As biomedical technology continues to advance, and along with it the development of prosthetics, more options become available to mitigate the loss of one or more limbs. Artificial appendages are being given functionalities previously thought impossible, and the creation of a machine that accurately substitutes an arm or leg is now just on the horizon. However, there are still practical issues with these prosthetics, namely, their price and inaccessibility to the average consumer. This project addresses these two concerns by using commercially available tools, Lego Mindstorms and the Emotiv EPOC EEG headset, to create an inexpensive and readily available alternative that retains basic functionality. To accomplish this, a laptop was obtained, and both the arm and headset were connected wirelessly via Bluetooth and USB receiver, respectively. Emotiv’s EPOC Control Panel was used to test functionality of the EEG headset. A sample program written for the Lego NXT was used to test the arm. A Java program was then written in Eclipse utilizing both the Emotiv API and Lejos SDK, which provides a Java Virtual machine on the NXT. The final project is able to handle the transfer of signals produced by the user’s facial expressions, translating them to commands sent via Bluetooth to the robotic arm, which can execute the following simple motions: rotate upwards or downwards, turn left or right, and open or close the claw.

The independent variable is the user of the system. In this study, this is also a constant, as there is only one tester. The dependent variable is the success rate of simple tasks – up, down, left, right, open, and close.

Future projects should focus on:
- Allowing the arm to operate off cognizant thoughts, a function supported by the Emotiv.
- Creating a more refined arm to be more refined and non-intrusion.

Future Research

Future projects should focus on:
- Smoothing out the currently jittery motions of the arm
- Constructing a more flexible arm using similar programming and more degrees of motion
- Removing the computer intermediate so that the headset can communicate directly to the arm
- Allowing the arm to operate off cognizant thoughts, a function supported by the Emotiv.

References