Paper ID: 78659
student

IAF/IAA SPACE LIFE SCIENCES SYMPOSIUM (A1)
Interactive Presentations - IAF/IAA SPACE LIFE SCIENCES SYMPOSIUM (IPB)

Author: Mr. Darren Berlein
International Space University (ISU), France

VIRTUAL REALITY AS A COUNTERMEASURE TO VESTIBULAR DEGRADATION IN ASTRONAUTS IN LONG DURATION MISSIONS

Abstract

As space exploration advances, astronauts will spend increasingly longer periods of time in altered gravitational environments which can negatively impact their physical, psychological and operational performance. The integration of multiple sensory channels on Earth provides information on postural control, however, in space, the lack of gravity as a fundamental reference leads to discrepancies between sensory systems affecting spatial ability and coordination. Long-duration missions to the Moon and Mars will require astronauts to transition between different strengths of gravity, making it crucial to prepare them for gravitational transitions before they occur.

Research in vestibular adaptation and gravitational transitions is limited, but virtual and augmented reality (VR/AR) technologies have shown promise in training patients with vestibular disorders on Earth. This paper explores the potential benefits of VR/AR technologies for training astronauts to maintain vestibular function and adapt to new gravitational environments. Developing countermeasures to maintain vestibular function during crucial moments in mission operations, such as gravitational transitions, is essential to ensure the successful completion of mission tasks and objectives and ensuring the health of astronauts.

This paper highlights the importance of early training in VR/AR simulations for astronauts to prepare them for the altered gravitational environments they will experience during long-duration missions. By providing immersive and realistic experiences, VR/AR technology can help astronauts develop their postural control strategies and motor coordination in a controlled environment before they encounter the real-life challenges of spaceflight.

In addition to the benefits for astronauts, the use of VR/AR technology for training could also have implications for mission planning and design. By simulating different scenarios in VR/AR, mission planners could gain a better understanding of the challenges and opportunities presented by different gravitational environments. This could help them design more effective mission strategies and improve the safety and success of space missions.

Overall, this paper argues that VR/AR technology has significant potential for improving the training and performance of astronauts in altered gravitational environments. By enabling them to adapt to new conditions and maintain their vestibular function, VR/AR technology could help ensure the success of long-duration space missions, as well as the health and well-being of astronauts.