2024 BIG IDEA CHALLENGE FINALISTS

ARIZONA STATE UNIVERSITY

AEGIS - Inflatable Lunar Landing Pad System

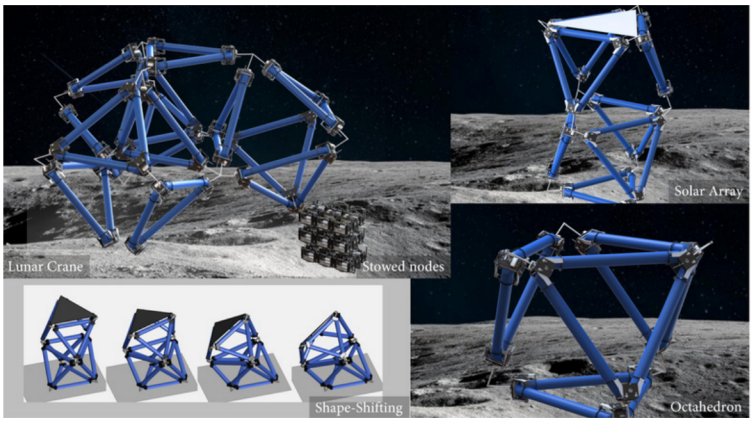
Advisors: Dr. James Bell, James Rice, Josh Clang, Tyler Smith

Aegis is an inflatable and reusable landing platform which is capable of autonomously deploying to reduce dust and debris generated by landers whilst providing precision landing assistance to enable a safe landing. Aegis is a novel landing pad system which uses inflatable structures for exhaust deflectors to reduce dust, innovative composite materials for high temperature survivability, and a modern communications architecture for transmitting positional information to landers on approach.

BRIGHAM YOUNG UNIVERSITY

Untethered and Modular Inflatable Robots for Lunar Operations

Advisors: Dr. Nathan Usevitch, Dr. Marc Killpack



BYU proposes a modular, inflatable robot that can create a variety of different robotic structures on the moon. The robot consists of a set of inflated fabric tubes and robotic roller modules. The robot can change its shape robotically, and be structurally reconfigured based on the task at hand. The robot stows compactly, can lift heavy loads, and operate untethered. BYU will demonstrate this robot performing two tasks: a structure that can aim a solar array, and a crane that can lift loads.

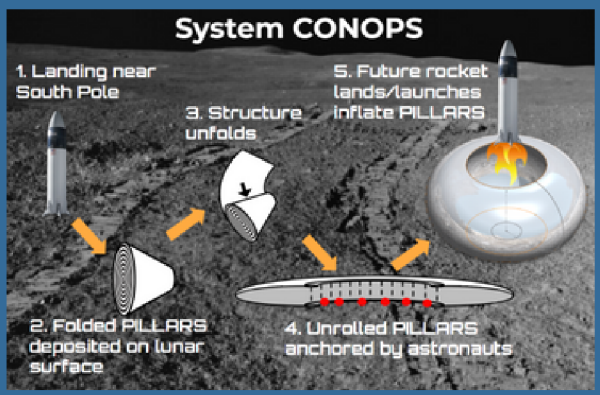
CALIFORNIA INSTITUTE OF TECHNOLOGY

WITH NASA'S JET PROPULSION LABORATORY, CISLUNE, AND VJ TECHNOLOGIES

PILLARS: Plume-deployed Inflatable for Launch and Landing Abrasive Regolith Shielding

Advisors: Dr. Soon-Jo Chung, Kalind Carpenter

For a continued human presence on the moon, work must be done to mitigate dust kicked up by rocket launches and landings. As a potential solution to this problem, PILLARS is a 20 meter tall berm structure capitalizing on the low mass/volume of inflatable technology to create an efficient and effective barrier to mitigate the destructive effects of rocket plumes.

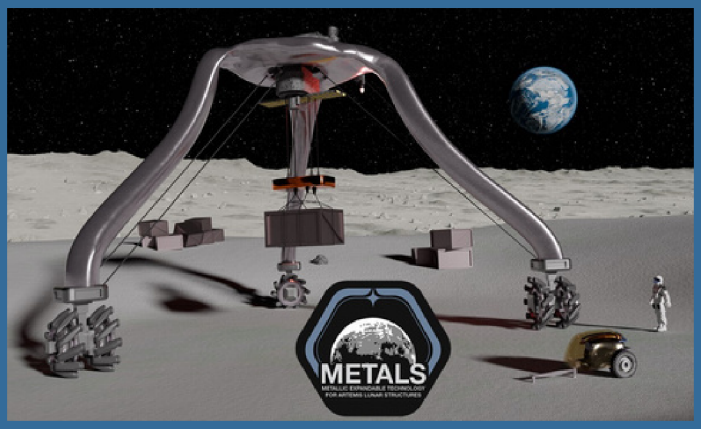


2024 BIG IDEA CHALLENGE FINALISTS

NORTHWESTERN UNIVERSITY
WITH NATIONAL AEROSPACE CORPORATION

METALS: Expandable Technology for Artemis Lunar Structures

Advisors: Dr. Ian McCue, Dr. Ryan Truby



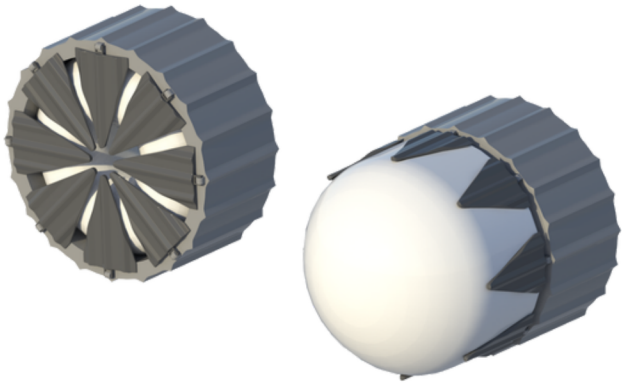
Metal Expandable Technology for Artemis Lunar Structures (METALS) is a versatile metal inflatable system that utilizes a novel combustive inflation process for inflation of efficiently packaged metal structures. METALS is designed to deploy from a compact storage configuration into a system of robust, expanded structures suitable for a variety of lunar applications such as gantries, towers, and other structural members.

UNIVERSITY OF MARYLAND

Auxiliary Inflatable Wheels for Lunar Rover

Advisor: Dr. David Akin

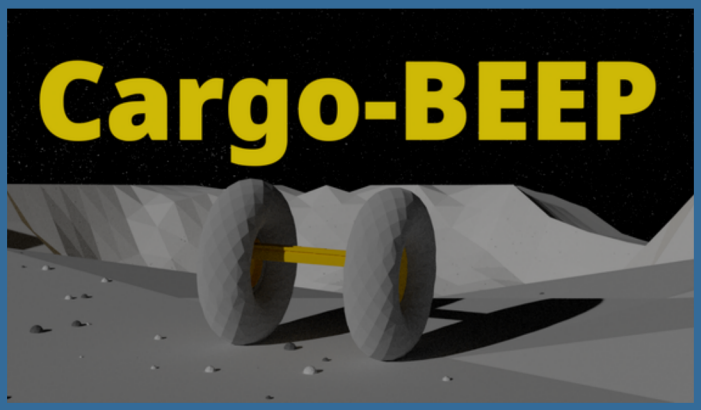
To expand the range of reliable rover traversability, UMD proposes to develop a reusable inflatable auxiliary wheel that is mounted in the hub of the conventional wheel. If the rover gets stuck or needs to traverse uncompacted regolith, the auxiliary wheel inflates to increase the wheel width, decrease the contact pressure, and better fit the wheel to the new soil characteristics. It also deploys additional grousers to increase the soil thrust, and the system self-stows in the wheel hub for reuse.



UNIVERSITY OF MICHIGAN

Cargo-BEEP (Cargo Balancing Expandable Exploration Platform)

Advisor: Dr. John Shaw



Cargo-BEEP is a two-wheeled inflatable vehicle, with the ability to autonomously navigate the lunar surface to assist astronauts in carrying cargo, either following astronauts during excursions or transporting supplies between locations. Cargo-BEEP is light and compact, expanding from a small cylinder. The vehicle would operate similarly to a Segway in principle and could be mounted on rovers or even on astronauts' suits while in compact form.