NASA Rover Challenge 2018

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Senior Design Project

- Two-semester senior level capstone design course
  - Design
  - Fabrication/Testing
- Planning, design, and analysis of a product or system
- Manufacture and testing of a prototype
- Competition - depending on project

Project Description

- Design human-powered rover
- Points-based competition in Huntsville, AL
- Half-mile obstacle course simulating extra-terrestrial terrain
- Several tasks to simulate exploratory missions

NASA. (n.d.). *NASA Human Exploration Rover Challenge 2018* [Photograph].

Semester 1 - Design

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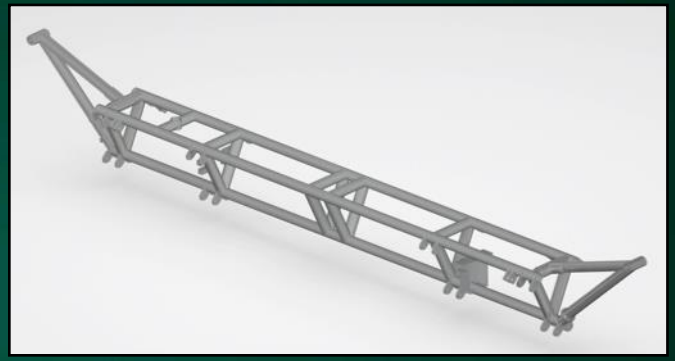
Frame

- 6061 Aluminum
- Frame weight 32 lb
- A-Arm connections
- Must fit inside 5’ by 5’ cube
  - Folding mechanism



Wheels - Design

- 29 inch total diameter
- Aluminum
- 3 inches wide
- 14.4 pounds total
- 60A Urethane tire

Image Courtesy of 2014-2015 Rover Team

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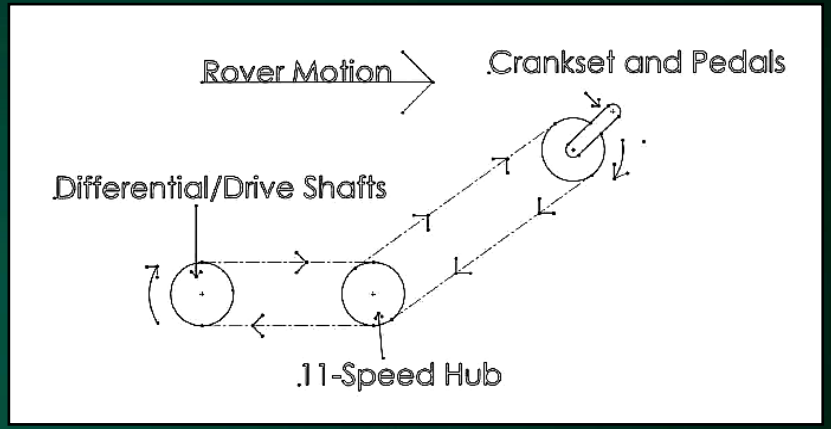
Drivetrain - Design

- Chain Drive
  - Affordable and customizable
- Differential
  - Agility > Traction loss risk
- 11-Speed Hub
  - 2-19 mph
- Single Speed Crank
  - Affordable



Shimano Alfine. (2017). *SG-S700 Internal Hub* [Photograph].

Semester 2 – Fabrication

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Wheel

- Cut and Cope Tubing
- Water Jet Cut Ribs
- Rolled Rim
- Aluminum TIG & MIG Welding

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Frame

- Cut and Cope Tubing
- Aluminum TIG Welding

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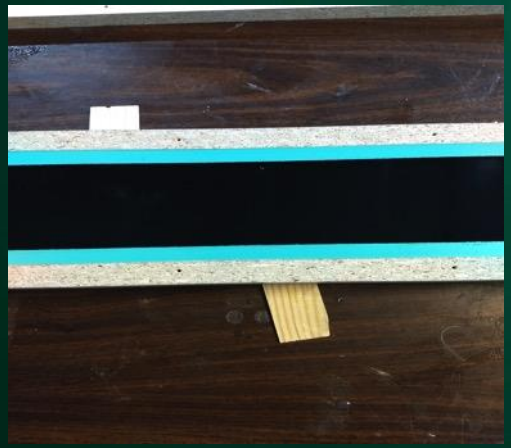
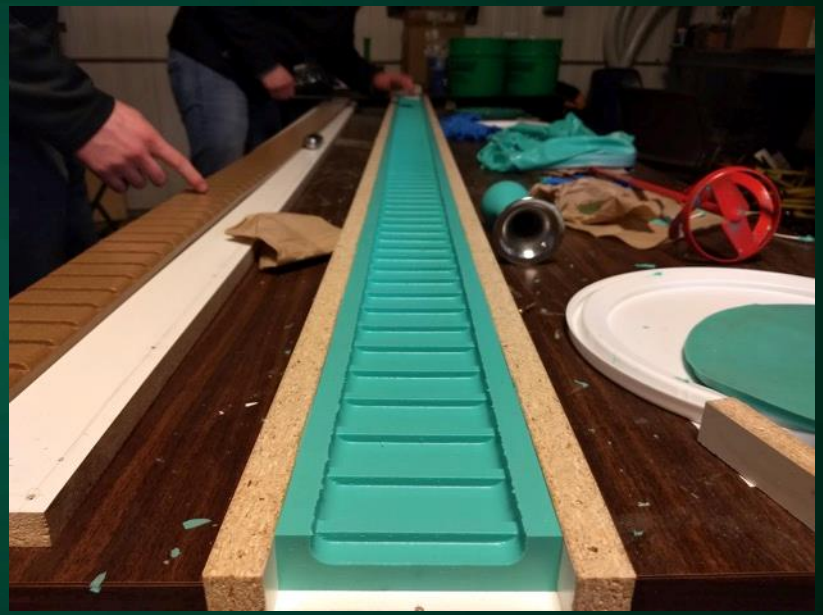
Tire

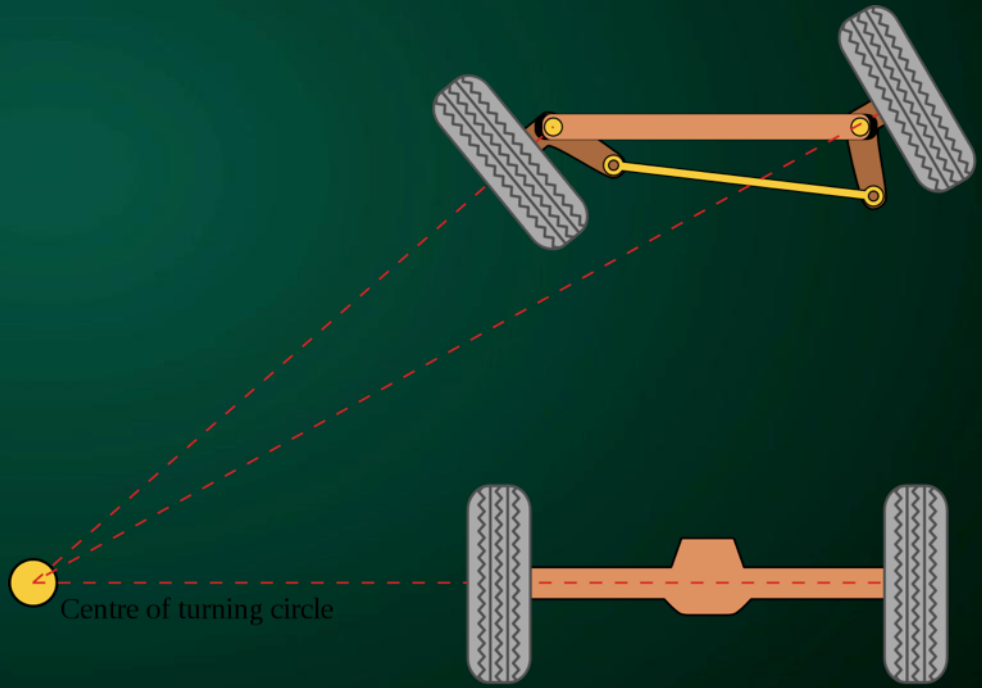
- MDF Positive
- Silicone Negative
- Urethane Tire





Unexpected Challenges

- Altered Steering Geometry
- Ackerman Steering



Future Recommendations

- Allow for more time for manufacturing of rover
- Try to reuse as much material from previous years rover

Thank You

NDSGC

North Dakota Space Grant Consortium. (2017). *NDSGC Logo.* [Photograph]

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