

CPRE 491
Oct 31, 2024

Weekly Report 7

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: 35 Issues: N/A	Assist in setting up the Python environment and laying the groundwork for the project alongside the team. Explore potential solutions for integrating USB-C functionality into our software and assess its impact on the project's software architecture.
Daniel Karpov Hours: 6 Cum. Hours: 30 Issues: N/A	Worked on developing a python program that connects to the DAQ and plots live sensor data. Got it fully working for a button press and started playing around with acquiring data from the heart rate sensors.
Jay Patel Hours: 6 Cum. Hours: 23 Issues: N/A	Assisted in development of a python plotting function for use with the heart rate sensor. Worked with Daniel and Chuck to filter and better process data for the graph
Ty Beresford Hours: 6 Cum Hours: 38 Issues: N/A	Provided a new MacOS [.sh] file to maximize utilization of set-up process; added rule-set within GitHub repository to reduce accidental force pushes (require PR requests for any merges). Added licensing, status and runners into GitHub repository.
Chuck Mallek Hours: 6 Cum Hours: 35 Issues: N/A	We were able to identify the functionality of the AD8232 heart rate sensor thanks to our client. Shortly after, we tested it on DAQami and saw a heartbeat signal input to our DAQ. We also tested our code in our git lab repo and saw a heart rate signal input. Lots of noise appeared on the graph, showing us ways to improve.

Advisor Meeting

Professor Meng Lu

Talked about what sensor we want to start first and how we will go about the rest of the sensors. We will start with the ECG together, which will be the most difficult of all the sensors. Once we get that we will split off and each work on our own sensor.

Room to improve:

- Need to get GUI and signal input process moving a bit faster

The Good:

- Got a good start after the meeting on getting this started

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	Next week, I will continue to set up the Python environment and help establish the project's software foundation with the team. I'll also keep exploring solutions for integrating USB-C functionality into our programs and evaluate its impact on the software side of the project.
Daniel Karpov	Continue to work on the ECG sensor data. Need to fine tune the script to work with the sensor data and need to find a way to reduce noise using filtering algorithms.
Jay Patel	Will continue to develop and tune the script for filtering and cleaning the raw sensor data acquired from the sensor values.
Ty Beresford	I have begun exploring options for MacOS development through a virtual machine (Parallels / UTM). Due to multiple potential platforms, addressing address translation on VM for kernel drivers will require extensive work and remodeling of programs.
Chuck Mallek	I will be working to help verify the previous signal from our Python GUI and quiet some of the outside noise from last week. I will also start looking at how to implement the "features to extract" from the data, especially since the ECG is the hardest sensor to get data from.