TEAM WALKER: BUILDING A BETTER ROLLATOR

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Mission: Team Walker is committed to building an affordable, stable, lightweight, fully-collapsible outdoor rollator.

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Problem Statement

TOO HEAVY

Commercial walkers often have a steel frame, which adds unnecessary weight to the walker. The user will have to carry the walker a non-negligible portion of the time in order to maneuver through doors and into other transportation.

UNRELIABLE BRAKES

The cheapest and most commonly used brakes stop the rear wheels by pressing a bar against the surface wheel. These brakes become unusable in the rain, and degrade the wheel surface over time.

UNSAFE

The hard rubber, 6” diameter (or less) wheels used by most walkers often becomes unsafe in tough terrain: the wheels get stuck in sidewalk cracks, and jolt over terrain due to poor suspension.

HARD TO TRANSPORT

One of the main issues with current rollators is the lack of sufficient collapsibility, making walkers difficult to transport in vehicles and to store at home, or while not using. Besides being bulky in storage, this becomes a problem when users need to retrieve walkers after being seated, interface with caregivers’ vehicles, or use public transportation.

STIGMA OF USE

Many rollator users do not wish to be seen as medical patients, or noticeably movement-impaired. Overly sterile design exacerbates this problem.

Solution

LIGHT

Create the entire frame out of hollow aluminum rods. Decrease the number and complexity of added parts. This will also make it easier for users to assemble the rollator themselves, if their caregivers are not available. Modular accessories allow the user to optimize weight of the rollator by only incorporating their most-used accessories.

RELIABLE BRAKES

Utilize the design iterations that bicycle brakes have already gone through in order to create superior brakes and don't degrade the wheel surface over time, give full braking capability, and require less adjusting. Find a cost- and weight-efficient way to do so. Create an easy trigger mechanism in order to accommodate those with compromised grip strength.

SAFE

Use 8" pneumatic or industrial foam wheels to better navigate rough terrain and provide a measure of suspension, to prevent from jolting the hands and wrists regularly.

EASY TO TRANSPORT

Create a rollator that collapses into a rectangular prism, or with a very slim profile in order to aid storage and stowing. Design wheels so the cart can be wheeled, like a suitcase or cart, while collapsed to further increase ease of transport.

SLEEK DESIGN

Good aesthetics and a beautiful, customizable design will ensure that the rollator is a pleasant tool to use in everyday life, instead of a symbol with negative connotations of age.

Primary / Secondary Research

VILLA GARDEN SENIOR CENTER RESIDENTS

- "It made walking easier. I can go faster and not feel like I'd fall."
- "I like the compartment, but sometimes stuff falls out when the walkers are in the back of a van."
- "It has to have a seat."
- "I can't go anywhere with stairs. Escalators maybe, but I try not to."
- "I hate walkers because I have to pick it up so it doesn't go over things. I only use it because my daughter wants me to."
- Users stow everyday things, including crosswords, newspapers, and personal belongings in the walker pouches, and need that to be easily accessible and out of the way of the collapsed state.

RANCHO LOS AMIGOS PHYSICAL THERAPIST, RANDY

- Rollators are inherently unstable because all points of contact are able to move.
- People who feel unsafe on rollators should use a regular walker with back legs instead of back wheels for true stability and a more appropriate walking pace.
- Most people do not maintain correct posture, or have the height adjusted to their body on their walker / rollator.
- Most people do not need a walker / rollator where the forearms are the main points of contact; it provides too much support for people who would benefit from using their muscles more.
- Health insurance subsidizes a new walking aid every

PRIMARY / SECONDARY RESEARCH

RANCHO LOS AMIGOS PATIENT, WILLIAM

- He continues to use the walker provided to him upon first being admitted to Rancho, a clinical walker.
- These walkers are cheap, light, and suit his lifestyle – his only desire is for a seat.
- Tight turns are not possible on a walker, so he just picks it up and changes direction.

AGING INTO THE FUTURE CONFERENCE, FOCUS GROUP

- Seniors do not know how to adjust rollators for their height, and often do not wish to contact their caregivers to do it for them, in fear of being a burden.
- Users often have problems with grip strength, making hand brakes difficult to use.
- Many users are low-income and require an affordable solution.
- Rollators are often very expensive, while medical walkers are very cheap and easy to find secondhand. Perhaps incorporate walkers into the design or manufacture.

Marketplace

ELDERLY POPULATION

Rollators are extremely popular among seniors, who use them to prevent falls while walking. While elders are not always the initial purchasers, they are the largest demographic of rollator users.

PEOPLE NEEDING AMBULATORY ASSISTANCE

Many people with disabilities have difficulty ambulating without external help, and use rollators on an everyday basis. People recovering from an injury on a long timeline may also require walking assistance via a rollator.

CAREGIVERS

Rollators are often bought for their true users by the users' family or loved ones, who also double as their caregivers. The final design must appeal to these caregivers in order to establish full presence in the marketplace.

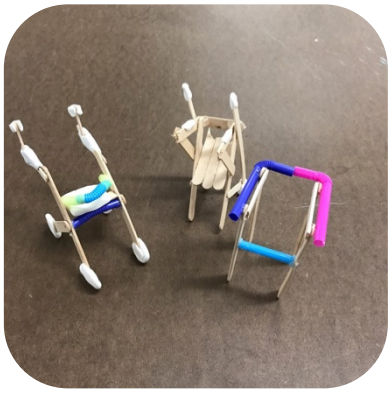
OTHER STAKEHOLDERS

Other stakeholders include doctors, physical therapists, medical supply stores, insurance companies, and manufacturers.

Design Approach: Iterations

SCALED MODELS

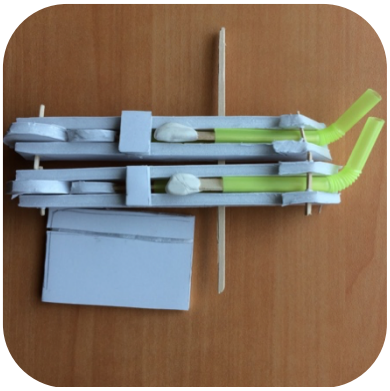
The initial prototypes focus on different mechanisms for collapsing the rollators.



(Left) These potential designs provide collapsibility due to having a bendy-straw-like middle frame and a seat that not only collapses upward, but to the side, along the side-profile of the rollator. These designs would allow the rollator to collapse along two axes (z- and x-) while most rollators on the market only collapse along one.

Some innovations that can potentially maintain correct posture include having an attachment to the handles that presses against the forearms, as well as color-coded and intuitive adjustment directions on the rollator itself.

(Right) This design gives up the thin profile in order to collapse into a small rectangular prism. The seat had to be removed completely for this design to fully collapse, and there is still the problem of the center beam.



(Left) This design offers a thin profile by having wheels that turn inwards to align with the slim profile, as well as longer handlebars that can be turned toward to align with the profile and potentially also serve as a trigger mechanism for the rollator's collapse.

DESIGN APPROACH: ITERATIONS

FULL-SIZE PROTOTYPES: ITERATION 1

This prototype has PVC pipes as an approximation of the future aluminum frame, and uses MDF to approximate plastic paneling.

The first iteration of our full-size prototype features a slim profile and length-adjustable legs. The height of the rollator is adjustable by screwing the handlebars up or down accordingly. The panel in the front has a peg board configuration for maximum adjustability of accessories, accommodating anything from a cup-holder to a magazine folder.

This prototype demonstrates that the wheel size is appropriate and the folding legs compounded with turning wheels allows for a slim profile. The peg board panel also presents aesthetic and artistic customizability by potentially serving as a canvas. Problems with this first iteration include stability problems involving the configuration and extendability of the back legs.

Iteration 2: Final Design

The final prototype for our re-designed rollator is collapsible to have an ultra-thin profile, includes 8” wheels, very few parts, and easily adjustable height. Improvements upon the first iteration include: an added backrest considered crucial by most users, fixed-length back legs that provide greater stability, and a lock to keep the seat upright. The parts are easily assembled and the rollator collapses with minimal hassle: the seat is lifted up and into place, and then the handlebars are turned inwards. The height is easily adjustable due to the innovative handlebars, which are ‘screwed’ down to shorten, and ‘screwed’ up to lengthen.

This rollator preserves all the necessary components, like stability, maneuverability, and a comfortable seat and backrest, while improving on less desirable aspects like the lack of collapsibility and unintuitive adjusting. This prototype demonstrates the need for 90-degree locking back-legs and a mechanism to ensure proper seat angle.

Future Goals

Our future goals are to build a usable prototype out of our prospective materials, e.g. aluminum rods, real wheels, etc. Brakes, as well as a stable locking mechanism for the back wheels, will be implemented. We will continue design iterations to achieve better aesthetics and look into even further collapsibility.

Our Team

We have learned so much about disability throughout the course of our research and design trajectory. Disability is not rare and can happen to any of us. Often, engineers do not put the person at the center of the design. As engineering and design students, we have learned the impact that user research should have on new iterations of deign if we are to create products that are a joy to use.

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Sketching
Ideation

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Caltech
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Function Aspects

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