Pelvic floor Biofeedback Design

Client: Dr. Patrick McKenna, UW Urology Department

Advisor: Dr. Amit Nimunkar

Team: Sam Lines (Leader)

Michael Simonson (Communicator)

Shawn Patel (BWIG)

Andrew Vamos (BSAC&BPAG)

Date: 9/29/2014-10/3/2014

Problem Statement

Pelvic floor muscle biofeedback systems have been used to educate and train people how to correctly control the process of urination in children and elderly patients. As devices slowly fail or get outdated, a new device and interface system that can be used in conjecture with videogame like training programs is desired. With the completion of a basic EMG biofeedback system, our goal is to continue to improve the functionality of the software while simultaneously designing hardware with commercial standards in mind. This product will be designed and tested so that use in a hospital will be safe for both the hospital staff and the patients.

Last Week's Goals

- Continue research on driven right leg, and speak with Amit to overcome our problem of losing our signal when using driven right leg.
- Finalize the construction and testing of the filters.
- Test the common mode gain and differential gain of the constructed circuit to determine the common mode rejection ratio of our EMG.

Summary of Team Role Accomplishments

- Leader (Sam): Worked on finishing and testing the EMG circuit, worked on the presentation, and started research into other agencies with policies regarding use of electronics on patients
- Communicator (Michael): Finalized microcontroller decision, and worked heavily on the presentation.
- BWIG (Shawn): Worked on presentation and helped make and test the EMG circuit
- BPAG And BSAC(Andrew): Finalized the microcontroller decision, worked on the presentation, and helped finish the EMG circuit

Summary of Design Accomplishments

- We have decided to use an Arduino as the microcontroller for our device.
- We made the circuit with everything but the driven right leg, and we were able to acquire an EMG signal.
- The acquired EMG signal had a lot of 60Hz noise so we will try to implement the driven right leg as soon as possible.
- We finished the preliminary presentation and will begin the paper shortly.

Project Difficulties

- We have finished the circuit based on designs used to study pelvic floor and abdomen muscles, but we are having a hard time finding distinct regulations that govern EMG.
- With our finished circuit, there is still too much 60Hz noise so we will be working on driven right leg to improve our CMRR.
- We have decided to use USB power and a DC/DC converter to get negative power, but this is going to increase the complexity of the circuit and fabrication time.

This Week's Goals

- Work on implementing the driven right leg circuitry
- Prepare to order parts for the DC/DC converter
- Work on testing protocol for our device
- Continue research on FDA and IRB regulations along with any other regulations from various agencies
- Finish preliminary paper

Activities

Person(s)	Task	Time (hrs)	Week Total	Semester Total
Sam	EMG circuit construction, presentation, safety research	3	3	11
Michael	Microcontoller decision, finalized presentation	3	3	11
Shawn	EMG circuit construction, presentation	3	3	10
Andrew	Microcontoller decision, presentation, EMG testing	3	3	10

Timetable

- Due to the large size of our timeline, I will attach the full excel spreadsheet

Expenses

- No current expenses