

Step by Step: A Comprehensive Approach to Stair Climbing Assistance

Date: 4/11/2024

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 planned the design's final prototyping. This week, we plan to sand the final prototype and add a cushion. We will test with force plates and collect data for analysis for our final report.

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. Review IRB submission
2. Test the prototype

Next week's individual goals

- Riley Toth
 - Review Arrow submission and resubmit
- Delani Wille

- Test prototype
- Finish bench fabrication
- Gracie Kreissler
 - Perform testing with current prototype
 - Make prototype presentable by sanding and getting a cushion for the knee platform
- Margo Amatuzio
 - Current prototype data collection
 - Complete writing testing protocol
 - Finish bench fabrication
- Cam Owens
 - Finish working on Outreach, finalizing the essay and activity outlines.
 - Help team members with their portion of the product.

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
 - Completed outreach editing
- Delani Wille
 - Worked on executive summary
 - Market analysis research
 - Purchase bench material
 - Meeting with Kip about patent claims

- Gracie Kreissler
 - Met with engineers to evaluate sturdiness of current prototype
 - Discussed the need to fabricate the prototype with 80/20 with the team
- Margo Amatuzio
 - Met to discuss next steps for prototype
- Cameron Owens
 - Continued working on the report for outreach.
 - Continued working on the essay explaining the impact of our outreach project.

Activities

| Name | Date | Activity | Time (h) | Week Total (h) | Sem. Total (h) |
|------------------|--|--|--------------------|-----------------------|-----------------------|
| Riley Toth | 4/8/2024 4/10/2024 | Outreach editing Team meeting | 1 1 | 2 | 28 |
| Delani Wille | 4/5/2024 4/5/2024 4/11/2024 4/11/2024 | Executive summary Market Research Purchase bench material Kip meeting | 2 2 0.5 1 | 5.5 | 33 |
| Gracie Kreissler | 4/7/2024 4/10/2024 | Prototype evaluation Team meeting | 3 1 | 4 | 30.5 |
| Margo Amatuzio | 4/10/2024 | Meeting to discuss next prototype steps | 1 | 1 | 23.5 |
| Cameron Owens | 4/10/2024 4/10/2024 | Outreach Meeting | 1 1 | 2 | 25.5 |