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Author: Mr. Giorgio Cifani
European Space Agency (ESA/ESTEC), The Netherlands

Mr. Alexandre Darrau
ESA, The Netherlands
Mrs. Flavie Aditya Annick Suzanne Davida Tohotaua Rometsch
ESA-ESTEC, The Netherlands
Mr. Gustavo Alvarez
ESA, The Netherlands
Dr. Ludovic Duvet
ESA - European Space Agency, United Kingdom
Mr. Robin Biesbroek
ESA european space agency, The Netherlands

ARGONAUT: ESA'S VERSATILE LUNAR LANDER ENABLING MULTIPLE MOON MISSIONS

Abstract

In the domain of space exploration, the importance of versatile lunar landers cannot be overstated, as they are fundamental to mission continuity and cost-effectiveness. This paper introduces the Argonaut program, a European Space Agency (ESA) initiative with the overarching aim of facilitating multiple moon landing missions. The program is strategically aligned with several high-level objectives, including fostering European autonomy in complex and extended robotic lunar exploration, making substantial contributions to international lunar exploration efforts such as NASA's Artemis program, and prioritizing scientific endeavor in line with ESA's Human and Robotic Exploration strategic goals.

Argonaut consists of two core elements: the Lunar Descent Element (LDE) and its Passenger module. The LDE incorporates essential transportation and landing capabilities, including propulsion, guidance, and precise landing mechanisms. Meanwhile, the Passenger module serves as a versatile platform capable of accommodating various payloads, ranging from logistical support for crewed surface missions to specialized scientific instruments tailored to specific mission objectives. With a modular architecture, complemented by an envisioned procurement approach per element, Argonaut optimizes resource utilization, enhances industrial opportunities, and streamlines mission planning and execution processes.

This paper conducts a comprehensive exploration of the design considerations inherent in various mission concepts within the Argonaut program. Additionally, it examines the potential applications of Argonaut, highlighting its adaptability and versatility as a driving force behind a new era of lunar exploration and research endeavors. With its strategic objectives and modular architecture, Argonaut is poised to revolutionize lunar exploration efforts and propel the ESA Member States towards greater understanding and utilization of the Moon's resources.