IAF HUMAN SPACEFLIGHT SYMPOSIUM (B3)
Astronaut Training, Accommodation, and Operations in Space (5)

Author: Mr. Stephen Ennis
DLR (German Aerospace Center), Germany

Ms. Flavie Aditya Annick Suzanne Davida Tohotaua Rometsch
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany
Mr. Florian Saling
DLR (German Aerospace Center), Germany
Mrs. Beate Fischer
DLR, German Aerospace Center, Germany
Mrs. Petra Mittler
DLR (German Aerospace Center), Germany
Mr. Lionel Ferra
ESA, Germany
Mr. Carlo Vizzi
European Astronaut Centre, Germany
Dr. Andrea Emanuele Maria Casini
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany
Mr. Maurice MARNAT
MEDES - IMPS, France
Mrs. Cecile Thevenot
MEDES - IMPS, France
Dr. Laure Boyer
CNES, France

ASTRONAUT TRAINING ON-BOARD THE INTERNATIONAL SPACE STATION USING A STANDALONE VIRTUAL REALITY HEADSET

Abstract

On-board training (OBT) constitutes an important tool in the training of International Space Station crew members. OBT can be used to supplement ground training and address unforeseen complex tasks. As such, OBT materials can take many forms and can often include graphical renders and animations of complex hardware or crew tasks. As the exploration programme focuses on destinations beyond low earth orbit, training time on ground remains a scarce resource and the need for short notice effective training persists, despite new constraints and technologies. As such, the need to deliver effective and efficient training on-board is growing both in relevance and significance. Unlike other media, immersive Virtual Reality (VR) increases user engagement and enables users to interact with and observe complex three-dimensional objects, phenomena and data. In this regard, the use of VR is seen as a critical enabler to future exploration.

VR-OBT is a joint DLR ESA technology demonstration aiming to deliver on-board training via VR. Specialized training content is under development for a modified first generation Oculus Quest, supplied by the French national space agency, CNES. In this paper we explore the various technical and logistical challenges inherent in developing effective training content for a standalone VR headset. This paper aims

to support and direct future efforts of this kind as the use of VR technologies in space bound environment matures.

VR-OBT focuses on a maintenance activity, RR (Removal Replacement) for the ESA Life Support Rack payload. Starting from the adaptation of the engineering CAD models, this paper details the various technical and logistical challenges inherent in developing effective training content for a relatively low performance VR headset. Corrections to the Quest's positional tracking and localization are also briefly detailed. This work builds upon the developments of CNES, in relation to their PILOTE and Immersive Exercise experiments utilizing a modified gen-1 Quest