

15th SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)
Hitchhiking to the Moon (8)

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THE PROPOSAL OF AUTONOMOUS MOVEMENT AND EXPLORING ON THE MOON SURFACE
BY COOPERATION OF BUDDY ROVER USING IMAGE PROCESSING**Abstract**

When exploring the Moon surface, advancing toward the target direction is very important. To overcome this issue, existing researches have focused on estimating the position of rover accurately. For this purpose, the large-size rover such as Mars Pathfinder of NASA has the potential of creating the map by using a high accuracy distance measurement sensors such as a laser rangefinder. What is noted here is that (1) the large-sized rover can carry the heavy and big size sensor including the laser rangefinder, but (2) it is difficult to bring such a rover by the low cost and lightweight small satellite due to the restriction of its size and mass. On the other hand, it pays attention to a low-cost, rapid exploration that uses the small satellite in recent years. The SLIM project in which we have participated is also one of the small satellite exploration project examined by Japan Aerospace eXploration Agency, JAXA. A SLIM project is the project to prove next generation satellite technology, for example navigation and guide etc., and a small satellite is sent to the surface of the moon as a demonstration experiment and exploring with rover of weight about 1 kilogram is assumed after a landing the lander. A teleoperation of rover from the earth is difficult for an operation time for limit brought by weight limitation of 1kg, and autonomy movement of rover is indispensable. Therefore, we propose the completely new Rover system which can move by autonomy to the destination 300 meters away from the landing point. In the proposed system, rover of two bodies moves sequentially in cooperation, and a mutual position is estimated using a camera and image processing. As a result, it becomes possible to create the local map from a move point. And by using the created local map, rover can move in the target direction. As a result of experimenting in order to verify the validity of the proposal method, it became clear to the destination 300 meters away from the landing point that it can reach in sufficient accuracy.