





### **3D** Printed Prosthetics for Kids



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### The Need

#### The warranted need

- 2000 children born in the US every year with limb defects
- Could be either upper or lower limb





#### Specifications for Our Hand

• Must be analogous to human hand in function

- •Hold a bike handle bar
- High conformability to patient
- Durable for at least one year of usage
- •Cost less than \$100
- Replaceable parts
- Color: pink or purple







#### Functionality Similar to Human Hand

## Main goal: Emmy wants to ride her bike1: Thumb opposition





#### Functionality Similar to Human Hand

# Main goal: Emmy wants to ride her bike 2: Compliant grip



#### Functionality Similar to Human Hand

## Main goal: Emmy wants to ride her bike2: Compliant grip





### High Conformability with a Socket

### •The more comfortable a prosthetic is, the more likely the patient is to use it





### **Durability and MTS Testing**

Durable for at least one year of usage – 1000 cycles
Hand failed at 3000 cycles





### Affordability of the Hand

- •Hand was to cost less than \$100
- A similar prosthetic costs about \$20,000 or more
  Final cost of hand materials \$26.04
  Does not include cost of labor (students and Eric Shoemaker), 3D printer, etc.

### **Specifications for Our Hand**

#### **Specifications**

- Hold a bike handle bar, similar to human hand
- High conformability
- Durable for one year
- •Cost less than \$100
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- •Color: pink or purple

#### **Solutions**

- •Thumb opposition and compliant grip
- Socket
- MTS Testing
- •3D printed the hand
- Replaceable parts kit
- Pink or purple hand

#### Looking Forward

## Project is concludingThank you to the Hoffmans and especially to Emmy!



### Acknowledgements

- Messiah College Collaboratory
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# Questions?



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