

Feasibility, Functionality, and Design of Open-Source 3D Printed Pediatric Prosthetics

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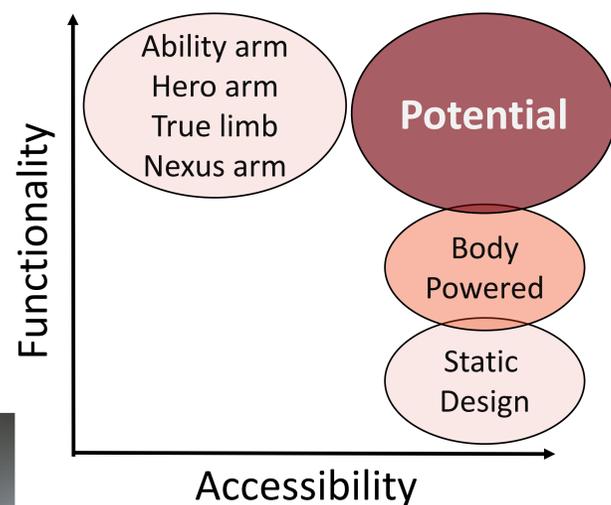
Introduction

- **Types of prostheses**
 - Passive
 - Body powered
 - Externally powered
- **Conventional options for prostheses**
- **Open-source prosthetics: e-NABLE**
- **Hands Up Greenville (HUG)**
- **Demographics**
 - Upper extremity handicaps
 - Pediatrics
 - Low SES
- **Problem**
 - Functionality vs. accessibility
 - Usable time span in pediatrics
 - Emotional/psychosocial impact



Aim

- **Open-source myoelectric arm**
 - Accessibility
 - Low-cost production- \$400
 - Free to patients
 - Adaptable to growing pediatric patients
 - Feasibility of repairs
 - High functionality
 - Repeatable process



Methods

1. **Assembly**
 - Existing design available on eNABLE platform (EI Medallo model)
 - Adjust prosthesis parameters to fit patient arm using CAD software
 - Create arm using 3D printer
 - Integrate circuitry into prosthesis
2. **Comparison of Functionality**
 - Myoelectric prosthesis to be compared with wrist actuated designs
 - Considered metrics
 - Ability to grasp small, medium, large objects
 - Ease of use
 - Comfort
 - Cosmetics
3. **Increasing Accessibility**
 - Establish HUG's capability to offer myoelectric designs to community
 - Create compiled instruction manual with parts list, printing files, and code

Conclusion and Next Steps

- 3D printed myoelectric arms offer the best opportunity for easily accessible, highly functional options for a vulnerable population of handicapped pediatrics.

Completed

Preparation of resources
Parts list ordered

In Process

Printing, circuitry, assembly

Next Steps

Trial of capabilities
Functional comparison
Organizing resources

Acknowledgements and Funding

- This work was partially funded by the UofSC SOMG IT and research departments
- The authors gratefully acknowledge the work of Dan Strat, Rikki Williams, and Tanner Karp for all their contributions to this project.

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Bionic Hand	Price Range (USD)
Hero Arm	\$10,000 to \$20,000
Ability Hand	\$20,000 to \$30,000
Atom Hand	\$50,000 plus
MyHand	\$10,000 to \$20,000
Vincent Evolution	\$30,000 to \$40,000
EI Medallo (HUG)	\$400 or less

