CPRE 491
Oct 7, 2024

Weekly Report 8

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 made significant progress on the a few of our heart-related sensors; we ran into issues where the noise of the DAQ was reducing the readability of waveforms, so it must be addressed before moving too far forward.

Individual Roles:

Sajan Patel Hours: 6 Cum. Hours: 41 Issues: N/A	Continue to set up a python environment along with GUI set-up. Exploring solutions for USB-C integration. Figuring out how to reduce noise produced from single output.
Daniel Karpov Hours: 6 Cum. Hours: 41 Issues: N/A	Worked on fixing the python code to process the signal given from the DAQ more clearly. Played around with the sensor and sensor connection to the DAQ to make sure that it was getting the correct data as well.
Jay Patel Hours: 6 Cum. Hours:41 Issues: N/A	Continued development on signal processing methods for the ECG sensor to acquire a useful waveform with minimal noise. Also researched and discussed potential GUI formats based on market available products
Ty Beresford Hours: 6 Cum Hours: 42 Issues: N/A	Continued exploring opportunities on MacOS porting; this would require some sort of virtualized driver file to accept, interpret and send data between DAQ and our sensors.
Chuck Mallek Hours: 6 Cum Hours: 41 Issues: N/A	I looked into some open-source code to see how they implemented their signal analysis for the ECG signal. We also wired myself up to the DAQ with the heart rate sensors, and to no luck all we had was noise. I researched how to use .csv files to import into our code for experimentation without being at the SICTR.

Advisor Meeting

We demonstrated what we had thought to be a working heart rate signal on our GUI, but it turned out it was just a bunch of noise. Our client gave us some open-source datasets that we can use to emulate our GUI without relying on physical data this will significantly improve productivity.

Room to improve:

- Need to get GUI and signal input process moving a bit faster
- Need to verify DAQ functionality and connection to the heart rate monitor

The Good:

- Got a good start after the meeting with remote work

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?). We also will start meeting on Sundays in addition to twice a week so that we can ensure a fully functioning heart rate sensor by the end of the semester.

Upcoming Individual Roles:

Sajan Patel	Continue work on GUI to refine it and make it a better user experience. And continue to work on noise reduction from sensors using software.
Daniel Karpov	Continue to test and debug the sensor. Start working on implementation with a possible GUI.
Jay Patel	Continued debugging and testing of the ECG sensor output and troubleshooting issues in data collection in our python script.
Ty Beresford	I would like to explore options at writing a MacOS system driver for DAQ, which could then be packaged with our entire project and installed via [macos_install.sh]. Unless the heart-related noise sensor ends, that will remain priority #1.
Chuck Mallek	I will be working on verifying that our DAQ is properly functioning since the connection with the heart rate monitor did not show up on our GUI or the DAQami software. Our client gave us some open-source datasets that we can use to emulate our GUI without actually relying on physical data.