

Easton LaChappelle

*Fine Motor Skills Using Neural Activated Biomechanical Prosthesis*

The goal of this project is to design and fabricate an affordable upper limb prosthesis that is controlled neurologically. I am using EEG, ECG and blink movement to create a seamless control system that an everyday person can master within a few hours. I am reducing cost by fabricating the arm using an additive manufacturing machine and creating gearboxes to increase the strength. Users want the prosthetic to function as a real arm and with that come weight and range of movements. During the design phase I simulated stress and movement to make sure the arm is durable enough for everyday use and can still have a human like range of movements. The main motor type I'm using to actuate the arm is servos. This makes electronics simpler and smaller and also coding easier and more accurate. The arm is all self-contained meaning that power and the electronics are all within the arm. I am using Teensy microcontroller as the brain of the arm as well as amplifier circuits and Bluetooth receivers. To control the arm the user flexes a muscle to enter a selections state. Once there, they use a series of blinking to select pre-loaded movements such as hand, elbow or wrist movement. Once a movement is selected the EEG headset measure attention/focus which controls the movement. Based on the user I can tailor the control system to whatever we find works the best for that person.