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Moon Exploration – Part 1 (2A)

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DEVELOPMENT PROGRESS OF THE FIRST ISPACE PRIVATE LUNAR EXPLORATION MISSION

Abstract

As a start-up company based in Japan, Luxembourg and the U.S., *ispace* is developing small, lightweight lunar landers and rovers to establish a low-cost platform for scheduled transportation. Since 2018 as one of the five finalist teams of the Google Lunar XPRIZE—HAKUTO, we continue our lunar exploration program as HAKUTO-R with "R" stands for "Reboot". Mission 1 will enter an orbit around the Moon, while Mission 2 will perform soft lunar landing and deployment of rovers to collect data from the lunar surface.

We *ispace* have contracted with SpaceX's Falcon-9 rocket to carry our lunar landers for the HAKUTO-R program as secondary payloads. The launches for the first and second missions will occur in 2020 and 2021, respectively.

Our first mission is an orbiter that enters into an elliptical lunar orbit and it aims to be the first privately-led, privately-funded mission to have close observation of the Moon. It is a critical mission for *ispace* to test data gathering and relaying technology for our future Earth–Moon transport system.

The second mission will attempt soft landing on the Moon and deploy two rovers on the lunar surface. Similar to the first mission, it serves as a pilot test to demonstrate our landing capability and surface exploration technology on the Moon. These two missions pave the way for our next series of commercial missions to carry customer payloads after 2021 whose schedules are demand dependent.

Our lunar missions consist of the following phases: (1) Earth orbiting and trans-lunar injection; (2) Lunar orbit insertion; (3) Observation of the Moon for 1 month in Mission 1 followed by a hard landing; (4) Soft landing on the lunar surface for Mission 2 and surface exploration by our micro-rovers up to 14 days. Areas with high scientific and resources utilization interest such as skylight hole near Lacus Mortis are our primary target landing sites. High-definition pictures and live stream videos will be transmitted back to the Earth.

With Draper as the lead of the team to participate in NASA's Commercial Lunar Payload Services (CLPS) Program, *ispace* is continuing to develop a low-cost platform to frequently access and explore the Moon; while Draper providing their support on precise landing on the Moon with their 50-year of heritage since the Apollo. Such a system can enable mapping and retrieving valuable resources from the lunar surface for research and commercial applications in the next decade.