Developing a Cost Effective 3D Printed Hand with Speech Recognition

Hwang, Alan

Statement of the Problem: Children‘s prosthetic needs are complex due to their constant growth and psychosocial development. Existing technologies for customized computer-assisted prosthetic hands are extremely expensive. Low-cost alternatives lack the functionality of controlling hand grips. The intensive effort and physical training that are necessary to use the advanced models can cause fatigue, which often results in abandonment of the prostheses. Objective: This project aims to design a cost-effective 3D printed hand that employs servo motors, Arduino and a speech recognition application to control finger motions to perform daily functions while reducing training stress. Procedure: • Modify the open sources 3D printed hand as a prosthetic. InMoov was selected for function, durability, tension and forearm and rotation wrist design • Arduino UnoR3 board was used to control motors servo connected to the 3D hand • Apply voice recognition shield (MOVI) to train voice command • Use Arduino IDE to develop program to control the hand • Test and retest voice command ability to control hand grips Results: The combination of Arduino and the MOVI shield was employed successfully to control the 3D hand through voice commands. With its light-weight wrist and forearm design including motor storage, the prosthetic enhanced usability and reduced muscle training, fatigue and stress. It was significantly lower cost compared to myoelectric arms on the market.

Awards Won: