NASA SBIR 2018 Phase I Solicitation

Z5.01 Augmented Hybrid and Virtual Reality (XR) Technology for Human & Robotics Exploration

Lead Center: JSC

Participating Center(s): AFRC, JPL, KSC

Technology Area: TA4 Robotics, Telerobotics and Autonomous Systems

Within the ISS Program, maintenance requires well trained crew members and is labor intensive, expensive and inefficient. NASA uses paper and electronic procedures to direct crew through complex maintenance procedures for all on-board systems. Developing and executing procedures are still time consuming and tedious tasks, and substantial training is needed to understand the technical details for troubleshooting defective components, and the performance of critical maintenance and repairs. *X-R* based technology systems could have the potential to support future human exploration missions by providing the type of guidance normally associated with an expert human trainer. The capabilities of envisioned future *X-R* based systems will augment the ability of the crew while being simple and highly intuitive to use.

On board maintenance is one of the potential areas in which *X-R* technology can be a game changing technology. Other areas such as physical and mental health support for long duration mission isolation from family and friends, mission planning, mission data visualization, are also to be considered in the context of this topic.

The objective of this subtopic is to develop and mature *X-R* technology (system/ software) and to impact all aspects of mission operations including planning, execution, training and crew health countermeasures, in order to enable human exploration beyond LEO.

Proposal are sought to address the following Technology Areas:

- TA-4 TABS 4.4 Human Systems Interface: augmenting the natural environment with precise visual cues as well as with audible and tactile alerts to fully engage and guide the human operator through lengthy and complex spaceflight procedures.Â
- TA-4 TABS 4.5 Autonomy: using *XR* technology to enable crew autonomous operation and reduce dependency for ground support.
- TA-6 TABS 6.3 Human Health and Performance: using *X-R* technology to enhance situational awareness and to reduce cognitive overload while performing complex task.
- TA-7 TABS 7.5 Mission Operations & Safety: using *X-R* technology to reduce human error, improve operational efficiency and mission timeline while reducing prior training requirements.

For all above technologies, research should be conducted to demonstrate technical feasibility during Phase I and show a path toward Phase II system/software demonstration and delivering a demonstration system/software package for NASA testing.