Motion Control Technologies for the Sustainment of Lunar Exploration. T. M. McCarthy[1], [1]Motiv Space Systems, 350 North Halstead Street, Pasadena, CA 91107. (Tom.McCarthy@motivss.com)

Introduction: NASA has stimulated the movement toward a sustainable presence on the Lunar surface through the CLPS program, technology investment programs, HLS selections, developing technology roadmaps for power generation and deploying ISRU technologies to support human presence.

Motiv realizes one of the greatest challenges in accomplishing the goals of sustained presence on the moon involves the survivability and robustness of the assets to be delivered to the surface. The lunar day/night cycle delivers some of the harshest environmental conditions our planetary spacecraft and systems can experience. Daytime temperatures can exceed 120°C and nighttime teperatures in certain regions can drop below -180°C. These challenges are in addition to the classic lunar dust issues and make operations for robots and equipment difficult to exceed lfetimes beyond a single lunar day.

Motiv has utilized the NASA SBIR program to help develop it s own technology roadmap which allows for avionic motion control systems and actuation systems to not only survive but operate throughout the lunar night without thermal accommodation. Essentially, take the environments head on, as-is, and perform.

This paper will explore the contributions of the DACEE (Dual Axis Controller for Extreeme Environments) and its deployment on the COLDArm mission slated for a 2024 CLPS launch as a technology demonstration with JPL. In addition, the DEEDS (Distributed Extreme Environments Drive System), as funded by the SBIR Phase II Sequential Program, is a next generation modular control and high power actuation system designed to meet the needs of the future lunar robotic systems, mobility platforms, cargo offload equipment, and a variety of processing equipment which will be relied upon to operate continuously for years, not weeks.