

IAF SPACE EXPLORATION SYMPOSIUM (A3)
Interactive Presentations - IAF SPACE EXPLORATION SYMPOSIUM (IP)

Author: Mr. GeonHo Lee
Unmanned Exploration Laboratory (UEL), Korea, Republic of, geonho.lee@uel.co.kr

Mr. KangSan Kim
Space Generation Advisory Council (SGAC), Korea, Republic of, antonio.stark@spacegeneration.org

SYSTEM OF QUADRUPLE ROVER FOR LUNAR HABITAT 3D PRINTING CONSTRUCTION

Abstract

Lunar habitats are most often found in dome shapes due to their economy of material usage to inner volume, and the high level of structural integrity provided. The difficulty of transporting construction materials from Earth requires lunar habitat construction to utilize lunar soil. The most efficient method of lunar habitat construction is 3D printing of lunar habitat domes using mobile 3D printing equipment, or 3D printer-equipped rovers. This study investigates 3D-printer rovers with robotic leg-wheel combinations that can scale the sides of lunar habitat domes during construction. Leg-wheel hybrids can operate as both four-wheeled rovers or four-legged quadruple rovers by locking or releasing the wheels attached to the legs. This study looks at one proposed model of a quadruple leg-wheel hybrid rover and analyzes the strengths and limitations of the proposed approach. The degree of freedom enabled by each leg, the amount of weight and equipment to be carried by the rover, and the type of 3D extrusion used are all proposals, and can be adapted to different mission variables and environment limitations. Ultimately, this paper does not attempt to propose a single best solution for lunar habitat 3D printing construction, but rather provides a framework for analyzing and comparing different approaches for constructing large-scale structures via mobile 3D printing platforms.