Design and Development of a Human Powered Vehicle – Competition Hosted by NASA

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Project Scope

The goal is to design a human powered vehicle to compete in the 2017 NASA Rover challenge, March 30-April 1. The vehicles will compete for the fastest time across a simulated extraterrestrial terrain, which consists of crates, boulders, ridges, inclines, crevasses, and sand pits.

Competition Constraints

- Human Powered (Male and Female)
- Collapsible into 5ft cube
- Safe and lightweight
- 15in. clearance from ground to rider
- Wheels must be designed, constructed, and tested by the team

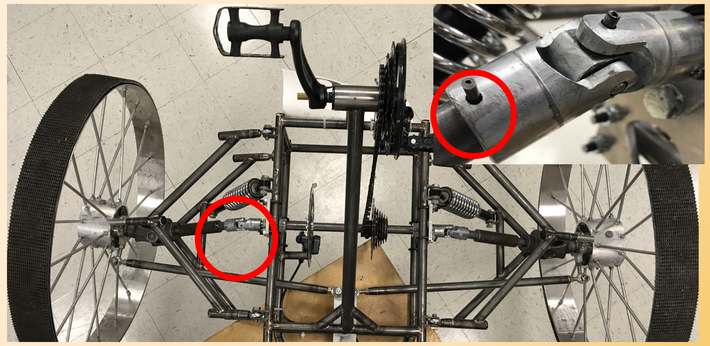
Prototype

Team 17 at competition and the folded rover sitting on the scale weighing 125 lbs. The rover is folded using a water jet steel hinge joint.

Competition Results

Front Drivetrain Failure:

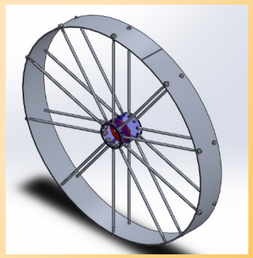
- Pins holding the u-joint to the drive shaft sheared

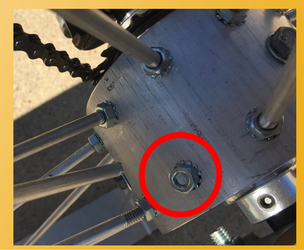


Rear Drivetrain Failure:

- Rear boom cantilevered and bent causing the chain to slack and pop off

- Team pushed the rover across the course to test and experience course
- **Wheels Survived with minor damage:** 2 spokes sheared on impact with obstacles





Lesson's Learned

- Common Failures: drivetrain chains popping off, wheel failure and suspension failure.
- Dynamic analysis is extremely necessary
- Ample testing of prototype must be done to fix simple issues
- The drivetrain is the most important component to being successful

Summary

- Drivetrain
- Get to testing as fast as possible

Acknowledgements

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References

[1] NASA Rover Challenge. https://www.nasa.gov/roverchallenge/home/index.html