

IAF SPACE SYSTEMS SYMPOSIUM (D1)
Cooperative and Robotic Space Systems (6)

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ZERO G SPACE ROBOTICS FACILITY FOR DESIGN, DEVELOPMENT AND VALIDATION OF
ROBOTIC SYSTEMS & MISSION OPERATIONS

Abstract

With advances in automation and artificial intelligence, robotic systems promise to be indispensable in future space initiatives such as Lunar Gateway and on-orbit satellite servicing. While there are a number of challenges in designing, testing and validating a robotic system for space, one of the most difficult is optimizing the control system for Zero-g performance and evaluating the interaction of such systems with free-flying payloads or a variety of worksite interfaces. This paper looks at the recent development of a generic Zero-g robotic ground testbed at MDA which can be used to replicate the dynamic performance of different manipulator designs and concepts as well as interact with a dynamic emulator system which has the versatility to mimic a wide variety of free-flying payloads and worksite interfaces. This paper will discuss how the facility enables better design of new control features on existing space robotics (such as those on the International Space Station) as well as new systems that are being considered for Lunar Gateway and other on-orbit servicing initiatives. In addition to the benefits provided in detailed control system design and analysis, the advantages of validating overall mission operations with the use of Augmented Reality to complement the reality of the hardware in the lab will also be examined.