

## **Progress Report # 8**

### **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: 10/31/24

#### **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
  - Began working on fabrication and prepared for the upcoming Show & Tell happening on Friday

- Simon
  - Met with other team members at Design Innovation Lab to sort out the selection and finalize the specific material selection for wires acting as threads for the design
  - Began working with Sarah on electronic configuration and Arduino coding to program the Nano controller. Successfully tested and was able to force a sensitive resistor to display output of desired forces in Newtons.
  - Created Fritzing Diagram for the whole electronic schematics
- Sarah
  - Attended a sewing workshop at the makerspace to learn how to sew our threads and electronics to the glove.
  - Wrote code that prints out the force exerted by the fingers and lights up a LED light to indicate to the user that a threshold force has been applied.
  - Met with clients on Thursday to measure the maximum force exerted by their hand, which will be used to calculate the moment and torque.
  - Wrote our elevator pitch which will be used for show-and-tell.
- Nicolas
  - Finished the design for the finger brace
  - Began 3d printing finger brace
  - Finished plans for pulley and rope system
- Owen
  - Met with the rest of the team on Monday to work on material selection and fabrication methods for the device
  - Worked with Joey and Nicolas on Wednesday to 3d print a part to prevent the fingers from overextending in the glove
  - Began working on testing plans for one of the tests we will conduct
- Joey
  - Met with client Thursday measure the maximum force exerted by their fingers, which will be used to calculate the moment and torque.
  - 3D printed a finger brace to prevent hyperextension, also worked with Owen and Nicolas to finalize the wire and motor system (both wire and motor have been ordered)
  - Finished ordering all materials needed (as of now)
  - Met with Dr. Puccinelli to address budget questions

### **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
  - Continue working on fabrication and further expand the mechanism to be working with more than one (index) finger.
  - Support other team members to finalize their fabrication and testing
  - Complete the required training for HIPAA after being released
- Sarah
  - Write code that uses an emergency stop button on the glove that will override the thread and motor system.
  - Solder the electronic components together once we have confirmed they all work.
  - Begin planning the layout of the thread and motor system and electronics on the exterior of the glove.
- Nicolas
  - Finalize prototype in preparation for show and tell
  - Continue work on the pilot system to get it to work for multiple fingers
- Owen
  - Continue working on the thread and motor system with Nicolas and Joey
  - Continue with the testing plans
- Joey
  - Complete HIPAA
  - Install the threads onto the 3 middle fingers of the glove and attach to the motor unit
  - Print the finger braces for the additional 2 fingers

### 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](#)