

North Dakota Space Grant Presentation

NDSU NASA Rover Challenge

Group Members:

Oliver Boeckel

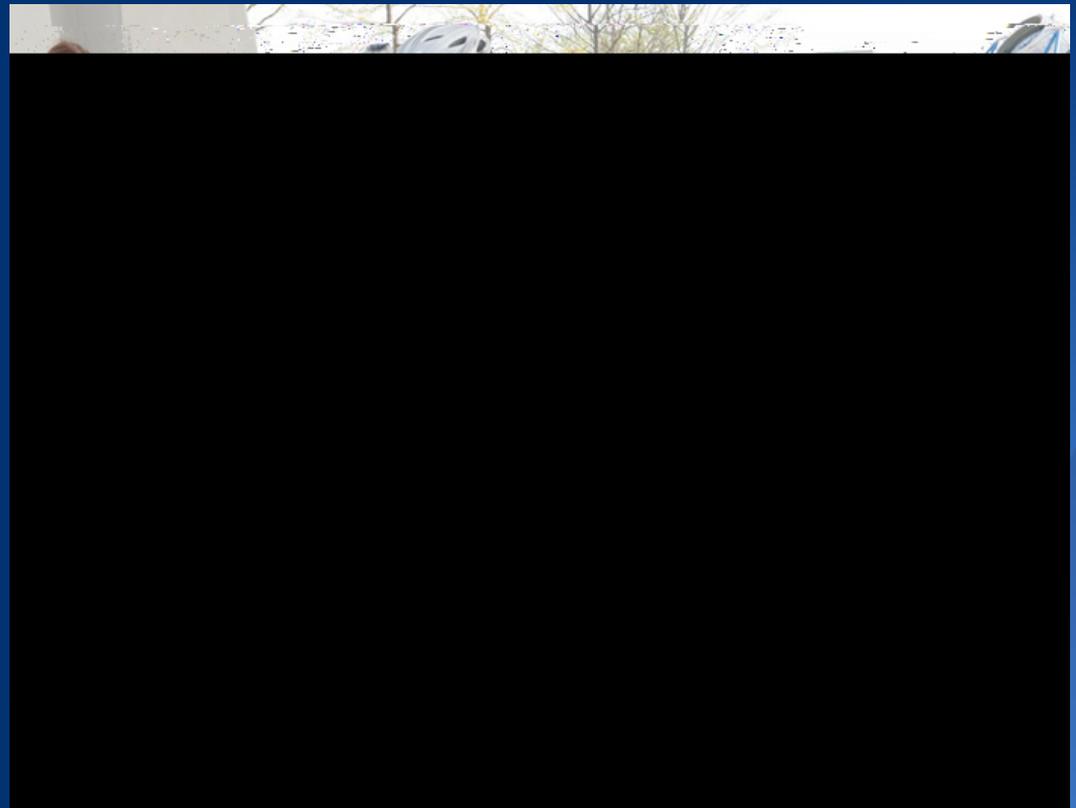
Jacob Hanson

Paul Johnson

Lance Krogh

Lindsey Feyder

May 5, 2014



NASA Mission

- Engineering design challenge to replicate current NASA plans
 - Explore planets, moons, asteroids, comets...
- Engage students with technology and concepts that will be needed for future exploration missions
- Formerly named Great Moonbuggy Race

Project Description

- Human powered rover
 - Design
 - Fabricate
 - Test
- Compete in NASA Rover Challenge Competition
 - Obstacle course
 - Simulated craters, crevices, rocks, inclines
 - Scored on assembly and race times

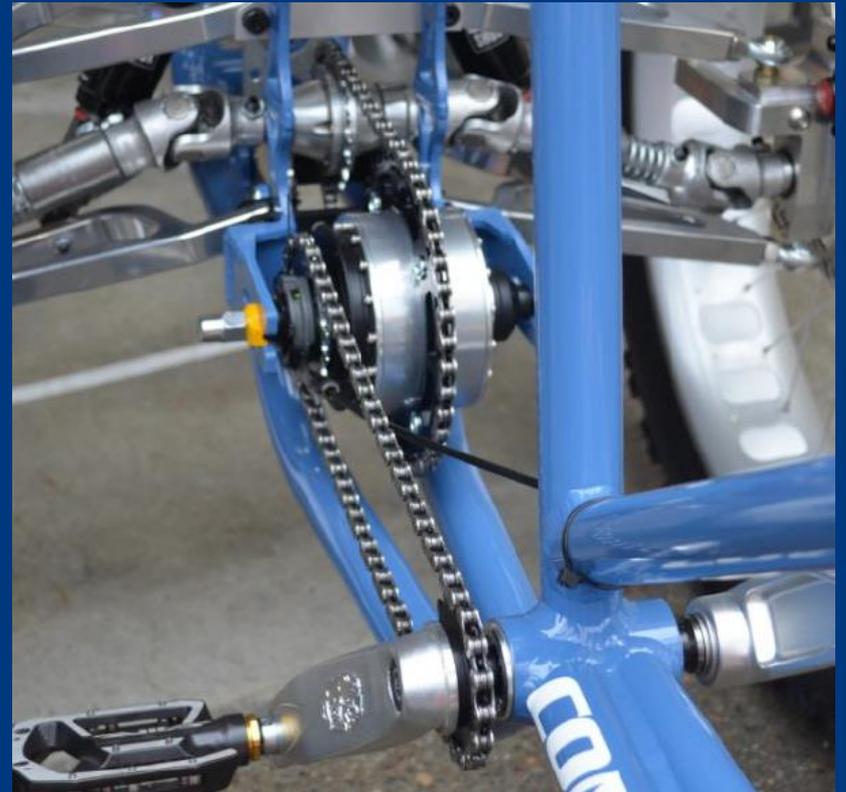
Competition Constraints

- Two operators, one male and one female
- Collapse into 5 ft³ space
- No energy storage devices
- No pneumatic tires
- 15 ft turning radius
- Operate on 30° side-to-side embankment
- 15 inch clearance
- 120 in² fenders
- 1 ft³ simulated electronics box



Design Aspects

- Frame
 - Center hinge mechanism
- Steering
 - Skid-steer style
- Drivetrain
 - 2 CVT internal gear hubs
- Suspension
 - Wishbone A-arms and air shocks
- Wheels
 - Airless insert, layered style



Competition Results

- Assembly time: 13 seconds!
- Run #1
 - Failure on inclined plane
 - Sheared ball joint
- Run #2
 - Failure on inclined plane again...
 - Pulled major joint out of knuckle



Budget Overview

Subcategory	Original Budget	Updated Subtotal
Frame	\$580.38	\$409.82
Steering	\$283.62	\$151.92
Drive Train	\$2,167.92	\$2,185.99
Wheels	\$1,012.00	\$340.14
Suspension	\$1,095.00	\$17.74
Fabrication/Assembly	\$1,195.94	\$650.45
Stock Bicycle Components	\$810.00	\$259.00
Miscellaneous	\$1,649.68	\$775.61
Travel	\$3,641.00	\$3,239.70
TOTAL EXPENSE=	\$12,435.54	\$8,030.37

ND Space Grant: **\$6,000**

Major Expenses

- Internal gear hubs and housing
 - \$1,276.00
- Custom wheel knuckles
 - \$512.17
- Flanged wheel axles
 - \$598.50
- Travel
 - \$3,239.70

Thank you!!

Questions?

