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Fine Motor Skills Using EEG Technology and Biomechanical Prosthesis

For my project I designed, fabricated and created a fully working robotic arm. I tried to make my arm match the strength and ability of a human arm. I achieved this by studying anatomical drawings and diagrams of the human arm and the physiology. I used geared DC motors to actuate the arm and potentiometers as a feedback system so I can tell where the arm is at all times. The hand is a model I created in a CAD program and was 3d printed using ABS plastic. The hand uses small rubber bands that act as tendons and servo motors to actuate the fingers. I obtained smart car motor drivers to power the shoulder motors and a smaller controller to drive the elbow. I programmed an Arduino microcontroller as the main processor that's controlled with code based on C which moves the arm. I attached a 7.4v 2200mah Lipo battery to power the arm. I wrote functions to control the arm so I can tell it to do a series of movements with a push of a button. I also connected an EEG headset modified to read the user's brainwaves and get a focus rate. With the EEG I can control the hand so when the user focuses on an object the hand will close and grasp an object. The arm also has a feedback system using a force sensor and a vibrating motor to give the user a sense of touch.