NASA University Student Launch Initiative - Aerodynamics and Recovery

The USLI competition is a NASA-sponsored, nationwide rocketry competition. This year's challenge is to fly as close as possible to a team-declared altitude and deploy an R/C rover to collect a lunar ice sample.

Mission Profile

Launch Vehicle Specifications:

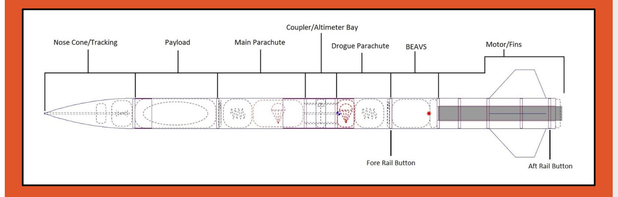
- Lenght: 119 in
- Weight: 60.9 lb
- Max Velocity: 542 ft/s
- Motor: Aerotech L2200
- T/W Ratio: 11.4
- 0 - 60 metric: 0.34 s
- Airframe materials: Fiberglass, Carbon Fiber, and Aluminum

Recovery Specifications:

- Parachute Sizes: 12 ft / 36 in
- Descent Time: 81 s
- Descent Speed: 99.1ft/s
- Impact Velocity: 13.7 ft/s
- Apogee Altitude: 4,000 ft
- Black Powder Charge Sizes: 2.6 g/6.4 g

Payload Specifications:

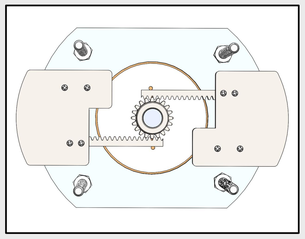
- Top Speed: 1.3 mph
- Battery Life: 5 hours
- Range: 2.8 miles
- Total Carrying Capacity: 15 mL
- Endurance: 2.115 hours
- Horse Power: 0.02



Oregon State University

Blade Extending Apogee Variance System (BEAVS) 2.0 and Simulations

- BEAVS 2.0 is an active airbrakes system that reads in-flight data from sensors and calculates the predicted apogee altitude. If the predicted altitude is greater than 4,000 ft, the airbrakes will extend and reduce the apogee through induced drag.
- This system is used to hit the altitude challenge on the nose, as it is part of the competition grade to hit 4,000 ft.

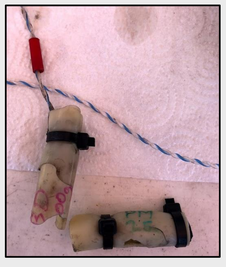


Black Powder Parachute Ejection and Energetic Mid-flight Black Powder Ejection Reserve System (EMBERS)

- Black powder is used as the parachute ejection energetic because it is powerful and reliable.
- Once black powder is energized through an e-match, the rocket's sections separate and the parachute is pushed out of the airframe.
- EMBERS is a custom-designed safety device that ensures that all charges are detonated during launch vehicle descent while still in the airframe.

Parachutes

- Our rocket has one main and one drogue parachute. The 36 in. drogue parachute deploys at apogee, and the 144 in. main parachute deploys at 600 ft.
- Parachutes help slow the rockets descent and ensure the rover and internal components recover safely.



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PROJECT SPONSORS
NASA
The Oregon Space Grant Consortium

PROJECT STATUS

- Percent Completed: 100%
- Number of Requirements: 7
- Number of Requirements Met : 7
- Major Milestones: Subscale 1, Full Scale 1