ADAPTABLE HOUSE - FULL SUPPORT SYSTEM

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ADAPTABLE HOUSE

BACKGROUND & PURPOSE

- Develop a way for people with disabilities, injuries, etc. to independently move around their house while fully supported.
- Current solutions are static, inefficient, expensive, ugly, with a lack of self reliance.

Problem Statement
Design a chair that allows those in need to comfortably and independently move around their house without relying on others or static and expensive equipment.

DESIGN CORE FUNCTIONS

- **Stowability:** Fold and move the support out of the way when not needed.
- **Accessibility:** Be available whenever and wherever someone needs it.
- **Comfort and Aesthetics:** Be comfortable for long periods of time and looks aesthetically pleasing.

INITIAL DESIGNS CONSIDERED

A **Pugh Decision Matrix** was used to weigh pros and cons of alternative chairs, e.g. office chairs, hammocks, camping chairs, etc.

Criteria	# Office Chair (base)	# Wooden Chair	Gaming Chair	Hammock	Saucer Chair	Portable Camping Chair	Hanging Egg Chair
Comfort (x2)	0.8	0.25	0.7	0.6	0.7	0.4	0.8
Ergonomics	1	0.5	0.7	0.3	0.7	0.2	0.6
Durability	0.8	0.7	0.7	0.4	0.7	0.7	0.6
Aesthetics (x2)	0.5	0.3	0.6	0.75	1	0	1
Adjustability	0.8	0	0.8	0.6	0	0	0
Material Quality	0.5	0.5	0.6	0.5	0.5	0.5	0.7
Foldability	0	0	0	1	0.25	1	1
Stowability	0	0	0	1	0	1	0.25
Accessibility (x2)	0.75	0.75	0.75	0.2	0.75	0.5	0.5
Weight of Chair	0.7	0.6	0.6	1	0.7	0.9	0.7
Potential for Addons	0.3	0.6	0.3	0.5	0.4	0.7	0.8
Stability	0.8	1	0.8	0.3	1	0.8	0.6
Breathability	0.7	0.8	0.6	0.9	0.5	0.7	0.8
Total Score	9.7	7.3	9.2	9.6	9.65	8.3	10.65

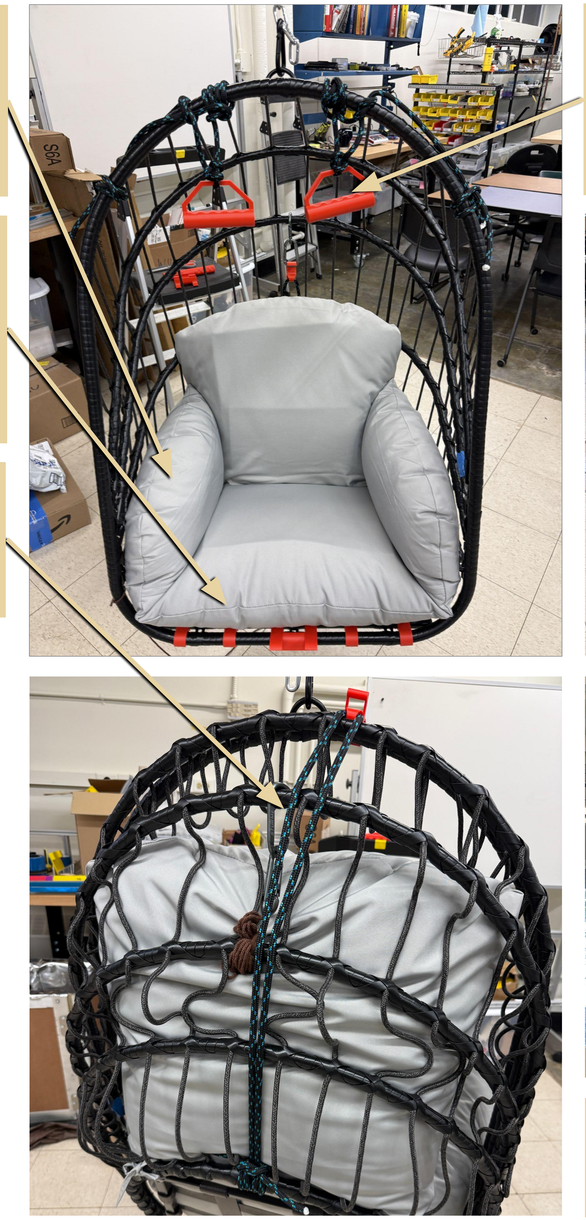
DESIGN & DEVELOPMENT

Our team used a Pugh Decision Matrix to select the hanging egg chair as the foundation for our design. Through several design iterations, we explored and implemented 3D-printed modifications, including hooks, handholds, and a footrest designed for minimal user input. These iterative improvements allowed us to refine the chair's functionality and enhance the overall user experience.

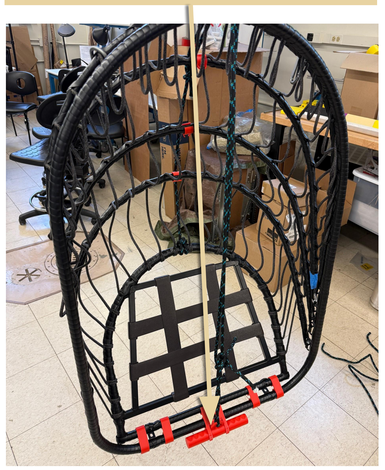
Cushion: Supports the user's posture and back to help relieve pain.

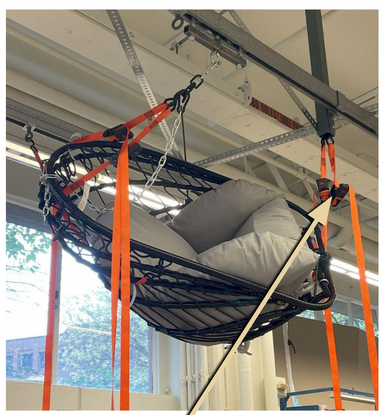
Bottom Hooks: Allows for easier foldability while maintaining rigidity of the chair.

Folding Cable: Helps the user hold the chair up in one motion.



Handhold: Assists the user in standing up. Alternatively, it can be used to keep the chair securely folded.

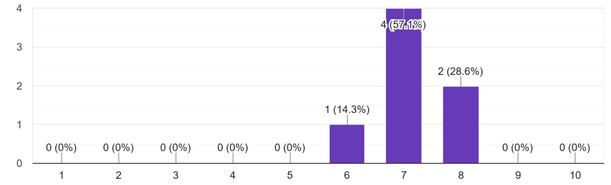




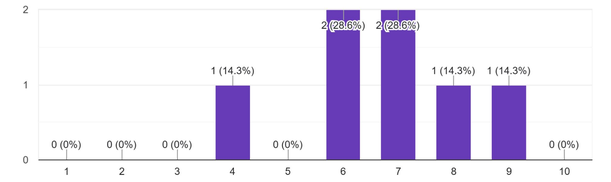
Stowability: Moves the chair up and out of the way.

USER RESULTS

How comfortable is the chair for an extended period of time?
7 responses



How well does the chair support posture and reduce strain on the body?
7 responses



The survey data above shows that most participants considered the chair a good foundation that can be adjusted to better suit personal preferences for comfort.

FUTURE STEPS

- **Improving Foldability:** Exploring more compressible options / deconstructing chair further.
- **Electric Stowability System:** Developing a motorized system to stow the chair.
- **Leg Rest:** Developing possible motorized component for user comfort and ease.

Acknowledgements

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QR link to more data from the survey.

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