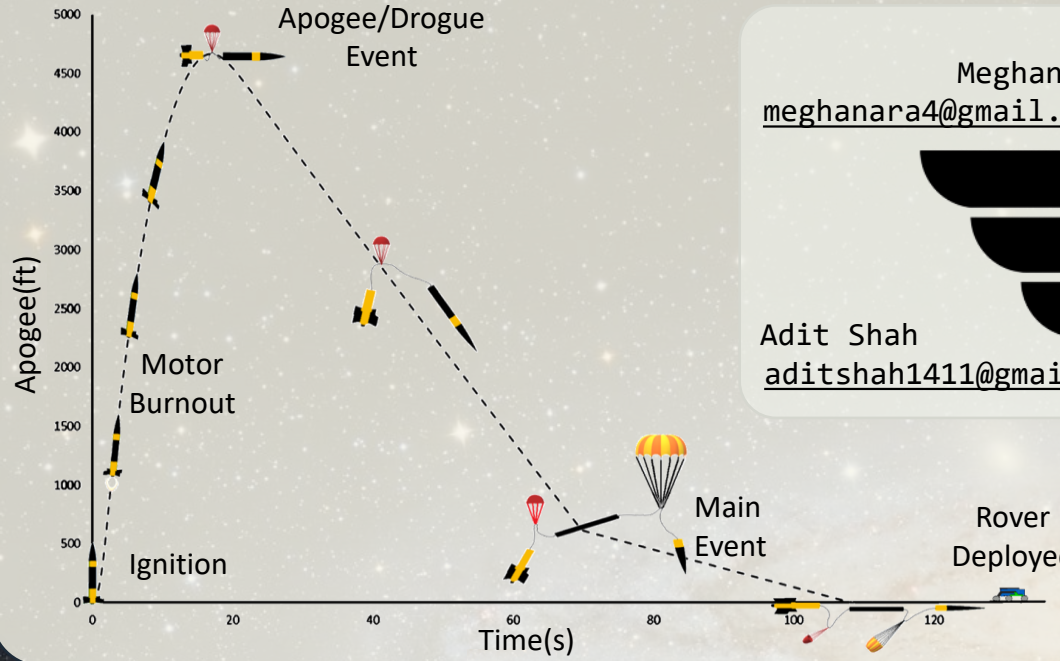

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The Mission

The NASA Student Launch Initiative is a high-powered rocketry competition. Teams are asked to design and build a rocket that can meet specific flight objectives while safely carrying a payload.

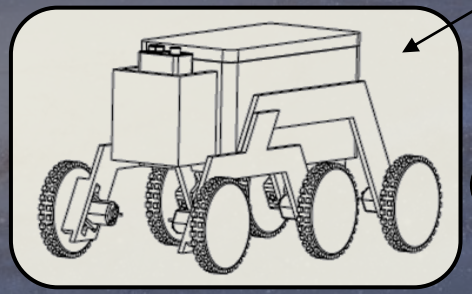
Rocket objectives

- Rocket must achieve an apogee between 3,500 feet and 5,500 feet.
- Teams will choose a target apogee that they strive to achieve.
- After apogee, the rocket must descend within 90 seconds
- The rocket must not drift more than 2,500 feet

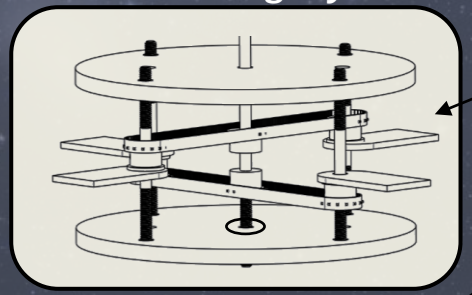
Payload Objectives

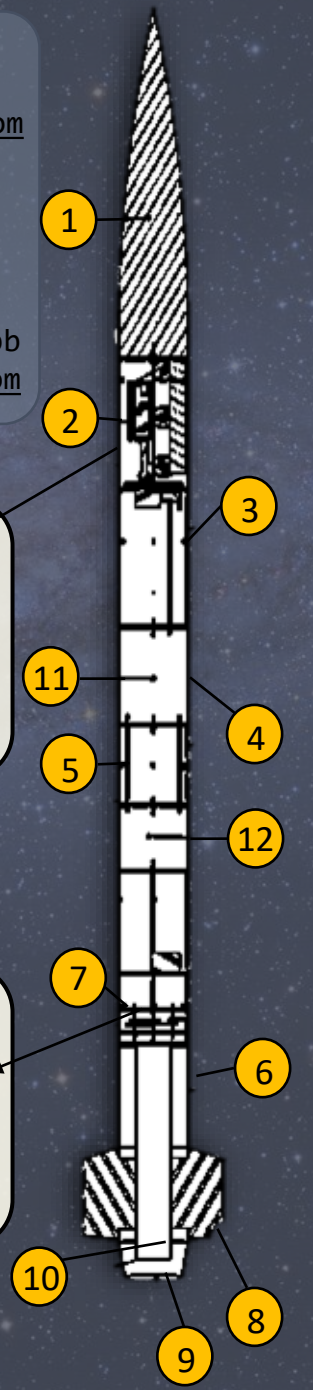
- The payload must collect 10 mL of simulated lunar ice and transport it 10 ft.
- The payload must deploy from the rocket without human interaction
- The payload mission must be completed within one hour

Rover Payload



Active Drag System





Vehicle Components

1. Nose Cone
2. Payload Bay
3. Deployment Bay
4. Recovery Body Tube
5. Avionics Bay
6. Booster Body Tube
7. Active Drag System
8. Fins
9. Boat Tail
10. Motor
11. Main Parachute Bay
12. Drogue Parachute Bay


Full-scale launch
March 1st, 2020
Argonia, KS

Photo by: Lance Licktieg

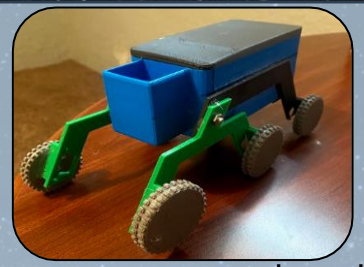
Project Summary

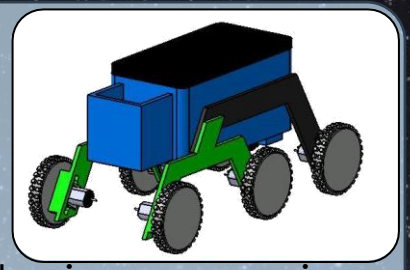
The length of the launch vehicle comes in at just under 10 ft. and it's launch weight is nearly 40 lb. The rocket is made of fiberglass, chosen because of its strength and light weight. The motor chosen was the Cesaroni L1720-WT. Based off preliminary weight estimations, this motor would allow a thrust-to-weight ratio of about 10. The fins were kept large to increase stability, with a slight sweep.

The team also employed the use of an active drag modulation system (ADMS) in order to fine tune the apogee that the launch vehicle would reach. The chosen motor will overshoot the target apogee, and the ADMS system will deploy blades to create more drag, bringing the altitude down to the target.

Several tests were conducted in order to verify separation forces, verification of payload deployment, and yield testing of the fin attachments. Construction of the launch vehicle took place in various labs in Wichita State's John Bardo Center including the Aerospace Lab over a period of 6 weeks. WSL was able to launch the competition vehicle twice with much success.

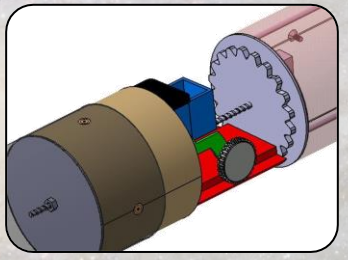
Rocker – Bogie Rover





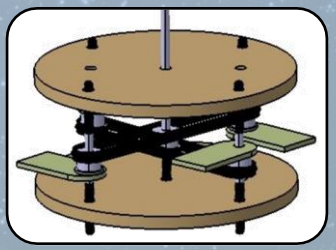
The payload uses a rocker-bogie suspension system, modeled after NASA's Mars rovers. It is able to easily maneuver over unpredictable terrain.

Payload Orientation & Deployment (POD)



The rover sits in the Payload Orientation and Deployment bay during launch. It is held in place so it doesn't get damaged during the flight.

Active Drag Modulation System (ADMS)



The ADMS is uses a motor that rotates a post through the center of the system, which moves chains and allows the blades to rotate in and out of the rocket.