IAF HUMAN SPACEFLIGHT SYMPOSIUM (B3)
Interactive Presentations - IAF HUMAN SPACEFLIGHT SYMPOSIUM (IP)

Author: Mr. Pavlo Tanasyuk
Spacebit Global Ltd, United Kingdom

AUGMENTED REALITY FOR SPACE EXPLORATION: ENHANCING ASTRONAUT TRAINING AND ROBOTIC MISSION CONTROL

Abstract

Whereas the space flights have become progressively challenging, simulation training in high-tech environment and remote-control infrastructure has taken flight. An AR-based innovative tool can aid in astronaut training, robotic mission operation, and surface exploration through real-time overlays, which allow interactive and immersive training.

This paper examines how AR can be utilized to enhance astronaut training through virtual mission simulation, emergency scenario training exercises, and spacecraft system interaction. The paper also explores AR-directed robotic operation, where the operators on Earth or in space can control rovers and landers remotely through real-time AR overlays.

Key areas covered:

1. AR for Astronaut Training and Mission Simulation: - Virtual tour of spacecraft to acclimatize to zero-G. - AR overlays in real-time for procedural training and anomaly troubleshooting.

2. AR in Robotic Mission Control: - AR-enabled visualization of far-end control of rovers. - Enhanced situational awareness through real-time 3D mapping of Martian/lunar geography.

3. Human-AR Interaction in Space Environments: - AR-enabled cognitive and operational benefits of AR under microgravity environments. - Optimization methods of latency and bandwidth for AR in deep space missions.

By combining AR technology into space operations, space explorers and robotic space travelers can improve their decision-making, reducing risk and increasing efficiency. This document proposes a model for implementing AR solutions in training, exploration, and real-time mission support, charting the course for future human and robot cooperation beyond Earth.