific calculation of ECG wave diagrams. We discussed opportunities at filtering noise within ECG wave diagrams, potential fixes and how to properly train a model to interpret ECG waves (GPT?).

## **Room to improve:**

- Ensure all sensors are working independently with software

## **The Good:**

- Initial readings from HR sensor look promising, but need to refine more

# Upcoming Week

## Upcoming Group Success:

As a group, we plan on developing a further base API; however, we must address how to make the code modular to accept all forms of sensors (possibly an implemented interface?).

## 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	Next week I plan on working with Jay in developing, testing and pushing a python script that will process data and develop a plan that we will use for the different kinds of sensors.
Jay Patel	Will continue work developing, testing, and pushing python scripts for the supplied daq in order to develop a comprehensive strategy for data analysis for each sensor
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	I will work on getting the heart rate sensor to output to the pre-built DAQami software so that software analysis development can continue in parallel. Also, some of the next steps will be to produce a working blood oxygen sensor output to create the next lab module.