Biofeedback Controller: Virtual Training for Myoelectric Transradial Prosthesis

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Robotic prosthetics of the modern day often utilize myoelectric control. Myoelectric control uses electromyography, a system of detecting and quantifying the electrical activity of contracting muscles as a way to actuate dexterous movement. The electrical signal quantified by EMG sensors can be trained and strengthened via repeated contraction. Using the extensor and flexor muscle groups as isolated myoelectric sites, I created a device that incorporates modern gaming to increase the electric threshold of muscles commonly used for myoelectric control. With collaborative efforts from both Advanced Arm Dynamics and Advancer Technologies, the system created makes use of Advancer Technologies' v3 EMG sensor and employs a sensor orientation that is capable of training four muscle groups at once. Using the Adruino Uno and the corresponding software as a microcontroller, an interface was created that allows the user to play multiple scrolling games such as Mario using only muscle contractions as controls. The current developed prototype would cost the user under two hundred dollars while current training devices range from upper hundreds to thousands of dollars. This device is capable of increasing the electromyogram signal exponentially and therefore allows clinical prosthetists to obtain more information from the patient's muscles.

Awards Won:

Third Award of $1,000