

# Thumb Wrestlers FINGER 2.0



Avery Frazier, Ryan Burr, Royal Elder Dr. Perry, Dr. Wolbrecht Vish Ketkar, Cobi Brower



## Overview

- Goals for our project:
  - Make the finger rehabilitation robot work for both left and right handed impaired persons
  - Eliminate friction and tighten up joints on spherical five bar system for thumb movement rehabilitation
  - Manufacture and test carbon-fiber embedded 3D printed parts for rigidity and durability
  - Have a working prototype to send to California for trials by Thanksgiving
- Current Status
  - Working through design of new aluminum links for 5-bar thumb system
  - Finalizing base plate design and trying to get it manufactured
  - Modeling and preparing to print a setup for testing the 3D printed parts



#### Value

- Big Picture: rehabilitate stroke patients with compromised manual mobility
- Capability Gap: Current FINGER robot rehabilitates fingers only, not the thumb
- Objective: Complete a prototype thumb module for the FINGER robot
- Closing the gap: Completing the module will allow for rehabilitation of the thumb as well as fingers, drastically increasing rehabilitation benefits.



## Schedule Semester 1

		Year	2020																
		Month		Se	pt				Oct				N	ov		Dec			
Task Description	Duration	Assigned	8/30	9/6	9/13	9/20	9/27	10/4	10/11	10/18	10/25	11/1	11/8	11/15	11/22	11/29	12/6	12/13	12/20
Desktop Plate Design																			
Desktop Plate Manufacture			- -						4	· · · · · ·									
Joint 1 Aluminum Design																			
Joint 1 3D Prototype testing							-												
Joint 1 aluminum Machining										0	E 1	7							
Right-to-Left Flipping			- 																
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# Budget

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## Redesigned Baseplate

• Current design was only setup for right hand rehabilitation

• Had to concentrate on manufacturability and being able to change from left to right quickly and easily



• Waterjet next iteration of baseplate

• Using 80/20 bar for attachment





# Quick Change From Left ro Right

• FINGER 2.0 needs to work for both left and right handed cases

• Pointer and middle finger actuator can be flipped for right hand use

• Decided to 3D print another left hand 5-bar setup for thumb

• Actuators need to be able to be changed easily and quickly





## Machined Ends

- Exploring concepts using machined link ends
- The goal: reduce play in the joints by tightening tolerances and using stiffer materials



Use elasticity in 3D printed material to act as a clamp by cinching down on a machined axle.



Have an aluminum end fit into and bolt into a groove on the link with tighter tolerances for the axle.



## Machined Ends (Cont.)



Face Mount

Combines the joint axis with the link to eliminate one set of tolerances



**Dovetail Face Mount** 

Currently tabled due to manufacturing complexity