Developing an iOS App to Enable an Arduino Controlled 3D-Printed Hand

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Developing an iOS App to Enable an Arduino-Controlled 3D Printed Hand Abstract Statement of the Problem: Existing technologies for creating customized computer-assisted prosthetic hands are prohibitively expensive. Children face even more financial hardships due to growth and ongoing needs for a new hand. Low-cost alternatives typically lack the flexibility and functionality of controlling hand grips to perform routine tasks. Objective: This project aims to build a 3D hand and develop an iOS application so an individual can use an iPhone to control finger motions of the 3D hand to perform daily functions. Procedure: A 3D printed hand was designed with specifications to suit a child's hand. The model "Cyborg Beast" was selected from "e-Nable Community" for function, size, durability, and cost. An Arduino Uno and Ethernet boards were used to control five servo motors connected to the 3D printed hand. A customized platform mimicking a forearm panel was then built to secure these motors and computer programs developed to control the motor movement of all fingers. After extensive PC testing of the motor finger movement, an iPhone app was designed to control the 3D printed hand. Results: With a code controlling various combinations of finger movements, the computer program embedded in the iPhone app can execute commands that enable the 3D printed hand to perform several everyday hand grips. Future steps include (1) designing a light-weight forearm unit prototype that can be used to store motors, battery, and microcontroller, (2) developing computer codes for additional hand grips, and (3) researching stronger but lighter motors.

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