ARVR2023 – ESA Status and Outlook

Peter van der Plas
Software Systems Division

Monday 13/11/2023

→ THE EUROPEAN SPACE AGENCY

ESA Status and Outlook – Application Domains

Application Domains for AR/VR

- Assembly, Integration and Test (AIT)

- Astronaut Operations and Training

- Concurrent Engineering

- Earth Observation Data Exploration

- Product Assurance (PA)

- Space Science Data Exploration

- Spacecraft Operations

ESA Status and Outlook – Activities

- Over 50 activities performed or currently ongoing
    - Either generic or in specific application domains
- A brief selection of upcoming activities…
    - Use of augmented reality and virtual reality in collaborative and cooperative space applications
    - Immersive space design environment
    - Operational validation of extended reality use cases for Space operations
    - XR devices for use in micro-gravity
    - Use of state-of-the-art AR/VR input devices in space applications

→ THE EUROPEAN SPACE AGENCY

ESA Status and Outlook – Technology Roadmap

Some ideas for future R&D…

- Combined dynamic and static tracking, including location precision
  - *Use cases: to support tracking in micro-gravity, remote Ground Station maintenance, to locate equipment*
  - *Issues: test markers used, real model versus CAD model alignment, large rooms and big crowds are more complex*

- AR/VR authoring environments, including standards aspects of model and procedure inputs, as well as reduction of preparation time
  - *Use cases: Mix of onsite and offsite authoring, field: operation of facilities. Define the way in ESA we can define and share models (e.g. 3D models).*

- Full immersion through avatars, haptics, sound, effective mixed reality

ESA Status and Outlook – Technology Roadmap

- Advances of AI in combination with immersive technology

    - *Use cases: Training of AI, AI for body recognition, exploration scenarios, medical assistants, generation of 3D models from 2D images*

- Added value of well-defined and designed UI/UX

    - *For space-based systems, simplicity is required. This also applies to ground-based systems for operations (dependability, people under stress).*

- Interfaces between AR/VR and other systems, how to integrate AR/VR based systems