LSU | College of Engineering
Department of
Mechanical & Industrial Engineering

ME, ECE, IE Capstone Design Programs

The GeauxStand: A Mobile, All-Terrain Standing Frame
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St. Lillian ACADEMY

Bell Helicopter — A Textron Company

Jack

Background

A standing frame is a medical device that provides a wheelchair user the ability to transition from a sitting to standing position.

No standing frame on the market is designed for athletic or all-terrain activity.

Image Courtesy: EasyStand

Primary Objectives

1. Support and protect the user during normal operation and in the event of sudden deceleration
2. Travel smoothly over rough and elevated terrain
3. Play soccer facilitated through a kicking mechanism
4. Remain stable and upright during operation

Major Engineering Specifications

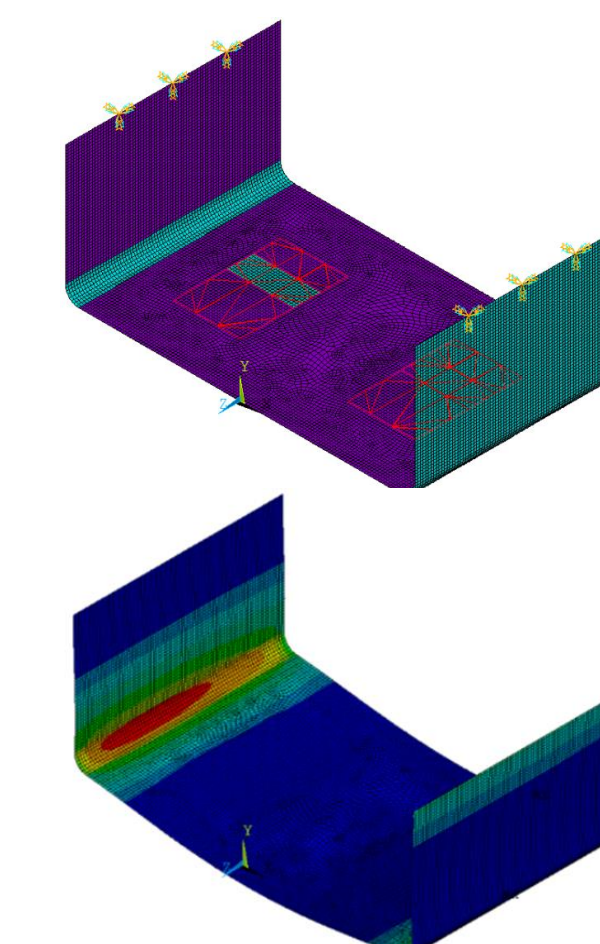| Attribute	Target Value	Prototype Result
Wheel Camber	= 15 [°]	15 [°]
Points of Contact	> 3	5
Device Weight	< 65 [lbs]	85 [lbs]
Incline before Static Tipping	> 4.76 [°]	4.76 [°]
Manufacturing Price	< 1400 [USD]	3580 [USD]
Time to Set-Up	< 2 [min]	1:49 [m:ss]
Top Speed	> 5 [mph]	5 [mph]
Accommodating User Weight	> 65 [lbf]	65 [lbf]
Accommodating User Height	> 49 [in]	49 [in]

Final Prototype
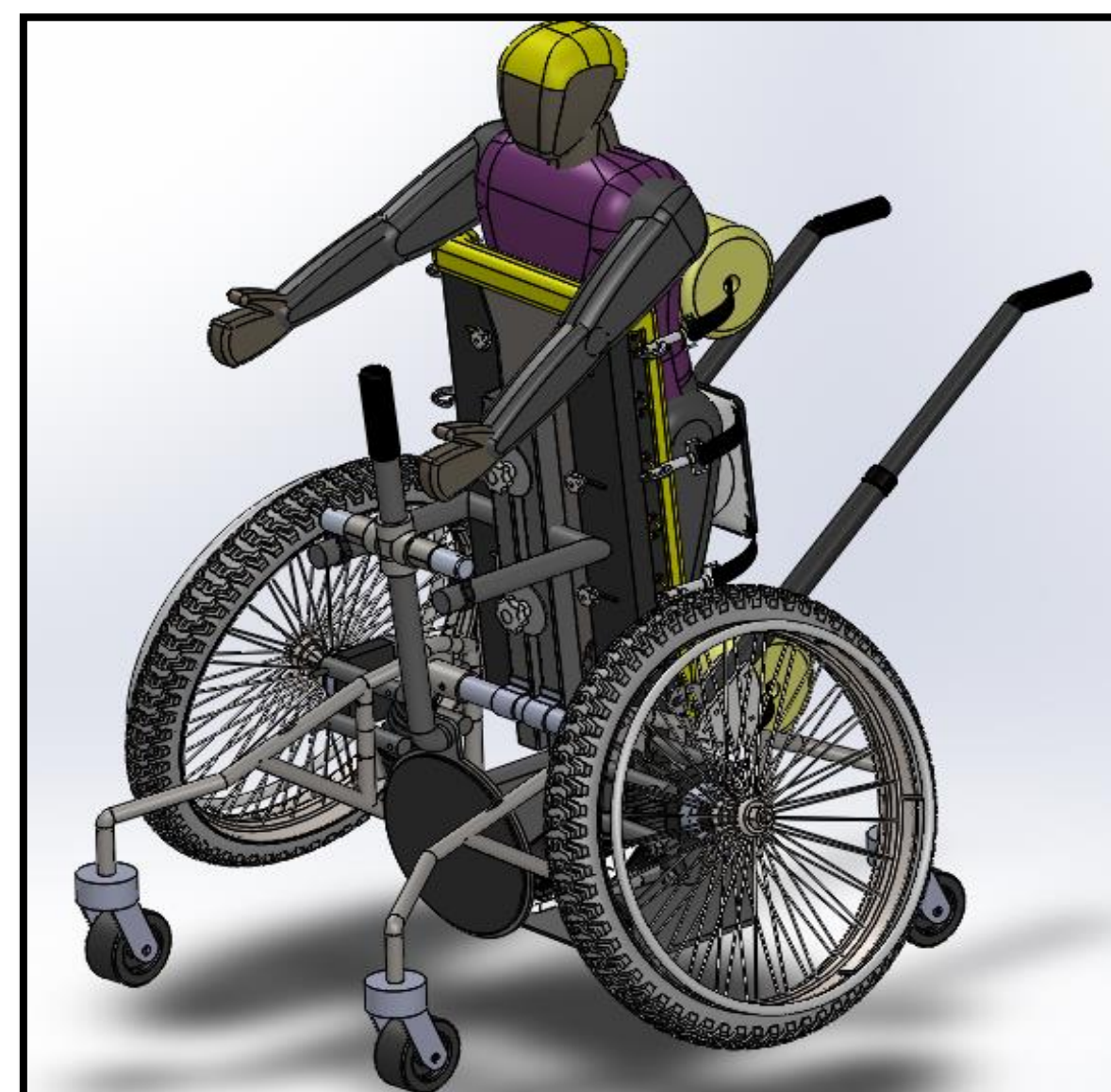
Analysis: Critical Stresses
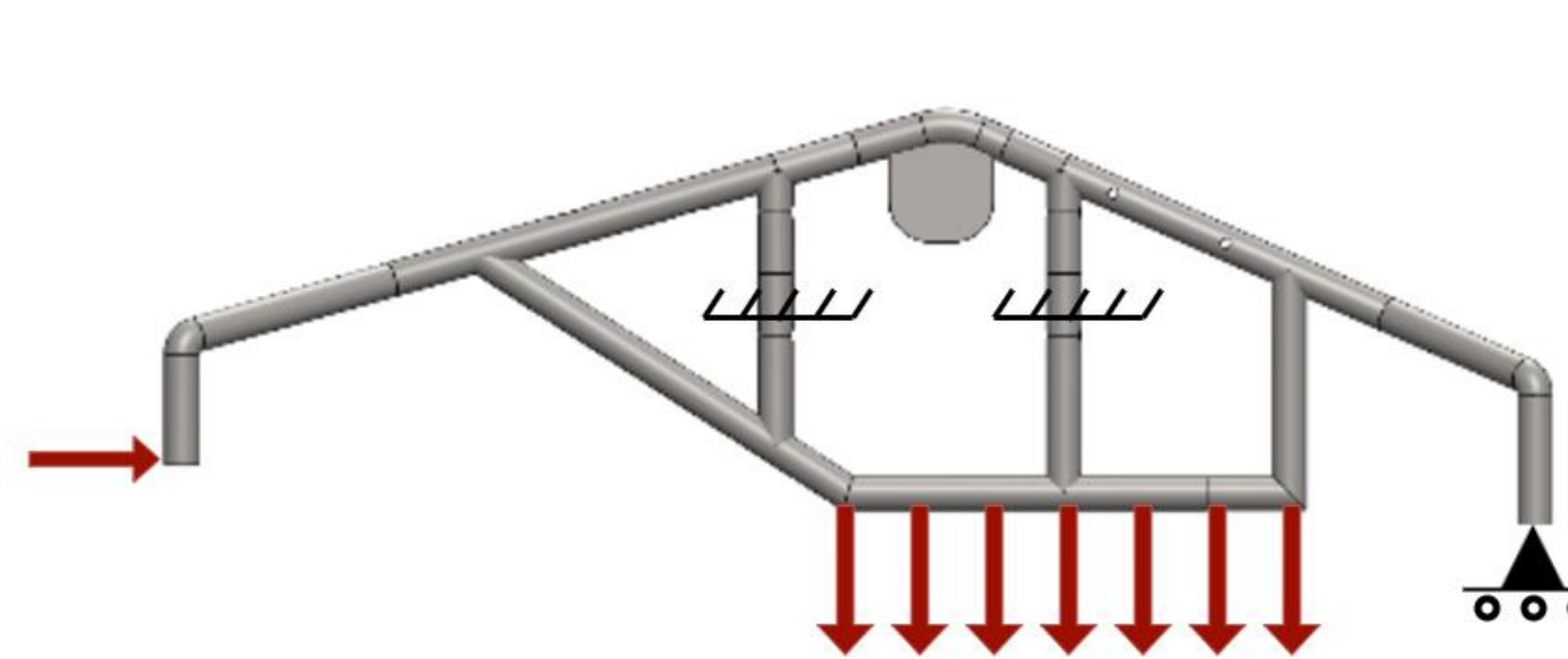
Frame Free Body Diagram   **Footplate Contour Plot**

Major Testing Categories

ISO 7176
- Static and Dynamic Stability
- Parking Brake Effectiveness and Fatigue
- Dimension, Weight, and Space
- Static, Impact, and Fatigue Strength
- Flammability Testing

Human Testing (LSU IRB-Approved)
- User Engagement
- Comfort
  - User
  - Third-Party Caregiver

Safety

The GeauxStand is designed and tested for compliance with ISO-7176 Class II medical device performance standards.

Key Safety Features:
- Cambered, All-Terrain Drive Wheels and Suspension
- 5-Point Harnessing System with Redundancies
- Cushioned Supports
- Caregiver Handles for Operational Stability

Budget and Fundraising

Misc. Testing, Cosmetics, Parts Replacements, Sales Tax, and Shipping 28%
Harness and Support Subsystem 22%
Frame 9%
Kicking Mechanism 5%
Wheels and Suspension Subsystem 36%

Actual Costs: 3580   Funds Raised: 5360
TOTAL MONIES

Sponsors: Elissa McKenzie (St. Lillian Academy), Bell Helicopter, Jack Rettig   **Advisor: Dorel Moldovan, Ph.D.**