ECE 5255 Biomedical System Design Fall 2013

Due: 11/12/13

Lab 3B Electrocardiogram and Heart Rate

Objective: The purpose of this lab is to provide experience with data acquisition, digital signal processing, and feature extraction in the context of capturing the electrocardiogram signal and then extracting the heart rate information from the signal, both done automatically by a graphical-based program.

Procedure:

1. For this part, make sure to operate the myDAQ using your laptop on battery power and not from the AC outlet. Using the wires and electrode patches provided, connect the inputs of the ECG circuit to yourself, with the positive and negative input electrodes on each respective arm/wrist and the ground on the right foot. You should play around with various placement locations for all 3 electrodes and see which gives the best signal quality. Use your MyDAQ oscilloscope to view the ECG signal.
   a. Location of positive electrode:_____
   b. Location of negative electrode:_____
   c. Location of reference (GND) electrode:_____
   d. Show the oscilloscope output to your TA/instructor and save this output to submit. Sign-off for part (d)._____
   e. Repeat (d) using the provided FRI physiological amplifiers. Sign-off for part (e). _____
2. Discuss your observations for the signals captured in parts (1d) and (1e). In particular, consider the differences between the two signals and reasons behind the differences. (Hint: What different between the designs of the two amplifiers-yours versus FRI?)

3. Write a LabVIEW VI program to acquire and plot the ECG waveform. Name this program as **Lab3B_ECG_lastname1_lastname2.vi**
4. **Write a LabVIEW VI program that, in addition to previous part (3), processes the ECG waveform to acquire the average heart rate. Name this program as Lab3B_ECG_avg_hr_lastname1_lastname2.vi.**
5. **Write a LabVIEW VI program that, in addition to previous part (4), processes the ECG waveform to acquire the instantaneous heart rate. Name this program as Lab3B_ECG_ hr_lastname1_lastname2.vi.**

Submissions:

Hand in this completed lab form. Submit via the digital dropbox the 3 LabVIEW vi programs as described in steps 4-5 above.