

Garden Helper

Derrick Bittner, Alex Brannen, Cam Snoeyink, Anthony Swanson, and Jacob Tanis

Introduction

Problem

- 1 in 5 people above the age of 75 have a documented mobility issue.
- Gardening is popular among the elderly population.
- No suitable options available to the public that made getting to ground level easy and repeatable for those with mobility issues.

Solution

- The Garden Helper is an aluminum rollator device outfitted with a motorized kneeling platform. The user is able to kneel on the platform lowered to the ground and raised back up.
- The rollator is specifically designed for outdoor use. (gardening)
- the kneeling pad will double as a lid to a compartment where the lifting mechanism, control system, and battery will reside.
- The lifting mechanism is a winch-type assembly stored inside the seat with cables exiting the sides of the platform.

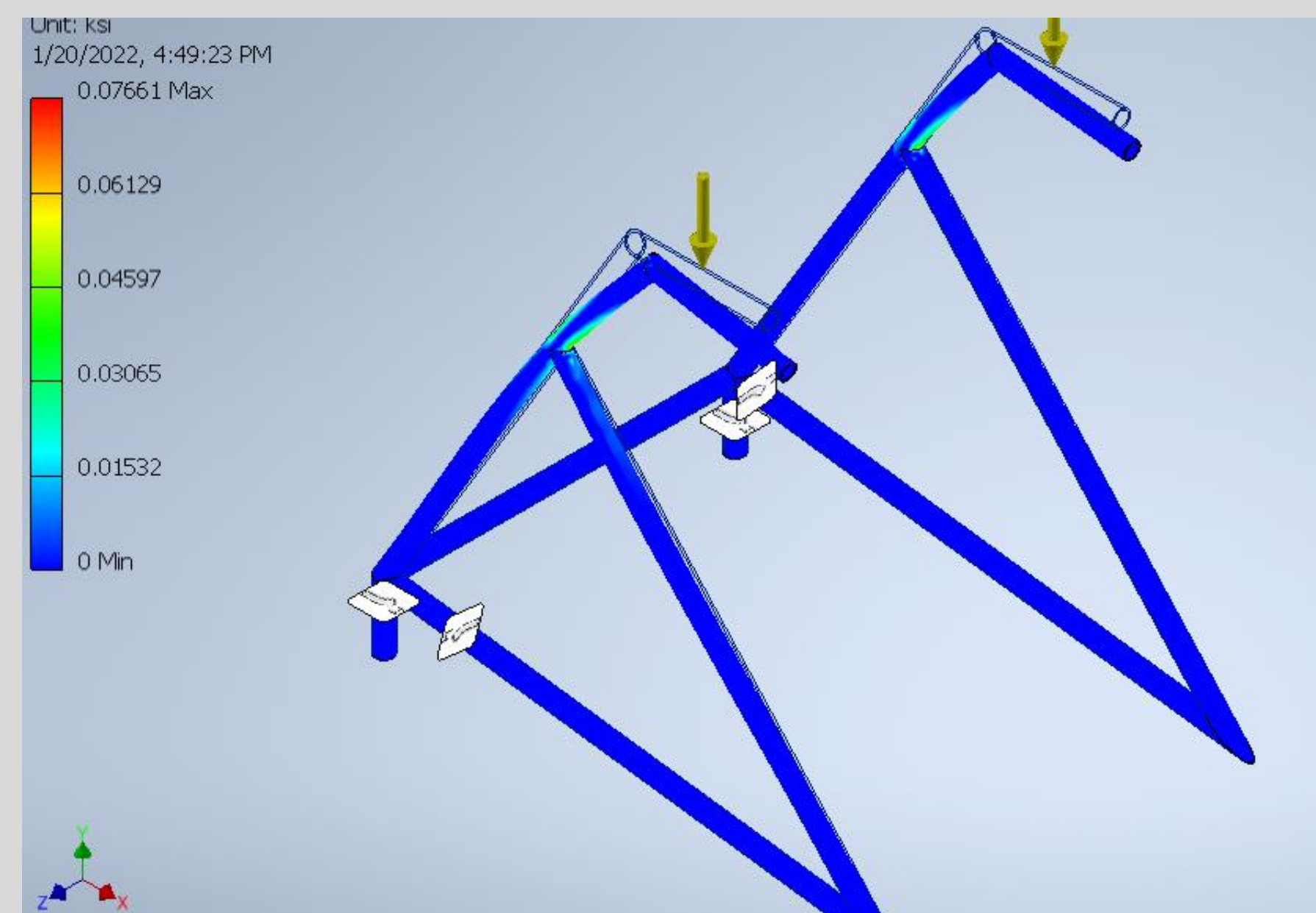
Objectives

Safety

- Due to the intended use and customer, our team understands the importance of safety when designing the Garden Helper.
- We designed our frame and lifting mechanism to hold a 300 lbf with liberal safety factors.
- We designed and selected our lifting mechanism to avoid pinch point and externally moving parts.
- We want the

Function

- Traverse 2" variations in ground
- Weigh in under 50 pounds
- Safely raise and lower 300 pounds



Design

Frame

- Our Frame shape originated from similar rollator shapes. A CAD model was generated, and FEA was run to determine material dimensions.

Lifting Mechanism

- The lifting mechanism chosen would need to safely lower a 300 lbf load from around the average knee height of 23 inches to the ground. Linear actuators, scissor lifts, and pneumatics were all explored to achieve this. The team decided on using an internal winch that spooled a cable that exited out the sides of the seat and attached to the frame. This confines the moving parts inside the seat and out of the way of the user. A DC driven ATV winch was chosen to accomplish this.

Seat

- Starting out with rough sketches and moving to the CAD software Inventor, we modeled a seat that would fit our winch, battery and other controls. The seat assembly includes pulleys on both sides that help route the winch cable out of the seat and up to the frame. FEA analysis was used to compute stress concentrations and determine material thickness.

Wheels

- Due to the outdoor use of our product we needed to be able to maneuver the Garden Helper in rough terrain.

Final Prototype

CAD Assembly



Prototype

- A final Prototype was constructed out of aluminum tubing and allowed the team to prove our design concept



Continuous Improvement

- Reduce Weight
- Increase Safety Guarding
- Add Adjustable Handles
- Lighten Front Forks
- Design and Manufacture Unique Control Interface
- Source pertinent gear/motor
- Make platform transform into seat
- Custom PCB

Acknowledgements

- Prof. Chris Hartemink (Faculty advisor), Ryan Tran (Industrial consultant), Jeff Deheer (Industrial consultant)