NASA Human Exploration ROVER CHALLENGE

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Team Introductions

Tavares Butler
Project Engineer

Jessica Meeker
Mechanical Engineer

Phillip Dimacali
Design Engineer

Jerald Yee
Quality Engineer

Lazaro Rodriguez
Manufacturing Engineer

Sponsor and Advisor

Shayne McConomy, Ph.D.

Chiang Shih, Ph.D.

A statewide network of colleges and universities supporting the expansion and diversification of Florida's space industry through grants, scholarships, and fellowships to students and educators in Florida.

Objective

To produce a functional rover capable of completing challenge course obstacles and tasks while being able to traverse on various terrains and adhere to the rules set forth by the 2020 guidebook.

Project Budget

Breakdown of costs for each system with a total allotted budget of $1,905

Frame and Drivetrain

Component	Quantity	Cost	Total
bearing	6	$ 10.79	$ 64.74
shaft	1	$ 33.96	$ 33.96
axel	1	$ 61.04	$ 61.04
plate	1	$ 200.24	$ 200.24
bb shell	2	$ 6.00	$ 12.00
3/8" tube	1	$ 37.25	$ 37.25
freewheel	2	$ 21.99	$ 43.98
adapter	2	$ 19.99	$ 39.98
chain tool	1	$ 6.00	$ 6.00
chain	10	$ 6.00	$ 60.00
			$ 559.19

- The Frame and drivetrain accounts for 29.5% of our total budget of $1,905
- The machine shop was able to utilize their material saving us approximately $202.60 by not needing to purchase 30ft of chromoloy tubing material

Braking

Component	Quantity	Cost	Total
Dual Brake Lever	1	$ 13.27	$ 13.27
Brake Cables	2	$ 11.31	$ 22.62
Dics	2	$ 7.49	$ 14.97
Calipers	2	$ 9.39	$ 18.78
			$ 69.64

- The Braking mechanism accounts for 4% of our total budget of $1,905
- By Utilizing parts from previous semesters projects we were able to repurpose components to be used with our rover design

Seating and Restraints

Component	Quantity	Cost	Total
Adult Helmet	2	$ 39.59	$ 79.18
2 Point seat Belt	2	$ 39.95	$ 79.90
GreenLine Saddle	2	$ 45.95	$ 91.90
Installation Hardware	2	$ 4.95	$ 9.90
			$ 260.88

- The Seating and Restraints accounts for 14% of our total budget of $1,905
- Helmets are included in this section to account for rider safety

Steering

Component	Quantity	Cost	Total
Go-Kart: Rack and Pinion system	1	$ 149.00	$ 149.00
Shipping	1	$ 22.09	$ 22.09
			$ 171.09

- The Steering mechanism accounts for 1% of our total budget of $1,905
- We are ordering a rack and pinion system made for Go-Karts and are adapting

Overview

System	Cost	
Frame & Drivetrain	$	559.19
Braking	$	69.64
Seating & Retraints	$	260.88
Steering	$	171.09
Total	$	1,060.80

- We are currently only using $1,060.80 of our $1,905 budget
- So 56% of our budget has been consumed with a few more purchases that still need to be finalized

Rover Systems Overview

Frame, Drivetrain, Wheels, Braking, Seating & Restraints, Steering

Frame and Drivetrain

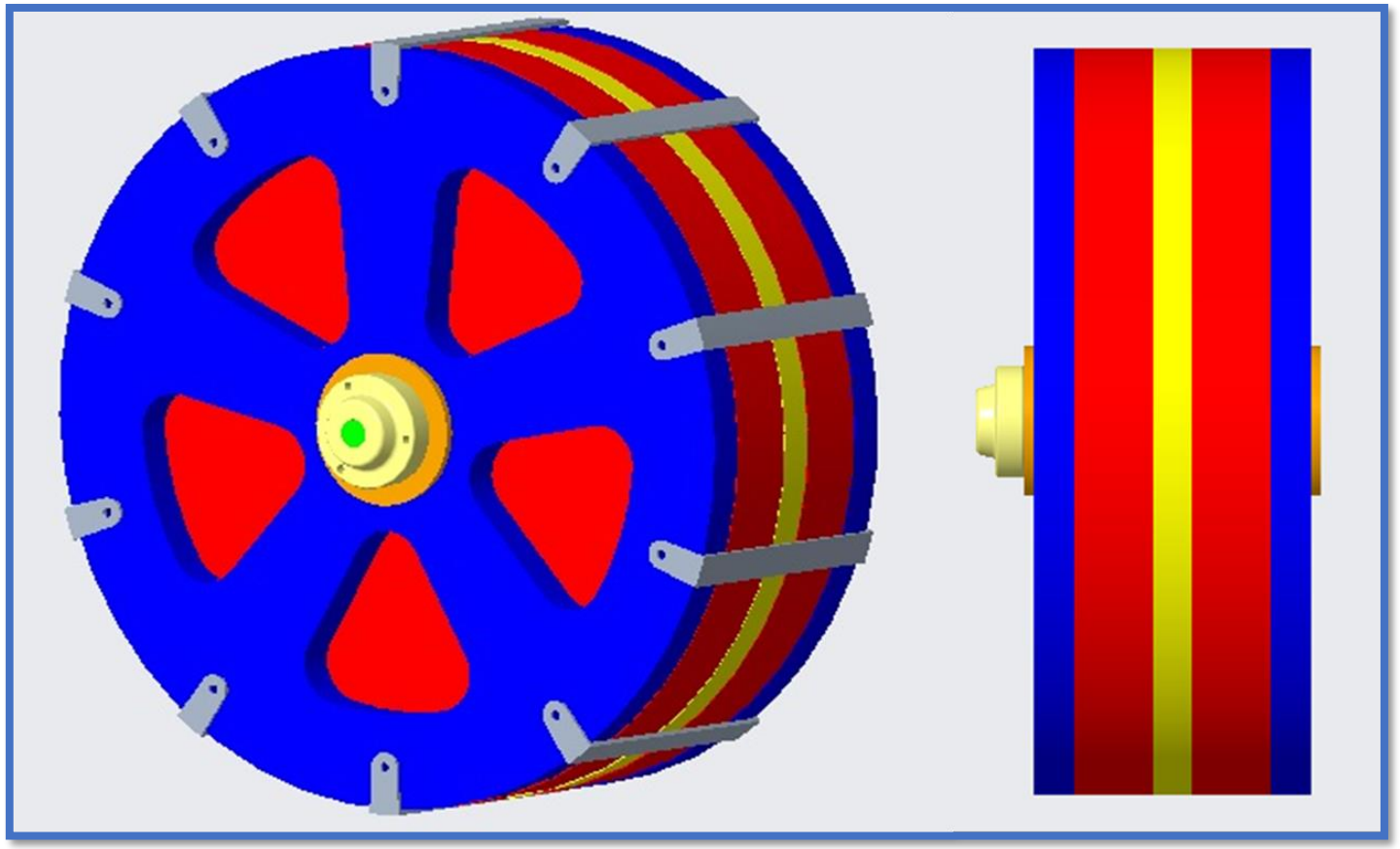
Current Status:

- The rendering in the image to the right is currently being manufactured in the COE machine shop
- The parts for the drivetrain have been ordered, waiting for arrival

Wheels

Current Status:

- Currently fabricating our custom Foam Core wheel
- The rendering in the image is what the finalized wheels will look like but will be these colors
- Still looking into what thickness metal sheets to use for casing of wheels
- Offer ability to perform well on both loose and rocky terrains



Braking System

- **Mechanical Disc Brake**
- Components
  - Disc Brake, Brake Caliper, Mounting Bracket, Cable, Brake Lever
- Pros
  - Cheap
  - Easy Maintenance

Braking System

Assembly

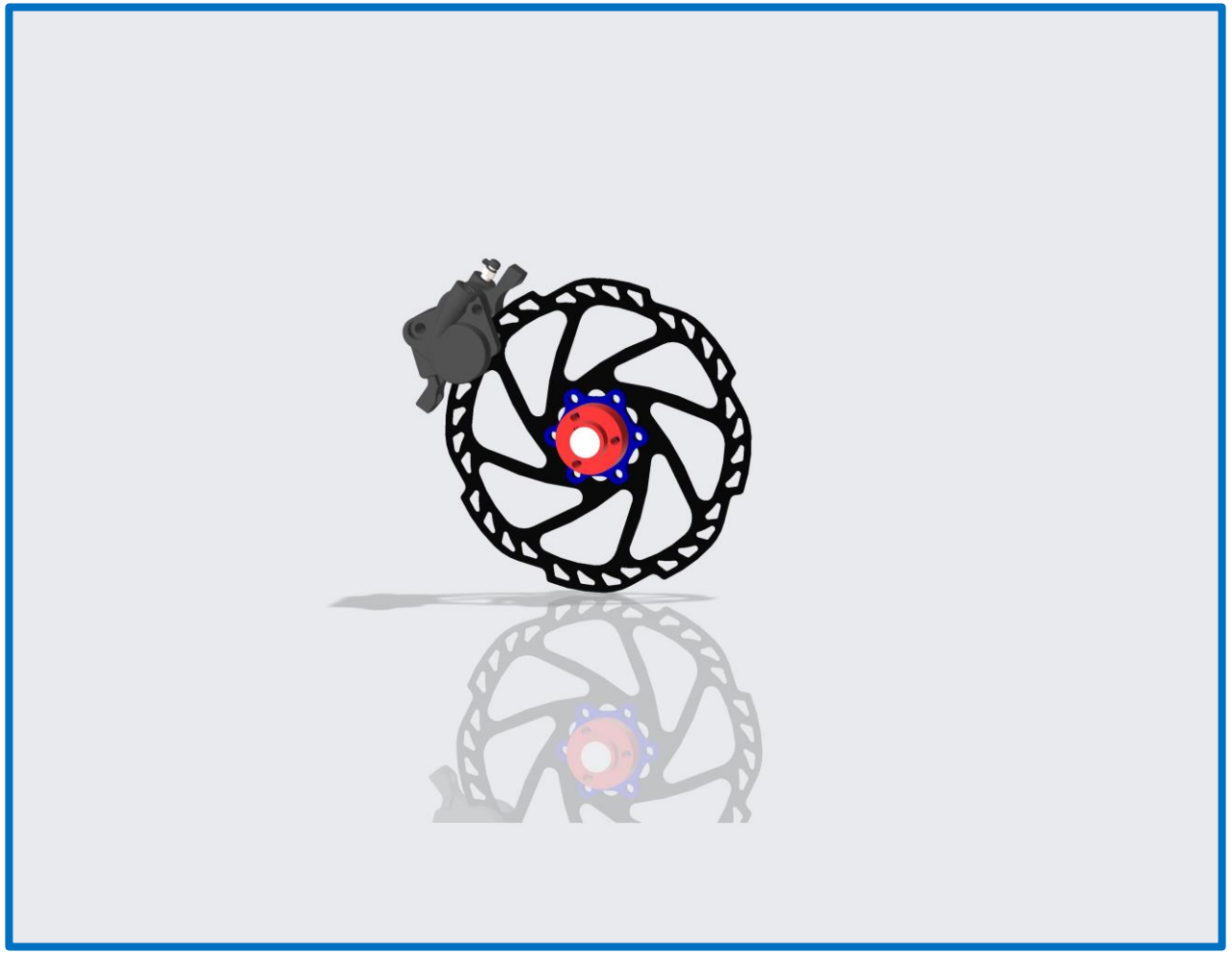
- Brakes in the rear of Rover
- Custom made brake rotors and rotor keys
- Custom mounting brackets

Disc Brake

Rotor Key

Disc Brake Rotor

Braking System



Braking System

Goals To Be Completed

- ❑ Finalize Design/Cad Model for Mounting Bracket
- ❑ Order Parts
  - Brake Cables,
  - Double Output Brake Lever
  - Cable Housing
- ❑ Machining/Manufacturing

Seating and Restraints

2-Point Lap Retractable Seat Belt

Greenline Saddle with Back rest

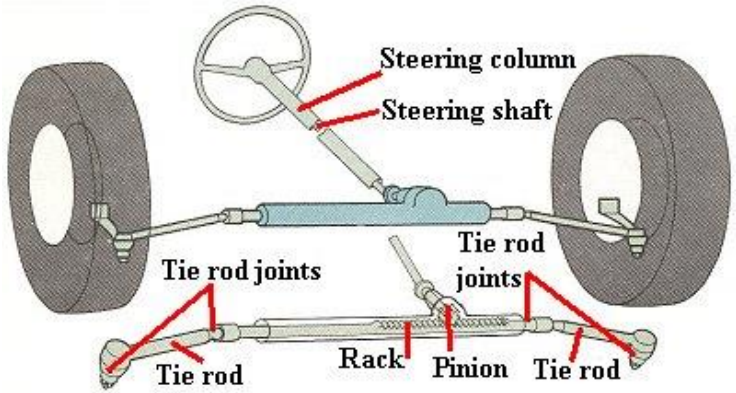
Seating and Restraints

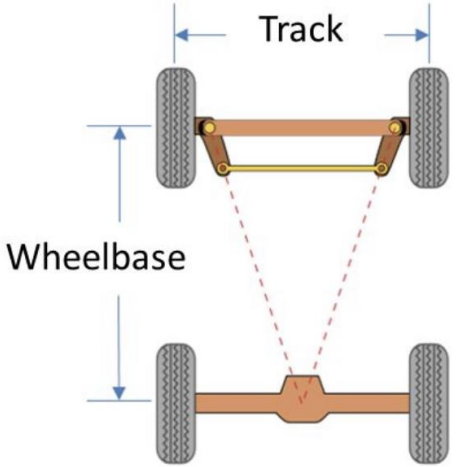
Helmets for rider protection

- Since we will not have a roll cage for the there is no need for a 3-point seat belt or harness as this would over constrain the riders
- Also to still adhere to competition rules, the helmets for the riders are a requirement

Steering: Rack and Pinion

- The track distance is determined by adding the width of the frame (20 inches) and the distance added to the frame by the front hubs (3.5 inches)
- We are going to use a Go-Kart rack and pinion





Testing and Validation Course

Systems Being Tested

- Steering
- Braking
- Suspension
- Wheels

Contact Information

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If I have seen further than others, it is by standing upon the shoulders of giants. ~ Sir Isaac Newton