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REVOLUTIONIZING HABITAT CONSTRUCTION: 3D PRINTING WITH LOCAL MATERIALS FOR MARTIAN AND LUNAR BASES

Abstract

This paper explores the paradigm shift in habitat construction for Martian and lunar bases facilitated by 3D printing technology and the utilization of locally available materials. By leveraging additive manufacturing capabilities and utilizing regolith and other indigenous resources found on Mars and the Moon, we investigate innovative approaches to overcome resource limitations and streamline habitat construction processes in extraterrestrial environments.

Our research outlines a comprehensive framework for prospecting, extracting, and processing local materials to produce construction-grade feedstock for 3D printing. Through rigorous analysis, we assess the structural integrity, sustainability, and cost-effectiveness of 3D printed habitats tailored for the unique environmental conditions of Mars and the Moon.

Furthermore, we underscore the transformative potential of this approach in enabling the establishment of self-sustaining colonies on distant celestial bodies. By reducing reliance on Earth-based resources and minimizing transportation costs, 3D printing with local materials offers a viable pathway towards sustainable space exploration and human habitation beyond Earth.