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T1-3

変形型月面ロボットによる一粒の挑戦

Challenges of lunar exploration by Transformable nano rover of which nickname is "SORA-Q".

渡辺　公貴 [1]
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1．Overview

The Transformable nano rover (Lunar Excursion Vehicle 2 (LEV-2), with the nickname “SORA-Q”), has succeeded in taking an image of the SLIM spacecraft that landed on the lunar surface and was jointly developed by four parties, namely, JAXA, TOMY Company, Ltd., Sony Group Corporation and Doshisha University .LEV-2, together with the Lunar Excursion Vehicle (LEV-1) , are the first Japanese lunar surface exploration rovers , and LEV-2 is the world’s first rover to conduct fully autonomous exploration of the lunar surface. LEV-2 and LEV-1 also performed synchronized and coordinated lunar surface exploration for the first time.LEV-2 is now the world’s smallest and lightest lunar exploration rover.

2．Description of SORA-Q

SORA-Q has been jointly developed by JAXA, TOMY Company, Ltd., Sony Group Corporation, and Doshisha University since April 2019.SORA-Q was launched from Tanegashima in Japan by H-2A rocket on September 7, 2023, aboard the SLIM developed by JAXA.

Credit: JAXA / TOMY Company / Sony Group Corporation / Doshisha University

Fig. 1.　SORA-Q

LEV-2, along with LEV-1 SLIM and was released to the Moon on January 20, 2024, just prior to the SLIM landing, along with LEV-1. Afterwards, LEV-2 took images of SLIM and the surrounding environment, which were transmitted to the ground by LEV-1's communicator. The rover, resembling a baseball ball, has a diameter of roughly 80 mm and weights around 228g.

Its transformational mechanism allows for compactness during transportation, with enhanced mobility achieved through the use of extendable wheels, a tail stabilizer, and cameras. To traverse soft terrains efficiently, the rover utilizes an eccentric wheel mechanism.

Fig. 2. An image of SLIM on the lunar surface

Fig. 2. not only shows how SLIM landed on the lunar surface but also proves that the following actions have been performed correctly: transformation of LEV-2 from the folded spherical shape to the deployed wheeled configuration, movement of LEV-2 on the lunar surface, image acquisition by the onboard cameras, autonomous selection of transmitting images that effectively captured the SLIM spacecraft and its vicinity, and wireless data transmission between LEV-2 and LEV-1 on the lunar surface. The other data, including travel logs, are still under analysis, and the results will be announced in the future.

Reference

1) Jan. 25, 2024 [release] Transformable nano rover successfully captures and transmits image of SLIM lander on the moon