

Progress Report # 11

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: 11/21/24

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

Our team once again met together this week to continue working on the fabrication of the device. We managed to sort out the electronic configuration and successfully got the motors powered and running according to the programmed coding with the Arduino IDE system. Our team also finalized the modified glove component with inserting additional outer layers to provide skeletal structures and prevent any further injuries from the extension assisted by the synthetic motor-thread system.

Summary of Weekly Team Member Design Accomplishments

- TEAM
 - Continued working on fabrication of motor-thread and electronics.
 - Began 3D printing and finalizing the coding to activate the motor for pulling the thread accordingly based on initial stimulus
- Simon

- Continued in updated coding and assembled the electronic configuration with implementing H Drive motor component to run the motor in forward and reverse direction with a controllable setting with different threshold values.
- Adjusted the coding and electronic circuit furthermore to set appropriate value of current flowing through the motor system to provide adequate amount of torque for the fingers to extend at controllable manner
- Began on the training procedure for acquiring certificate for human subject training
- Sarah
 - Updated code and circuit to include an emergency stop button that overrides the activated motor code to stop the motor. Also added a time requirement concerning force applied to activate the motor, to prevent activation when the glove is being put on.
 - Attended office hours to troubleshoot problems with our motor driver.
 - Built an updated Fritzing diagram of our final circuit, to be used in our poster and final report.
- Nicolas
 - Finished assembly on first prototype of the glove additive device
 - 3d printed the new axel and finger braces
 - Made modifications to the glove for better fitting
- Owen
 - Created a new solidworks mock up of the finger braces modified to different sizes and also made a solidworks file for the axel and had them printed
 - Worked on assembling the first prototype
- Joey
 - Completed assembly of first prototype
 - Helped brainstormed new finger brace mechanism
 - Tested the first prototype

Weekly/Ongoing Difficulties

We are still trying to figure out how to set different stages with multiple threshold values to initiate and also stop the motor from pulling the thread in order to accomplish the extension of hand in multiple angles rather than having the hand fully extend at once. This would require more sophisticated coding and adjustment of circuit to achieve the desired outcome regarding safety and preventing further injuries for the client. Due to next week being shortened with Thanksgiving, every team member needs to coordinate and agree on specific deadlines to meet to accomplish the initial prototyping before the final presentation week.

Upcoming Team and Individual Goals

- TEAM
 - Finalize on fabrication and create a working prototype that is able to extend the finger(s) and begin testing protocols for analysis and discuss future improvements and modifications needed

- Simon
 - Complete the training sequence
 - Complete the modifications with adding additional electronic components for having the motor operate with multiple stages
 - Begin soldering after the coding and circuit has been completed with modifications
 - Begin working on the outline of the final presentation and report
- Sarah
 - Begin working on our poster.
 - Begin extension angle testing and velocity testing on the glove.
- Nicolas
 - Continue testing/working on our prototype
 - Reprint components for second prototype
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- Owen
 - Continue testing the prototype and printing new parts as needed to improve the prototype
 - Finish testing plans
- Joey
 - Finalize the spreadsheet for materials and cost/expenses and get confirmation by the BME department for reimbursement processing
 - Begin on final deliverables

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

Materials & Expenses

Link to [spreadsheet](#)