EE / CprE / SE 491 – sdmay18-12

Pilot Biometrics - ECG Waveform Captures
Report 5

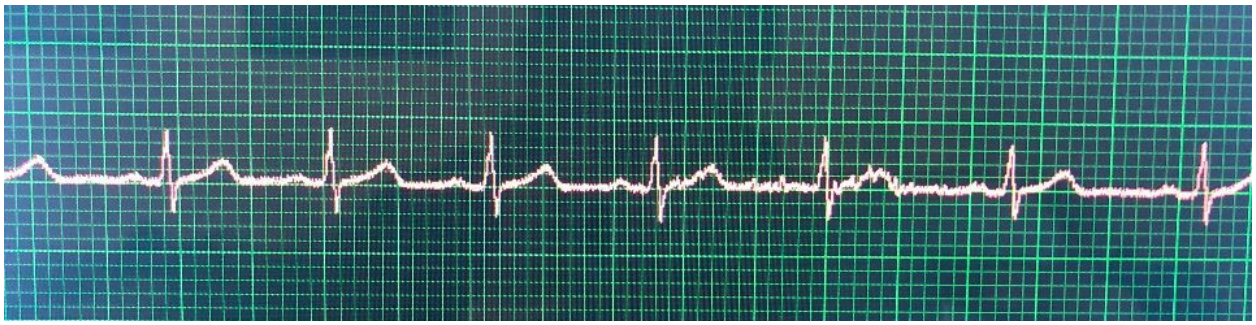
3/9/2018 – 3/23/2018
Client: Rockwell Collins
Point of Contact: JR Spidell
Faculty Advisor: Dr. Tyagi

Team Members:

Ryan Gallus - Team Lead
Justin Bader - Filter Design Lead
Zachary Glanz - Filter Design Lead
Kory Gray - Operating Systems Lead
Andrew Jones - Algorithm Design Lead
David Kirpes - Circuit Design Lead

Weekly Summary

This week, our team made significant progress with the ADC configuration. We were finally able to set all registers so that the ADC produces an accurate ECG waveform. The ECG sensor pads interface with the ADC, which writes to registers on the microcontroller in real time. This produces ECG waveform data which can be read by code on the microcontroller board. This week, the team also developed a program to write out ECG data into a useable, permanent format for analysis, testing, and building a training set for the neural network.



Past Week Accomplishments

- Finished configuring the ADC to produce accurate waveform
    - Adjusted register settings to account for three-lead design

    - Interfaced new configuration with ECG sensor pads
    - Interfaced new configuration with microcontroller board
        - ADC data writes to registers on the board
- Developed program to save ADC output data
    - Store ECG data in permanent, useful format
    - Data available for testing, analysis, and training model
- Designing notch filter to block 60Hz frequency from power supply
- Continued work on operating system issues
- Continued testing on artificial neural network

Pending Issues

- Still working on operating system and creating linux development environment
- Still building training set of data to use with the artificial neural network
- Waiting on battery to arrive to work with power supply

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
Ryan Gallus	Began comparing live ECG sensor output data to sample data. Working on developing test suite to build training data set with both normal and cognitive stress ECG waveform data.	5	90
Justin Bader	Finally got the ADC to work and spit out useful data. Worked on program to spit out the useful data to allow the guys working on software to start analyzing actual ECG waveforms. Beginning a routine as well to store any/all of our test ECG data for use whenever we desire. Begun design of a notch filter to cut out the 60hz frequency from the wall because that is picked up on the ECG. also will be building a high and low pass filter	15	88
Zachary Glanz	Helped Bader with getting ecg readings.	7	93
Kory Gray	Worked on operating system, got the development environment running. Still trying to fix the rebooting problem.	4	73
Andrew Jones	Ran into trouble while trying to get the ANN to save weights between tests (this would allow the ANN to “remember” between flights). So I have been continuing to troubleshoot that problem.	4	76
David Kirpes	Battery has been ordered. Power supply is operational. I also helped complete some debugging/testing with the raw data we	5	91

	were receiving from the sensors.		

Comments and Extended Discussion

- We are planning on building our own training set of data with real ECG sensor output from our device, rather than using sample data sets we found online. Instead, we will use the sample data to compare with our own tests to ensure accuracy.

Plans for Coming Week

- Continue testing ECG sensor device on team members to build training set for artificial neural network
- Continue building linux development environment
- Build notch filter