Motorized Backyard Chair
Team 34 - Sponsored by QL+

Faculty Advisor: Dr. Matt Nowinski **Sponsor Advisor:** Kristie Yelinek

Team Members: Waleed Aleem, Alexis Ambriz-Juarez, Kevin Byrne, Brendan Chellew, Ryan Hack, & Max Lustig

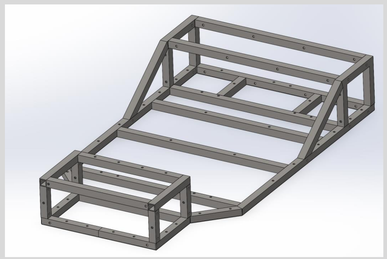
Problem: There is currently a large market for mobility assistance devices, however, most tend to fall short in one way or another. Standard wheelchairs can be hard to maneuver with prosthetics, and motorized wheelchairs often move too slowly or cannot traverse Chris' hilly backyard.
Objective: Design a motorized chair capable of navigating Chris' yard, featuring easy-to-use controls, adequate torque, and safe operation around children.

Background:

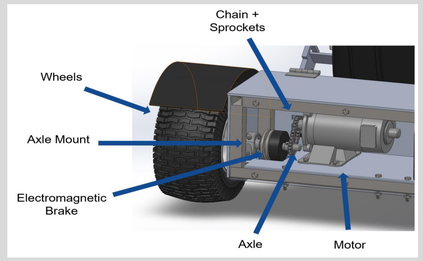
- Chris Walker, a retired U.S. Army Staff Sergeant worked as an EOD Technician
- Sustained an accident that resulted in left arm, right arm, and left leg amputations
- Uses a myoelectric hook and knob prosthetics
- Chris reached out to QL+ in hopes of finding a way to spend more time outside with his daughter

Chris Walker and his daughter, Penny

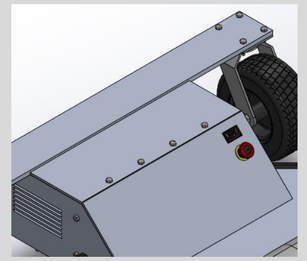
System Architecture:



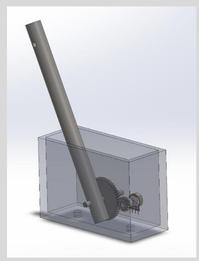
Bare Frame



Drivetrain Components

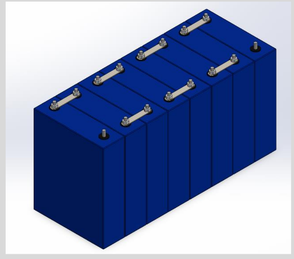


E-Stop & Battery Indicator

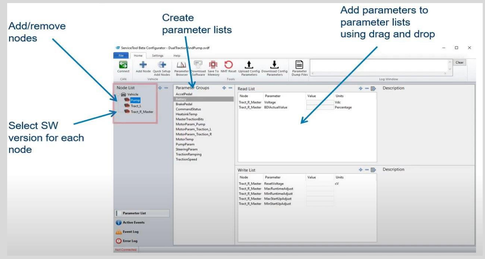


Control Interfaces

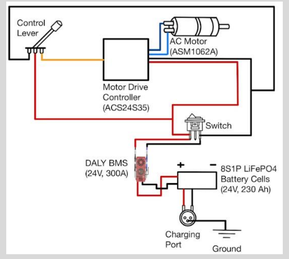
Custom 24V Battery



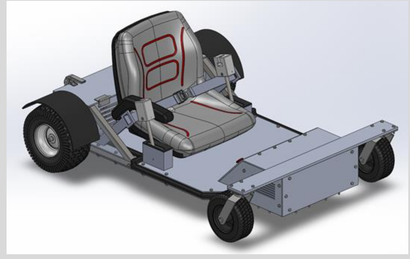
Programming GUI



Basic Wire Schematic

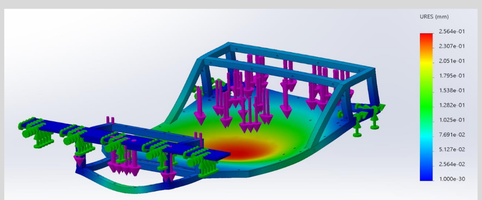


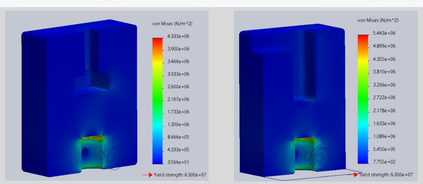
Complete Design



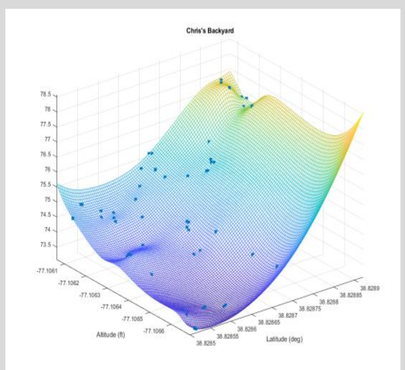
Testing & Evaluation:

- FEA & Grade Analysis, System Checks, & Parameter Tests





FEA Results



Grade Calculation Plot

	Objective	Threshold	Actual
Speed	2.2 m/s	1.1 m/s	
Power/Torque	3700 W	2200 W	
Battery Life	5.0 hrs	2.0 hrs	
Seat Height	0.15 m	0.30 m	
Temperature	21 °C	38 °C	
Noise Generation	60 dB	70 dB	

Conclusions:

- ✓ Met Chris' requirements and mobility needs
- ✓ Passed system checks and testing
- ✓ Sleek and visually appealing final product
- ✓ Completed chair will be delivered to Chris following the engineering expo

THANK YOU!
Special thanks to Bob Lang, Inmotion U.S., Salem Waterjet, Sumitomo, and the Hyster-Yale Group for their generous donations and assistance on this project!