NASA SBIR 2018 Phase I Solicitation

Z5.02 Robotic Systems - Mobile Manipulation

Lead Center: JSC

Participating Center(s): ARC, GRC, KSC

Technology Area: TA4 Robotics, Telerobotics and Autonomous Systems

NASA seeks innovative robotics solutions for upcoming missions to lunar orbit and the lunar surface. Â This targeted call seeks unique combinations of mobile manipulation, defined as work systems able to position themselves and then perform work with limbs. Â This combination of mobility and manipulation is a technical challenge, with static manipulation systems or mobile systems poorly suited to perform work being more common. Â The intent for this subtopic is to stimulate new solutions to the challenges of mobile manipulation, capturing recent advances in robotics technology in numerous terrestrial sectors that are relevant to space exploration. Â Broader topics of interest include perception, mobility for extreme terrain, autonomous control, human-robot interaction and dexterous manipulation. Â Lunar surface challenges involve mobile manipulation in soft soils, extreme thermal conditions, and sustained periods of no or low communication with Earth. Â Challenges in lunar orbit involve mobile manipulation in zero gravity, positioning work systems for preventive maintenance, logistics handling and contingency operations of a dormant spacecraft with reduced communication. Â Human interaction with these robotic systems will be limited due to communication blackout periods and time delay, and must be optimized for both mobility phases and manipulation phases of work. Â These lunar missions require low mass, low power and low volume solutions. Â All command and control approaches for human interaction should assume limited communication capabilities, requiring supervision of autonomous systems. Â Surface systems must be robust despite challenges of dust and thermal cycles. Â Orbital systems must be safe around human crew members and able to work with spacecraft interfaces intended for humans. Â Technologies proven in near term lunar missions must be scalable for future Mars exploration.