Extravehicular Activity and Human Surface Mobility Technologies

A NEW PARTNERING OPPORTUNITY

Reference No: 80JSC022EHP

Purpose:
The NASA Extravehicular Activity (EVA) and Human Surface Mobility (HSM) Program (EHP) seeks to work with partners to advance the technologies associated with human surface mobility in support of NASA's Artemis missions. The EHP vision is to provide safe, reliable, and effective EVA and HSM capabilities that allow astronauts to survive and work outside the confines of a spacecraft on and around the Moon. Artemis missions will return humans to the surface of the Moon using innovative technologies to explore more of the lunar surface than ever before. We will collaborate with commercial and international partners and establish the first long-term presence on the Moon. Then, we will use what we learn on and around the Moon to take the next giant leap: sending the first astronauts to Mars.

EHP Flight Projects are Exploration EVA suits (xEVA suits) and tools, Lunar Terrain Vehicle (LTV), and Pressurized Rover (PR). For more information, reference the EHP website here: Extravehicular Activity and Human Surface Mobility - NASA.

The EHP and partners will collaborate on developing lunar surface capabilities to reduce risk and increase productivity of EHP Flight Projects during Artemis missions. Focus will be on technologies that mitigate risk for lunar surface systems that will provide mission planners with more choices, thereby increasing mission success. In pursuing these types of capabilities, NASA and potential partners will develop new and improved technologies that will provide additional options for terrestrial applications in multiple industries.

Additional Information:
EHP may periodically publish in Appendices to this announcement identifying specific technologies under current development to further inform potential collaboration opportunities. An example of one such technology being developed is described in Appendix A - Lunar Dust level sensor and Effects on Surfaces (LDES). For access to this export-controlled document, please email the points of contact below. (Document can be found at Sam.gov.).

EHP periodically places informational reference documents that relate to lunar human surface mobility accessible by industry in the EHP Technical Library. Access to the technical library requires Login.gov access. Follow the prompts to gain access. Once access has been granted, the informational documents related to this announcement is in the 'EHP Technology Integration' folder, in which you will find information on the following (major updates to the technical library content will also be updated here):

- LDES – initial ground test results regarding the magnitude of thermal impact that lunar dust has on surfaces.
- 84S Lunar Terrain Model – a terrain model of the lunar south pole (below the 84 South latitude) which can be used as an early reference data set to enable initial studies of the lunar terrain.

Additionally, NASA has made available to the public the Digital Lunar Exploration Sites Unreal Simulation Tool (DUST) which is an early 3D visualization application of the

lunar south pole. Its intended use is for early inspection, mission planning, and analysis of lunar landing and traverse sites for HLS and Artemis Base Camp. This application and the supporting toolkit built from DUST are used to provide distributable lunar environments and tools to support rendering and exporting terrain, multi-display facilities, and connections to Trick-based simulations. It can be attained at the following link: Digital Lunar Exploration Sites Unreal Simulation Tool (DUST) Products(MSC-27522-1) | NASA Software Catalog.

Technology:
EHP Technology goals include, but are not limited to, overcoming environmental and long mission duration challenges. Lunar environmental challenges include operating in dust (lunar regolith), radiation, and extreme temperatures. Martian environmental challenges are operating in Martian carbon dioxide-rich atmosphere and 1/3g, driving the need for low size, weight, and power. Long mission durations drive sustainability and maintainability challenges. Some technology areas of interest include, but are not limited to dust mitigation capabilities, EVA systems, local relative navigation, increased battery capacity and reduced charge time, and advanced mobility concepts capable of sustained operation while minimizing maintenance in a lunar environment for an extended service period. Each system will be required to operate in the extreme environment of cis-lunar orbit and/or the lunar south pole, including inside Permanently Shadowed Regions (PSRs) and onto Mars.

Intellectual Property (IP):
This potential Partnership may produce new IP that could be jointly owned by NASA and the partner or may become the property of the partner. Standard clauses for partnership agreements are provided in the appendices of the Space Act Agreements Guide, NAII 1050-1. These standard clauses are usually used without any changes. Any deviations from the standard intellectual property clauses are reviewed by NASA Office of the General Counsel at the Headquarters and/or Center-level, as appropriate and approved by NASA Partnerships Office.

Potential Commercial Applications:
Lunar, undersea, automotive, nuclear, space tourism, personal protective equipment (PPE) …

Keywords:
Mobility, spacesuit, rover, vehicle, power infrastructure, sustainable, dust, communication architecture, relative navigation and localization, regolith, lunar terrain vehicle, LTV, pressurized rover, PR, lunar, Artemis, moon, ISS, LEO

Contact Information:
Technology Development and Partnerships Manager,
EVA & Human Surface Mobility Program
Email: Michael.a.berdich@nasa.gov

Partnership Manager,
JSC's Partnership Development Office
Email: jsc-partnerships@mail.nasa.gov