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DESIGN AND DEVELOPMENT OF THE YAOKI ROVER AND RESULTS FROM THE LUNAR SOUTH POLE ON IM-2

Abstract

The Yaoki rover landed on the Moon on March 6, 2025, aboard the Intuitive Machine IM2 lander. Weighing only 500 g, it is the smallest privately funded planetary rover. Designed as a technology testbed for future, larger rovers and other lunar infrastructure, the Yaoki rover platform supports innovative developments. The Dymon team also developed a dedicated carbon-fiber deployer with a standard interface that can easily integrate with a broad range of landers. For example, on IM2, the Yaoki rover was positioned in the otherwise unused space between the struts of the Athena lander's legs.

This paper first provides an overview of the design and architecture of the main rover, deployer, and ground segment systems of the Yaoki mission, and then presents the surface operations conducted in the lunar South Pole region along with key mission data.

We detail the rover and deployer architectures—including the avionics (camera, onboard computer, two brushless motors, power system, radio and antennas, temperature sensors, and accelerometer) and the flight software design.

Regarding the ground segment, we discuss the implementation of a Mission Control System based on the open-source Yamcs framework, the 3D simulation environment for the lander, rover, and lunar surface, and the specifics of the Earth-based testing environment prior to launch.

Finally, we present the main results and data transmitted from the rover on the Moon, providing an overview of the different phases of operations and an analysis of the images, sensor data, and housekeeping telemetry.