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HAPTIC TECHNOLOGY FOR ANALOG MISSIONS AND SPACE HABITATION

Abstract

1 Introduction

Haptic technology, encompassing the sense of touch and its associated perceptions, holds promise in revolutionizing analog missions and space habitation. The major challenges of space habitation- radiation shielding, advanced life support systems, and energy generation in space habitats demand innovative solutions. This abstract proposes a systematic integration of haptic technology, augmented reality (AR), and virtual reality (VR) to simulate real-time interactions with space environments.

2 Proposal

The proposed system involves a smart suit equipped with sensors and actuators essential for seamless touch interactions. Augmented by AI-induced AR (Augmented reality) and VR (Virtual reality) technologies with mapped blueprints from satellite data, this approach aims to transcend current analog mission boundaries. Analog astronauts, immersed in a haptic feedback system, can interact with a virtual representation of a targeted geographical location in space, offering a novel solution to challenges such as radiation shielding and life support systems.

Key components of the haptic feedback system include actuators, sensors, a controller/processor, and software algorithms. Actuators generate physical sensations, sensors detect user interactions, the controller processes input, and algorithms interpret data for realistic haptic experiences. This versatile technology finds applications in various space exploration simulations including space habitation and aerospace medical simulations.

The integration of LiDAR technology facilitates accurate mapping of geographical locations, allowing for the creation of immersive simulations. The smart suit, worn by analog astronauts, acts as a sensitive wearable device with sensors replicating the human body's responsiveness. It enables experimentation with various ideas related to space habitation, such as testing radiation protection methods in a virtual environment.

3 Conclusion

Through this innovative approach, analog missions can recreate challenging scenarios, including radiation exposure and emergency situations, contributing to the refinement of life support systems and architectural designs for space habitats. The proposed technologies offer a viable source for gaining valuable insights crucial for future space exploration and habitation missions, promising to enhance the quality and efficiency of analog missions for the advancement of space exploration.