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APPLICATIONS OF AUGMENTED REALITY FOR EXTRAVEHICULAR ACTIVITY: FIELD RESULTS FROM THE IMPLEMENTATION OF SCOUT ASSISTANT ON EVA SPACESUITS

Abstract

Augmented Reality (AR) is a rapid growing 21st century technology that offers potential for future human spaceflight missions. One of many implementations, is the usage of AR into a Heads-In Display (HID) for future spacesuit helmets. AR technology has the potential to assist astronauts during their (lunar) Extravehicular Activity (EVA) by providing key information about the spacesuit, mission procedures, the environment, and communication tools. In addition, AR technology can facilitate communications (visual and auditory) between Mission Control Centre (MCC), the Intravehicular (IV) crewmembers, and the (EV) astronauts. This can reduce EVA time, which decreases exposure to radiation and micro-meteorites, and also could save mission costs, as an EVA is estimated around $1.5 million. In 2018, an AR tool for EVA applications was first developed by Texas AM University. This AR tool, named the "Space Communications, Operations, and User Telepresence (SCOUT)" Assistant, is deployed using the Hololens 2, and includes multiple features to support EVA operations, including information about spacesuit parameters, battery life, and mission procedures (McHenry et al. 2020) . In addition, the SCOUT assistant offers a telepresence whiteboard that allow the MCC (or the IV astronaut) to draw in 3d space and directly project onto the view of the EVA crewmember. Moreover, SCOUT has an artificial intelligent (AI) navigation system capable of identify points of interest, detect hazards, and guide a group of crewmembers towards mission waypoints using hologram overlays. We propose to integrate, for the first time, the SCOUT assistant into simulated spacesuits from Astroland Agency and the BORPsuit from Paul Bakken, Lunares. After integration, the prototypes will be tested in the field during the CHILL-ICE II analog campaign (August 2022) in the lava tube systems of Iceland. Results will contribute to further develop the next generation of AR systems for EVA applications, informing requirements and user preferences needed for an AR Heads-in Display in planetary spacesuits.