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: 10/20/2014-10/25/2014

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 As devices slowly fail or get outdated, a new device and interface system that can be used in conjecture with videogame like training programs is desired.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

- Finalize our design on a printed circuit board hardware to order our PCB
- Look into the frequency characteristics of different muscle groups so that we can confirm that we are indeed measuring from the correct muscle groups
- Finalize testing protocols with Amit's guidance

Summary of Team Role Accomplishments

- Leader (Sam): Communicated with professors of physiology and kinesiology to determine frequency characteristics of different muscles
- Communicator (Michael): Began contact with the IRB to prepare for clinical use
- BWIG (Shawn): Researched frequency characteristics of different muscles
- BPAG And BSAC(Andrew): Researched frequency characteristics of different muscles

Summary of Design Accomplishments

- We have confirmed that the frequency components of the EMG signal will not help us differentiate signals from different muscles
- With that knowledge in mind, we ordered parts and will be working on ordering our pcb.
- Andrew found a paper describing the frequency changes at different levels of contraction that indicates it will be possible to use an envelope function to determine the amplitude of the signal, and then use that to play the game

Project Difficulties

- In order to get the precision we wanted for our circuitry, we had to order surface mount components. Andrew has had some experience with this, so we don't believe it will be too much of an issue during construction
- Due to a grounding problem, we had a lot of 60hz noise in our circuit. With Dr. Nimunkar's help, we were able to elminate this problem.

This Week's Goals

- We have ordered the parts, so we will use the time for their delivery to finish the PCB and order that
- Begin working on the Arduino software to prepare to completion of the EMG circuit
- This software update will mainly consist of programmable gain control to help make the system more universal in patient treatment.

Activities

Person(s)	Task	Time (hrs)	Week Total	Semester Total
Sam	Ordering parts	2	4	22
	Test grounding problem	1		
	Research	1		
Michael	Ordering parts	2	4	23
	Test grounding problem	1		
	Contact IRB	1		
Shawn	Ordering parts	2	4	22
	Test grounding problem	1		
	Research	1		
Andrew	Ordering parts	2	4	22
	Test grounding problem	1		
	Research	1		

Timetable

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

Expenses

- After buying the parts, the current expense of the project is $41.22. A picture of the total expenses incurred is posted below.

Index	Quantity	Image	Part Number	Description	Customer Reference	Available Quantity	Backorder Quantity	Unit Price	Extended Price
☒ 1	2		DCP010505DBP-ND	IC REG ISOLATED +/-5V 0.1A 7DIP		2 Immediate	0	8.69000	$17.38
☒ 2	8		RMCF0805FT51K0CT-ND	RES 51K OHM 1/8W 1% 0805		8 Immediate	0	0.10000	$0.80
☒ 3	8		P9.09KCCT-ND	RES 9.09K OHM 1/8W 1% 0805 SMD		8 Immediate	0	0.10000	$0.80
☒ 4	16		RMCF0805FT20K0CT-ND	RES 20K OHM 1/8W 1% 0805		16 Immediate	0	0.02900	$0.46
☒ 5	16		P180KCCT-ND	RES 180K OHM 1/8W 1% 0805 SMD		16 Immediate	0	0.10000	$1.60
☒ 6	8		490-8288-1-ND	CAP CER 4700PF 50V 1% NP0 0805		8 Immediate	0	0.43000	$3.44
☒ 7	8		490-8309-1-ND	CAP CER 0.043UF 50V 5% U2J 0805		8 Immediate	0	0.45000	$3.60
☒ 8	16		399-7342-1-ND	CAP CER 1UF 16V 5% X7R 0805		16 Immediate	0	0.28300	$4.53
☒ 9	8		311-43.0KCRCT-ND	RES 43K OHM 1/8W 1% 0805 SMD		8 Immediate	0	0.10000	$0.80
☒ 10	4		S7050-ND	CONN HEADER FMALE 17POS .1" GOLD		4 Immediate	0	1.35000	$5.40
☒ 11	4		CR0805-FX-6201ELFCT-ND	RES 6.2K OHM 1/8W 1% 0805 SMD		4 Immediate	0	0.10000	$0.40
☒ 12	56		P10.0KCCT-ND	RES 10K OHM 1/8W 1% 0805 SMD		56 Immediate	0	0.02880	$1.61
☒ 13	4		P68.0KCCT-ND	RES 68K OHM 1/8W 1% 0805 SMD		4 Immediate	0	0.10000	$0.40
							Subtotal		$41.22
							Shipping		Estimate
							Sales Tax		unknown