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AUTONOMOUS ROVER FOR LUNAR MINING AND EXPLORATION (ARLME)

Abstract

Nano Rover with H3 Tracer will help the lunar mining operations in near future. Helium extraction and the idea of harvesting a clean and efficient form of energy from the Moon has stimulated science fiction and fact in recent decades. Unlike Earth, which is protected by its magnetic field, the Moon has been bombarded with large quantities of Helium-3 by the solar wind. It is thought that this isotope could provide safer nuclear energy in a fusion reactor since it is not radioactive and would not produce dangerous waste products. We are testing lunar mobility and mining operation in landing site ARLME rover is the Regolith excavation is desired in future space missions for the purpose of In Situ Resource Utilization (ISRU) to make local commodities, such as propellants and breathing air and to pursue construction operations. The excavation of regolith on another planetary body surface such as the Moon Mars an asteroid or a comet is extremely difficult because of the high bulk density of regolith at lower depths. Additionally, because of the low gravity in these space surface environments the mass of the excavator vehicle does not provide enough reaction force to enable the excavation blade to penetrate the regolith if traditional terrestrial methods are used. ARLME uses counterrotating bucket drums on opposing arms to provide near-zero horizontal and minimal vertical net reaction force so that excavation is not reliant on the traction or weight of the mobility system to provide a reaction force to counteract the excavation force in low-gravity environments. The excavator can traverse steep slopes and rough terrain and its symmetrical design enables it to operate in reverse so that it can recover from overturning by continuing to dig in the new orientation. The system can stand up in a vertical position to dump into a receiving hopper without using a ramp. This eliminates the need for an onboard dump bin, thus reducing complexity and weight. ARLME has wireless control telemetry and onboard transmitting cameras allowing for teleoperation with situational awareness.