Department of Biomedical Engineering
UNIVERSITY OF WISCONSIN–MADISON

Gait Trainer With Treadmill

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Client: Amanda Pajerski
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Overview

Problem Statement

A woman with a significant mobility impairment uses a Gait Trainer while walking because of seizure risks and poor postural strength. To maintain her strength and conditioning, it is crucial that she goes on her daily walks, however Wisconsin weather is often unpredictable. Therefore, the solution is to design a transfer device that will allow her to use her gait trainer on a treadmill, so that she will have consistent access to exercise. The transfer device will need to allow the gait trainer to be wheeled safely onto the treadmill and be safely secured. It will also need to hold a combined 173.6 kg. The device must be easy for caregiving staff to use, take less than 5 minutes to assemble, weigh under 22.0 kg, and have the ability to fold.

Background Information

Client: Mrs. Amanda Pajerski - Occupational Therapist at Continuum Therapy

Patient: Woman with mobility impairment & seizure disorder

Supported Walking Benefits:

- Increased mobility [1]
- Reduced muscle loss
- More community involvement [2]
- Improved mood

Previous and Competing Designs

- Rifton Treadmill Base: Expensive, bulkier
- Body-Weight Support System: Large, expensive, requires transfers
- HCI Ramps: No guard rails, made for wheelchairs
- Fall 2024: Gait trainer with treadmill: Short guard rails, not user-friendly

Figure 1: Rifton Treadmill Base [3]

Figure 2: Body-Weight Support System [4]

Figure 3: HCI Ramps [5]

Figure 4: Fall 2024: Gait trainer with treadmill [6]

Summary of Product Design Specifications

- Physical Characteristics
  - Fits Horizon T101 treadmill and Rifton Pacer Gait Trainer
  - Load capacity ≥ 173.6 kg
  - Device weight of moveable parts ≤ 23 kg
  - Guardrails ≥ 2.54 cm
- Operational Characteristics
  - Setup / storage ≤ 5 minutes
  - Use frequency: up to 7 days/week, 10–15 min sessions
  - Smooth finish, slip-resistant, easy-use locks, and compactable

Design 1: Telescoping Ramp

Pros

- Adjustability to other treadmills
- Removable side tracks (attached via toggle latch)
- Compact folding of ramp

Cons

- Bump in middle of ramp
- Increased difficulty of fabrication

Figure 7: Toggle latch [8]

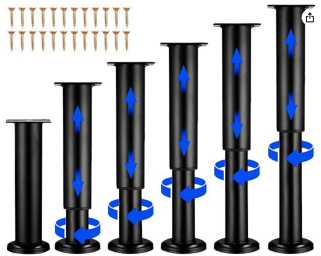


Figure 6: Adjustable legs [7]

Figure 5: Telescoping ramp design

Design 2: Suitcase Ramp

Pros

- Easily removable components
  - Wheels and handles on removable side tracks
  - Lightweight aluminum folding ramp

Cons

- Lacks adjustability
- Wheels create instability of side tracks

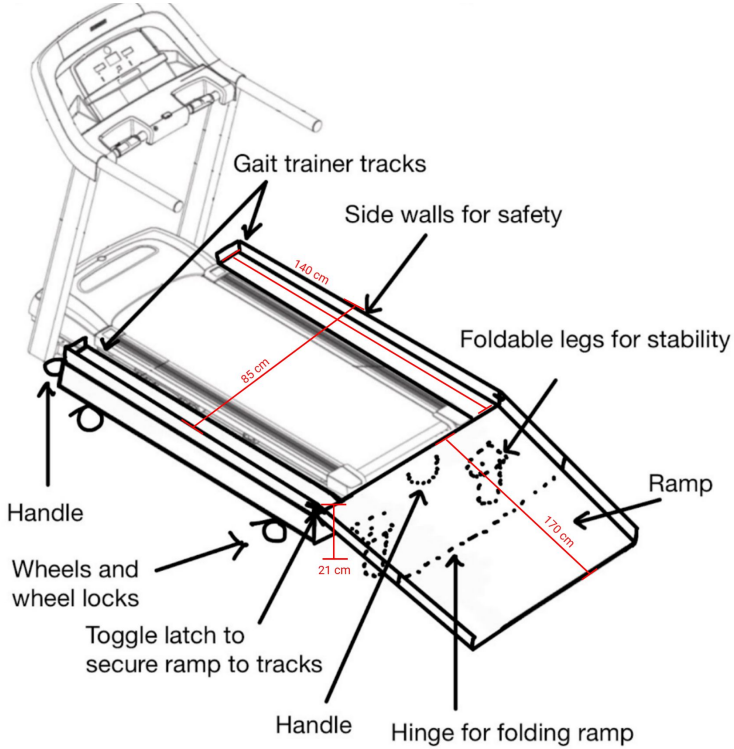


Figure 8: Suitcase ramp design

Design 3: Folding Ramp

Pros

- Stability of side tracks
- Easier set up

Cons

- Treadmill belt permanently in down position
- Lacks adjustability

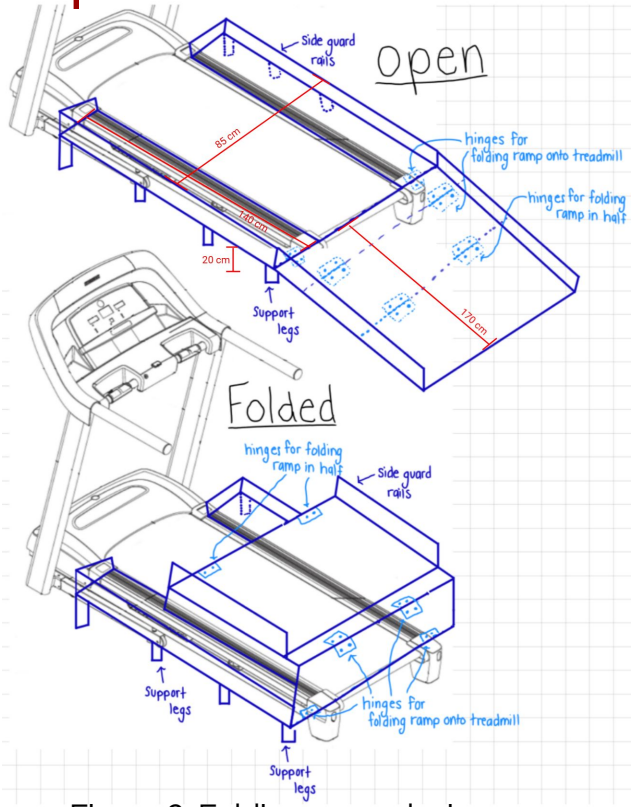


Figure 9: Folding ramp design

Design Matrix

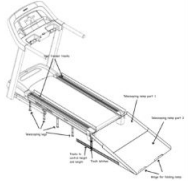
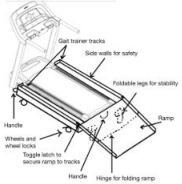
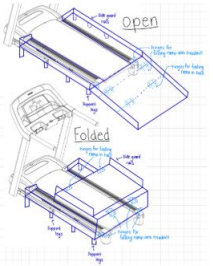
		Design 1: Telescoping Ramp		Design 2: Suitcase Ramp		Design 3: Folding Ramp	
						
Criteria	**Weight**	**Score**	**Weighted Score**	**Score**	**Weighted Score**	**Score**	**Weighted Score**
Safety	25	3/5	15	4/5	20	4/5	20
Ease of Set Up	25	3/5	15	3/5	15	3/5	15
Weight of Device	15	3/5	9	4/5	12	3/5	9
Compactability	15	4/5	12	4/5	12	4/5	12
Ease of Fabrication	10	3/5	6	4/5	8	3/5	6
Adjustability to Other Treadmills	5	4/5	4	2/5	2	2/5	2
Cost	5	2/5	2	4/5	4	3/5	3
Total	100	63		73		67	

Figure 10: Design Matrix

Final Design

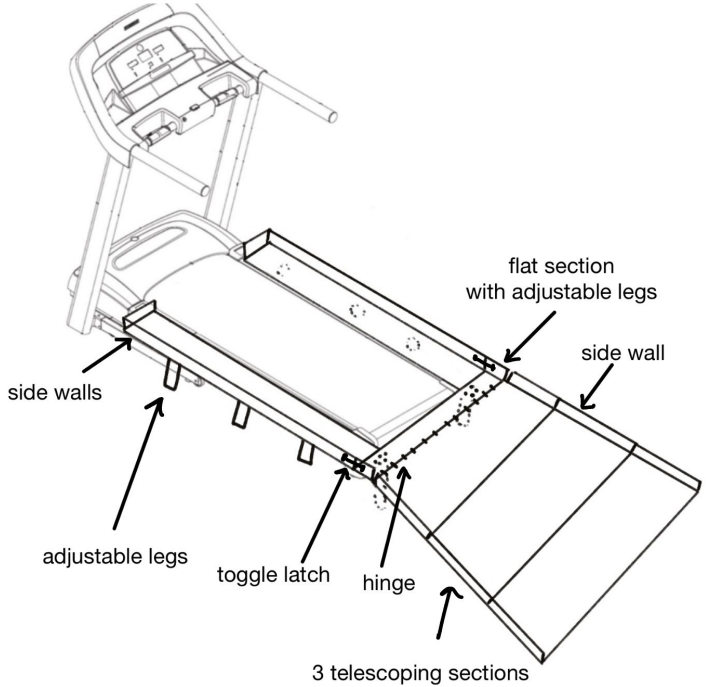


Figure 11: Adjustable Telescoping Design

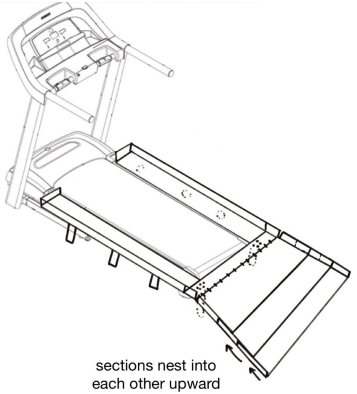


Figure 12: Drawing showing how telescoping ramp nests into each other

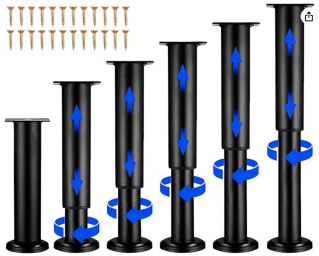


Figure 13: Adjustable legs [7]

Future Work

- Testing in solidworks
- Fabrication plans
- Welding and metal fabrication
- Access to treadmill
- Future testing

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Questions?