NASA seeks innovative robotics solutions for upcoming missions to lunar orbit and the lunar surface. This targeted
call seeks unique combinations of mobile manipulation, defined as work systems able to position themselves and
then perform work with limbs. 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. 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. Broader topics of interest
include perception, mobility for extreme terrain, autonomous control, human-robot interaction and dexterous
manipulation. Lunar surface challenges involve mobile manipulation in soft soils, extreme thermal conditions, and
sustained periods of no or low communication with Earth. 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. 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. These lunar missions require low mass, low power and low volume solutions. All
command and control approaches for human interaction should assume limited communication capabilities,
requiring supervision of autonomous systems. Surface systems must be robust despite challenges of dust and
thermal cycles. Orbital systems must be safe around human crew members and able to work with spacecraft
interfaces intended for humans. Technologies proven in near term lunar missions must be scalable for future Mars
exploration.