

Background and Objective

The SPRI team has been iterating a custom prosthetic for Edie Steinhoff, a New Mexico Tech Employee, since fall of 2017. The team has continued to research innovative ways to provide Edie with a prosthetic that has accurate grip type classifications and high-level control while also being developed at a low cost.

Previous Work



Figure 1: Fall 2019 assembled prosthetic

- Used EMG sensors
- Smaller motors
- Compact design
- Redesign of fingers
- Different printing material
- New socket

Design Requirements

The goal of the finished design is to meet the following requirements:

- A more comfortable and aesthetic design.
- Simple design
- Moderate cost in the range of ~\$500 to \$600
- Easy to switch between grip types
- High functioning
- Dexterity and mobility of fingers

Results

- Electronic compartment and battery housing.



Figure 2 : Electronic housing and battery housing.

- A lightweight battery pack was designed.
- Electronic compartment and battery housing.
- Redesign of servo horns for use on motors
- Fingers on the prosthesis were redesigned to be less resistive so that the motors did not stall.
- PCB's that include A4950 motor drivers, the Adafruit itsyBitsy, and other electrical components were created to reduce the wiring of the prosthetic device.



Figure 3: Battery selected for the design.

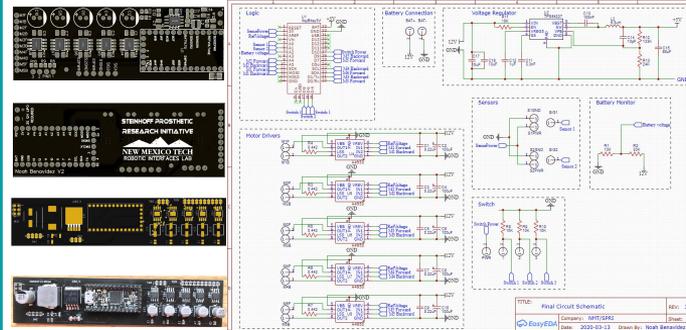


Figure 34 Spring 2020 PCB designs (left) and PCB Schematic (right).

Conclusion

Throughout this semester, the team was able to redesign the prosthesis to allow for the electrical and motors to all fit into the electrical-component housing. The housing will wrap around Edie's forearm to keep all the prosthetic components in close proximity. The fingers were redesigned to be less resistive to the movement from the motors. Lastly, the new printed circuit boards and power source were designed and assembled.

Future Work Fall 2020

In Fall of 2020 the team plans to complete the following tasks:

- Integrate the PCB to the hand design to reduce wires.
- Test battery pack to ensure that it is safe for use.
- Work on creating a more complex program to allow accurate readings for the different grip-type actuations.
- Assemble the prosthetic hand and make design iterations on parts if deemed necessary.

Spring 2020 Design Team

