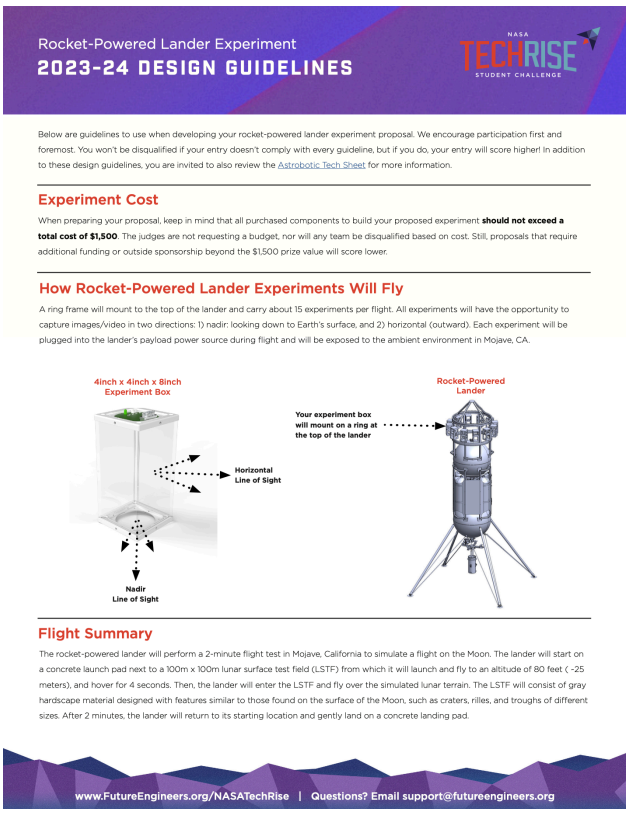
DESIGN GUIDELINES

The 2023-24 NASA TechRise Student challenge invites student teams to develop experiment ideas for either a rocket-powered lander or a high-altitude balloon. Due to the uniqueness of this challenge, there are rocket-powered lander guidelines and high-altitude balloon guidelines. Please select the vehicle type to below to view the guidelines applicable to your entry type.

Please click to view the

NASA TechRise Rocket-Powered Lander Guidelines



Rocket-Powered Lander Experiment

2023-24 DESIGN GUIDELINES

Below are guidelines to use when developing your rocket-powered lander experiment proposal. We encourage participation first and foremost. You won't be disqualified if your entry doesn't comply with every guideline, but if you do, your entry will score higher! In addition to these design guidelines, you are invited to also review the Astrobotic Tech Sheet for more information.

Experiment Cost

When preparing your proposal, keep in mind that all purchased components to build your proposed experiment **should not exceed a total cost of $1,500**. The judges are not requesting a budget, nor will any team be disqualified based on cost. Still, proposals that require additional funding or outside sponsorship beyond the $1,500 prize value will score lower.

How Rocket-Powered Lander Experiments Will Fly

A ring frame will mount to the top of the lander and carry about 15 experiments per flight. All experiments will have the opportunity to capture images/video in two directions: 1) nadir: looking down to Earth's surface, and 2) horizontal (outward). Each experiment will be plugged into the lander's payload power source during flight and will be exposed to the ambient environment in Mojave, CA.

Flight Summary

The rocket-powered lander will perform a 2-minute flight test in Mojave, California to simulate a flight on the Moon. The lander will start on a concrete launch pad next to a 100m x 100m lunar surface test field (LSTF) from which it will launch and fly to an altitude of 80 feet (~25 meters), and hover for 4 seconds. Then, the lander will enter the LSTF and fly over the simulated lunar terrain. The LSTF will consist of gray hardscape material designed with features similar to those found on the surface of the Moon, such as craters, rilles, and troughs of different sizes. After 2 minutes, the lander will return to its starting location and gently land on a concrete landing pad.

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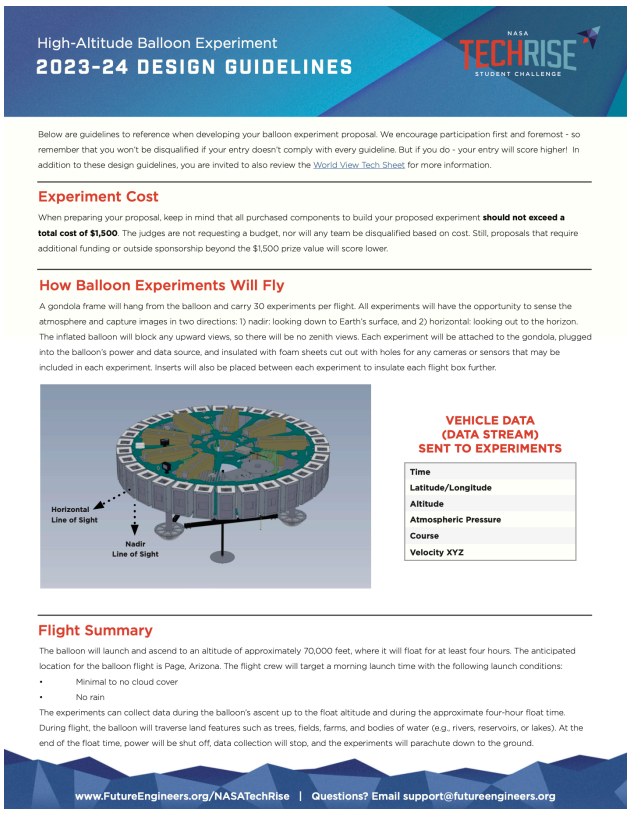
Please click to view the

NASA TechRise High-Altitude Balloon Guidelines



High-Altitude Balloon Experiment

2023-24 DESIGN GUIDELINES

Below are guidelines to reference when developing your balloon experiment proposal. We encourage participation first and foremost - so remember that you won't be disqualified if your entry doesn't comply with every guideline. But if you do - your entry will score higher! In addition to these design guidelines, you are invited to also review the World View Tech Sheet for more information.

Experiment Cost

When preparing your proposal, keep in mind that all purchased components to build your proposed experiment **should not exceed a total cost of $1,500**. The judges are not requesting a budget, nor will any team be disqualified based on cost. Still, proposals that require additional funding or outside sponsorship beyond the $1,500 prize value will score lower.

How Balloon Experiments Will Fly

A gondola frame will hang from the balloon and carry 30 experiments per flight. All experiments will have the opportunity to sense the atmosphere and capture images in two directions: 1) nadir: looking down to Earth's surface, and 2) horizontal: looking out to the horizon. The inflated balloon will block any upward views, so there will be no zenith views. Each experiment will be attached to the gondola, plugged into the balloon's power and data source, and insulated with foam sheets cut out with holes for any cameras or sensors that may be included in each experiment. Inserts will also be placed between each experiment to insulate each flight box further.

VEHICLE DATA (DATA STREAM) SENT TO EXPERIMENTS

Time
Latitude/Longitude
Altitude
Atmospheric Pressure
Course
Velocity XYZ

Flight Summary

The balloon will launch and ascend to an altitude of approximately 70,000 feet, where it will float for at least four hours. The anticipated location for the balloon flight is Page, Arizona. The flight crew will target a morning launch time with the following launch conditions:

- Minimal to no cloud cover
- No rain

The experiments can collect data during the balloon's ascent up to the float altitude and during the approximate four-hour float time. During flight, the balloon will traverse land features such as trees, fields, farms, and bodies of water (e.g., rivers, reservoirs, or lakes). At the end of the float time, power will be shut off, data collection will stop, and the experiments will parachute down to the ground.

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