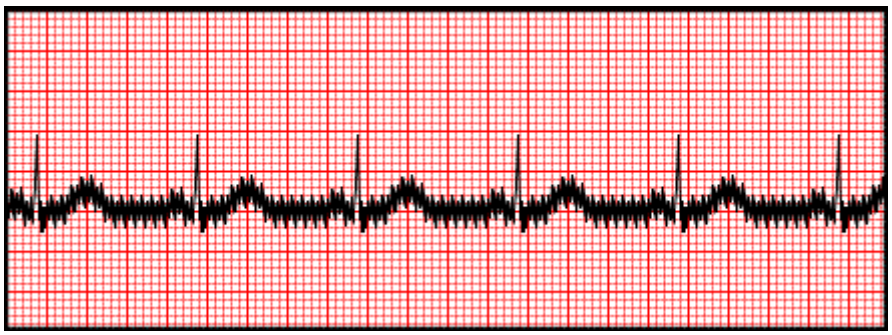
Digital Filtering of Biomedical Signals

In Lab Experiment #1, simulation for an ECG signal with AC interference was considered (shown below). Such interference can be removed using proper signal filtering that removes the frequency range of the interference while allowing original signal frequencies to pass without much change. In Lab Experiment #4, this was considered using analog filters. In this experiment, we consider the design of digital filters for this purpose.



Design, conduct and analyze results of experiments to clean up the noisy ECG signal shown above (as simulated in Lab Experiment #1) using properly designed digital filters. Use the data acquisition features on the digital storage oscilloscopes in the lab to acquire a digital record of the signal and process it on Matlab. Assume that the ECG frequencies of interest that need to be preserved are all below 50 Hz. Report measured performance specifications of your filters.

General Requirements

1. Experimental procedure including detailed steps for all parts including the analysis of the results must be approved by instructor before conducting experiments.
2. You are free to select any components you prefer for your experiments.
3. You should be prepared to demonstrate your experimental setup and answer questions in all aspects related to your experiment.
4. You should work in groups of 3-4 students each. One report should be submitted on behalf of the whole group.
5. You may use any resources you find useful to your experiment as long as you acknowledge such use in your report in accordance to ethical guidelines.

References

- http://www.mauvila.com/ECG/ecg_artifact.htm
- http://www.medteq.info/med/ECGFilters

- *Assigned*: July 5, 2015
- *Deadline*: July 26, 2015
- *Submission*: Electronic form (PDF) to instructor's email address: `ykadah@kau.edu.sa`