Nikkei XTECH

“Refining Water Resources on the Moon”, ispace Collaborates with Kurita Industries and Others

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ispace, the lunar transportation service provider, will accelerate joint demonstrations with domestic companies possessing advanced technologies for lunar resource development. The company aims to equip its lunar lander with Kurita Industries' water treatment systems and EdgeCortix (Tokyo, Chuo) AI semiconductors by the late 2020s. It will also collaborate with Space Data (Tokyo, Minato) on the digitalization of lunar environmental data.

ispace Collaborates with Domestic Companies for Lunar Resource Development
Kurita Industries will send water treatment technology test equipment to the Moon after 2027.
EdgeCortix's AI semiconductors will autonomously control lunar landers and other equipment, with plans to send them to the Moon after 2028.
Space Data will build a digital twin that recreates the Moon's terrain and other features.

Ensuring a water supply for lunar operations

ispace will collaborate with Kurita Water Industries, a leading company in industrial water treatment, to develop water treatment technologies for use on the Moon. The partnership aims to help secure water resources for sustained human activity on the lunar surface.

Transporting water from Earth to the Moon is extremely costly, which is why water treatment technologies suitable for space environments are becoming increasingly important. By leveraging Kurita Water Industries' expertise in producing ultra-pure water for semiconductor manufacturing, the goal is to develop technologies to purify and refine water resources found on the Moon, such as ice and subsurface water.

Kurita Water Industries has already supplied ultrapure water for the ispace lander "RESILIENCE," which was launched on January 15, 2025, as part of its "Mission 2." This ultrapure water was produced using a system designed for use in space. The two companies aim to install a test device for lunar water treatment demonstration on a ispace lander sometime after 2027, with the goal of conducting tests on the Moon.

Autonomous control of the lunar lander

They are advancing joint development with EdgeCortix on the utilization of AI semiconductors for lunar exploration. The company's AI semiconductors are highly power-efficient and have excellent radiation resistance. As they are suitable for use in space, they will be considered for use in landers and lunar rovers. The goal is to jointly proceed with demonstrations by 2028 and, from that year onward, to install them on ispace's lander for transportation to the Moon.

The AI semiconductors are intended for use in the autonomous control of landers and rovers. They will be applied to image recognition during the lander's pinpoint landing and to self-location estimation for the rover.

For the lander's pinpoint landing, AI semiconductors can be applied to a highly safe landing method known as "image matching navigation." In this method, the lander recognizes its position on the Moon's surface using a crater as a landmark. By comparing the crater map built into the lander with the observed images, it measures its own position and automatically identifies a safe landing site while detecting obstacles.

In this process, CPUs (Central Processing Units) and GPUs (Graphics Processing Units) have been used for computational tasks, but there is an issue with power efficiency when using them in space, where power supply is limited. There is also the problem of susceptibility to malfunctions (soft errors) caused by radiation.

EdgeCortix's AI semiconductors adopt a data-flow architecture, also known as a non-Von Neumann architecture, which offers higher power efficiency compared to CPUs and GPUs. They also have the advantage of being less susceptible to soft errors. The method they use updates information, such as "weights" used in AI inference processing, during each inference cycle, meaning that even if an error occurs, it is less likely to affect subsequent computational processes.

In the joint demonstration, the resistance to space environments will be quantitatively evaluated. Ryo Ujiie, the Chief Technology Officer (CTO) of ispace, stated, "In the future, once lunar infrastructure is established, there could be applications such as autonomous optimization of communication networks."

Digital twin of the lunar surface

Space data aims to digitalize the Moon's environment and develop businesses based on that data. For lunar exploration and activities on the Moon, digital twin technology will be developed to recreate the Moon's environment, such as its terrain, in a virtual space. Using the lunar data collected by ispace during its exploration missions, highly accurate terrain models will be constructed.

On February 15, 2025, ispace's "RESILIENCE" successfully completed a "lunar flyby," passing near the Moon becoming the first commercial lander by a private company to do so. On June 6 of the same year, it will aim to land on the Moon's surface. Following the current lunar exploration plan, Mission 2, ispace is planning "Mission 3" in 2026, led by ispace's U.S. subsidiary, and "Mission 4" in 2027, which will be conducted by a lander currently under development in Japan.

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