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LUNAR VOYAGE 1: LUNAR OUTPOST'S MAPP ROVER AND PLANNED OPERATIONS FOR THE
FIRST COMMERCIAL ROVER EXPLORATION OF THE LUNAR SOUTH POLE

Abstract

Lunar Outpost's Lunar Voyage 1 will be the first privately-owned rover to traverse near the Moon's South Pole. The novel rover platform, the Mobile Autonomous Prospecting Platformed (MAPP), will explore Shackleton Connecting Ridge and collect a unique scientific data set that will further our understanding of the lunar south pole region. Lunar Voyage 1 will be delivered to the lunar surface by a lander built by Intuitive Machines during the IM-2 mission that will also deliver NASA's PRIME-1 drill to the lunar surface. MAPP hosts several payloads including Nokia's 4G/LTE communications demonstration, MIT's RESOURCE camera and AstroAnt, and several commercial instruments and payloads. The planned launch window opens in late 2024. The MAPP rover is a first-of-its-kind robotic exploration platform. MAPP hosts several scientific instruments that will collect data during the one lunar day long mission. MAPP is equipped with dual stereoscopic navigation cameras that will be used to map the lunar surface during the traverse. These cameras can be used to synthesize images in 3D and are optimized for observing geologic features a few meters in front of the rover. A third camera is used for dissimilar redundancy to collect additional imagery of the surface. During Lunar Voyage 1, MAPP will collect lunar regolith in a transparent collection hopper mounted inside one of the rover's wheels. A fourth camera focused on the surface of this collected regolith will capture detailed and close-up images of the regolith composition. The fifth sensor aboard MAPP is the RESOURCE camera created by the Massachusetts Institute of Technology and NASA Ames. This sensor is a solid-state depth sensor/LiDAR, capable of collecting 12-megapixel color enhanced with 1-megapixel time of flight depth data. This sensor will produce high resolution depth images for lunar geology and enable ground-based VR simulations of surface observations. The final remote sensing instrument on MAPP is a thermal camera for observation of surface temperature profiles in lit and unlit regions during the traverse. The MAPP rover will use these instruments to collect an array of scientific data that will deepen our knowledge of the properties of lunar highlands regolith, the presence of lunar resources, and geologic history of the Moon's South Pole region. This paper will outline the rover capabilities and discuss plans for rover surface operations.