

NASA Human Exploration Rover Challenge 2020-2021



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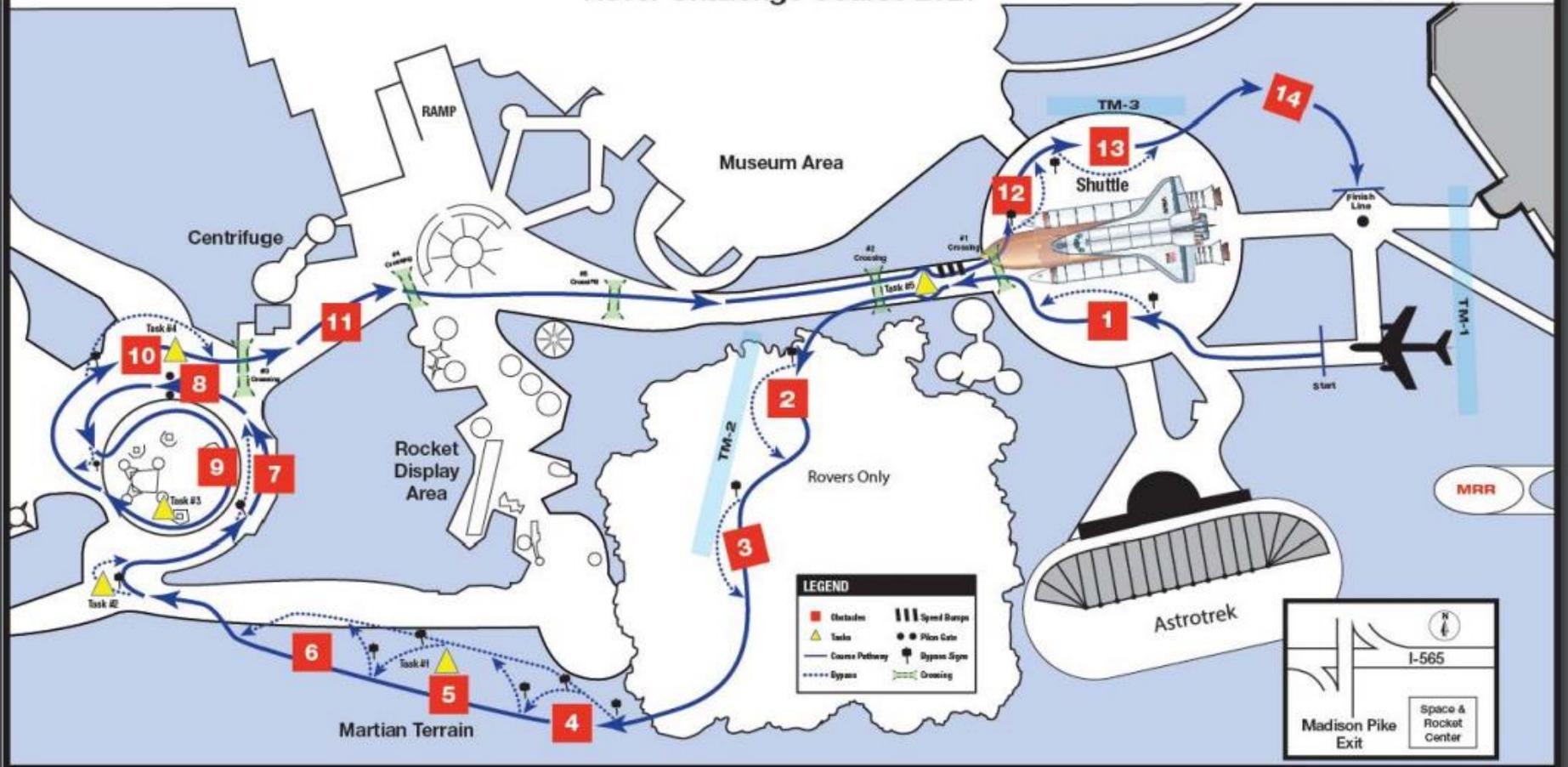
What is the Rover Challenge?

- NASA Human Exploration Rover Challenge (HERC)
 - Open to college and high school teams around the world
 - Engages students worldwide in the next phase of space exploration
 - Aligns with the Artemis mission to return to and explore the moon
 - 0.50 mile course simulating lunar terrain
 - Including 5 optional mission tasks



U.S. Space & Rocket Center

Rover Challenge Course 2021

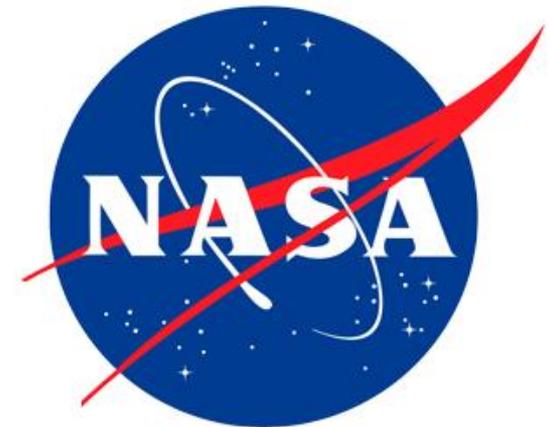


HERC Course Map



Design Project Description

- Design, develop, test a human-powered Rover
 - Including all task related components
- Capable of
 - Collapsing into a 5'x5'x5' cube
 - Climbing hills
 - Turning in less than 15ft radius
 - Off-road driving
 - Course completion within 8 minutes

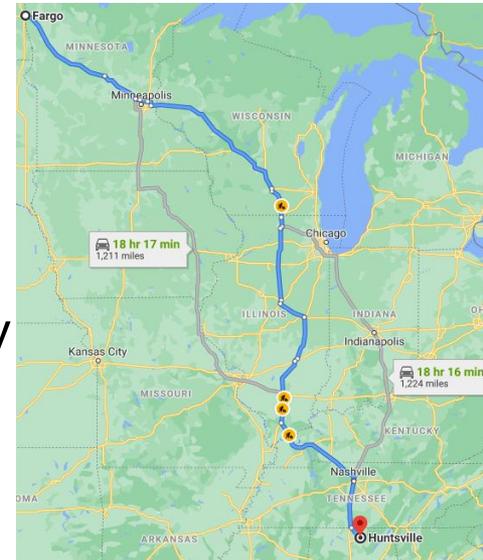


Project Goals

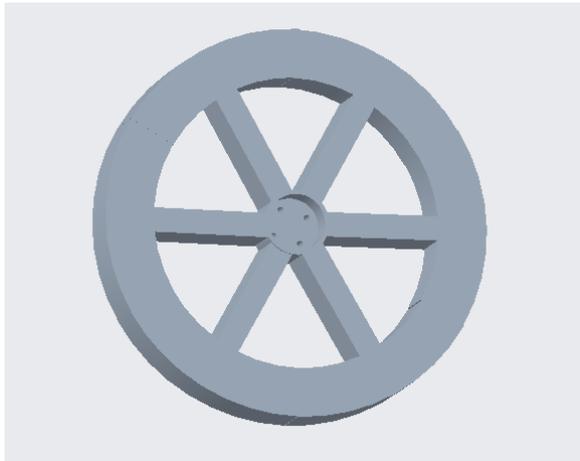
- Reduce overall rover weight
- Build wheels that are stronger than previous years
- Complete at least 3 of the 5 tasks
- Finish course within the time limit

Surprises and Challenges

- February 1st NASA cancelled all in-person events relating to the competition due to COVID-19
 - Project Impacts
 - Reduced travel budget
 - Completed rover no longer necessary
 - Overall competition results determined differently
 - Project goals
- Release of funding from the NDSU ME Department
 - Reduced time to order and manufacture the rover components

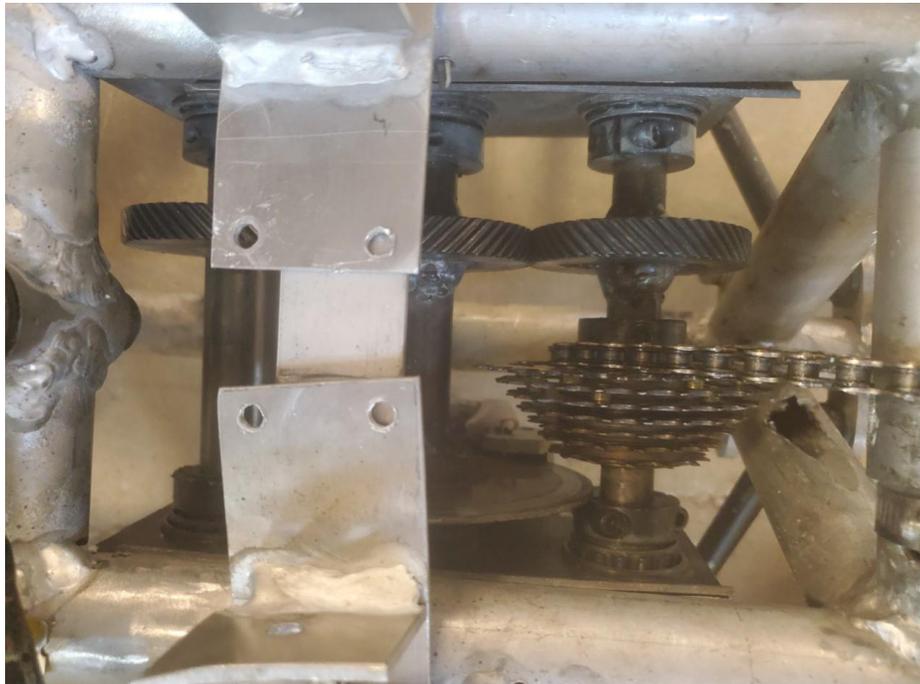


- Wheels made of resin
- 5lbs/wheel lighter than previous years wheels
- More traction than previous years
- 12-inch radius, 2.5-inch width
- More stable and safer



Gears

Gear	1	2	3
Pitch diameter	4.6	3.3	2.3
Number of teeth	46	33	23
Connection	Peddles	Brake disc	Wheels



Turn Limiter



Rover Seats

- 6061 extruded Aluminum tubes, 1.25" and 0.75"
- 17" long x 12" wide, 14" tall
- Quick connect using hitch pins
- Safety belts installed
- Seat back pocket and some sewing remaining



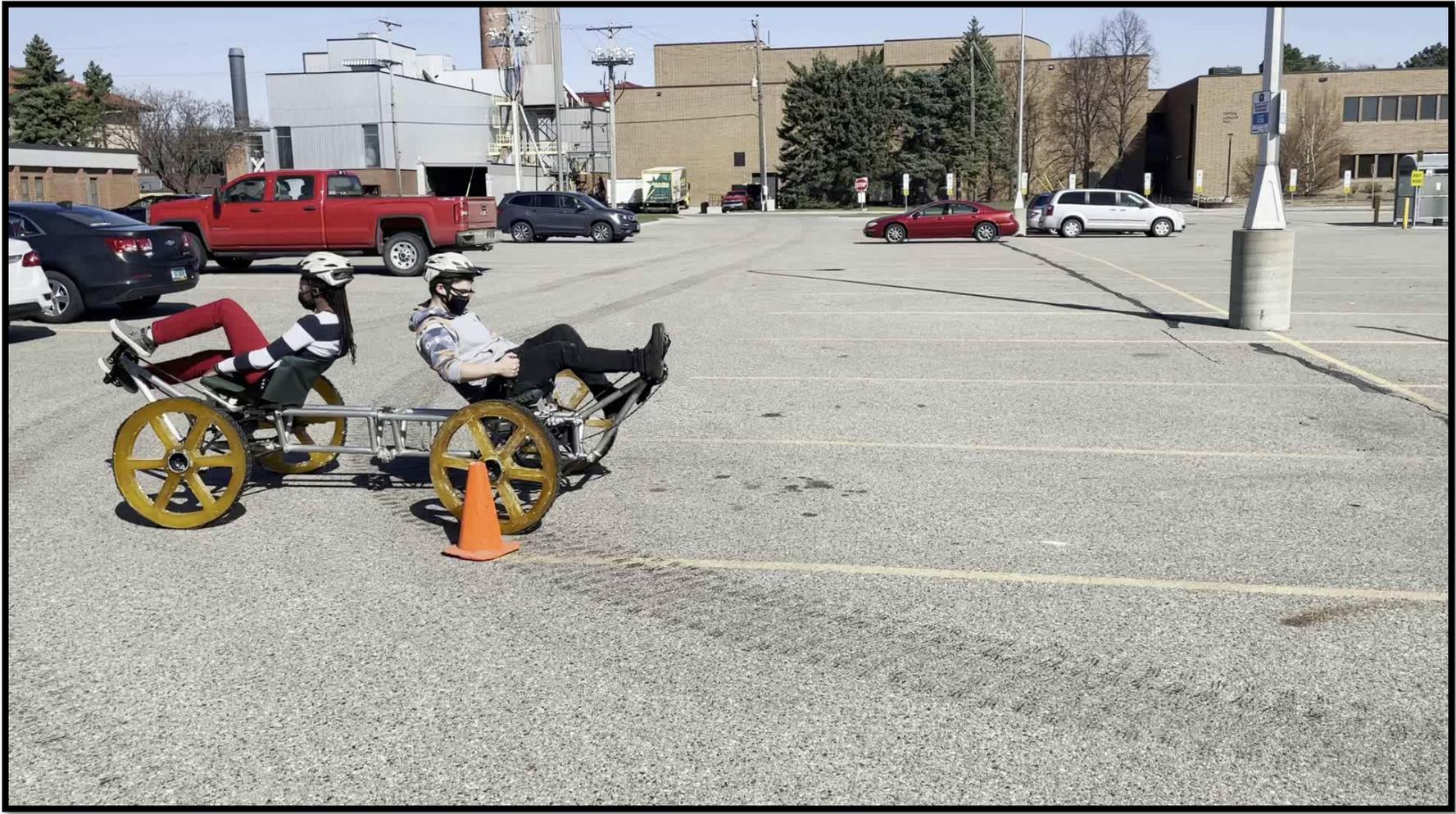
- Task 1
 - iPhone 6s and plastic filters
- Task 2
 - Solar panel on PVC
- Task 3
 - Core sampler from scrap steel
- Task 4 & 5
 - Pointer and hose clamp



2020-2021 Rover



Demonstration Video



Lessons Learned

- Complete project management
 - From planning to project completion
- Dealing with the unexpected
 - Making the best of what you have
- Time management
- Teamwork!



Acknowledgements

- Dr. Ghodrat Karami
- Dr. Ali Amiri and Dr. Alan Kallmeyer
- NDSU Mechanical Engineering Department
- ND Space Grant Consortium
- NASA HERC team



Questions?

