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Product Development

Low Cost, Multi-Grip, Upper Limb Prosthesis Design & Development

This prosthesis can save a child's family over $2,000 a year in new prothesis costs and provide a user more mobility than other options.

Introduction

Individuals who experience the absence of a limb and desire to use a prosthesis are limited by three aspects:
- High cost for custom prosthetics
- Technology that is available
- Young patients grow out of prosthetics quickly

Current Available Solution- Simple and inexpensive 3D printed prosthetics. These can be scaled to fit any user; however, they have limited grip capabilities.

Goal- Improve the design of 3D printable prosthetics by increasing mobility and grip capabilities.

Methods

1. Conduct research on available prosthetics, materials, and hand structure
2. Organize research to synthesize problem solutions
3. Design possible solutions
4. Digitally prototype final design
5. 3D print digital prototypes
6. Test 3D printed prosthesis

Results

The complete prosthesis contains:
- Kinetic knuckles for simplicity
- Independent finger tension release mechanisms
- Completely mechanical functions
- 3D models that can be printed in 35 hours or less.
- Entire assembly costs less than $150
- User experiences increased and grip options through independent finger mobility.

Conclusion

After testing the results of the prosthesis, the project goal is considered achieved. Although the goal has been met, improvements can be made. Design improvements include more ergonomic shapes and tighter grip capabilities. Functional improvements include stronger finger construction and better tuned 3D print settings.

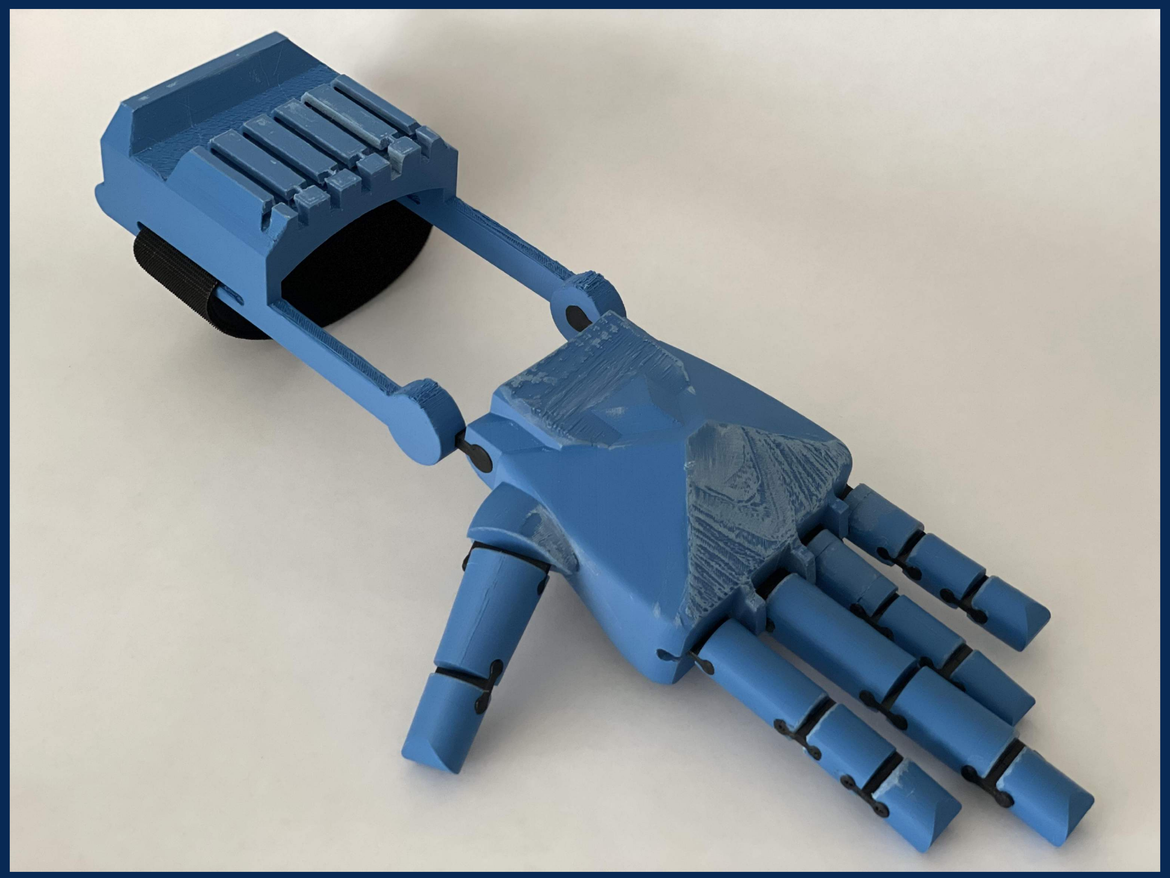

Figure 1 – Final prototype assembly

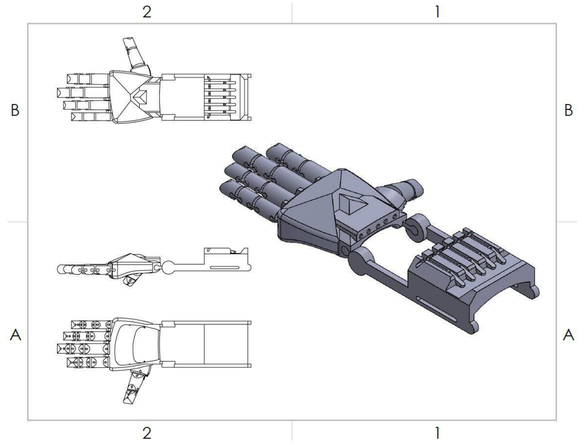

Figure 2- Complete Digital Prototype

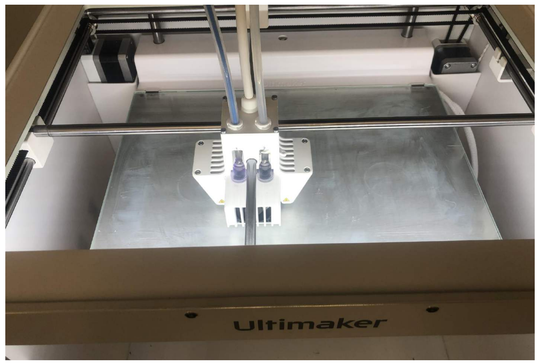

Figure 3- The palm being 3D printed

References

"Complete Guide to Arm & Hand Amputations and Prosthetics: MCOP." MCOP Prosthetics, 1 Apr. 2020, https://mcopro.com/blog/resources/arm-hand-prosthetics/.

SolidWorks software and 3D printer access provided through Utah State University and the Utah Assistive Technology Lab in Logan.

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