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CONSIDERATIONS FOR NEXT GENERATION LUNAR GATEWAY ROBOTICS WORKSTATION FOR DEEP SPACE EXPLORATION

Abstract

In 2018, the International Space Exploration Coordination Group (ISECG), which comprises of 14 international space agencies including CSA, NASA, ESA, JAXA, and Roscosmos, proposed that a Lunar-orbiting space platform would be critical in enabling mankind to return to the Moon, and for the human exploration of Mars and beyond.

Such a platform will require a robotics interface with high levels of autonomy and artificial intelligence in order to allow robotic elements to be operated in a Cis-Lunar orbit. Key challenges will include the cost of transporting hardware to the platform, greater communication delays and possible disruptions for remote operations, maximization of crew time for on-board operations, and maximizing efficiency of hardware mass and volume.

MDA, leveraging its vast experience in space robotics applications, in particular the Canadarm2 and Dextre manipulators on the International Space Station (ISS), has conducted several studies to explore and develop the key technologies essential to achieving the objectives of such a platform workstation. The focus has been on combining lessons learned from the ISS with existing technologies employing the latest in configurable hardware, workstation design, artificially intelligent software, data communications, and resource sharing. The use of Mixed Reality (virtual and augmented) technologies has also been studied to assist with robotic manipulation tasks, such as satellite docking, in order to increase Situational Awareness and minimize the need for Extra Vehicular Activities.

This paper summarizes key challenges, considerations, and the solution space identified in these Deep Space Exploration Robotics Workstation projects.