UBC BEST

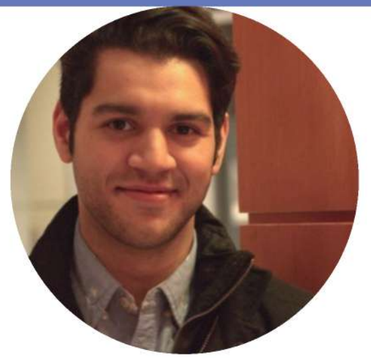
ENABLE

SIMON COX DESIGN COMPETITION 2022

Co-Assist

THE UNIVERSITY
OF BRITISH COLUMBIA

THE TEAM



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3rd Year Biomedical Engineering Student

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2nd Year Microbiology Student

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3rd Year Integrated Engineering Student

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OUTLINE

The Problem

Client Consultation

Our Vision

Client Needs

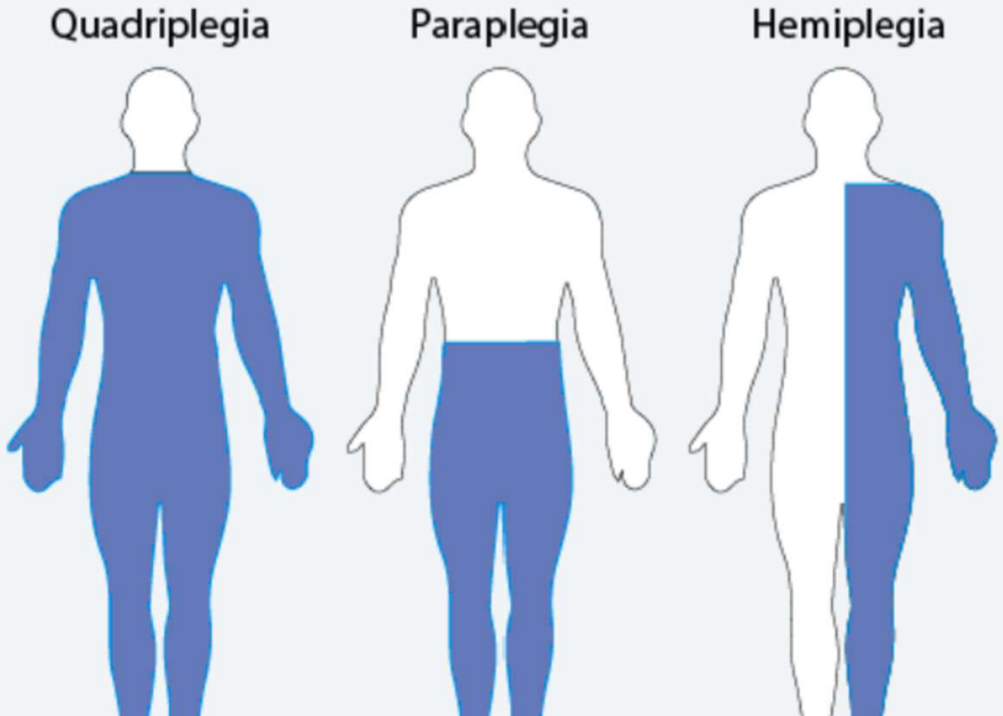
Design Process

Final Design Specifications

Future work

PARAPLEGIA

- The loss of motor function in one or more muscles.
- A subset of paralysis
- Affects the lower half of the body



PEOPLE LIVING WITH PARALYSIS

1 / 50

Nearly 5.5 million people living with some form of paralysis: which is around 8 times the population of Vancouver.

THE PROBLEM

Paraplegic wheelchair users usually have **limited independence** when completing daily tasks.

In light of COVID-19, receiving aid from others is **more challenging** to receive.

OUR CLIENT

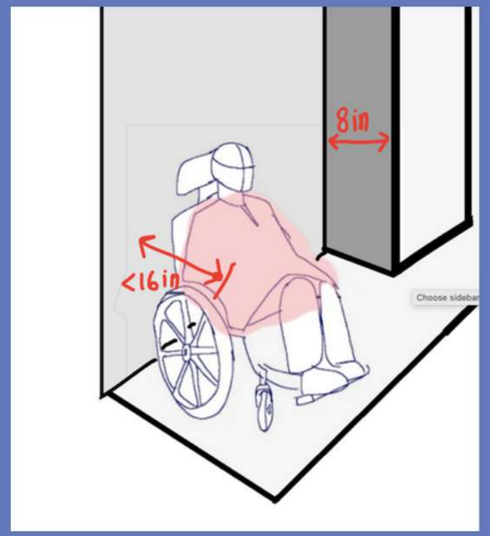
Our client Maureen lives in Vancouver, where it rains year-round.

Maureen has limited motion in her arms, and relies on a caregiver to put on her poncho.

OUR VISION

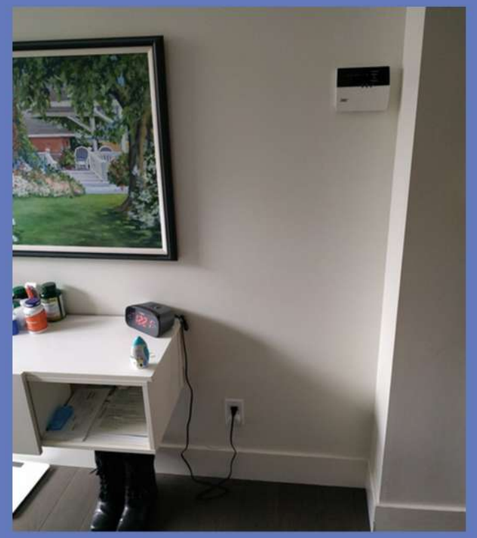
“To design a device that is **robust, portable, and easily adjustable** that allows the user to have **more independence**”

CONSTRAINTS



SAFETY & STURDINESS

Especially as Maureen's movement is limited



SPACE

Wall to wheelchair, wheelchair's shape

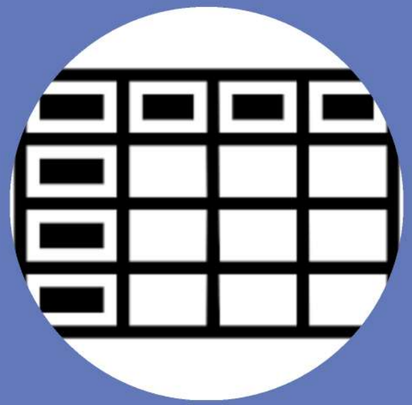
PONCHO

Device needs to support the weight of ponchos

DESIGN PROCESS

Concept Generation

Generating ideas, researching mechanisms for vertical movement, and testing ways to integrate design components



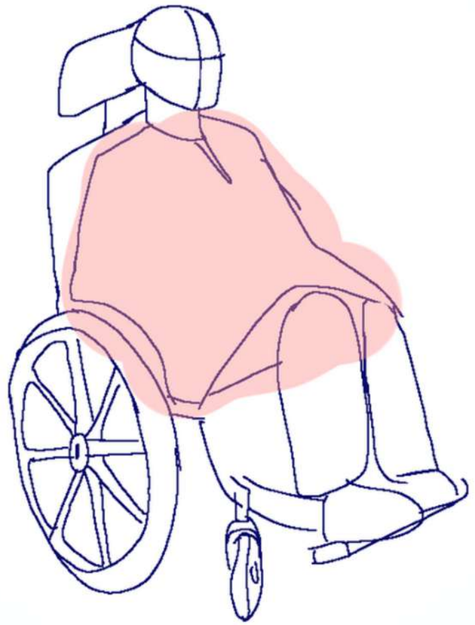
WDM

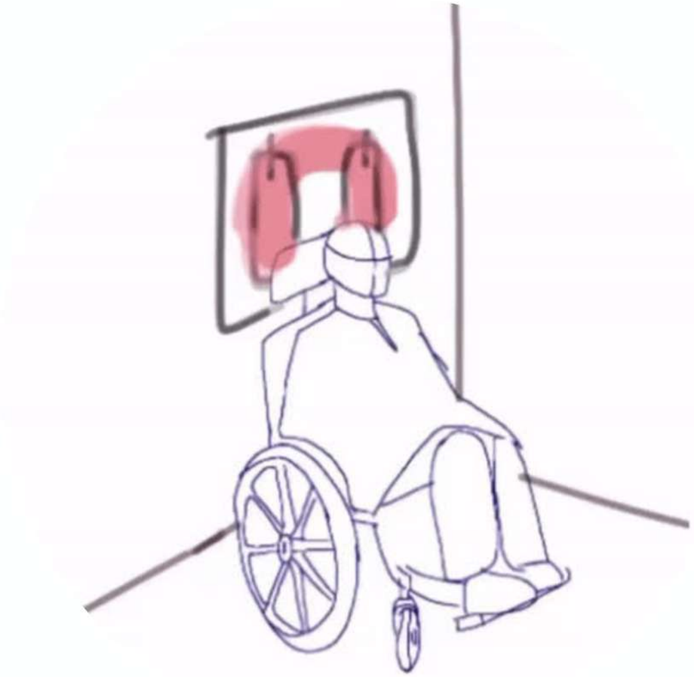
Deciding on the best idea by ranking, screening, and scoring the ideas against the key client requirements.

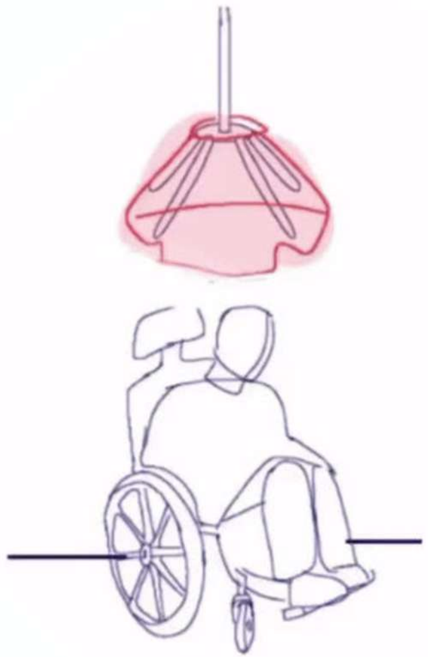
3D Modelling

Developing working CAD models for promising concepts, optimizing design features (eg. clamping and height adjustment mechanisms)

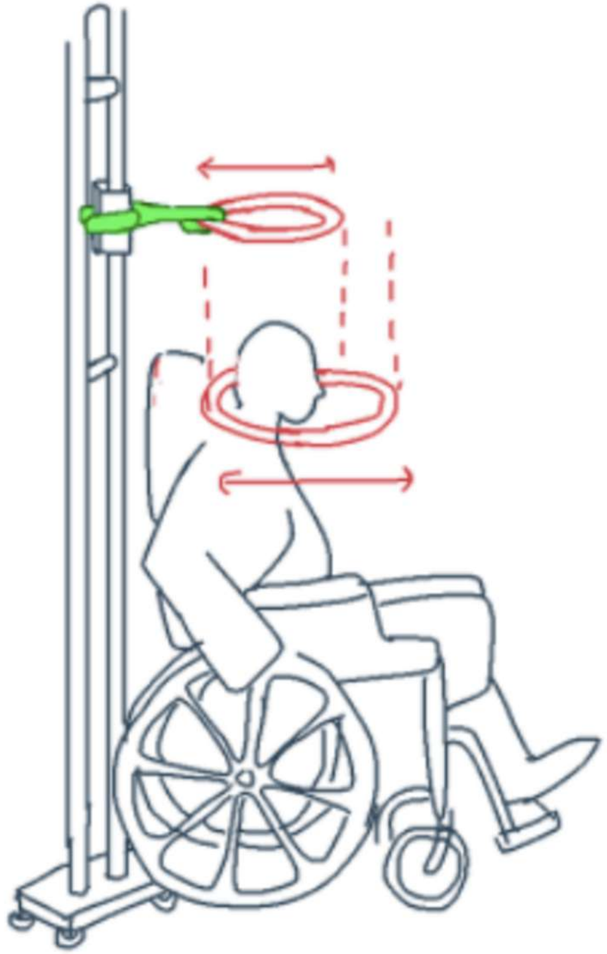
INITIAL IDEATION

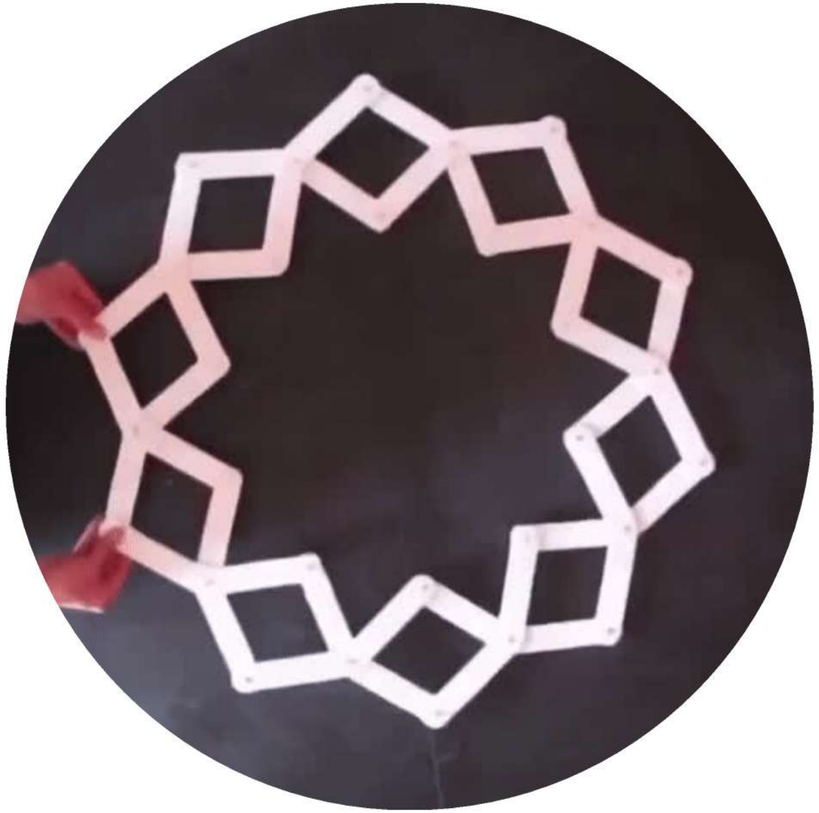






FINAL DESIGN





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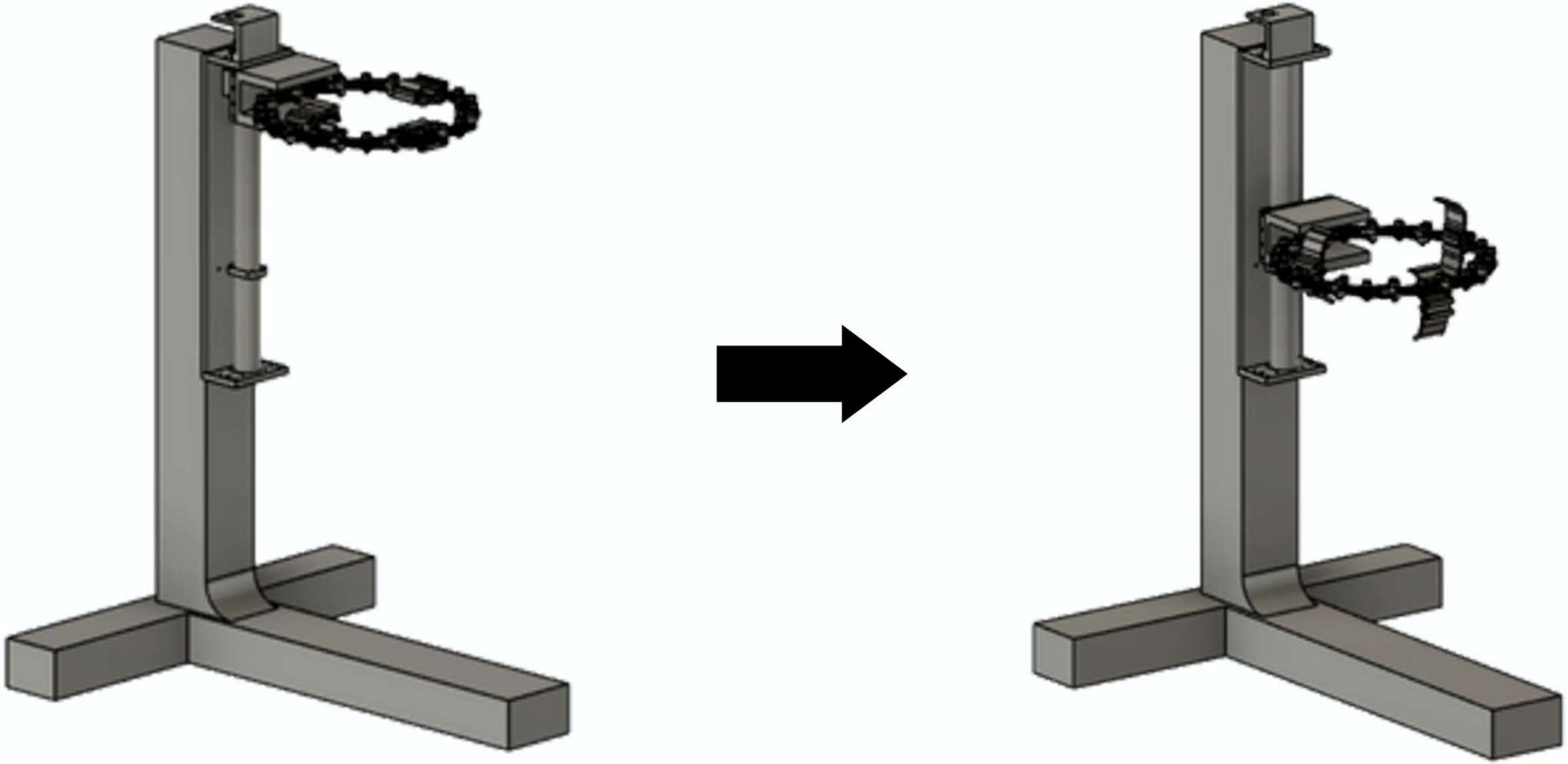


FINAL DESIGN - BASE

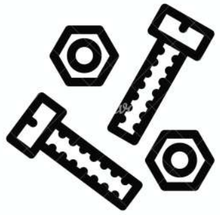
Durable
Made of stainless steel

Stable
The unique "T" shape

Safe
The thickness of the foundation is 3'', a perfect fit for wheelchair clearance

Base is 30'' in length; 27'' wide; 37'' high

FINAL DESIGN



Lead Screw mechanism powered by high-torque servo motor

Safety locking braces located at top and bottom

Rails on the side for structural stability

FINAL DESIGN - HOBERMAN CIRCLE

Specifications:

- Closed radius of 5"; open radius of 8.5"
- Jointed with thumb screws
- 36 connections
- Circle opens and closes with servo motor
- Hoberman circle houses 3 clips that hold poncho

FUTURE WORK


May 2022
Design Review
June 2022
Cost Analysis
July 2022
Machining Parts
Risk Analysis
May 2022
Order Parts
June 2022
Installation
August 2022

Thank You For Listening

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technology for living

References

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Paralysis statistics. Reeve Foundation. (n.d.). Retrieved April 4, 2022, from https://www.christopherreeve.org/living-with-paralysis/stats-about-paralysis#:~:text=Prevalence%20of%20paralysis%20in%20the%20United%20States,-In%202013%2C%20the&text=According%20to%20the%20study%2C%20there,paralysis%20%E2%80%93%20approximately%205.4%20million%20people.

Snels, P. (n.d.). Expanding Circle. YouTube. Retrieved April 4, 2022, from https://www.youtube.com/watch?v=j6x_m6kXm-Q&ab_channel=PatrickSnels