Krobohand

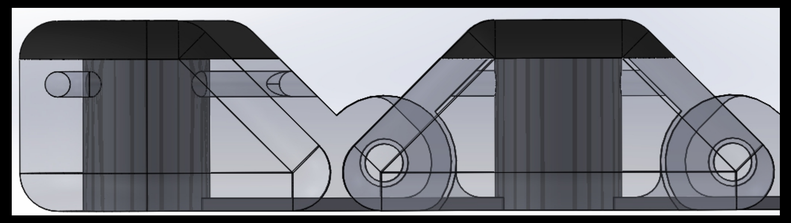
www.krobotech.com

A 3D Printed, Robotic Prosthetic Hand

UCI Samueli School of Engineering

Background

The Krobohand group recognized a significant gap in the upper limb prosthetic industry between cost and functionality of a prosthetic.



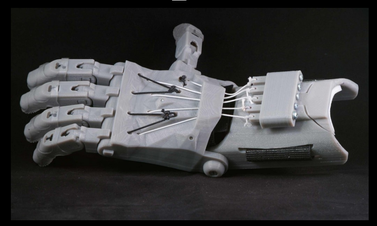
Joint Detail

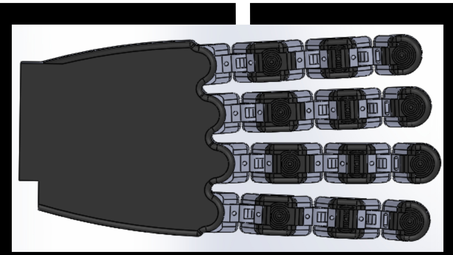
- Side profile showing flexible tendon, grips, and core.

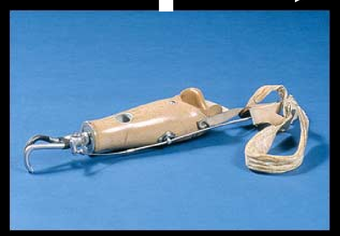
Raptor Hand - $50

Krobohand - < $1000

Split Hook - $10,000





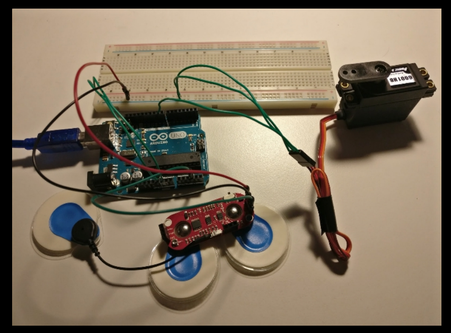


Goal

Bridge the gap in the upper limb prosthesis industry between cost and functionality.

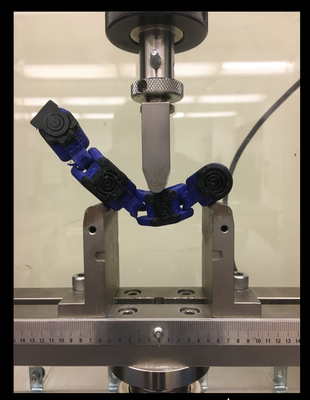
Objectives

1.) Fabrication with dual material 3D Printing.
2.) Streamline process of connectivity between electromyographic sensors and amputee.
3.) Create a sleek, clean, and recognizable upper limb prosthesis.



Tensile Test

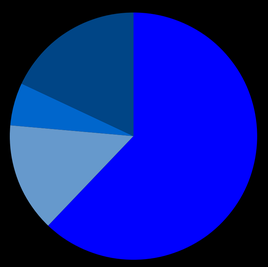
3-Point Flexural Test



Electromyography

1.) MyoWare sensor connected to existing muscle groups.
2.) Signal interpreted by Arduino microcontroller (Uno or Mega), actuates motor.

Budget: < $1000 Total Cost



- Filament - $145
- Arduino Mega - $45
- EMG & Electronics - $115
- Actuators & Motors - $500

Timeline: 2016-2017

Sep	Oct	Nov	Dec	Jan
Final Idea	Initial design & Prototyping	Testing of Prototypes	Single Finger Functional	EMG Connectivity

Feb	Mar	Apr	May	Jun
Single Finger with EMG	Final Hand Design	Final Thumb Design	Full Hand Completed	Redesign and Test

Design

Krobohand is both cost effective, as well as functionally viable. Fabrication techniques, as well as unique designs yield an innovative upper limb prosthetic.

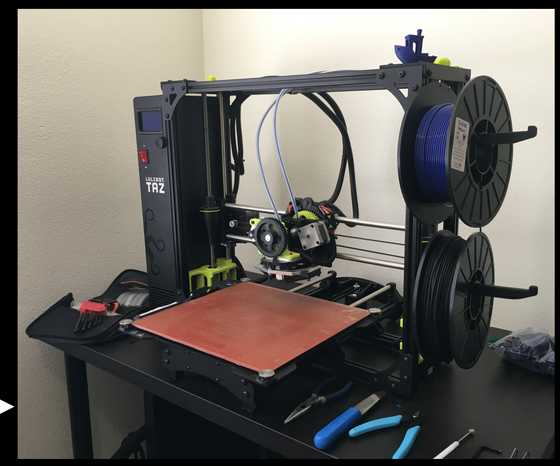
Innovation

1.) Fully 3D Printed Joints, Lateral Joints.
2.) Flexible tendon as a stabilizing, restoring force, like the extensor tendon of a human.
3.) Grip on palm side printed from same material as the flexible tendon, finger pads.
4.) Electromyography for connection between prosthesis and amputee, to be non-invasive.

Structural Testing

1.) Tensile Test – Avg. F before failure: 0.38kN or 85 lbf., 31.75mm (1.25in.) ext.
2.) 3-Point Flexural Test – Avg. F before failure: 0.83kN or ~180 lbf.

Krobohand Workstation



The Team

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- Cameron Hunt
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