Mid Point Review Report

Team # 17

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Project Sponsor:

Project Advisors:
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Department of Mechanical Engineering
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Department of Mechanical Engineering

Introduction

Problem Statement

The current generation of assistive walking devices is limited in their traversable terrain and functionality.

- **Indoor operation only**
- **Only perform basic functions**
- **Scooters / electric wheelchairs unnecessary or expensive**

Proposed Solution

Develop a walking assistive device designed to actively assist the user in both indoor and outdoor maneuverability.

- **Further empower the disabled and elderly community**
- **Offer wide-range of assistive functions**
- **Maintain ease of use and intuitiveness integral to current generation walkers**

Project Scope

Design and build an initial research platform

- **Traverse indoor & outdoor terrains**
- **Utilize a force-driven user input system**
- **Facilitate simple future enhancement**

Specifications

Frame

- Resemble current generation walker in aesthetics and standards
- Aluminum framing
- Supports up to 300 pounds
- Adjustable heights between 32 and 39 inches
- Adjustable handle width between 14 and 23 inches

Propulsion

- Minimum 11 inch diameter wheels or tracks
  - Travel over all indoor surfaces, grass, gravel…
  - Travel up or down slopes up to 10 °
- Move transversely 45° from the center axis
- Maximum operating speed of 3 mph

Control & Function

- Intuitive user input
  - Force-based drive control
- Fall Prevention
- Sit-Down/Stand-Up Assistance
- Object Detection/Avoidance
- Localization & Navigation

Criteria

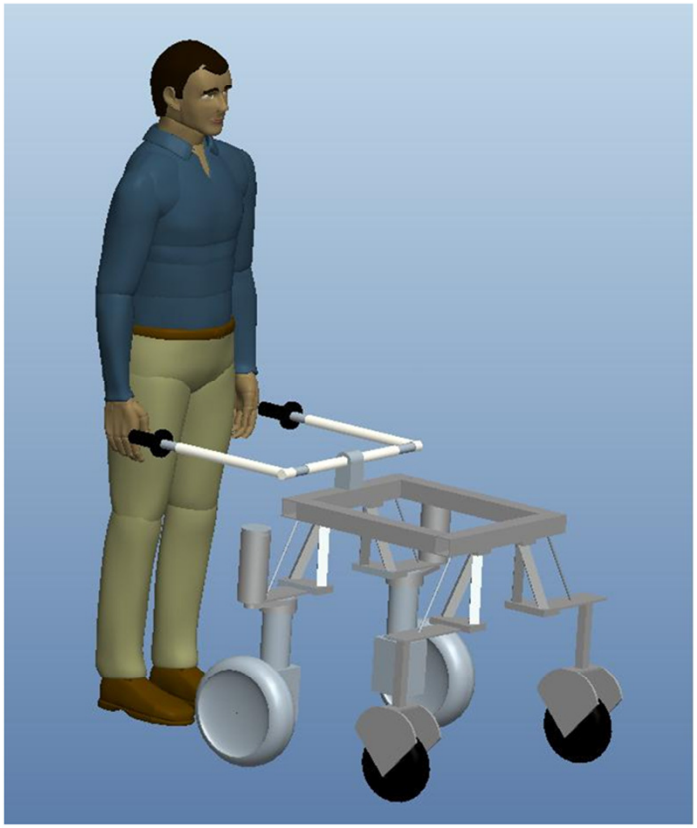
Maximize:

- Versatility
- Robustness
- User-friendliness
- Indoor operation
- Outdoor operation

Minimize:

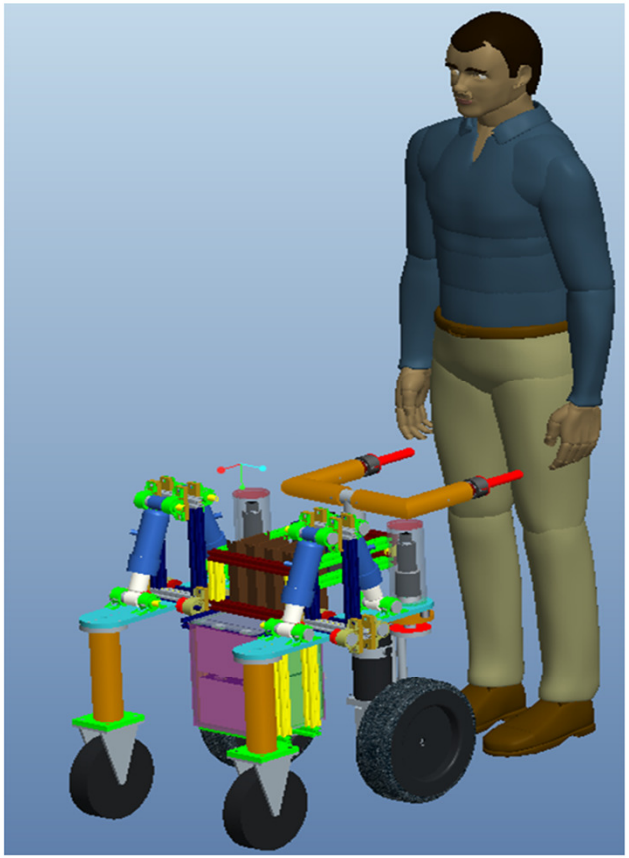
- Cost
- Weight

Design Modifications



(previous design)

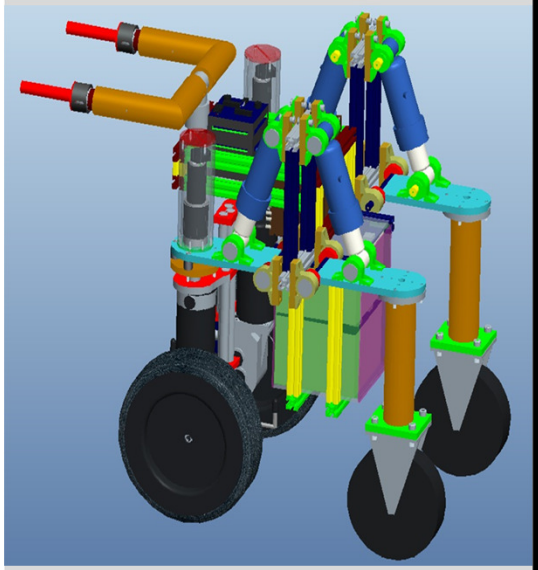
Design Modifications



(new design)

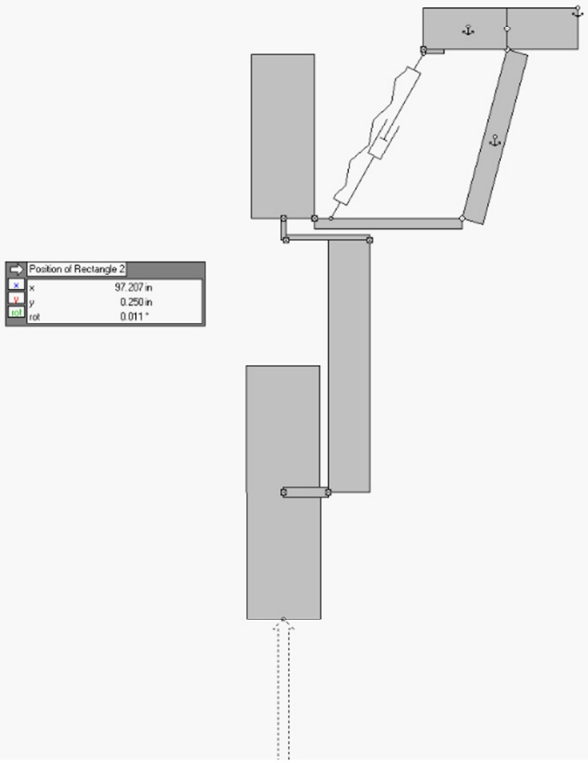
Design Modifications

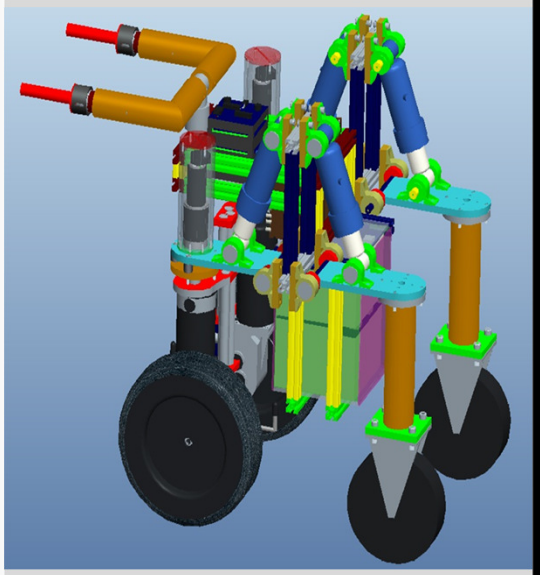
- Suspension Orientation
- Frame / Supports
- Handle Depth
- Driving Motor Encoder



Design Modifications

- **Suspension Orientation**





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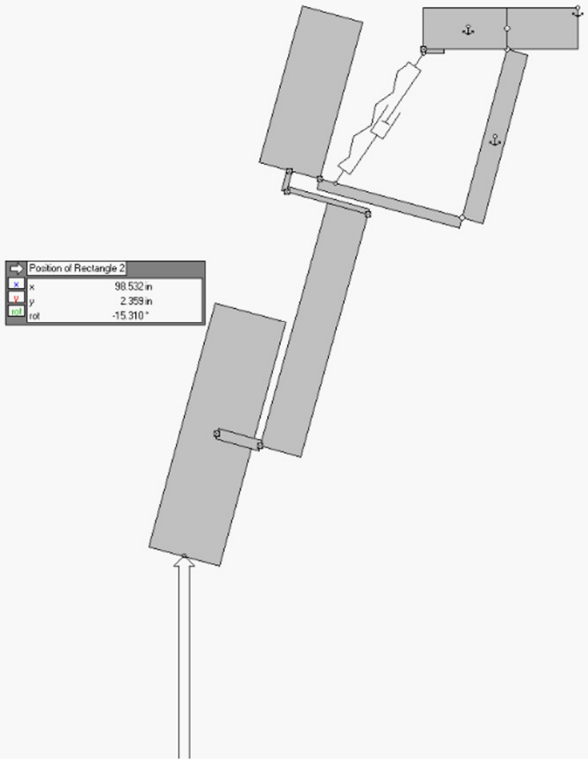

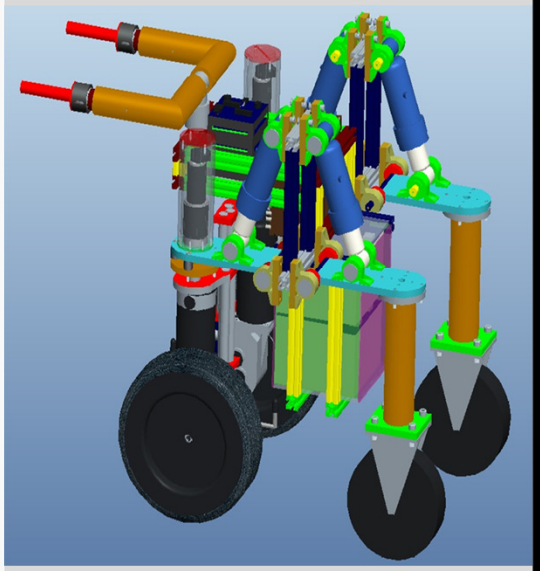

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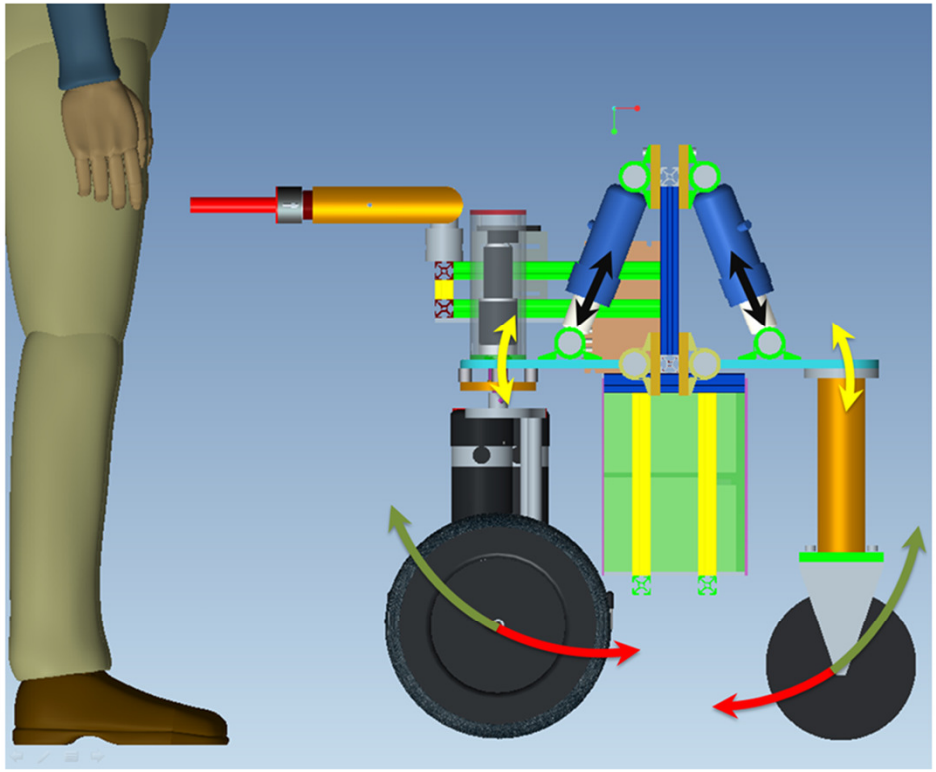

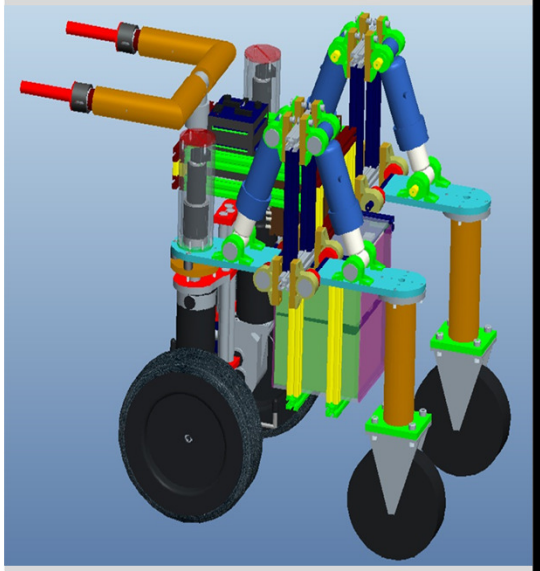

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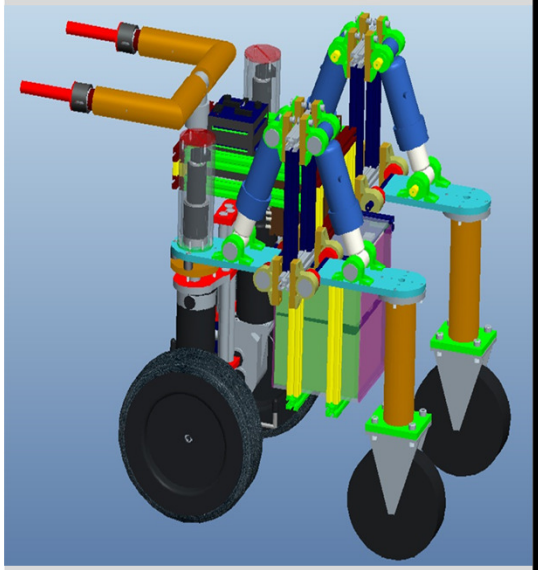
- Suspension Orientation
- Frame / Supports
- Handle Depth
- Driving Motor Encoder



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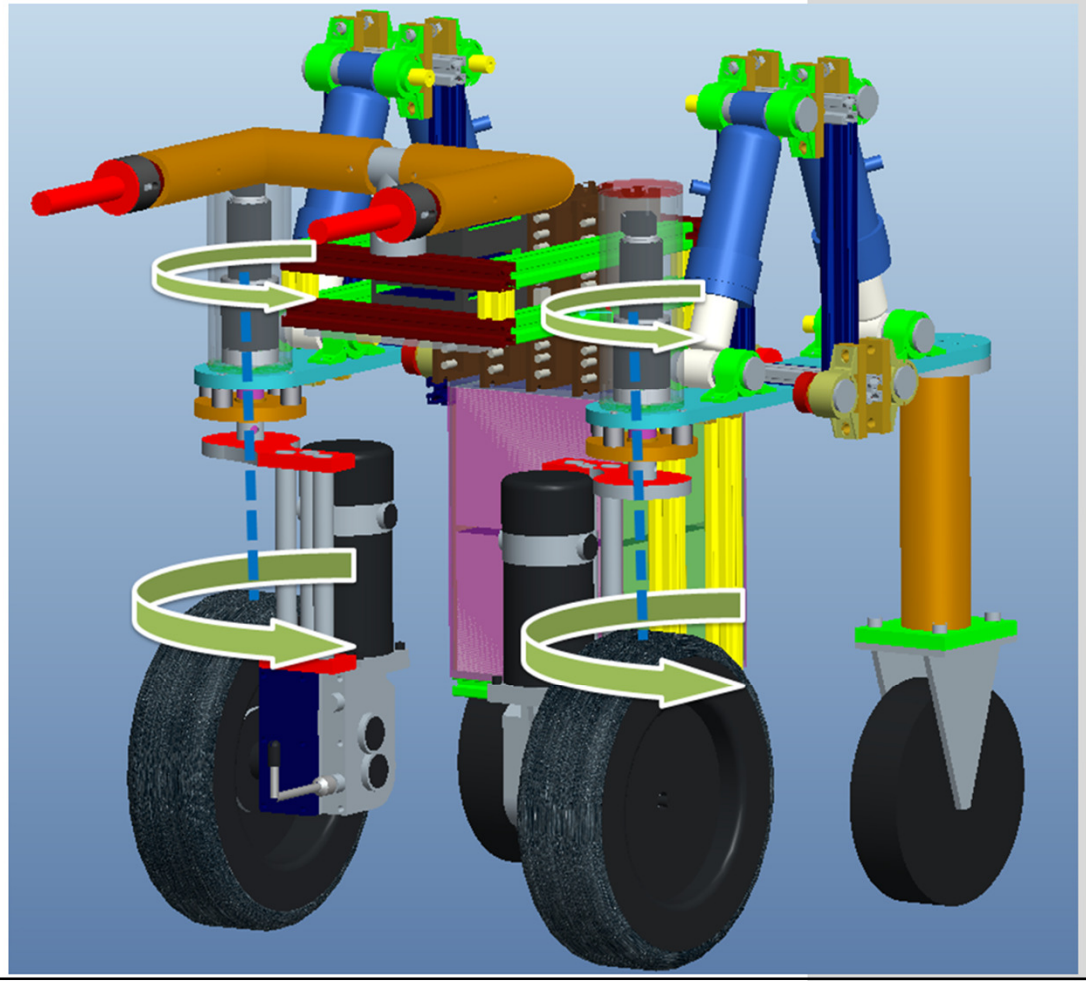

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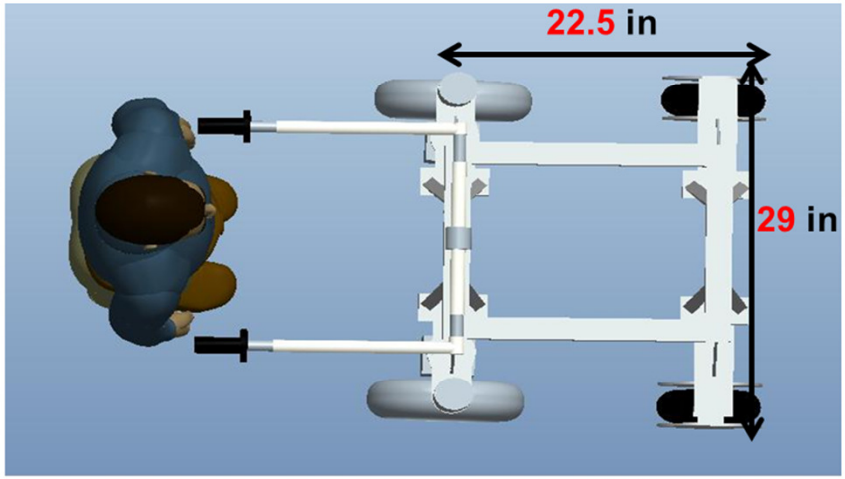

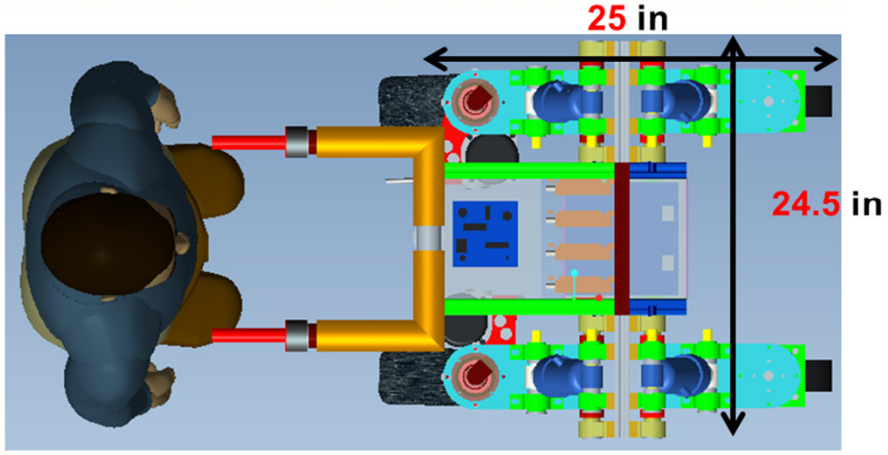

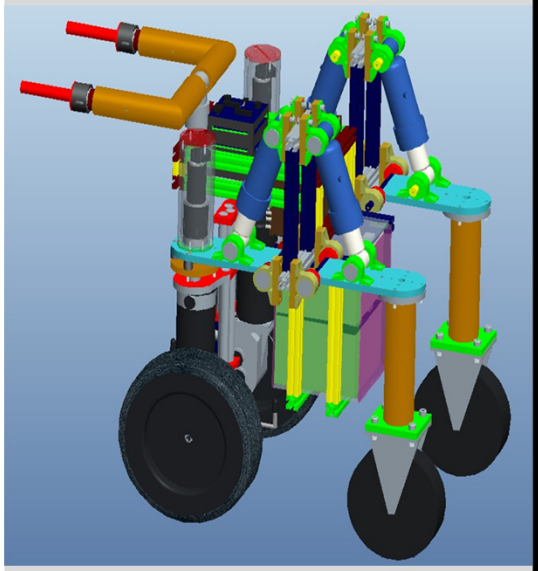

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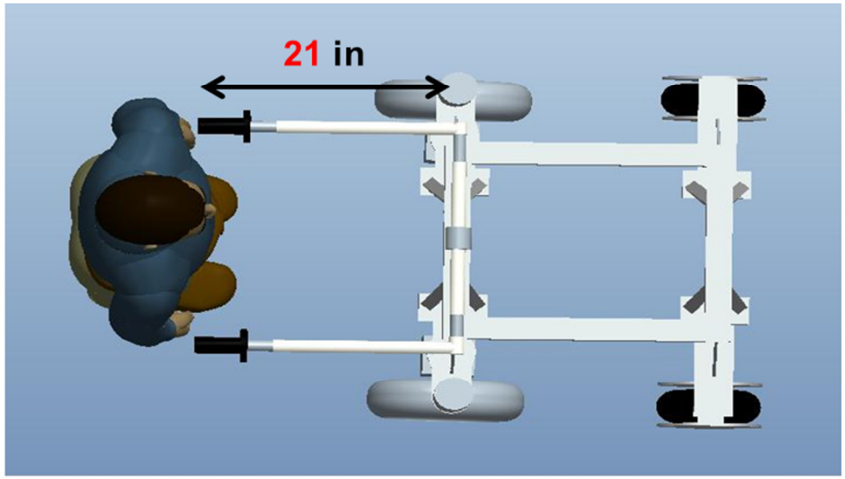

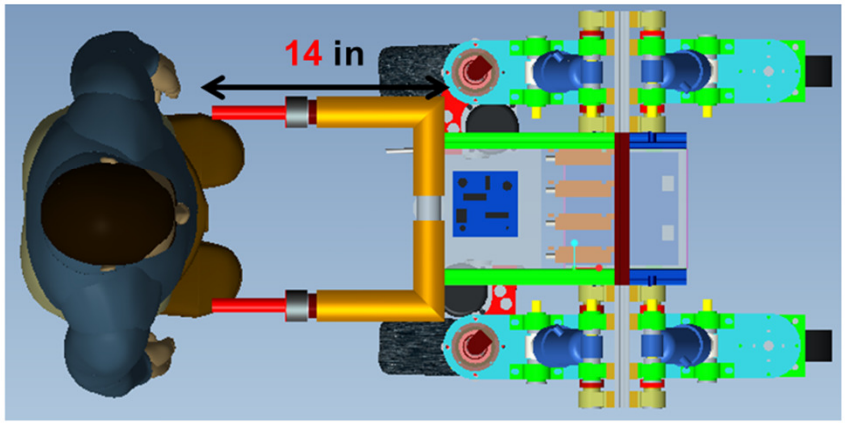

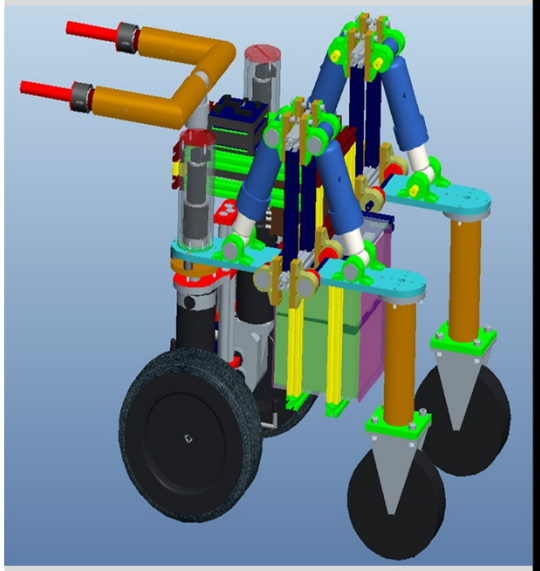

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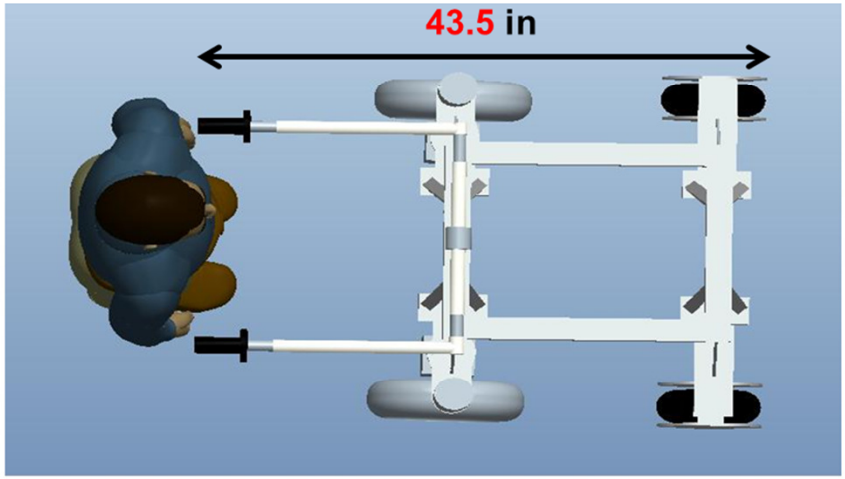
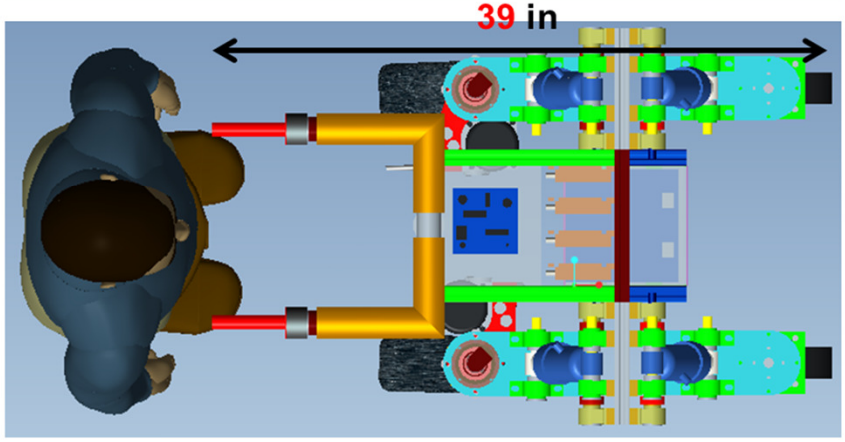
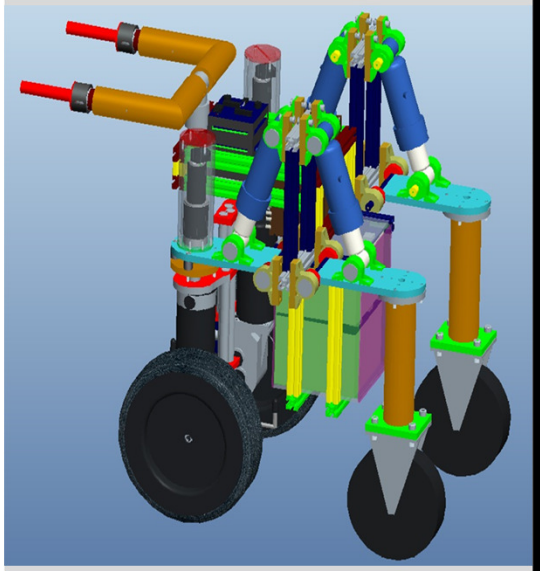
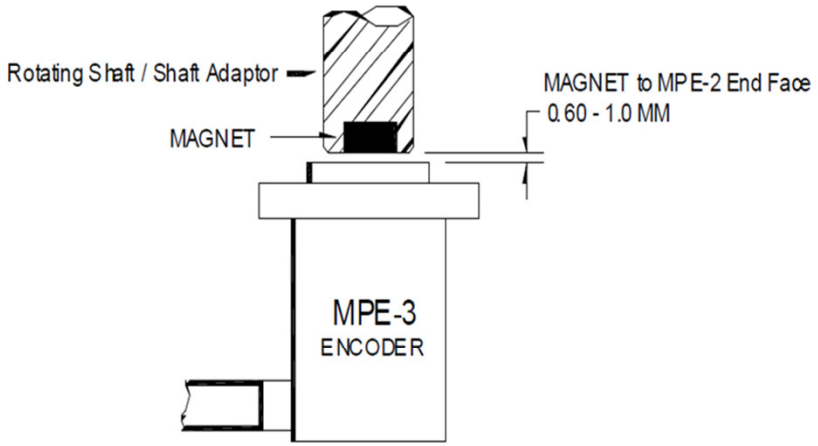


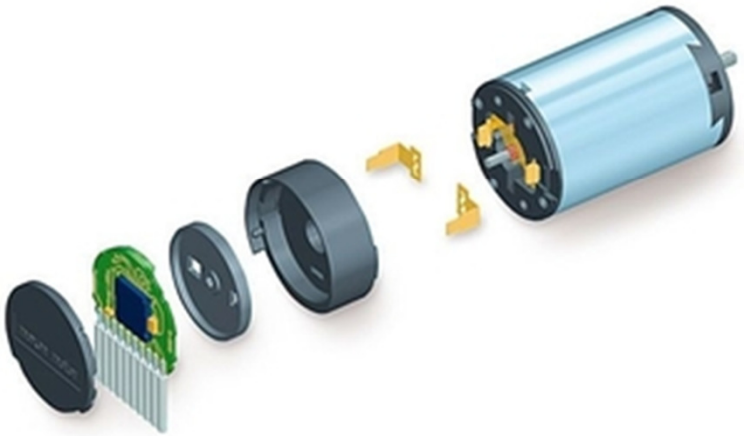


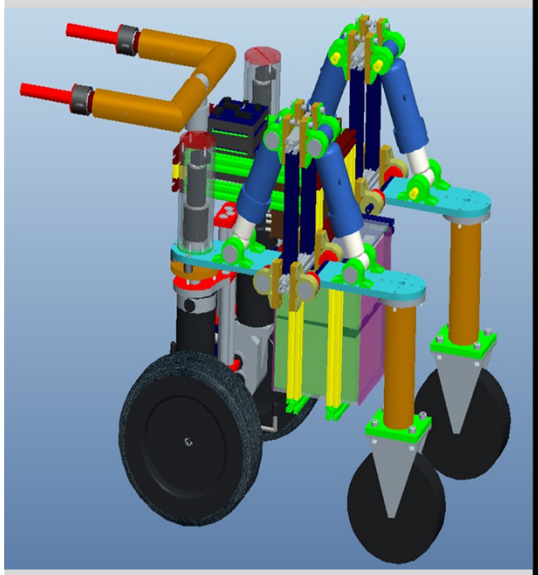


Design Modifications

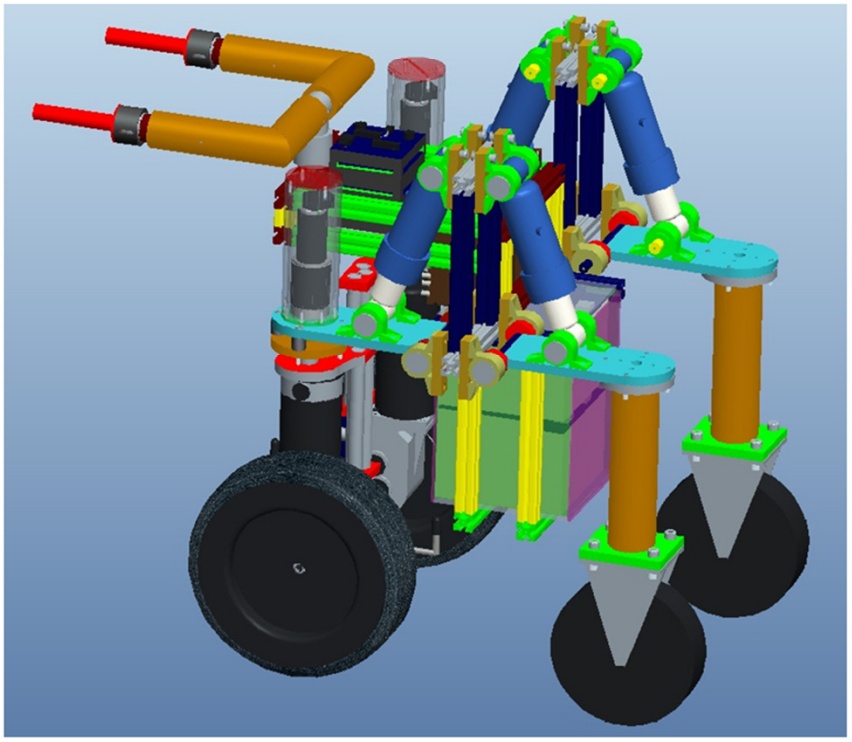
- **Driving Motor Encoder**





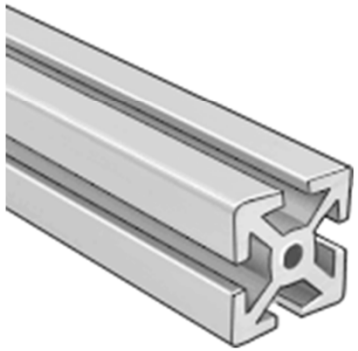


Current Status



1) Design Finalization

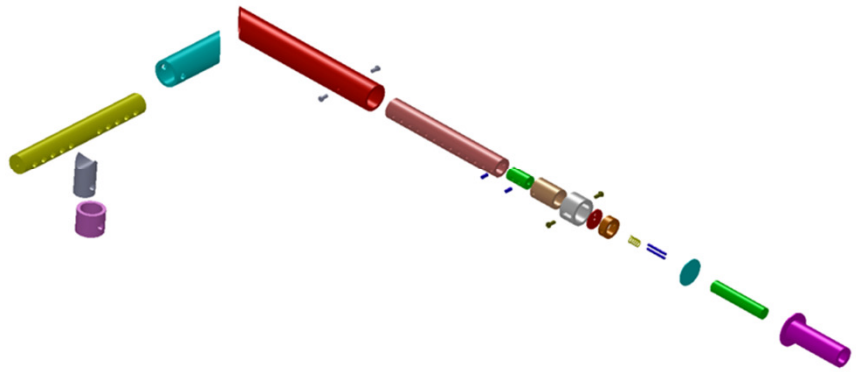
Current Status



1) Design Finalization

2) Final Ordering
   - Small connectors
   - Fasteners

Current Status



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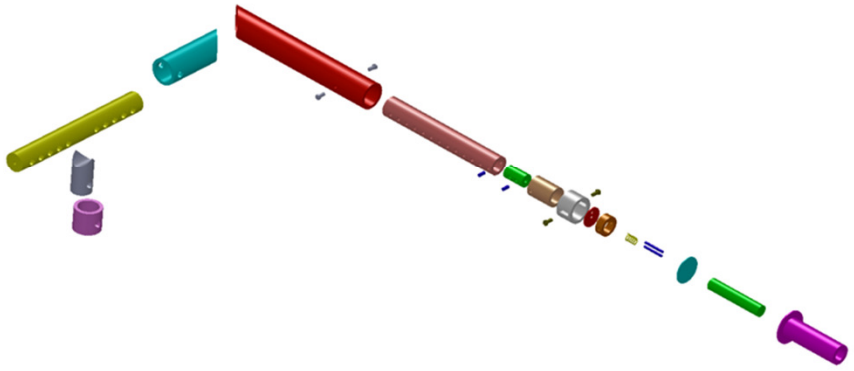
3) Receiving
   - Handle Assembly
   - Steering Motor
   - Driving Motor
   - Driving Wheels
   - Batteries

Current Status



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4) Machining

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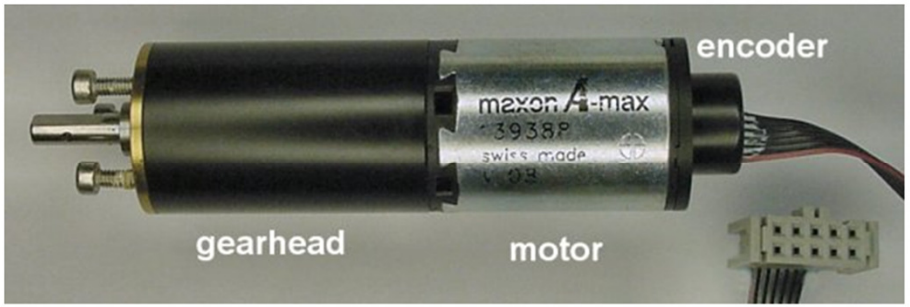

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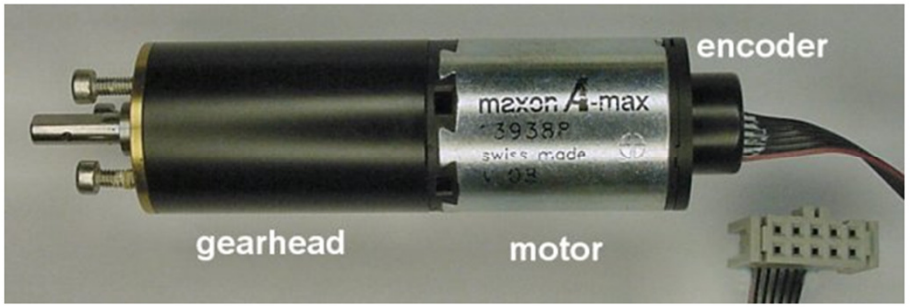
4) Machining

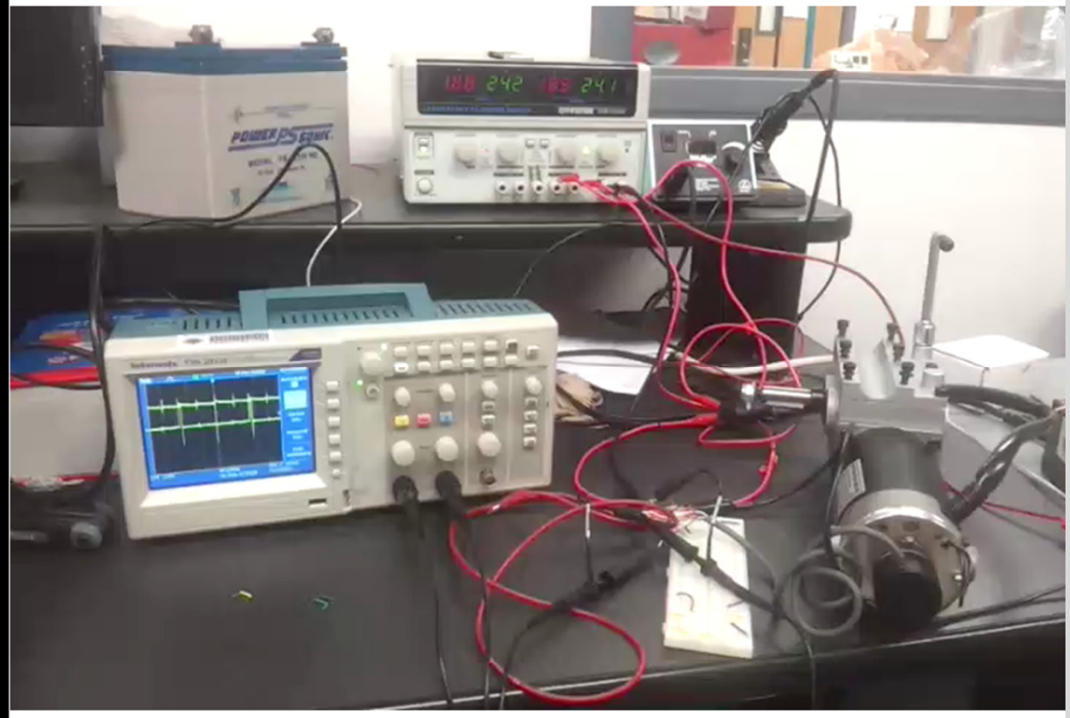
5) Initial Testing

Completed Tests



1) Steering Motors

Completed Tests



1) Steering Motors

2) Driving Motors & Encoders

Completed Tests

1) Steering Motors
2) Driving Motors & Encoders
3) Air Shocks

Future Work

- Complete Final Order
- Finalize Machine Drawings
- Machine Components

- Further Air Shock Tests
- Assemble Components:
  - Handles
  - Frame
  - Suspension
- Basic Controls

- Full Assembly Testing/Modification
- Final Report
- Open House

Potential Problems:

1) Delivery Delay

2) Machining Back-up

3) Unforeseen Assembly Difficulties

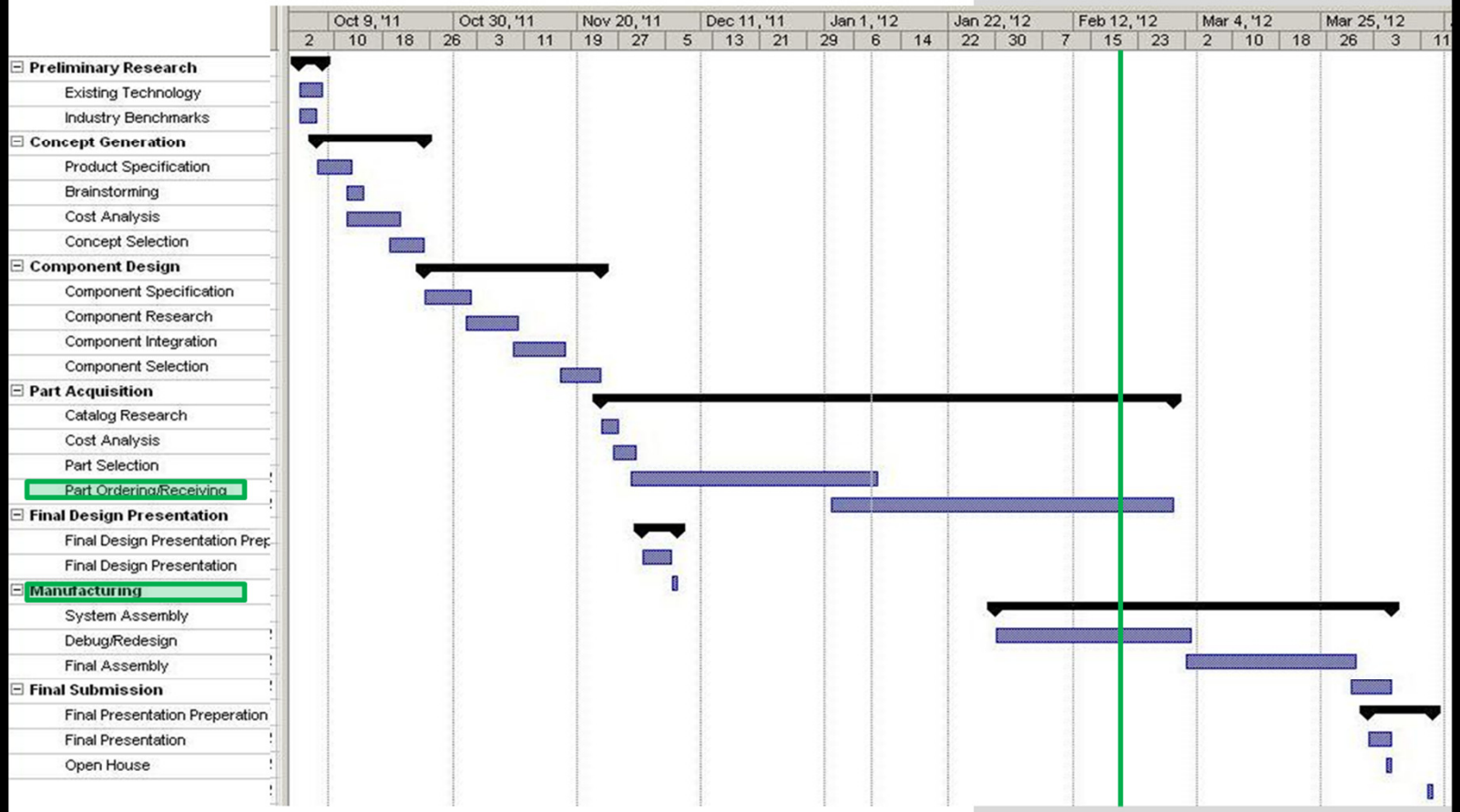
4) Minimum Spring Stiffness

5) Steering Motor Torque

Budget

FSU Project Budget Allowance	$5,000.00
Total Money Spent as of 2/16/2012	$4,673.41
Available funds as of 2/16/2012	$326.59
Expected Future Purchase Costs	$250.00
Remaining funds	$76.59

Timeline


Oct 9, '11
Oct 30, '11
Nov 20, '11
Dec 11, '11
Jan 1, '12
Jan 22, '12
Feb 12, '12
Mar 4, '12
Mar 25, '12
2 10 18 26 3 11 19 27 5 13 21 29 6 14 22 30 7 15 23 2 10 18 26 3 11
Preliminary Research
Existing Technology
Industry Benchmarks
Concept Generation
Product Specification
Brainstorming
Cost Analysis
Concept Selection
Component Design
Component Specification
Component Research
Component Integration
Component Selection
Part Acquisition
Catalog Research
Cost Analysis
Part Selection
Part Ordering/Receiving
Final Design Presentation
Final Design Presentation Prep
Final Design Presentation
Manufacturing
System Assembly
Debug/Redesign
Final Assembly
Final Submission
Final Presentation Preperation
Final Presentation
Open House

Questions?