MOONARK

Carnegie Mellon MoonArk
Fundraising Packet

February 2025

Carnegie Mellon University

A view of our Earth from Peregrine during Astrobotic's Mission 1 in January 2024. The mission was marked by many scientific, engineering and artistic achievements yet ultimately resulted in a return to Earth as a mechanical anomaly prevented a successful lunar landing.

Images courtesy of Astrobotic Technologies.

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Carnegie Mellon Continues its Mission to Achieve the Moon

On January 8, 2024 Astrobotic's Peregrine lander launched aboard ULA's Vulcan-Centaur rocket. The mission marked a significant milestone for commercial lunar exploration. It demonstrated the viability of partnerships between private companies and government agencies to deliver scientific and cultural payloads to the Moon.

A mechanical anomaly compromised the mission causing for Peregine to achieve lunar distance in advance of the moon's arrival. Under a NASA directive Astrobotic performed a controlled re-entry brought Peregrine back to Earth. MoonArk, aboard Peregrine spent 10 days in space returning to its resting place at Point Nemo, the spacecraft graveyard and the most remote place in the Pacific Ocean.

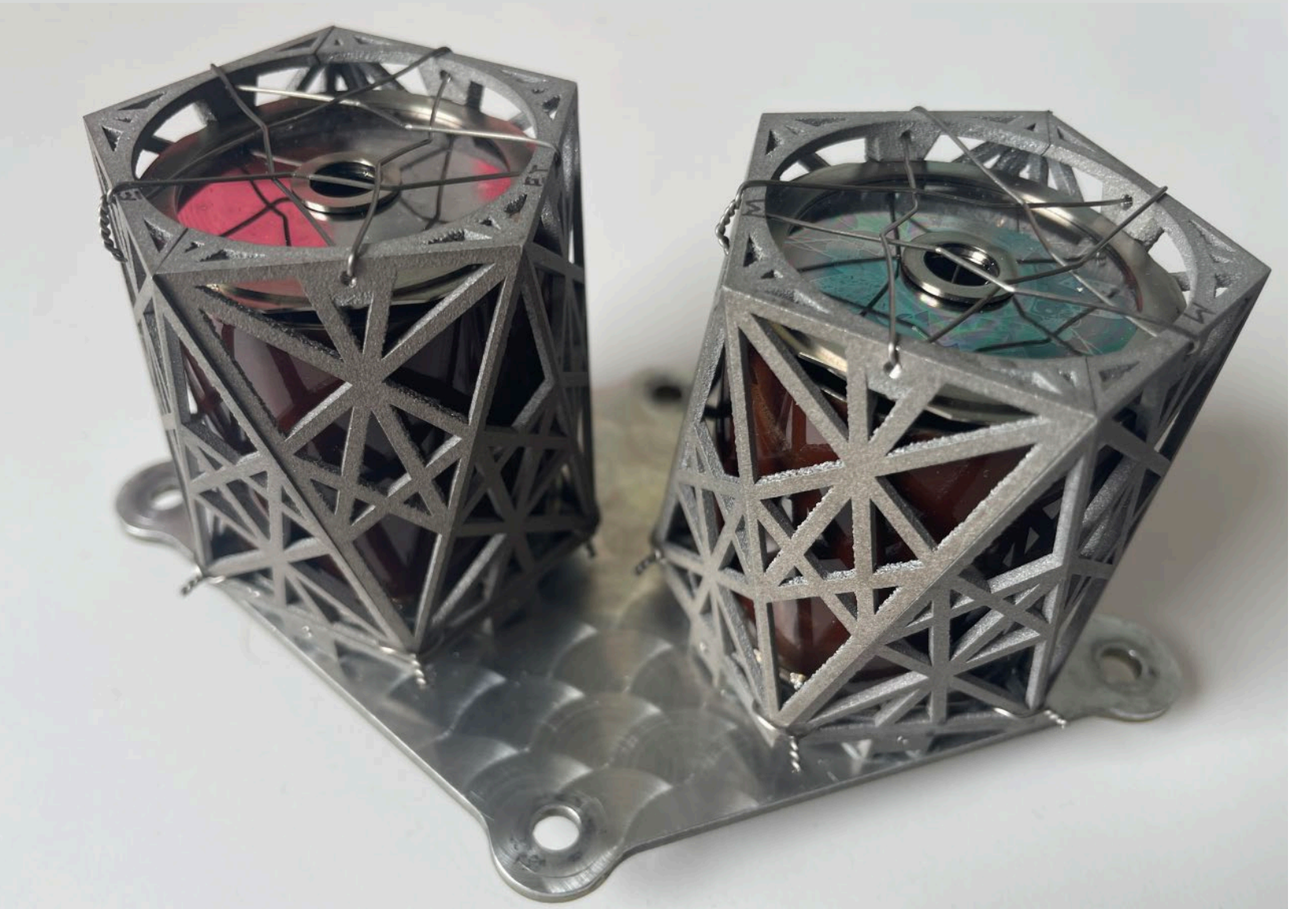
While the mission showcased the ambition and potential of commercial lunar exploration, the failure prevented the MoonArk and other payloads from reaching the lunar surface.

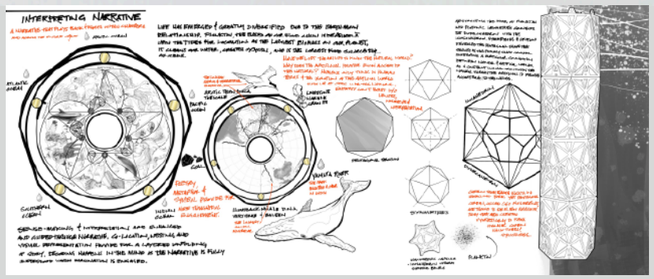
This outcome underscores the inherent challenges of space exploration and the importance of rigorous testing and contingency planning. Despite this setback, the collaboration between Carnegie Mellon University, Astrobotic Technology, and United Launch Alliance highlights the ongoing efforts to integrate cultural artifacts into space missions, aiming to preserve humanity's artistic and scientific achievements beyond Earth.

Future missions will undoubtedly build upon the lessons learned from this experience to enhance the reliability and success of space endeavors.

Our mission to achieve the moon continues with a full rebuild in 2025 for a launch with Astrobotic on a future mission.

Below, Astrobotic's engineers and payload specialists integrate Carnegie Mellon's Iris Rover to the deployment-side of the payload deck. MoonArk is visible on the static side of the deck. Image courtesy of Astrobotic Technologies.





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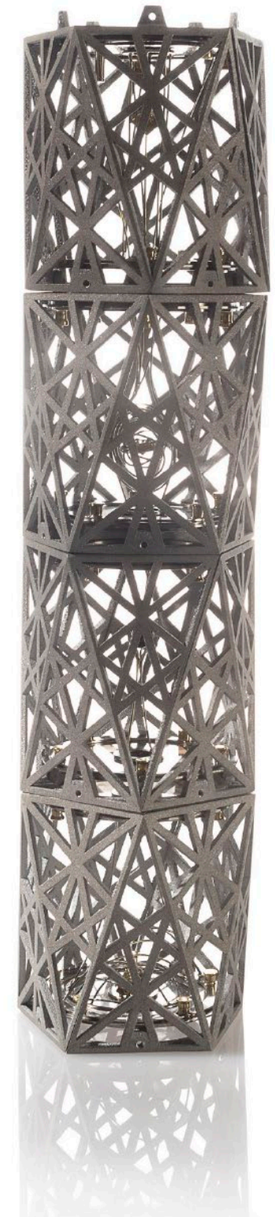
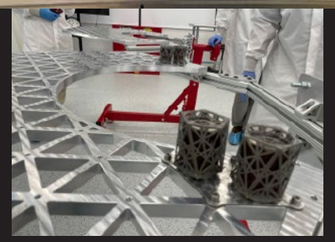
MoonArk provides a non-encyclopedic synthesis of the many dimensions of being human, blurring the boundaries of geography, time, and culture. As a reflective statement, the MoonArk aims to inspire inquiry today about our Earth, about our context in the universe, and about the meaning of life. Similar to the effect of “The Blue Marble” photograph from the 1972 Apollo 17 mission, the visual imagery, symbolic representations, physical payload, sculptures, and universal geometries in the MoonArk embody the totality of humankind as a cohesive entity contained by our earthly context and escaping our gravity to reach (longingly) outward into the universe.

A Poetic Deep Time Cultural Artifact

The MoonArk is a highly collaborative and massively integrated sculpture that poetically sparks wonderment through the integration of the arts, humanities, sciences, and technologies. Comprised of four independent 2”h x 2”dia chambers and weighing a combined total of 6 ounces, it contains hundreds of images, poems, music, nano-objects, mechanisms, and earthly samples intertwined through complex narratives that blur the boundaries between worlds seen and unseen. It is designed to direct our attention from the Earth outward, into the cosmos and beyond and reflect back to Earth as an endless dialogue that speaks to our context within the universe. Impossibly small, broadly diverse, hyper-light, yet incredibly enduring, the MoonArk is designed and engineered to last thousands of years to project humanity in a most beautiful and highly significant way.

We refer to the MoonArk as a future fossil object – a poetic way of describing its material intentionality as it blurs the line between designed artifact and expressive sculpture. Yet while the notion of a fossil resonates conceptually, it is difficult to fully comprehend the amount of time the “fossilizing” process represents. There is no human-made analog to geological time; nothing we have made is remotely close to becoming a fossil in the graspable future.





MoonArk exceeded all testing requirements for space travel and was the first payload installed on the Peregrine lander's payload deck.

In the image above, Carnegie Mellon's Iris Rover is prominently installed at the edge of the deck in front of one of a fuel tank. MoonArk is installed on the top side of the same deck.

The triangular grid of MoonArk's exoskeleton visually connects with the lander design to emphasize their connection. In future missions we aim to evolve cultural payload to integrate into the structure of spacecraft.

Photo of Peregrine in ULA's Vulcan-Centaur nose cone: courtesy of Astrobotic

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Innovation at the Edge of the Possible

The first MoonArk drove scientific and technical innovation. The project brought together companies and universities from around the world to solve the immense technical challenges in designing objects that can endure space travel and survive for 1000s of years. This project provides the impetus for our innovative collaborators to develop custom technology and processes to push their fields/industries further. In many cases, the materials they developed are industry-firsts and leading edge. Following are a few selected highlights:

3rd Dimension Industrial 3D Printing in Indianapolis, Indiana built the aluminum cage exoskeleton using 3D Systems additive aluminum sintering machines.

ARNANO in Grenoble, France has developed a method to engrave highly detailed imagery in sapphire disks for permanent archiving. The MoonArk project provided an opportunity to adapt their processes to laser engrave a layer of deposited platinum to achieve extremely high resolution (12,500 dpi). In addition, they worked to machine the sapphire crystal disks down to 0.25mm and bore a hole through the center. Both the small scale of the disks and complexity of the machining required new processes and machinery.

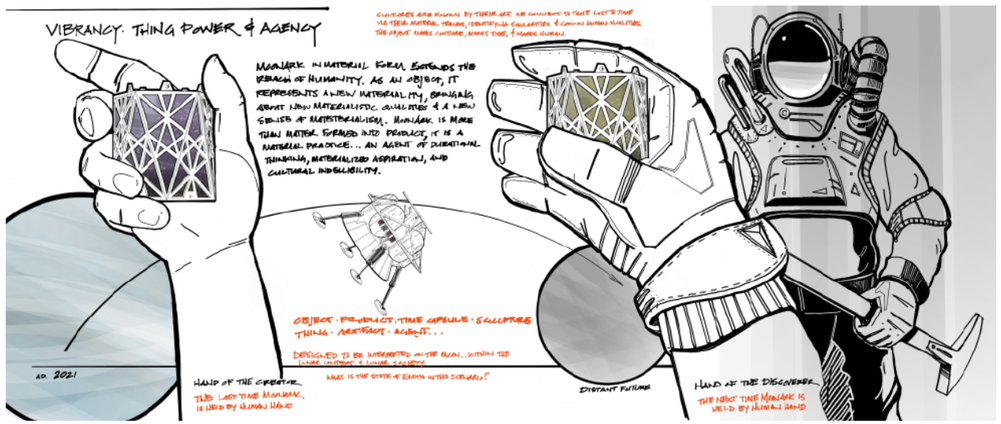
Professor Rongchao Jin at Carnegie Mellon University fabricated pyroelectric nanogenerators, nano forms that generate electricity when the ambient temperature increases or decrease dramatically. Any change in temperature provides the impetus for the nanoforms to electrify.

Peter Chen, a NASA scientist, used synthetic moon regolith from both NASA and the China Space Agency to build 1mm diameter Moon Regolith Mirrors. This experimental concept illustrates the potential for NASA to build impossibly large telescopes on the lunar surface to be able to see much further into the universe than anything we could launch into space.

Shinola watch company in Detroit, Michigan fabricated an impossibly small quartz crystal resonator and container (1mm x .5 mm x 5mm) for inclusion in the Ether Chamber.

Covestro, in Pittsburgh, Pennsylvania developed a new formulation of dye-sublimation coating for the metal murals. This coating can endure the radical temperature swings on the lunar surface, are more stable to ultra-violet light, and are elastomeric to hold together when the metal murals are roll formed.

Alessandro Scali and Alessandro Chiolerio from the Instituto Italiano di Tecnologia, etched high resolution images onto silicon wafers at the nano-scale. Typically nano images at this scale have a crude nature to them; however, the MoonArk provided an opportunity to develop new processes to achieve smooth-looking, impossibly small images only visible under a scanning electron microscope (SEM).



The Moon Arts Group is a collaborative team of approximately 60 members which include Carnegie Mellon faculty, students, and alumni working alongside ~250 independent artists, scientists, educators, designers, technologists, researchers, and professionals from 20 countries and 22 states, coordinated through three faculty members at CMU. Together with 18 university and corporate partners we are forging new ground in the ways we collaborate to blur the boundaries between art and science.

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Across the World and in Popular Culture

MoonArk has been featured and referenced in hundreds of international articles and the project directors have been interviewed for France.tv, NPR, and Our Region's Business, and a host of podcasts and special programs.

We have also published multiple articles in professional and space industry trade journals and arts magazines. Carnegie Mellon (with the help of Animal Studio (think Taco Bell Chihuahua) created a feature promo video and film makers in Europe have followed us on our travels to document the momentous achievements of MoonArk.

We aim to amplify MoonArk in our next run at achieving the moon. Now, more than ever, MoonArk may serve to bring people together from across the world.

Select press is included here.

INNOVATION
Summer 2024

NPR
3 January 2016

THE NEW YORKER
25 July 2016

CNN
20 February 2020

SMITHSONIAN
8 January 2016

POPULAR SCIENCE
Fall 2019

The first MoonArk was exhibited in galleries and museums in Sweden, Japan, Slovenia, France, Greece, Hungary, Poland and across the U.S.

Currently, the twin MoonArk resides in the permanent archives of the Smithsonian National Air and Space Museum.

We plan to tour MoonArk II globally using our existing traveling exhibition and open our project archives to loan original materials that have never been shared before.

MoonArk was featured in the Miller Gllery exhbition celebrating the 30th Anniversary of the Frank-Ratchye STUDIO for Creative Inquiry. (above). Adjacent, MoonArk in its first exhibition in Sweden and installed in the Carnegie Museum of Natural History where the flight hardware resided for 2 years in run-up to launch.

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MoonArk II Website / moonarts.org

MoonArk I / Partners

Carnegie Mellon University · Astrobotic · James Madison University · University of South Carolina College of Arts and Sciences · Shinola Detroit · Nunatta Katersugaasivia Allagaatigarfialu Greenland National Museum & Archives · 3rd Dimension Industrial 3D Printing · General Dynamics Mission Systems · nano-c nanostructured carbon · ARNANO · MECCO · Commercial · 4.2.2. South · Carnegie Museum of Natural History · NASA · National Space Society · International Gemological Institute · covestro · ThermoFisher Scientific · Masterbond Adhesives | Sealants | Coatings · The Frank-Ratchye STUDIO for Creative Inquiry · Carnegie Mellon University School of Design.

Invest in our Cultural (Payload) Initiative

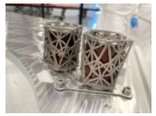
We are actively fundraising to generate **$250,000 USD** to support a full re-build of MoonArk to exacting specifications, readiness testing for flight certification, programming and promotion.

MoonArk II will be fabricated on an expedited schedule in efforts to make a July 2025 delivery to Astrobotic for acceptance testing.

In parallel, we aim to conduct materials testing to determine the condition of MoonArk I which currently rests in the space vehicle graveyard at Point Nemo, the most remote place in the Pacific Ocean (and on earth).

We would love to discuss a partnership and how you and/or your organization can support this effort to achieve the moon.

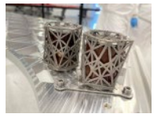
MoonArk I / 2009-2024



Flight Hardware
Valued at $2M< if recoverable from Point Nemo

Smithsonian Twin
Valued at $410k

MoonArk II / 2025 -



***New* Flight Hardware**
Priceless when Moon is achieved

New Touring Twin
Valued at $500k

MOONARK

Please contact:
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Donors can also use the following link to support the Moon Arts Group:

https://givenow.cmu.edu/campaigns/42888/donations/new?a=8533448&designation=moonartsgroup

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Cover photo courtesy of Hap Griffin

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