

Step by Step: A Comprehensive Approach to Stair Climbing Assistance

Date: 2/22/2024

Client: Dan Kutshera

Advisor: Dr. Russ Johnson

Team:

Margo Amatuzio

Gracie Kreissler

Delani Wille

Cameron Owens

Riley Toth

Problem statement

In the field of neuro-rehabilitation, physical therapists encounter a significant obstacle when assisting patients with weight-bearing restrictions to transition back to their homes. The primary challenge revolves around negotiating steps, which often proves to be an arduous task due to various constraints. Ramps, typically considered a solution, are frequently deemed impractical due to cost implications and compliance with rise-to-run criteria. As an alternative, patients are advised to use garden benches from hardware stores, which lack adjustability and medical design. This makeshift solution is frustrating for healthcare providers, as it is not purpose-built and poses issues with bench availability.

To address this gap in the next three months, there is a clear need for a specialized, medically designed bench tailored for step use, offering safety and adjustability to improve the mobility and independence of patients in neuro-rehabilitation.

Brief status update

This week, the team worked on communication with Arrow and the testing procedure. In the upcoming week, we want to have the trial procedures and consent document written and prepared to be submitted. We also are in the process of having the two different base designs modeled in CAD with new L-brackets to assist with prototyping and finalizing a base size.

Difficulties / advice requests

Arrow application is longer than expected and require more attention

Current design

Materials and expenses

Item	Description	Manufacturer	Mft Pt#	Vendor	Vendor Cat#	Date	#	Cost Each	Total	Link
Category 1										
CORNER BRACE	BRACE, CORNER_2"_GALV_4PK		030699 152674						\$6.97	
BRACE, CORNER_5"_ZINC	BRACE, CORNER_5"_ZINC		030699 152124						\$5.94	
Category 2										
CLEVIS PIN	TOWSMART 3/8" CLEVIS PIN		849278 012038						\$5.38	
SQ TB1.25	PUNCHED SQ TUBE ZP 1-1/4X36		887480 030471						\$22.93	
SQUARE TUBE	TUBE SQUARE ALUM 48X1X1/16		887480 013078						\$28.47	
8 IN SHIMS	8" COMPOSITE SHIM (12 PC BDL)		852981 002098						\$2.28	
								TOTAL:	\$71.970	

Major team goals for the next week

1. Assemble the adjustable prototype

Next week's individual goals

- Riley Toth
 - Finish writing the trial procedures and consent document to submit to arrow
- Delani Wille

- Work on intellectual property submission.
- Gracie Kreissler
 - Finish CAD designs
- Margo Amatuzio
 - Assist with patent application and testing research
- Cameron Owens
 - Continue working on Outreach and collaborate with the team to aid in testing and patent work.

Timeline

Task	Jan	Feb				March					April				May	
	26	2	9	16	23	1	8	15	22	29	5	12	19	26	3	10
Project R&D																
Empathize	x	x	x													
Background...																
Prototyping																
Testings																
Deliverables																
Progress Reports	x	x	x	x												
Prelim presentation			x													
Final Poster																
Meetings																
Client	x															
Advisor	x	x	x													
Website																
Update																

Filled boxes = projected timeline
 X = task was worked on or completed

Previous week's goals and accomplishments

- Riley Toth
 - Continued to fill out the Arrow form
 - Called Arrow for support on the form
- Delani Wille
 - Researched intellectual property.
 - Attended Arrow meeting for IRB form.
- Gracie Kreissler
 - Scaled down the current base on solidworks, designed L brackets for the adjustable prototype.
- Margo Amatuzio
 - Researched options for bench seat cushion.

- Cameron Owens
 - Continued work setting up the BME outreach including talking points and acquiring the audio equipment.
 - Researched further options for design of the base for future improvements.

Activities

Name	Date	Activity	Time (h)	Week Total (h)	Sem. Total (h)
Riley Toth	2/20/2024 2/20/2024 2/21/2024	Arrow Meeting Arrow forms Arrow forms	1 1 1	3	11.5
Delani Wille	2/20/2024 2/21/2024	Arrow meeting IP Research	1 1	2	11
Gracie Kreissler	2/20/2024 2/22/2024	CAD CAD	1 1	2	11
Margo Amatuzio	2/22/2024	Design Research	1	1	8.5
Cameron Owens	2/20/2024 2/21/2024	BME outreach Research	2 1.5	3.5	11.5