

47th STUDENT CONFERENCE (E2)  
Student Team Competition (3-GTS.4)

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## 2ND PLACE WINNING 2019 NASA RASC-AL TEAM - PLACEHOLDER

**Abstract**

This is a placeholder abstract for the 2nd place winner of the 2019 NASA Revolutionary Aerospace Systems Concepts - Academic Linkage (RASC-AL) competition. (<http://rascal.nianet.org>)

This paper will present the results of the 2nd Place winning team's project from the NASA RASC-AL Design Competition. The competition results will not be known until mid-June.

RASC-AL is an annual university-level competition seeking innovative approaches to NASA's future engineering and technology advancement needs related to extending humanity's reach beyond low Earth orbit. Teams will design innovative solutions with supporting original engineering and analysis in response to one of the following themes. Abbreviated Theme Descriptions: 1. Gateway Logistics as a Science Platform - Teams should propose use cases for a logistics module as a science platform and describe how their science payload fits within the provided capabilities of the logistics module. Teams should describe the concept of operations for their science payload, as well as any relevant operations after the logistics module leaves the Gateway. Teams should identify the science that will be performed and why it was selected.

2. Gateway-based Cis-Lunar Tug - Teams should design a reusable cis-lunar tug to transport payloads between the Gateway and low Lunar orbit. The tug should be reusable and refuelable at the Gateway. It should be capable of transporting non-crewed payloads, to include lunar sample return payloads, other science platforms, landers, and commercial assets.

3. Gateway-based Human Lunar Surface Access - Teams should come up with concepts for crewed lunar surface access and a campaign that allows repeated surface missions to establish a research station at or near one of the Moon's poles. The architecture should leverage current NASA capability investments, as well as existing or anticipated (near-term) commercial and international launch vehicles, in space propulsion capabilities, and lunar surface systems.

4. Gateway Uncrewed Utilization Operations - Given the Gateway's need for automation for continuous operations when the Gateway is uncrewed ( 11 months/year), opportunities exist to optimize the internal designs for crew interaction, robotic interaction, science/payload experiment packaging, standardized experiment interfaces and overall logistics systems for both when the crew is at the Gateway and in uncrewed mode. Teams should propose utilization scenarios and systems concepts addressing those scenarios for the 11-month uncrewed Gateway period. These scenarios should address automated logistics management, critical fault detection and maintenance, supportable science, technology demonstration and commercial applications in the absence of crew at the Gateway.