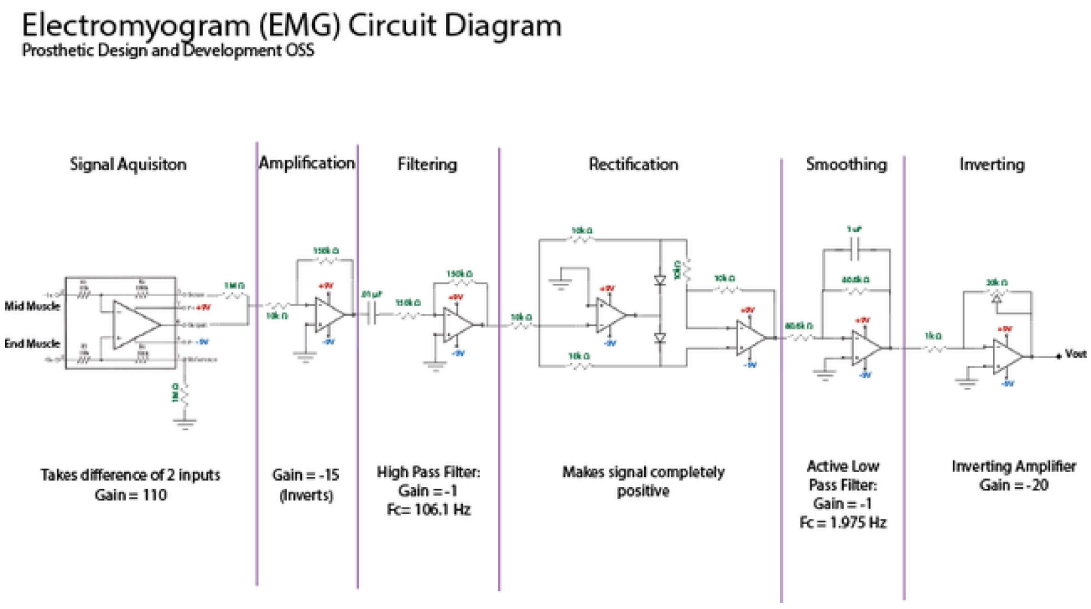
Prosthetic OSS

EMG Success!

Posted on March 19, 2015 by Meghan Tighe
After months of meticulous debugging, we are happy to announce that we now have a functioning EMG! Please hold your applause. Blood, sweat, and tears have gone into building this circuit so we are very glad to finally see the fruits of our labor and hope that you will all be impressed with our work.

How did we get it working? First, we finally got the right chips. This took a while, especially because we accidently got surface solder chips the first time. Next, we realized that we had not correctly built the circuit as shown on the circuit diagram. Finally, after reconstructing the circuit, we realized that we had made a mistake in the circuit diagram itself.

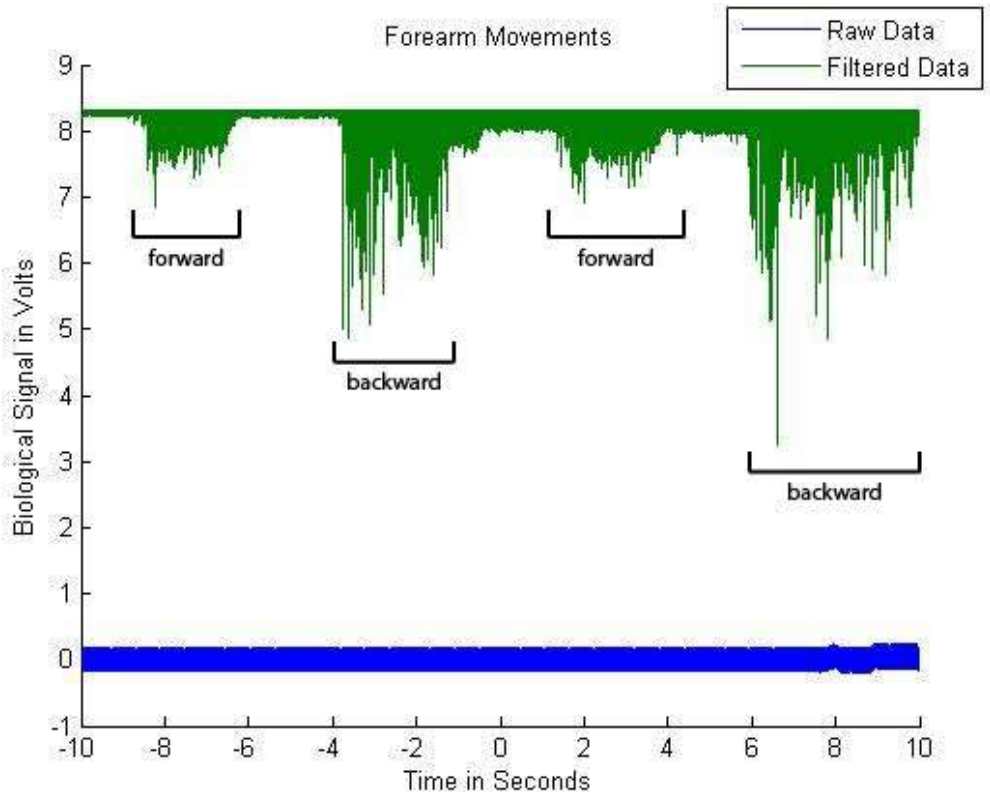
So the circuit is still the same with the small difference that we built it right this time. Below is an updated circuit diagram but our prior post (https://prostheticoss.wordpress.com/2014/12/10/round-two-of-making-the-measurement-circuit-an-emg/) is still an accurate explanation of the circuit.



(https://prostheticoss.files.wordpress.com/2015/03/emg-schematic.png)

And now, what you've all been waiting for (or at least what we've been waiting for): the data! For the data shown below, we were looking at the difference between two different muscles in the forearm. We had lots of fun playing and have picked a picture that best shows the kind of results we were seeing. There are two lines: the relatively flat (yet extremely noisy up close) blue line which shows the raw input from one of the two muscles, and the much more interesting green line which shows the output of our circuit. The data seemed to respond best to a flexing of the wrist. The plot shows four

distinct changes over a period of twenty seconds. This consisted of the test subject flexing and bending her wrist forward, momentarily relaxing, flexing backwards, momentarily relaxing and then repeating the process.



(https://prostheticoss.files.wordpress.com/2015/03/forearmforwardbackforwardbackgraph.jpg)

The most interesting conclusion that we formed is that there are many ways to make the signal not just be binary. The simplest is shown in the graph, where the amplitude of the changes is dependent on which muscle is being used. However, this depends on very exact placement of the electrodes and in further tests these exact results were hard to replicate; sometimes flexing the wrist forward created the bigger amplitude. A better method is to control the rate at which the muscle is contracted. During testing, there was an obvious difference between a quick pulse of the muscle and a slow flexing. We don't currently have any pretty graphs showing this but trust us for now and we will show you the data as soon as possible.

We are so excited to have a functional EMG circuit! Next, we are considering adding more filters, possibly of higher order, to further smooth the signal but are also wondering if we should go directly to the option of digital signal processing. Please let us know if you have any suggestions!

-Meghan

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One thought on “EMG Success!”

Bac Nguyen Canh says:
November 8, 2017 at 3:36 am
Hi!
Can I change INA106 to INA128?
Thankyou!!!

Reply