

Step by Step: A Comprehensive Approach to Stair Climbing Assistance

Date: 3/7/2024

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, we met as a team to discuss goals for the report, delegate responsibilities, and evaluate our timeline. We worked to complete another revision of our manuscript per our advisor's feedback, and we will submit again for review by this Friday.

The adjustable support column was successfully attached to the base via L-brackets. This functional prototype can now be tested within our team in order to finalize a design and begin the manufacturing process. We plan to do this next week.

The invention disclosure and ARROW documents are planned to be submitted by the end of this week as well.

Difficulties / advice requests

Current design

Materials and expenses

Item	Description	Manufacturer	Mft Pt#	Vendor	Date	Total
CORNER BRACE	BRACE, CORNER_2"_GAL V_4PK	Everbilt	030699152674	Home Depot	02/04/24	\$6.97
BRACE, CORNER_5"_ZIN C	BRACE, CORNER_5"_ZINC	Everbilt	030699152124	Home Depot	02/04/24	\$5.94
CLEVIS PIN	TOWSMART 3/8" CLEVIS PIN	TowSmart	849278012038	Home Depot	02/04/24	\$5.38
SQ TB1.25	PUNCHED SQ TUBE ZP 1-1/4X36	Everbilt	887480030471	Home Depot	02/04/24	\$22.93
SQUARE TUBE	TUBE SQUARE ALUM 48X1X1/16	Everbilt	887480013078	Home Depot	02/04/24	\$28.47
8 IN SHIMS	8" COMPOSITE SHIM (12 PC BDL)	Timberwolf	852981002098	Home Depot	02/04/24	\$2.28
						\$71.970

Major team goals for the next week

1. Submit invention disclosure
2. Test the prototype

Next week's individual goals

- Riley Toth
 - Review Arrow submission
- Delani Wille
 - Have meeting with WARF
- Gracie Kreissler
 - Test the adjustable design on the team
 - Design final CAD
- Margo Amatuzio
 - Evaluate testing protocol and establish quantifiable data for results section
- Cam Owens
 - Finish or help with any remaining work on the prototype
 - Rewrite journal article in accordance with new guidance.

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	x	x										
Prelim presentation			x													
Final Poster																
Meetings																
Client	x															
Advisor	x	x	x	x		x										
Website																
Update																

Filled boxes = projected timeline

X = task was worked on or completed

Previous week's goals and accomplishments

- Riley Toth
 - Submit final arrow documents
 - Helps fabricate the base connection
 - Met as a team to discuss preliminary report work

- Delani Wille
 - Finished Invention disclosure
 - Updated progress report
- Gracie Kreissler
 - Worked on prototype and finished its fabrication
- Margo Amatuzio
 - Fabricate and attach base to adjustable column for prototype
 - Worked on Results and Methods sections of manuscript draft and researched similar papers to continue to build upon testing protocol
- Cameron Owens
 - Complete Outreach activity with the team, helping ensure everything is ready to be submitted to Arrow for IRB.

Activities

Name	Date	Activity	Time (h)	Week Total (h)	Sem. Total (h)
Riley Toth	3/8/2024 3/13/2024 3/13/2024 3/14/2024	Fabrication Arrow work Preliminary report team meeting Updated preliminary report	1.5 2 1 1	5.5	20.5
Delani Wille	3/10/2024 3/13/2024 3/14/2024	Invention Disclosure Preliminary report team meeting Updated preliminary report	1 1 2	4	22
Gracie Kreissler	3/8/2024 3/13/2024 3/14/2024	Fabrication Preliminary report team meeting Updated preliminary report	2 1 1	4	22
Margo Amatuzio	3/8/2024 3/14/2024	Fabrication to attach adjustable column to base in TEAM Lab Work on manuscript	2 3	5	17.5
Cameron Owens	3/5/2024 3/4/2024	Prototype Work Journal	1 0.5	1.5	19