

Step by Step: A Comprehensive Approach to Stair Climbing Assistance

Date: 4/18/2024

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 went to Home Depot to purchase blocks for the force plate testing. We plan to perform testing on Friday in the BME lab for one step using the various interventions. The data will be analyzed and presented next Friday for our final presentation.

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. Test the prototype
2. Draw conclusions from testing

Next week's individual goals

- Riley Toth
 - Edit poster
 - Practice for the presentation

- Continue arrow editing
- Delani Wille
 - Work on Poster
 - Finalize prototype for presentation
 - Help analyze test results
- Gracie Kreissler
 - Perform testing with current prototype
 - Work on poster for presentation
 - Practice for presentation
- Margo Amatuzio
 - Perform analysis of testing using MATLAB
 - Work on results/analysis of final presentation
- Cam Owens
 - Finish poster for presentations
 - Help team members with their portion of the product.
 - Finalize Testing

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	x	x	x	x						
Prelim presentation			x													
Final Poster																
Meetings																
Client	x															
Advisor	x	x	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
 - Home depot supply run
 - Arrow editing

- Delani Wille
 - Worked on executive summary
 - Testing stair design
 - Home depot run
- Gracie Kreissler
 - Figured out testing plan with the team
 - Bought materials required for testing (stairs)
- Margo Amatuzio
 - Met with the team to purchase stair material
 - Plan testing protocol for Friday
- Cameron Owens
 - Finished Outreach.
 - Worked on materials and set up for testing to be done.

Activities

Name	Date	Activity	Time (h)	Week Total (h)	Sem. Total (h)
Riley Toth	4/16/2024 4/17/2024 4/17/2024	Team meeting Supply run Arrow editing	0.5 1 1	2.5	30.5
Delani Wille	4/17/2024 4/17/2024 4/18/2024	Stair design Supply run Executive summary	2 1 2	5	38
Gracie Kreissler	4/16/2024 4/17/2024	Team meeting Supply run	0.5 1	1.5	32
Margo Amatuzio	4/17/2024	Home Depot to purchase material	1	1	24.5
Cameron Owens	4/15/2024 4/17/2024	Outreach Testing	2 1.5	3.5	29