

sdmay18-12: Pilot Biometrics - ECG waveform captures

Week 7 Report

October 20 - October 27

Team MembersZachary Glanz — *Driver Design Lead*Andrew Jones — *Algorithm Design Lead*David Kirpes — *Circuit Design Lead*Justin Bader — *PCB Design Lead*Kory Gray — *Operating Systems Lead*Ryan Gallus — *Team Lead***Summary of Progress this Report**

The team made significant progress on the filter design, even without access to the ECG sensors. We decided to use both a hardware and software filter combination for the best results. Testing has been done with ECG sample waveforms available online, with added random noise. Progress was also made on the device driver, with some of the pin mapping done using information from the microcontroller data sheet. We have also started designing the algorithm and exploring what functions will be needed in Octave.

Pending Issues

Due to lack of ECG sensors at the moment, filter design is theoretical. There is going to be some odd ECG signals sent as pilots flex and unflex pectorals. Will need to test a lot to figure a way to filter this out. It will also be difficult to replicate the high-vibration environment for testing.

Plans for Upcoming Reporting Period

Continue work on the filter using sample data with added random noise. Finish installing the board support package and operating system onto the microcontroller board and continue work on developing both the device driver and the overall analysis algorithm.

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
Zachary Glanz	Worked on getting device driver and OS set up.	7	28
Andrew Jones	Started on algorithm design, i.e. overall layout, different modules, functions needed in Octave.	3	24
David Kirpes	Continued research of filtering. Running into potential problems with noise and other waveforms interfering with ECG. We will likely need a multi stage filtering design.	3	26

Justin Bader	Researched and began writing methods of filtering the ECG signals. Still waiting on ECG sensors for real data on this though so have been adding random noise to signals to “simulate” filtering out the noise. Expecting to have to do a major redesign of the filter though when we get the ECG sensors. Also still working on what the requirements are for transferring of medical data. Have been in contact with a privacy officer at a hospital in my hometown to figure out the standards for transferring medical data. So far it seems to be that any time the data needs to be transferred or stored it needs to be encrypted. Attempting to still discover what type of encryption it needs to go through.	5	28
Kory Gray	Read over data sheets for microcontroller in order to find how to interface once the OS is installed on the machine.	3	24
Ryan Gallus	Worked on redesigning the system diagram with a multistage filter, including both a high-order hardware bandpass filter, and a software filter using k-means clustering. Continued research into human testing techniques with induced stress.	5	31