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USE OF VIRTUAL REALITY FOR ASTRONAUT TRAINING IN FUTURE SPACE MISSIONS - SPACECRAFT PILOTING FOR THE LUNAR ORBITAL PLATFORM - GATEWAY (LOP-G)

Abstract

The use of new informatic technologies for the interaction between humans and machines has opened up a new spectrum of application opportunities, especially in the field of vision science. Virtual Reality (VR) visualization as an enhanced simulation environment offers the possibility to improve, flexibilize and accelerate the learning process of humans. For this purpose, a new spaceflight simulator has been developed in the Institute of Space Systems of the University of Stuttgart, as predecessor of the Soyuz Simulator. By combining the use of VR and realistic computational models, this new simulator aims to investigate how this technology can be applied to the training of astronauts. This paper describes which are the main technical challenges in order to develop a device that has to offer both graphical and physical realism, considering the need to perform at real-time and nonetheless perform mathematically complex calculations related to spacecraft dynamics, orbital perturbations, and more importantly, offer full interaction with the pilot. A case-study based on an interactive cockpit environment for the future Russian spacecraft "Federatsiya" is presented. A mission scenario based on the Lunar Orbital Platform - Gateway (LOP-G) is realized. The features this simulation are thorughly analyzed, from cockpit interaction to new graphical training tools proposed for enhancing the pilot's performance.