Secondary Airline Mobility Device

Team Members:

James Tang- *Team Leader*
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Eric Arndt- *BPAG/BSAC*

Client:

Dan Dorszynski

Presentation Overview

- Problem Statement
- Background
- Product Design Specifications
- Design Alternatives
- Design Matrix
- Future Work

https://snacksafely.com/2015/09/must-hear-lianne-mandelbaum-discusses-food-allergy-and-air-travel/

Problem Statement

- Traveling with a disability is a difficult process
- A person that uses an electric wheelchair must transfer to a manual wheelchair before boarding
- Transfers by airport attendants can result in injury or embarrassment
- Device desired would help make boarding process safer and with less chair transfers

http://www.spinal-injury.net/disabled-flying-guide.htm

Background

- Competing Designs
  - Design from BMEs last year
  - Karman Healthcare Airplane Aisle Chair
  - Columbia Medical AisleMaster
- Client wants us to “Think Outside of the Box”

https://www.healthproductsforyou.com/p-columbia-aisle master-airline-transfer-chair.html

Product Design Specifications

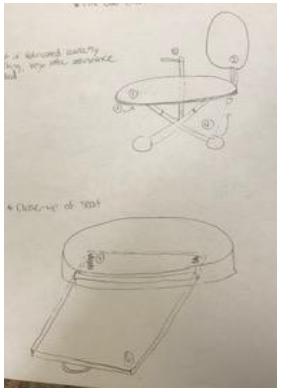
- Design must fit on airplane
  - Aisle of airplane approximately 20 in. wide
- Adjustable
- Compactible
  - Desired to fit in carry on (9 in. x 14 in. x 22 in.) or under seat of airplane (9 in. x 10 in. x 17 in.)
- Limit transfers

Product Design Specifications

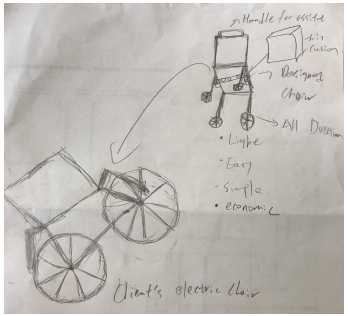
- Support at least 250 lbs.
  - Factor of Safety = 1.8
- Device should last a minimum of ten years
- Withstand varying temperature, pressure, and humidity changes
- Lightweight
- Get Creative

Design Alternatives

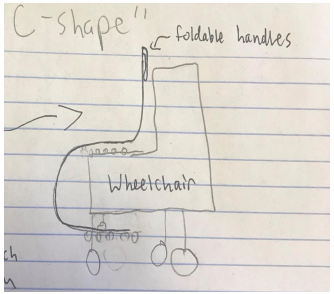
Ramp Chair



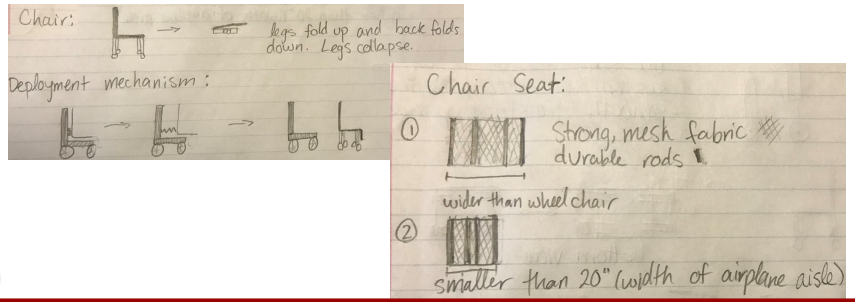
Fit-In Chair



C-Shaped Chair



Foldable Chair



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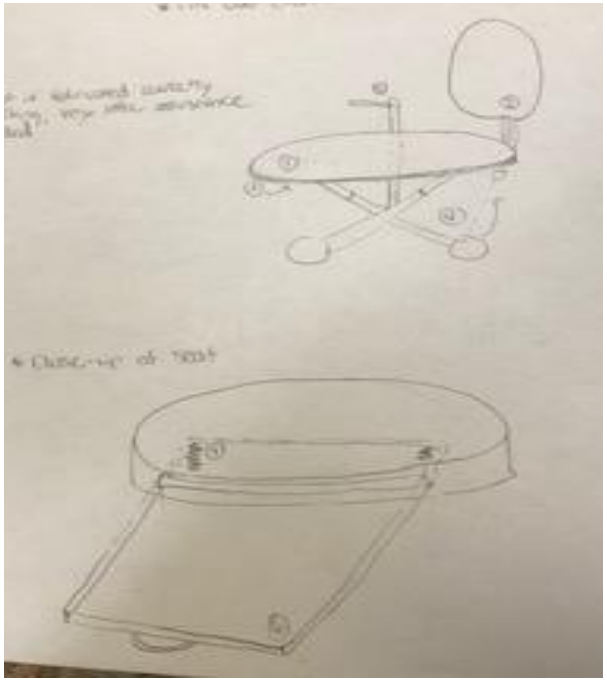
Design Alternatives - Ramp Chair

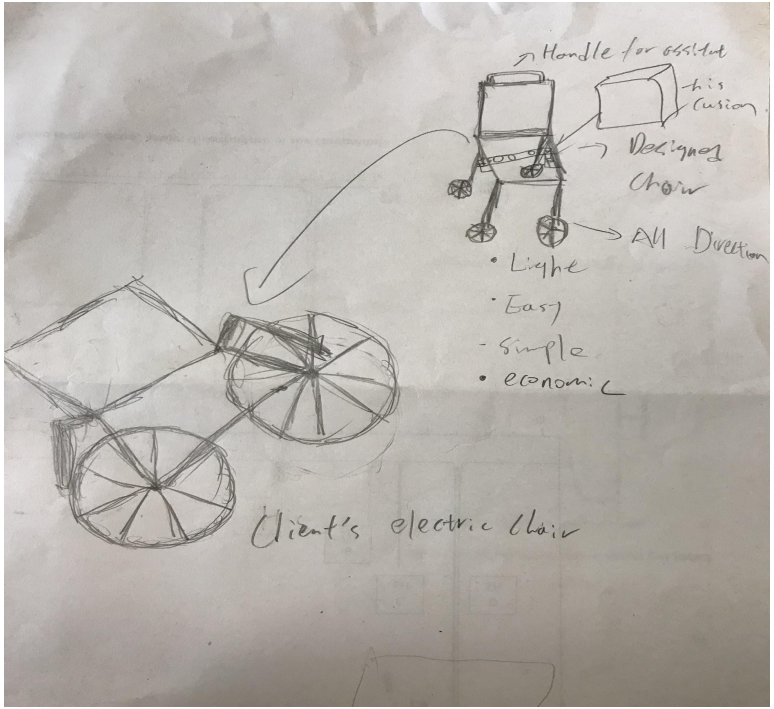
- Scissor-lift style wheels for easy height adjustment
- Retractable ramp to slide on/off airplane seat without need of lifting
- Thin cloth/plastic seat and seat back
- Foldable seat to increase stowability



Design Alternatives - Fit-In Chair

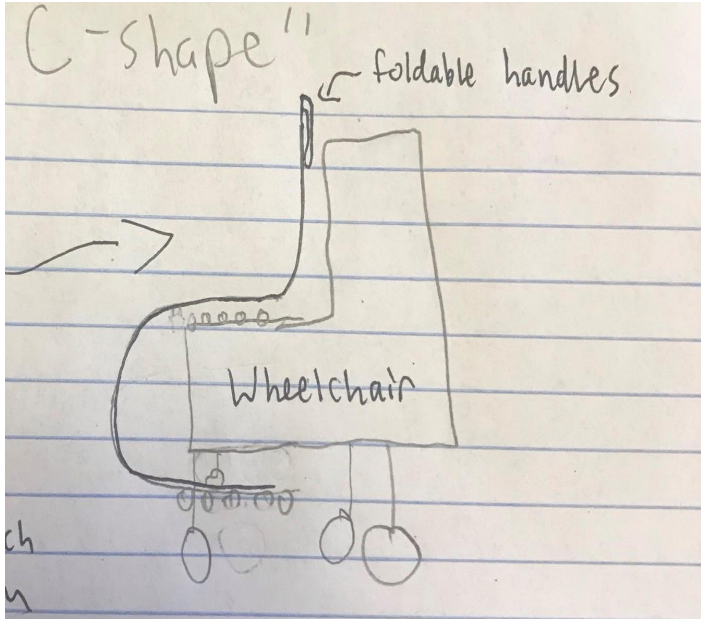
Outstanding Characteristics:

- Adjustable back legs
- Double layers seat with a track slide
- Quick & Convenient in Use
- Durable
- Low cost



Design Alternatives - C-Shaped Chair

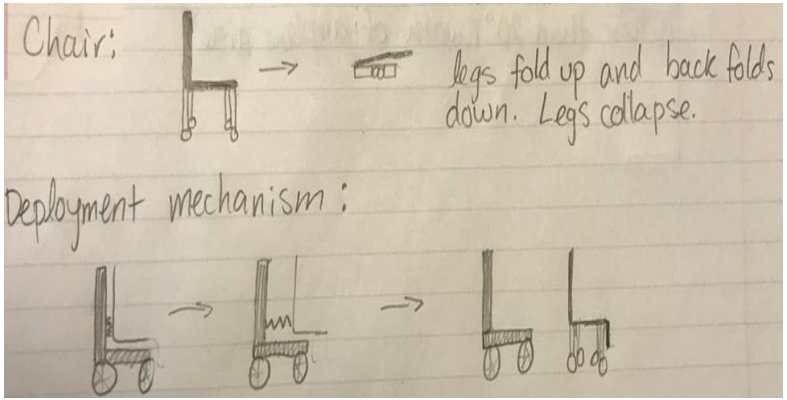
- Design can be attached and detached from electric wheelchair via roller mechanism
- Foldable handles
- Omni-directional wheels
- Wish to slide device right over airplane seat
- Adjustable at the middle slot of “C”

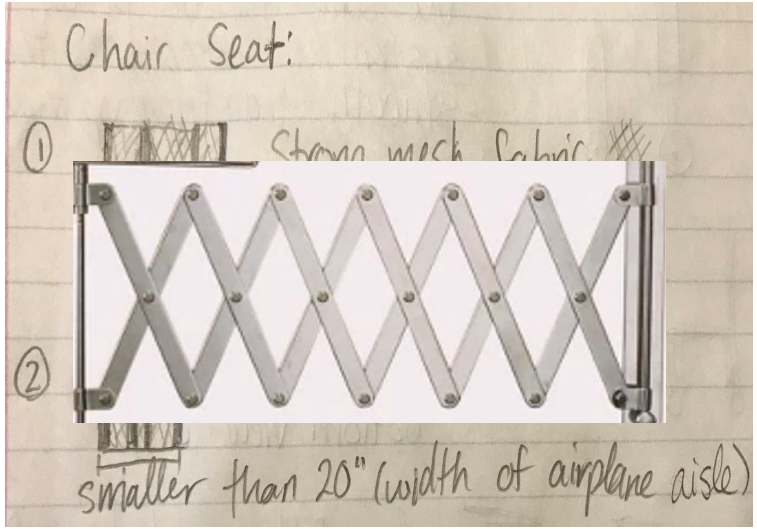


Design Alternatives - Foldable Chair

Key design characteristics:

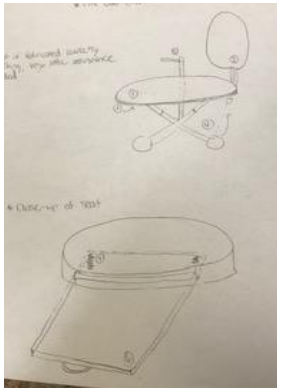
- Deployment mechanism
- Folding seat



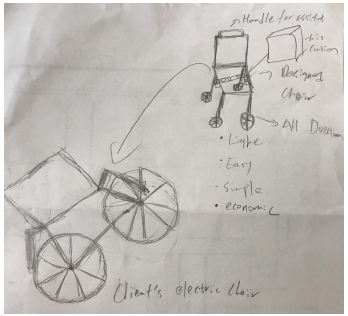


Design Alternatives

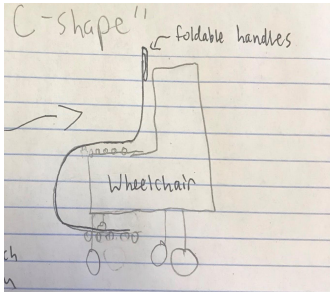
Ramp Chair



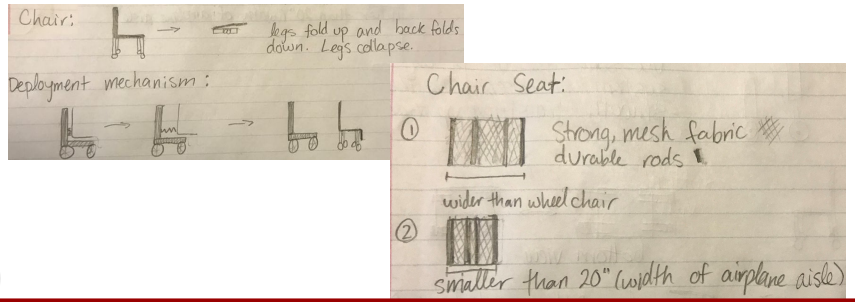
Fit-In Chair



C-Shaped Chair



Foldable Chair



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Design Matrix	1		2		3		4	
Ease of Use/Effectiveness (20)	(3)	12	(4)	16	(3)	12	(4)	16
Safety (20)	(4)	16	(4)	16	(3)	12	(3)	12
Adjustability (15)	(5)	15	(2)	6	(3)	9	(5)	15
Compactibility (15)	(5)	15	(1)	3	(3)	9	(5)	15
Durability (10)	(3)	6	(5)	10	(3)	6	(2)	4
Ease of Fabrication (10)	(1)	2	(5)	10	(2)	4	(2)	4
Cost (5)	(2)	2	(5)	5	(4)	4	(4)	4
Innovation (5)	(5)	5	(2)	2	(5)	5	(5)	5
Total (100)	73		68		61		75	

Future Work

- Finalize design and sketch
- Order necessary materials
- Determine testing procedures for each key design characteristic
- Begin prototype fabrication

References and Acknowledgements

- Client: Dan Dorszynski
- Advisor: Dr. Aaron Suminski