

Team #43: Beach Accessibility for a Young Woman in a Wheelchair

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Objective

Design and manufacture a motorized wheelchair to allow customer to access the beach.

Background

- Special Needs Individual with Muscular Dystrophy
- Requires Assistance to Access the Beach
- Family Beach Vacation

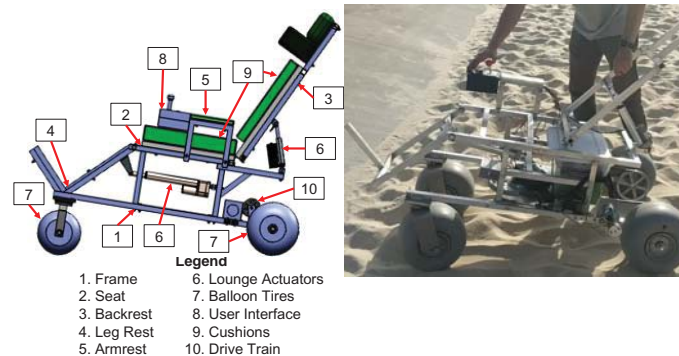
Measurable Engineering Specifications

Specification	Value	Results
Run Time	8 hours	7.4 hours
Weight	90lbs	105lbs
Size	3ft x 6ft	2.83ft x 4.5ft
Recline	95° - 135°	100°-133.7°
Speed	1.1 mph	1.5mph

Safety Considerations

- Electrical connections will be waterproofed
- Secure during transportation
- Pinch points will be blocked off
- Sharp edges will be filleted or covered
- Straps will be used to prevent customer from slipping and falling out of chair

Design Overview



- Legend**
1. Frame
 2. Seat
 3. Backrest
 4. Leg Rest
 5. Armrest
 6. Lounge Actuators
 7. Balloon Tires
 8. User Interface
 9. Cushions
 10. Drive Train

Power Analysis

Note: Drive Motors and Lounge Actuators will be used separately and intermittently

Component	Current	Voltage	Power
Drive Motors	15.33 A	24 V	368 W
Lounge Actuators	10 A	12 V	120 W
Battery Indicator	0.0667 A	24 V	15 W
Arduino Mega	0.0250 A	9 V	0.2250 W
Joystick	0.0100 A	5 V	0.0500 W
Receiver	0.0100 A	5 V	0.0500 W
Switches	0.0025 A	5 V	0.0125 W
Max Power			384 W
Battery Capacity			960 Wh
Continuous Run Time			2.5 hours

Codes and Standards

Rehabilitation Engineering and Assistive Technology Society of North America (RESNA) WC-1 & WC-2: 2009

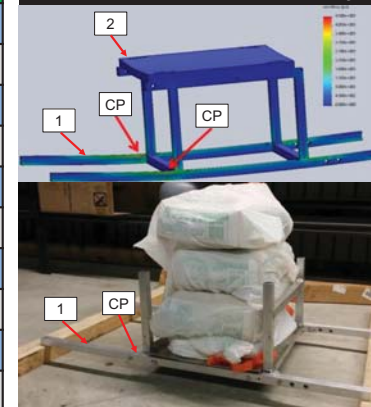
Summary:

Testing procedures to determine Maximum Speed, Acceleration, Deceleration, Static Stability, and Dynamic Stability

Budget

Mechanical	Cost	Electrical	Cost
Frame	\$ 884.89	Motors	\$ 1312.57
Drive Train	\$ 788.08	Power	\$ 1104.32
Seat	\$ 459.91	Controls	\$ 428.05
Mechanical Total	\$ 2132.88	Electrical Total	\$ 2844.94
Est. Project Total	\$ 4977.82		
Available Funding	\$ 1500.00		
Fundraising Amount	\$ 3477.82		

Static Load Analysis and Testing



Boundary conditions:

- 140lbs load
- Corners fixed
- Shown to left by "CP"

Test Results:

- Withstood 200lb load
- Safety factor of 2 compared to customer weight



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