Paper ID: 52809
oral

IAF SPACE EXPLORATION SYMPOSIUM (A3)
Moon Exploration – Part 2 (2B)

Author: Dr. John Walker
ispace, Inc, Japan

Mr. Louis Burtz
ispace, Inc, Japan
Mr. Fabian Dubois
Japan
Dr. Abigail Calzada-Diaz
ispace, Inc, Luxembourg
Mr. Toshiki Tanaka
ispace, Inc, Japan

ISPACE MODULAR LUNAR ROVER DESIGN

Abstract

ispace is a company whose vision is to expand and sustain humanity's presence in space by utilising resources available on the Moon. ispace previously developed the Sorato rover for the Hakuto Google Lunar XPRIZE team, and is now developing its own lunar lander and its next generation of lunar rovers.

The Sorato rover is a simple 4-wheel skid steer rover that comprises a redundant controller architecture, 4 cameras, an IMU, a surface radio (communication to Earth is via a lander) and a time-of-flight sensor for hazard detection and avoidance. At under 4kg, it was a highly integrated design capable of carrying only a small payload. Although it didn't fly, it was qualified by ispace and became the baseline technology for its lunar rover program and input into its lunar lander program.

ispace is now making an updated rover with a modular design. The rover is similar in design to Sorato, but is 10kg with approximately 5kg of payload capacity with seven standardized payload spaces, designed for the anticipated payload requirements such as thermal environment, access to space, and access to the lunar surface. Each space provides mechanical mounting, regulated power and a standard data interface. The architecture of this rover has two "levels." First, there is a lower level designed for high reliability, including all components necessary to "rove" or explore: defined as all functions related to command and data handling, locomotion and image / near-realtime video transfer for teleoperation. Second, there is a higher level designed for high performance, including additional cameras, LiDAR and a COTS controller capable of on-board image processing and localization. The lower level is designed to support ispace's medium term rover missions and provide consistent baseline data across several missions, while the upper level is designed to be upgraded frequently.

ispace will fly a rover with both levels, ispace-internal payload and hosted payloads in an upcoming mission to demonstrate its technology development. The "lower" level of this rover design also serves as a rover bus, available to customers that want a proven rover platform including mobility and communications, but wish to own and control the entire rover and its payload space.