Project Summary:

With millions of people around the world missing an upper body extremity in part or in whole, our project offers a demonstration of the innovation offered by using 3D printers to create custom designed, modular prosthetic devices that can be independently functional or integrated into pre-existing medical practices.

The overall design proposes a variety of customization options that are easy to upgrade, downgrade, and modify to suit a specific user's needs. 3D printing is utilized because of the rapid concept-to-application turnaround time, while the scope of the project was chosen to show the versatility of the 3D printing technology and concept of modular design.

The proposed project will be broken up into three different tiers that build off of the prior version. The first tier is designed to be purely mechanical prosthetic that uses tension to open and close the hand. Tier two will replace the tension system with sensor controlled motors to enhance grip strength. This design also includes capacitive sensors at the end of the fingertips which help control the intensity of the grip to protect both the motors and any objects being handled. The final tier will take the electrical aspects from the previous model, but instead of relying on gyroscopic sensors or manual, external input such as buttons, the movement of the hand will be controlled by variances in the user's electromyographic (EMG) waves as collected and processed by onboard computers. This has the benefit of allowing the user, through EMG sensors on the body, to naturally control the prosthetic arm and use the device to greater benefit.

Innovation:

On average, prosthetics can cost thousands of dollars and can take up to a year to construct. Once built, it is difficult for current designs to be modified to offer different functionalities to the user. The completion of this project will demonstrate the potential for inexpensive prosthetic device creation and customization with effective usability. This project also furthers the research of externally integrating technology with the human body.

Positive Impact:

This project provides a positive impact for the world as a whole because it provides an inexpensive yet invaluable opportunity to improve or restore the quality of life for millions of people all over the world.

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