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Author: Dr. Samuel Webster
EPE Oceania Pty Ltd., Australia

Ms. Katie Doyle
Lunar Outpost, Australia
Mr. Henry Laurie
Lunar Outpost, Australia
Mr. Ben Sorensen
EPE Oceania Pty Ltd., Australia
Mr. Joe Kenrick
Lunar Outpost, Australia
Ms. Samantha Raines
EPE Oceania Pty Ltd., Australia

LEAPS AND BOUNDS: ROO-VER, AUSTRALIA'S FIRST LUNAR ROVER MISSION

Abstract

The Australian Space Agency's Trailblazer project will see ELO2 design, construct and operate the Australian-made rover, 'Roo-ver', on the lunar surface later this decade. The 20 kg Roo-ver is Australia's flagship lunar exploration mission which will contribute to NASA's endeavour to go to the Moon and on to Mars. The project completed its preliminary design review (PDR) and is progressing rapidly toward a delta PDR where updates to the mission profile and integration with NASA payloads will be implemented. This paper will present the Roo-ver mission, the mission's technical objectives, and update the progress toward the next milestones.

Roo-ver is limited to 20kg with the goal of achieving significant autonomous capabilities. The first mission objective, "to demonstrate and progress Australian exploration foundation services capability with remotely operated and autonomous robotic lunar assets" [1], highlights the importance of automation and remote operations to Australian space strategy [2]. The second mission objective, relating to the delivery of regolith to a NASA facility, will contribute to NASA's endeavour to establish a sustainable human presence on the Moon and go on to Mars. As the mission concept has matured, the delivery of lunar regolith has evolved into the delivery of a NASA sensor suite to key locations on the lunar surface to measure regolith composition. Effectively measuring and mapping lunar surface regolith composition, particularly the presence of radicles, is of significant interest to the ISRU community, and will contribute to understanding the impact of operations on the lunar surface through plume-surface interactions.

Developing and demonstrating foundation services is central to the Roo-ver project objectives. In space, foundation services are operational activities that support exploration missions to build towards a sustained off-earth presence. They may take the form of exploration, logistics, inspection, or a range of other fundamental activities. Linking of terrestrial and space-based capabilities, including the robotics and autonomous developments from this mission, will provide benefit to all associated sectors and enhance the competitiveness of existing Australian industries.

Roo-ver's mission, particularly its contribution to improving understanding of plume-surface interactions, will inform sustainable lunar activities as humanity reaches for the stars. It is a first for Australia, and represents an exciting opportunity that will develop Australian space-based robotics, autonomy, and remote operations capability. These are capabilities that underpin the foundation services required for a

sustained off-earth presence, as well as bolstering the efficiency and sustainability of terrestrial activities that are key to Australia's future.