National Aeronautics and Space Administration

Autonomous Systems Laboratory

Autonomous operations are critical for the success, safety, sustainability, and crew survival of NASA deep space missions beyond low-Earth orbit. Future missions to the Moon and Mars will consist of spacecraft, landers, habitats, satellites, and rovers that must operate independently for extended periods because astronauts will not be present at all times, and there will be limited or no communication with Earth. For the past 10 years, NASA's Stennis Space Center in south Mississippi has been developing and evolving an innovative software platform, along with expertise and processes required for implementation of autonomous operations, that can solve those complex challenges.

- Stennis Space Center is DEMONSTRATING autonomous operations of the nitrogen system at the site's High Pressure Gas Facility. Autonomy technologies that enable fault detection, management, and maintenance, along with the way the system shares information, have potential use in all elements required for sustainability of Artemis missions. The technology has demonstrated success at other NASA centers and with industry partners.

- The Stennis Autonomous Systems Laboratory delivers a PARADIGM SHIFT in how NASA develops autonomous software by enabling cost-effective, comprehensive, "thinking," and evolutionary autonomy for future space and ground systems.

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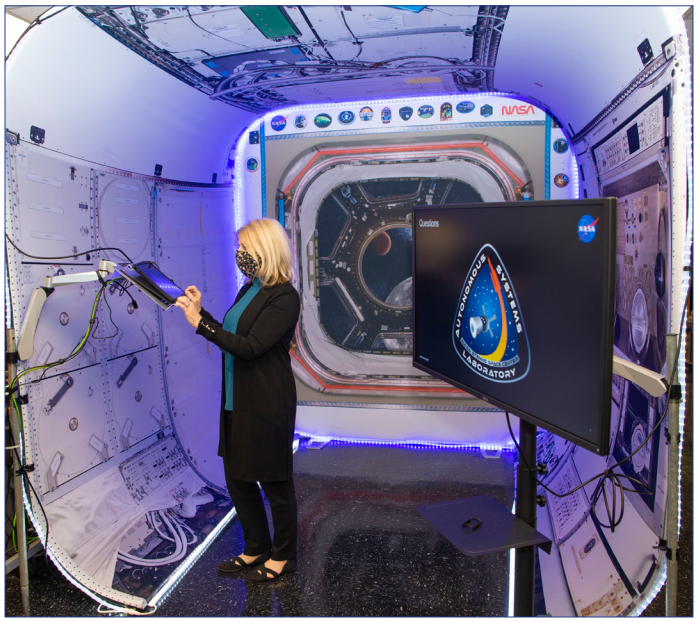
- The Stennis Autonomous Systems Laboratory group is a SMALL TEAM of technologists at NASA's Stennis Space Center designing, testing, and deploying capabilities that help critical systems operate more autonomously and efficiently.

- For more than 10 years, the Autonomous Systems Laboratory team has FOCUSED on providing capabilities that can be used on ground systems, as well as those needed to enable sustainable exploration of the Moon and beyond.



- The Stennis Autonomous Systems Laboratory RECEIVED TOP HONORS in March 2021 from the international Institute of Electrical and Electronics Engineers Aerospace Conference for a collaborative paper on how to implement health management capabilities into an existing high-pressure, pump-based system. The paper focused on how to use predictive and condition-based maintenance on the liquid nitrogen pump system at Stennis.

- The Stennis Autonomous Systems Laboratory is VALIDATING NASA Platform for Autonomous Systems as a platform for enabling intelligent, distributed, hierarchical autonomy. This capability is required for sustainable autonomous operation on the Moon and Mars, and includes the ability to rapidly evolve and integrate components.