

Progress Report # 9

UW Adapted Fitness: Grip Strength Improvement Mechanism

Client: Dr. Kecia Doyle

Advisor: Prof. William Murphy

Team:

Simon Nam (Team Co-Leader and BSAC)

Sarah Kendall (Team Co-Leader)

Nicolas Maldonado (Communicator)

Owen Noel (BWIG)

Joey Dringoli (BPAG)

Date: 11/06/24

Problem Statement

A longtime Adapted Fitness client and mechanical engineer has worked consistently on stimulating his hand with lesser grip strength. The client would like a custom mechanism that would help an adapted fitness client improve his grip function and enable him to better grip on daily objects and workout equipment.

Brief Status Update

This week our team met together to discuss and plan out fabrication details and we slightly switched our focus to prioritize on the functionality of mechanism to assist clients' fingers to extend from a fist formation. We decided to begin building the mechanism with the electronics and thread-motor system solely with our index finger first, and then moving onto other remaining fingers once the initial mechanism works. We met with our client again this Thursday at Bakke Recreation to measure the forces being applied for each of our client's fingers to figure out required torque for determining adequate power for the motor to be supplied.

Summary of Weekly Team Member Design Accomplishments

- TEAM
 - Received feedbacks and suggestions from last week's Show & Tell

- Focused more on specifications of motor/thread system and updated codes for Arduino nano controller
- Simon
 - Researched more on how to allow FSR (force resistor sensor) to provide limitations for when to start and stop operating the motor
 - Continued working on the electronics
 - Met with other team members to discuss further about the fingers' dynamics in terms of moment/torque being applied during extension
- Sarah
 - Met with Joey, Owen, and Nicholas to further discuss the thread and motor system. Found 3.7 V DC motors to use and decided to use an axle.
 - Worked on troubleshooting our current Arduino code. The code/circuit is not powering the motor, despite supplying enough voltage and force to turn on the system. Did research and updated code to attempt to solve the problem.
- Nicolas
 - Met with the team to work on the motor system
 - Worked on the finger brace system and decided on attachment method for glove
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- Owen
 - Met with Joey, Nicolas, and Sarah to work on the motor and thread system
 - Finished the testing plan for one of the tests
- Joey
 - Completed reimbursement documentation and budget proposal
 - I ordered PVC tubing for the rope to protect the client's skin
 - We determined that we are using an axle for the motor system to help the rope “catch” with Sarah, Owen, and Nicolas.

Weekly/Ongoing Difficulties

We are still trying to figure out how much torque is actually required for the clients' fingers to be pulled at appropriate level to the desired angle without any further issues. A more sophisticated thread motor system is required to resolve this matter.

Upcoming Team and Individual Goals

- TEAM
 - Continue working on fabrication and create a working prototype that is able to extend the finger(s)
- Simon
 - Complete HIPAA training when it is available to enroll
 - Continue working on the electronics for prototyping
 - Finalize on deciding the appropriate servo motor that is based on the amount of torque required to extend the fingers
- Sarah
 - Once our circuit is correctly powering the motor, solder the components and sew them into the glove.

- Create a blueprint for how the components will sew into the glove.
- Nicolas
 - Assemble motor thread system on glove
 - Print other finger braces
- Owen
 - Finish a second testing plan
 - Meet to work on the threading further to try to finish the threading for one finger
- Joey
 - Finish the motor-to-axle connection (shave down the metal to the appropriate size)
 - Begin threading the line to the finger-tip (finish one finger by next week)

Project Timeline

Project Goal	Deadline	Team Assigned	Progress	Completed
Background Reading and Prep for First Client Meeting	9/12/2024	All	Complete	Yes
PDS Draft 1	9/19/2024	All	Complete	Yes
Design Matrix w/ at least 3 ideas	9/26/2024	All	Complete	Yes
Preliminary Presentations	10/4/2024	All	Complete	Yes
Preliminary Deliverables (Report, Notebook, Peer Eval)	10/9/2024	All	Complete	Yes
Final Poster Presentation	12/6/2024	All	Not yet started	No

Final Deliverables	12/11/2024	All	Not yet started	No
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Materials & Expenses

Link to [spreadsheet](#)