



Lunar performances employ a rover to carry out choreographed movements and leave deliberate marks in its tracks. *Moon Marks* is a series of drawings on the Moon left in the tracks of the rover. One of the first activities that we might carry out on the Moon is a series of drawings to announce our arrival and reflect on what it means to gaze back at Earth. The rover's wheels themselves are artistic tools designed to leave meaningful imprints that can be translated musically, visually, and kinesthetically.

ARTS, HUMANITIES, AND CULTURE IN SPACE EXPLORATION: ON THE GROUND, IN THE SKY, AND INTO OUTER SPACE

BY FRANK PIETRONIGRO



Astrobotic Rover

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Courtesy of Frank Pietronigro

ZGAC SKY STUDIO Parabolic flight For Artists showing 'Seed of the Infinite Absolute' by Lowry Burgess, flown by Frank Pietronigro on a Zero Gravity Corporation ZeroG flight.



Courtesy of Frank Pietronigro

ZGAC SKY STUDIO Parabolic flight For Artists showing 'Microgravity Mobile', flown by Frank Pietronigro on a Zero Gravity Corporation ZeroG flight.



"Drift Painting in Microgravity As Scientific Research" with Frank Pietronigro.

"Space art is a process that leads to a product. The process of creation can happen anywhere and can be deliberate (commissioned) or accidental (inspired). The product consists of a) object(s), and b) the impression on the observer(s), both immediate and lasting. To be space art, at least some element of the project must exist off-Earth."

— J.D. Burke

The arts have always had a place in spaceflight. As a renowned design researcher, Dr. Yvonne Clearwater joined NASA in 1984 as their first-ever environmental psychologist. But she was also a member of the design team for the ISS, where she was asked questions like "what colors should we use in the interior?" She established and led the award-winning NASA Habitability Research Team in rigorously tackling micro-gravity interior design issues including spatial orientation, stimulus deprivation, privacy, personalization, and perceived spaciousness in the isolating and confining work-live modules of the International Space Station.

A major direction in their work was defined as functional aesthetics, in recognition of the no-frills business of outfitting this pioneering space platform. The team scientifically approached problems and translated the results into formal design guidelines in collections of NASA spacecraft design standards. They fought hard to get windows in the crew quarters to allow astronauts to engage in the favorite off-duty activity on any human space mission: looking out the window back to the beautiful, rolling Earth. Given that windows were to be severely limited due to their weight penalties and space debris vulnerabilities, the team demonstrated that from Antarctica to outer space, simulated out-the-window views of naturalistic Earth scenes could be useful for mental and physical restorative effects.

Today, Yvonne Clearwater leads an innovative team working to develop a new NASA Cultural Convergence web domain as a unique hub in the intersection of art, science, and technology devoted to space exploration, and an underlying global clearinghouse they call 'art space.' These new media venues will include live links to past, present, and future endeavors and their results in the realm of space art.

Hope for Humanity through the Arts

History has shown that when artists and scientists collaborate, invention and innovation follow rapidly. Spaceflight technology is a site where artists and scientists can learn from one another by sharing their unique experiences — and their dreams — between their two divergent cultures. A new cooperation is unfolding among artists, space scientists, and engineers with the discovery of a rich common language that expands the horizons of these complementary cultures. According to Celestine Star, founder of Golden Star Productions, collaboration can foster a new hope for humanity from the new genre of the arts, humanities, and culture in space exploration.

Today, a new breed of artists who wish to work in zero gravity on the ISS and on missions to the Moon differentiate their movement by calling it 'arts in space' in order to better convey their methodological intentions to work directly with spaceflight technology. Organizations also play key roles in arts in space advocacy work, including the Arts Catalyst in London, International Astronautical Federation's Technical Activities Committee for the Cultural Utilization of Space, Leonardo OLATS, Leonardo Magazine, Zero Arts One, the International Society of Arts, Science and Technology, and the SKY ART group.

Arts in Outer Space

An audience of over 15,000 people enjoyed a historic world premiere of "I See The Earth and It Is Beautiful," featuring Commander Peggy Whitson and Crew Member Garrett Reisman of the 16th Expedition of the ISS, during Yuri's Night in the Bay Area at NASA Ames Research Center. The ISS could be seen in the sky passing nearly 300 miles over the event. The film featured interdisciplinary collaboration between astronauts onboard the ISS with space artists, musicians, and video editors on the ground.

This Cosmic Antiphony was co-created by the Deep Space Signaling Group (DSSG) at the STUDIO for Creative Inquiry, Carnegie Mellon University, Golden Star Productions, and the Zero Gravity Arts Consortium (ZGAC), in association with the Space Generation Advisory Council and Yuri's Night Bay area production team.

This short film will be screened again during ISDC 2011 and during the ZGAC Arts in Space screening during the San Francisco International Arts Festival 2011. The storyline takes audiences on a journey through beautiful clouds into space, then into the ISS, where Commander Peggy Whitson delivers a message while speaking the historic first words spoken from space by Yuri Gagarin, "I see the Earth and it is beautiful." In celebration of NASA's 50th anniversary, the audience was brought back to Earth while enjoying stunning imagery of NASA's space shuttle re-entry to Earth at sunset, descending back down through Earth's atmosphere, where the beautiful vistas and breathtaking views of life on our planet are celebrated.

Arts in the Sky

During the Life in Space track at ISDC 2011, a presentation will be offered to highlight plans for ZGAC Gravity Pulse: Parabolic Flight for Artists, involving flight on Zero-G Corporation's G-Force One jet (pending ZGAC parabolic flight sponsorship achievement). This historic flight on Zero Gravity Corporation's jet is an interactive, interdisciplinary, multicultural, and intergenerational flight where artists representing cultures from around the world will fly projects. The flights include a mother-daughter performance and a research project that considers transpersonal psychology and its significance for creative practice while utilizing digital aura photography. Artists will also utilize new video imaging technologies, such as a panospheric lens that provides images in 360 degrees, while investigating alternative means for documenting art projects created during parabolic flight.

An international team of experts in the fine arts, webcasting, psychology, history, and cultural theory will also fly with curators, writers, space scientists, and engineers collaborating on cutting-edge arts in space projects whose concepts are defining this new art movement of zero-

gravity arts. Perhaps, in support of the goal of increasing interdisciplinary collaborations, the acronym STEM should be turned into STEAM: Science, Technology, Engineering, Arts, Music, and Mathematics. ZGAC welcomes and encourages prospective artists, sponsors, space scientists, and engineers to join with us in support of the creation of ZGAC Gravity Pulse Parabolic Flight for Artists.

The Future of Space Arts

Scientists have been able to expand their understanding of nature by going into space, and myriad contributions to humanity have resulted. What fascinating benefits the arts will bring to space exploration! The value to human history is extraordinary. A new generation of space exploration enthusiasts will be captivated not by the archetypal images of space exploration of yesterday, but by the reality of experiencing and seeing all forms of cultural expression in space. The success of Yuri's Night festivities demonstrates that a new generation will find greater allegiance to space science and engineering if they see all aspects of our cultural diversity and human expression integrated into space activities on the ground, in the sky, and in outer space.

The 30th ISDC offers space enthusiasts opportunities to learn about developments taking place within the arts, humanities, and culture in space exploration through presentations offered by The Moon Arts Group and ZGAC, an artist-created international space arts organization dedicated to fostering greater access for artists to spaceflight technology and zero-gravity space through the creation of international partnerships with space agencies, art organizations, and leading universities.

Frank Pietronigro is an interdisciplinary artist, educator, and author; co-founder of the Zero Gravity Arts Consortium; West Coast representative of the STUDIO for Creative Inquiry, College of Fine Arts, Carnegie Mellon University; Yuri's Night Bay Area Production Team Member; professor in the Web Design New Media Department at the Academy of Art University; and curator for the Zero Gravity Arts Consortium Screening at the San Francisco International Arts Festival.

Corporations partner with schools to establish creative links between the Earth and Moon.

In 2008, the STUDIO for Creative Inquiry at Carnegie Mellon University was invited by Astrobotics Inc. to join in the robotic Google Lunar X PRIZE competition with legendary roboticist Red Whittaker and his team at the Robotics Institute. Lowry Burgess, arts in space pioneer, formed the Carnegie Mellon artistic team. They have created artistic concepts based upon establishing links between the Earth and the Moon. Moon Arts Group projects include the *Moon Bell* that will use radio waves, telescopes, and emerging computer software to create a sound from the Earth to the Moon and back again and the *Moon Ark-Reliquary* that integrates four independently described payloads into one extraordinary and highly significant billion-year enduring payload. In the *Moon Ark-Reliquary* are the ashes of the dead, the nano-micro DNA of life on Earth, the gathered waters of the world in carbon nano-tubes, and the *Fragrance for the Moon* with surrounding poetry – all in an integrated extraordinarily beautiful container affixed to the *Lunar Lander* pedestal, the landing platform of the Tranquility Trek robot, and Moon Marks where the Rover's tracks are used to delineate drawings on the surface of the Moon. Other projects such as *Earth Tapestry*, *See Me on the Moon*, *Hear Me on the Moon*, *Touch the Moon*, *Moon Fragrance*, *The Well-Wishing Ring*, and *Moon Poems* further embody various senses.

For more information on the Moon Arts Group, the Space Arts Development Fund, and the Zero Gravity Arts Consortium, please visit:

Space Arts Development Fund: www.isdc.nss.org/2007/spaceart.html

Moon Arts Group: www.moonarts.org/index.html

Frank Pietronigro: www.pietronigro.com

San Francisco International Arts Festival: www.sfiac.org/2011/

Space Arts Info Database: www.spacearts.info/

Zero Gravity Arts Consortium: www.zgac.org



William L. "Red" Whittaker