



HCDS - Hiking Stroller

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Objective

The goal of this project is to create a stroller design, that would be able to maneuver through various different terrain such as hiking trails, gravel, rocks, etc. while maintaining comfort and safety for Lydia as well as her father

Client

- ❖ Lydia and her Family
- ❖ 6 year old girl who has:
 - Intractable Epilepsy
 - Brain Malformations
 - Diminished White Matter
- ❖ No definitive diagnosis but is thought to have a type of Leukodystrophy
- ❖ Loves going outdoors with her two siblings and parents
- ❖ Her father, Mark, works for Boulder Parks and Rec and loves being outdoors



Figure 1: Lydia

Introduction

- ❖ Lydia's dad is an avid hiker and enjoys trails like South Table
- ❖ He would like to be able to take Lydia out on hikes with him as well as the rest of the family
- ❖ There is no current solution for the requirements that need to be met for Lydia's specific needs:
 - Typically hiking strollers are too wide for narrow trails
 - Current designs on the market do not have the adjustability needed to create a safe and comfortable solution for Lydia.

Specifications

- ❖ Lydia seated at an angle of approximately 30 degrees
- ❖ Lightweight and Durable
- ❖ Transportable through their van
- ❖ Able to stand without being held
- ❖ Harness for hands free hiking and running
- ❖ Feeding bag holder
- ❖ Shade system
- ❖ Possible storage for medications and other necessities

Design Goals

- ❖ Needs to achieve safety, stability, and maneuverability for Lydia and her father
- ❖ Proposed designs considered had more than one wheel
 - Pros:
 - stable seating for Lydia
 - stable frame that can take on various types of terrain
 - Cons:
 - hard to maneuver on trail curves and bends
 - too wide for narrow trails
 - difficult to store in family van
- ❖ Selected Proposed Design:
 - Push and pull options for the user (Lydia's father)
 - Narrow base ideal for trails
 - 3 point harness to keep secure and safe



Figure 2 : Selected Proposed Design



Figure 3: Proposed Design #2

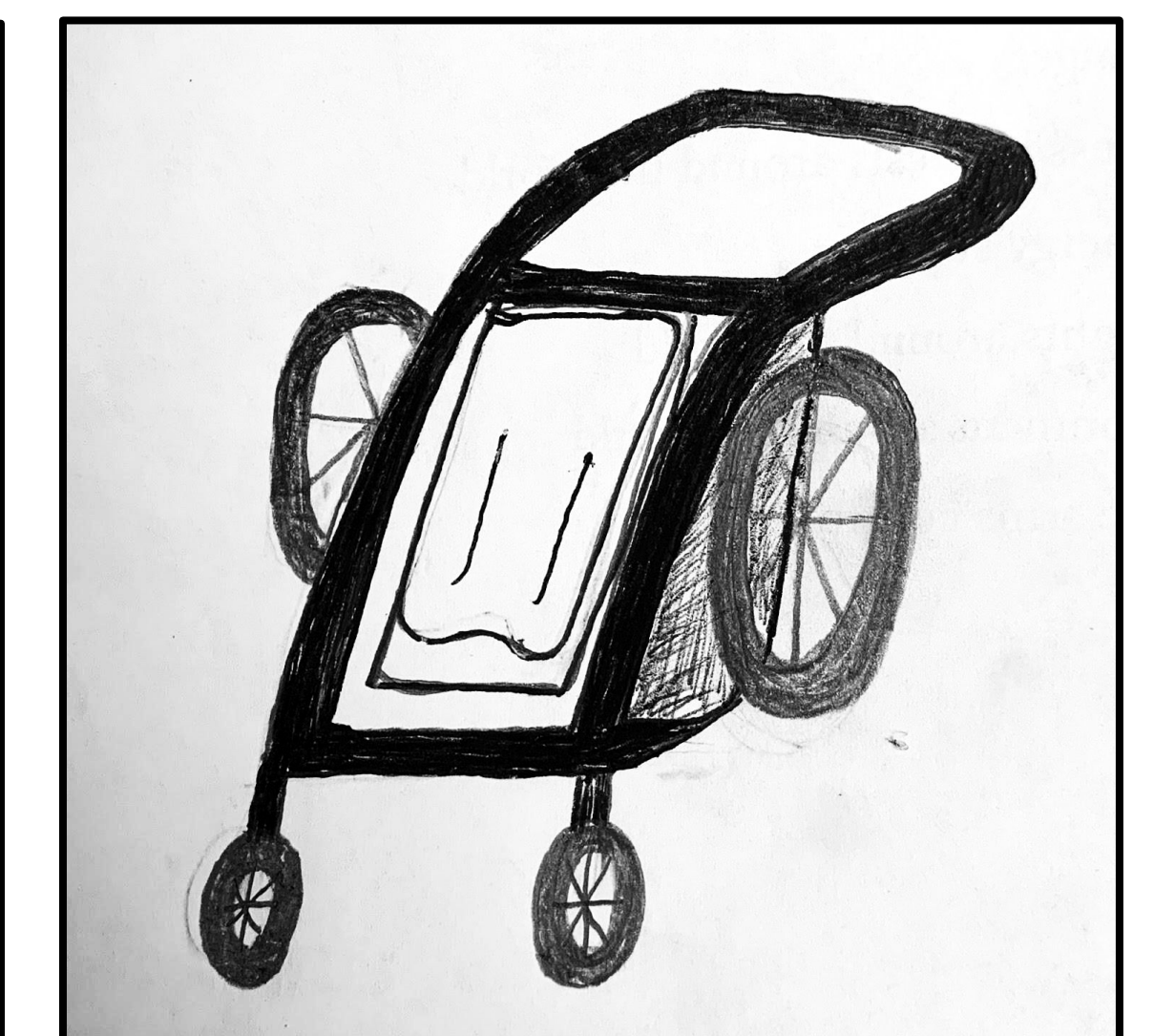


Figure 4: Proposed Design #3

Analysis

- ❖ Frame was constructed in SolidWorks
- ❖ FEA analysis was done on the frame with a load of 90 lbs applied
 - Von-Mises and FOS plots are shown
- ❖ Minimum FOS of 1.4 at a load of 90 lbs
- ❖ Load far exceeds the weight of Lydia and other components that are attached to the frame

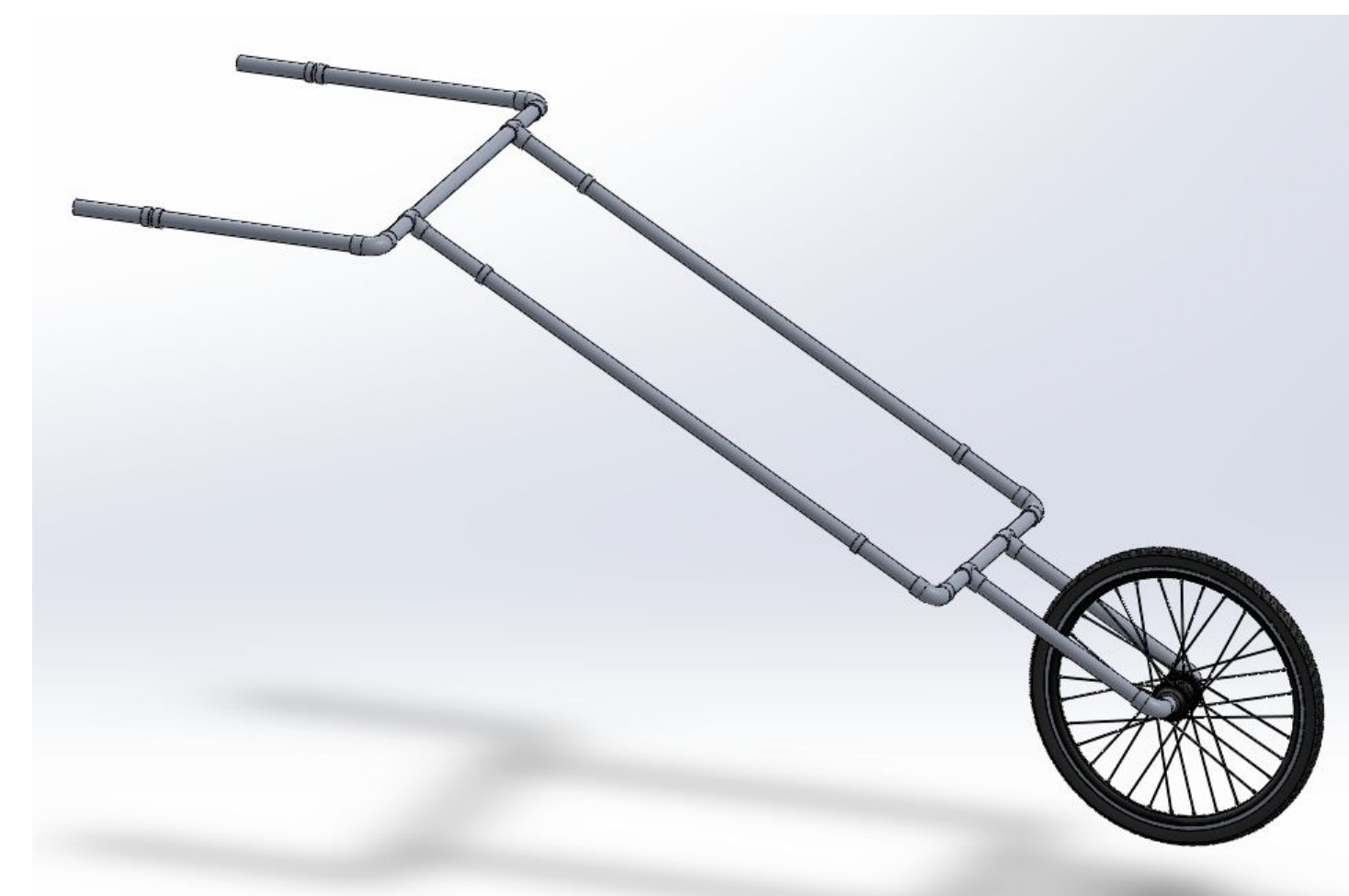


Figure 5 : Assembled Stroller Frame in Solidworks

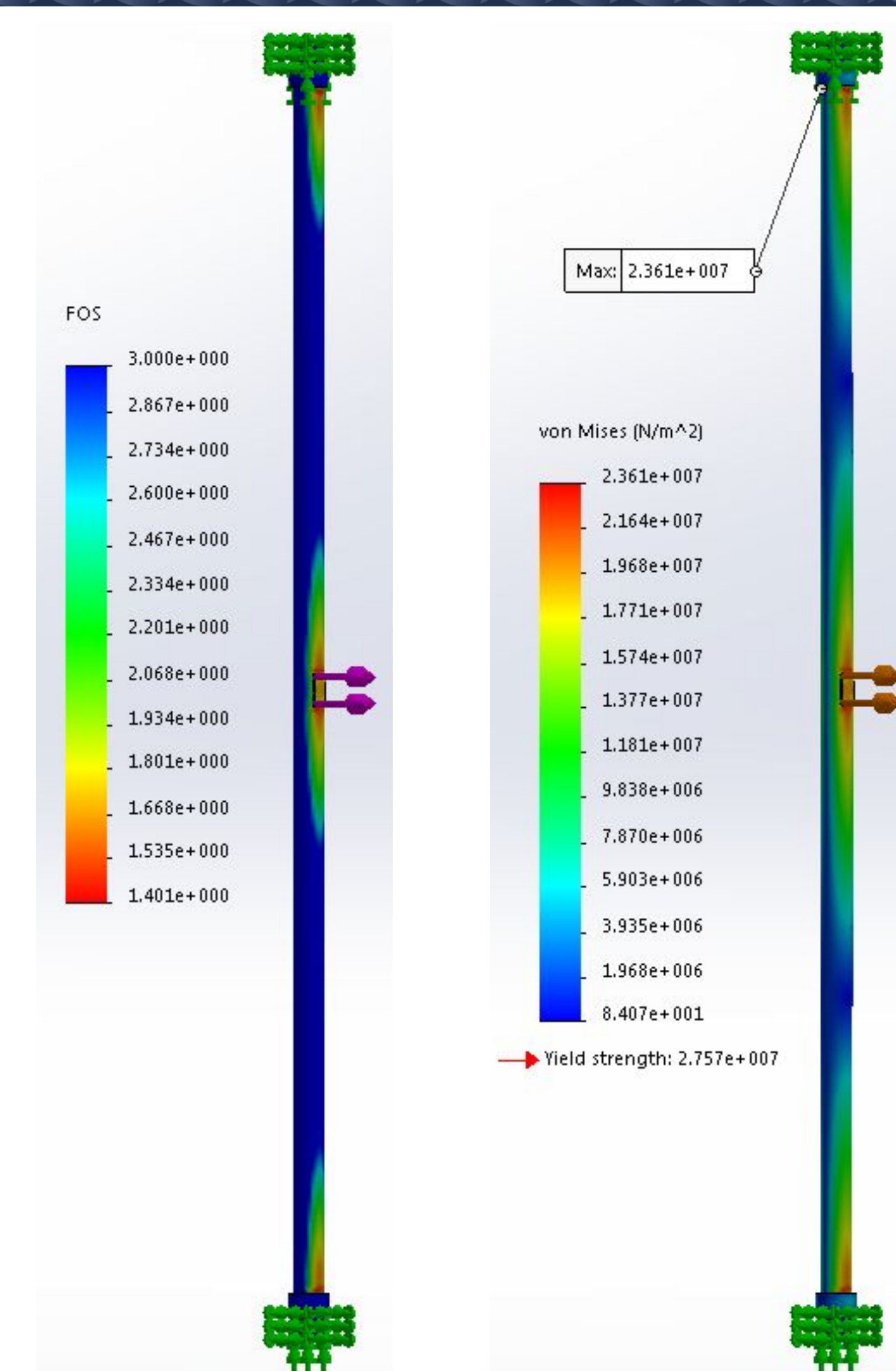


Figure 6: FEA Results of Design Frame

Final Design

- Mono-wheel design
- Push and Pull Options
- Harness for hands-free hiking and running
- Optional backpack attachment for storage
- Fixed 30 degree seating angle from ground (allen key adjustable)



Figure 7 : Lydia & Mark in Final Design Prototype



Figure 8: Lydia in Final Design Prototype

Conclusions

- ❖ Successfully built and tested a working prototype
- ❖ Met all primary requirements of the client
- ❖ Completely customizable to client's preference; both design and aesthetics

Next Steps

- ❖ Add a feeding bag holder
- ❖ Add a shading system
- ❖ Springs for better suspension

Acknowledgements

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- ❖ Lydia
- ❖ Lydia's parents, Mark and Danae
- ❖ Dr. Bach
- ❖ Dr. Salinas
- ❖ HCDS Seniors



Figure 9 : Lydia with Team Leads – Maggie and Cassidy