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ARCOR LUNAR SPIDER ROBOT FOR SPACE CONSTRUCTION

Abstract

Future lunar bases require advanced technologies for autonomous assembly in extreme environments. This project introduces a spider-like lunar robot, designed for the construction and adaptation of habitats on the surface and inside lunar caves. Its octopod architecture provides superior mobility on complex terrains, with enhanced stability for manipulating modular structures.

Equipped with robotic arms, this robot can pick up, move, and precisely assemble structural components. Additionally, it can collaborate with other robots in installing modular panels, adjusting its configuration based on the mission phase. Its integration with autonomous assembly stations reduces human intervention, accelerating lunar colonization efforts. The ability to function independently allows it to perform tasks even when direct communication with human operators is not possible.

This system represents a significant advancement in space construction automation, enabling the creation of sustainable bases without requiring astronauts at every assembly stage. The combination of high-precision sensors and AI algorithms allows it to adapt to environmental changes, adjusting its approach according to construction needs. It can continuously evaluate its surroundings, ensuring structural integrity during assembly.

The robot's modular design allows for customization of its tools and capabilities depending on the construction phase. It can be equipped with anchoring systems, welding tools, or 3D printing technology to fabricate components on-site, reducing the need to transport prefabricated structures from Earth. With this capability, the spider robot could play a crucial role in developing self-sufficient lunar infrastructure. By allowing real-time adaptation to different construction demands, it becomes an indispensable tool for long-duration missions and future planetary habitats. The combination of dexterity, adaptability, and autonomous decision-making ensures its effectiveness in extreme conditions. Furthermore, its power system is optimized for extended operations, using a hybrid approach combining solar energy and advanced battery storage. Its ability to coordinate with multiple robotic units allows for parallel construction processes, drastically reducing the time needed to establish functional habitats. This spider robot's scalable design enables the assembly of increasingly complex structures, making it a fundamental asset in humanity's endeavor to create a permanent presence on the Moon and beyond.