

Key facts

- Created in 2016
- Spinoff from CNRS
- Participation in 11 space missions (6 of which ongoing)
- Software already in use to train ESA's astronauts
- Homemade terrain system

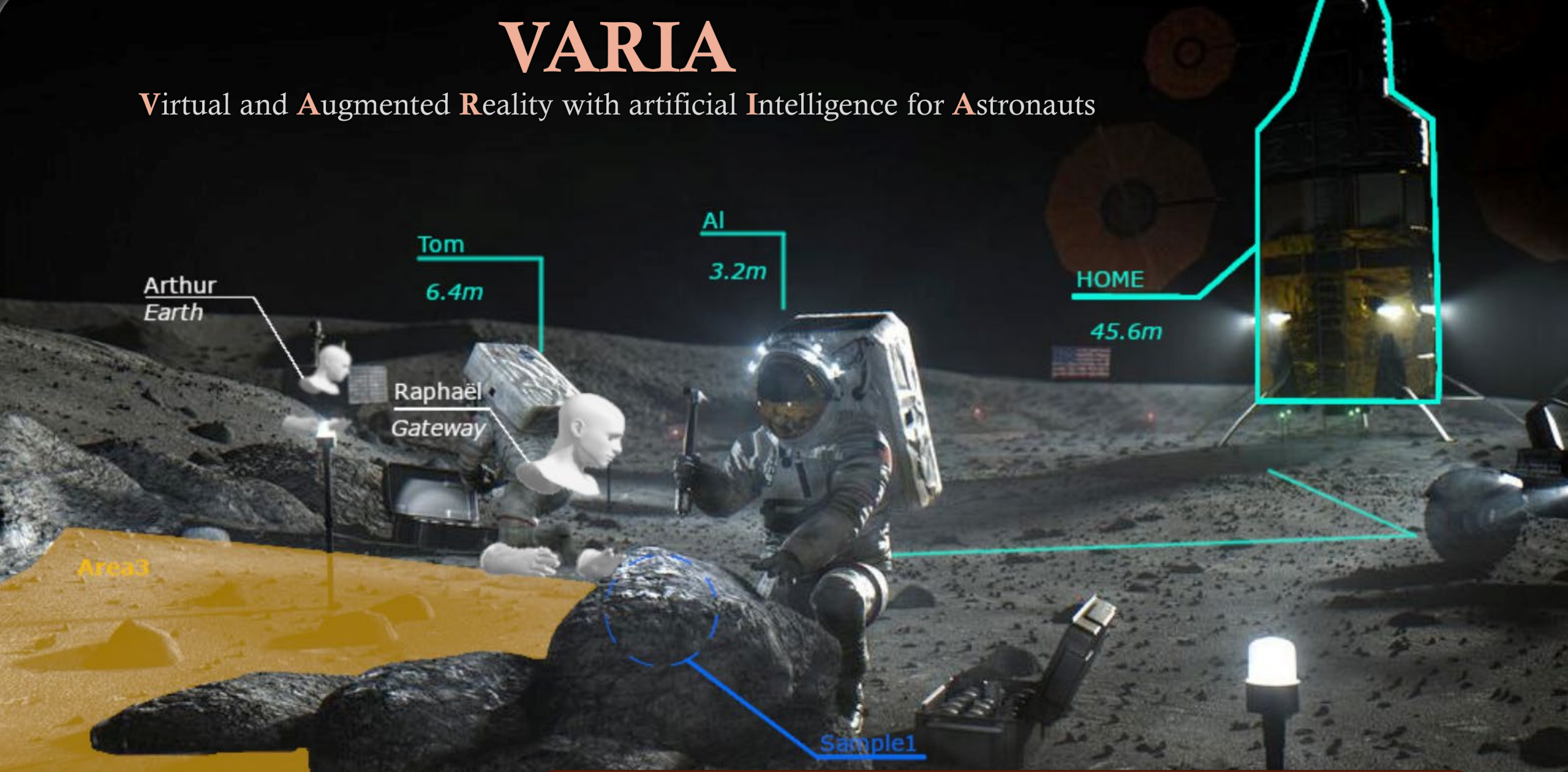
VR2Planets

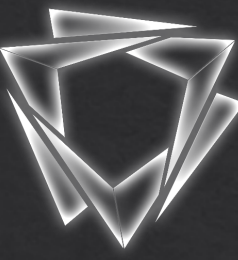
AR/VR for space programme 2023
11-12 dec. 2023 ESA/ESTEC

François CIVET, PDG
fcivet@vr2planets.com

VARIA

Virtual and Augmented Reality with artificial Intelligence for Astronauts





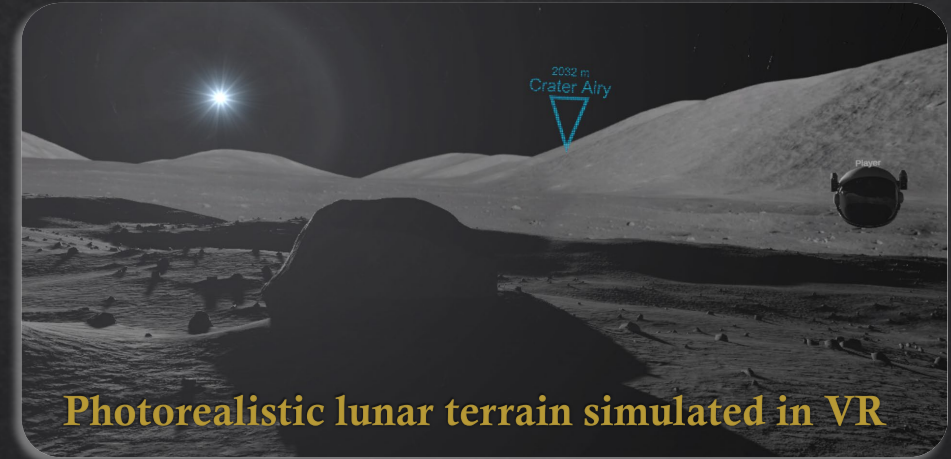
VR2Planets

VARIA V1

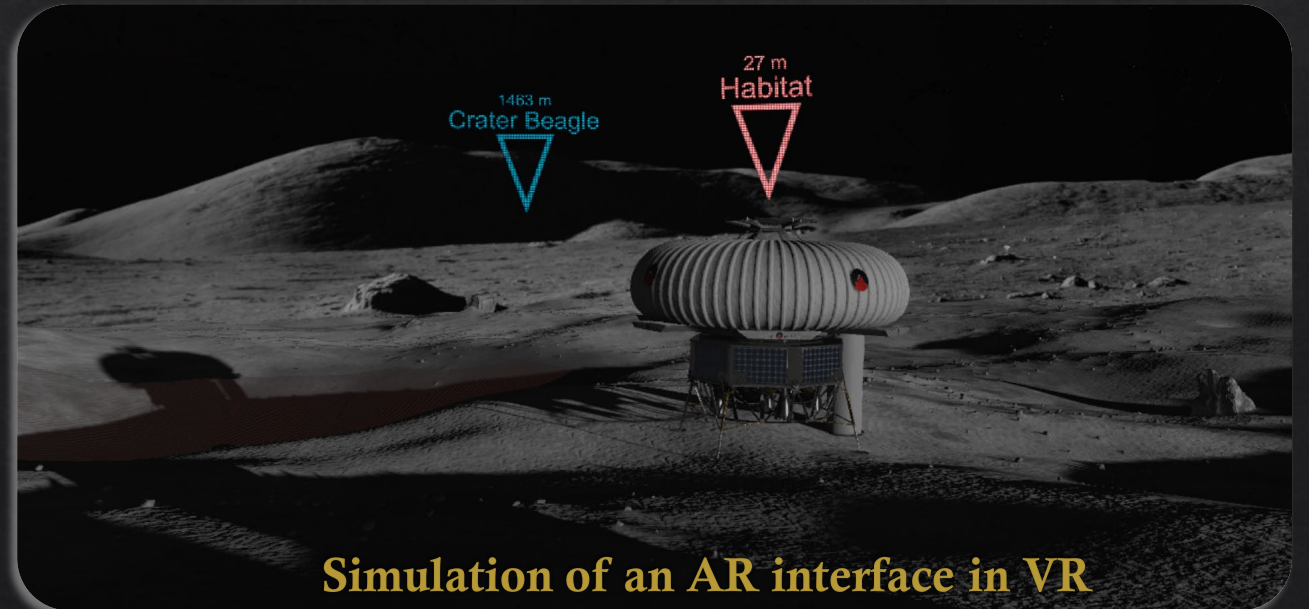
Prototype1 : DONE

Demonstration of immersive multi-agent collaboration

- ◆ Astronaut (AR simulated in VR)
 - ◆ HD lunar terrain 1:1
 - ◆ South Pole luminosity
 - ◆ AR interface (road, study area, points of interest...)



Photorealistic lunar terrain simulated in VR



Simulation of an AR interface in VR

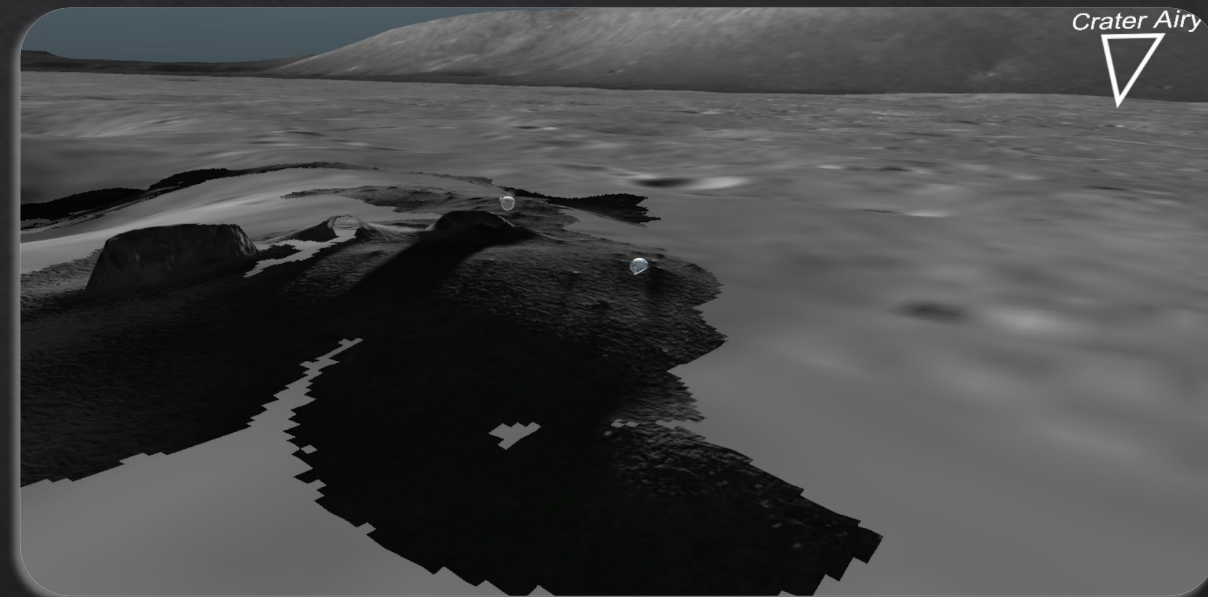


VARIA V1

Prototype1 : DONE

Demonstration of immersive multi-agent collaboration

- ◆ **Astronaut (AR simulated in VR)**
 - ◆ HD lunar terrain 1:1
 - ◆ South Pole luminosity
 - ◆ AR interface (road, study area, points of interest...)
- ◆ **Distant expert**
 - ◆ « Degraded » lunar terrain
 - ◆ Orbital data
 - ◆ multi-scale
 - ◆ VR interface with navigation assistance tools



Data sharing between astronaut and remote expert



VARIA V2



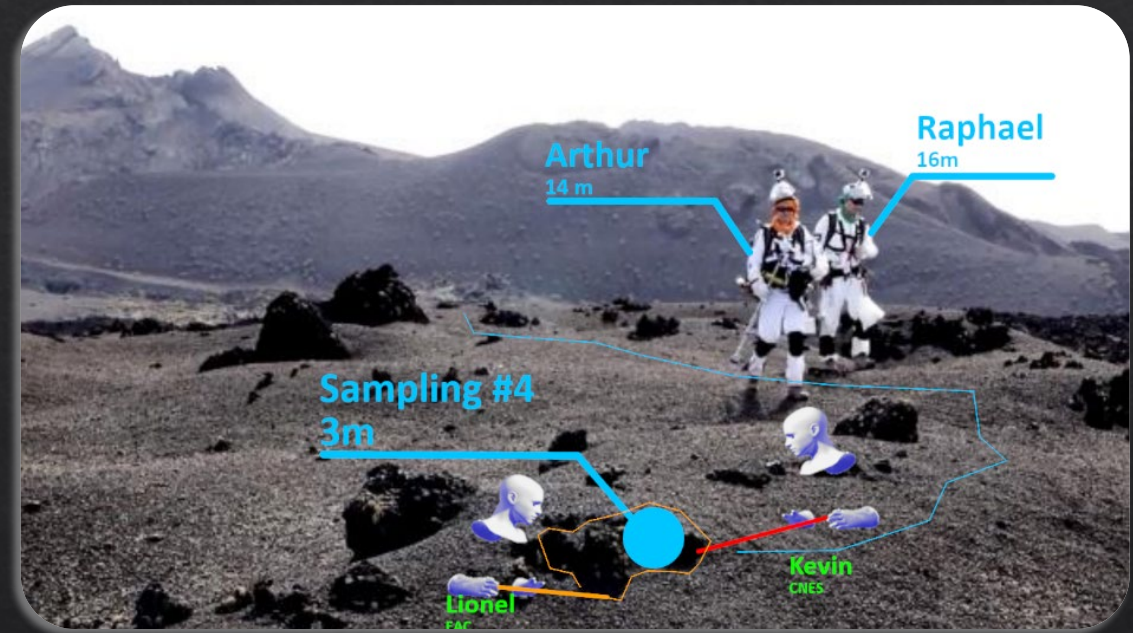
Prototype2 : WIP

Provide the numerical twin created by AR headset

- ◇ 3DTile server
- ◇ Test hardware
- ◇ Interface with AR headsets

On-sites tests:

- ◇ Lanzarote (training field - Canary island)
- ◇ SEROM (martian analog - CNES)
- ◇ LUNA (lunar analog – EAC)



View from the third operator on the field equipped with AR headset

VARIA V3

SLAM (24/25)

- ◇ Libraries tests
- ◇ Setting up SLAM libraries
- ◇ 3D client/network architecture design
- ◇ AR integration
- ◇ Tests, use cases, real-life situations

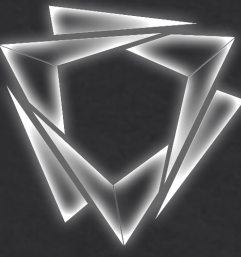
VARIA V4

Real-time 3D creation (25)

- ◇ Study of available technology
 - ◇ Point cloud (LIDAR)
 - ◇ Depth camera
- ◇ Real-time photogrammetry
 - ◇ General architecture
 - ◇ Data transfer protocols
- ◇ Server for data management
- ◇ Automatic data refinement



VARIA



VR2Planets

Let's try!



NESTOR VR

NOMADS IN THE SOLAR SYSTEM

EDUCATIONAL VR TOOL

Christian perez Nicolas

Carlos III university of madrid

introduction

- Virtual Reality experience for education
- Main objectives:
 - Increasing students' interest in space science
 - Introducing VR in education with high graphics and low cost
- Adaptable content for school education or astronaut training



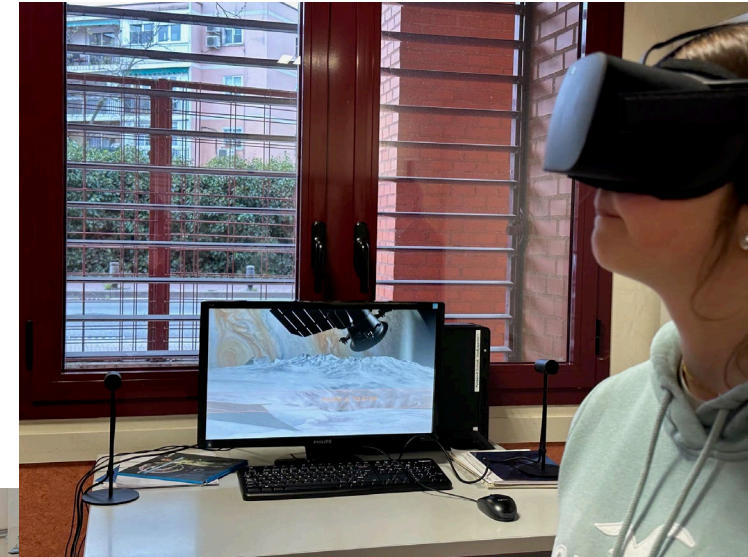
SPeCifications

- 3 open world locations: Moon, Mars, Europa
- Fully visitable Moon Base
- High Quality graphics
- Clean UI interface
- Easy experience controls for interaction
- Information by audio, no texts
- Use of Artificial Intelligence



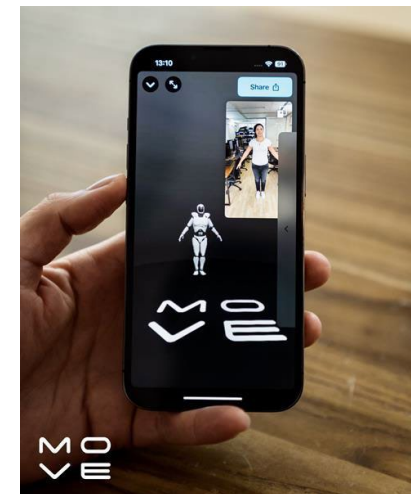
Design process

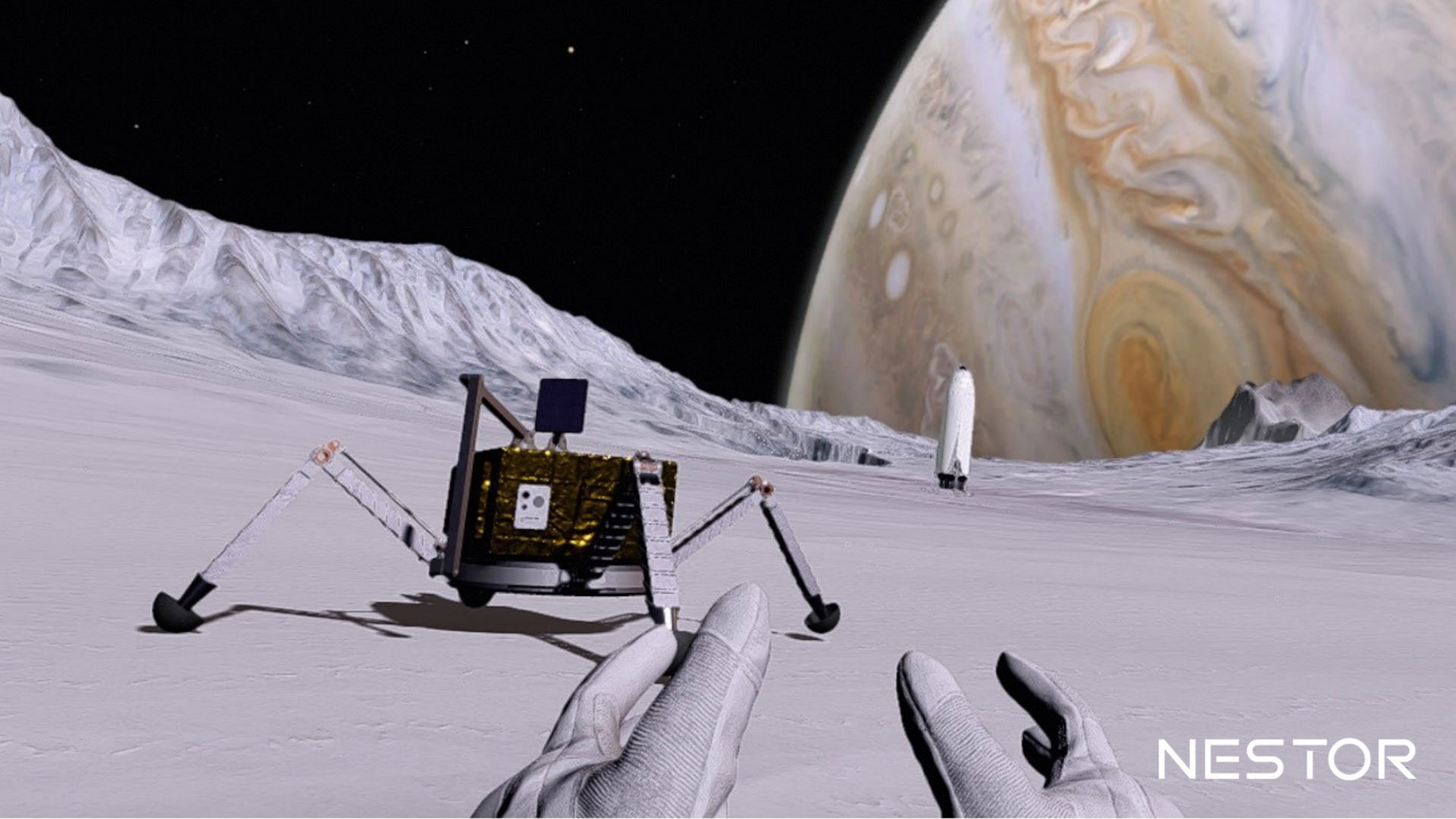
- Group of experts
- Integration of a group of students
- Presentation to museums
- ESAC Open Day



Future DEVELOPMENT

- Optimization for standalone headsets: Meta Quest 3
- Introduce the VR app in schools and institutes at low cost
- Make use of more AI tools for VR development
- Augmented Reality tools for education
- VR and AR tools for Astronaut training:
 - Medicine
 - Psychology

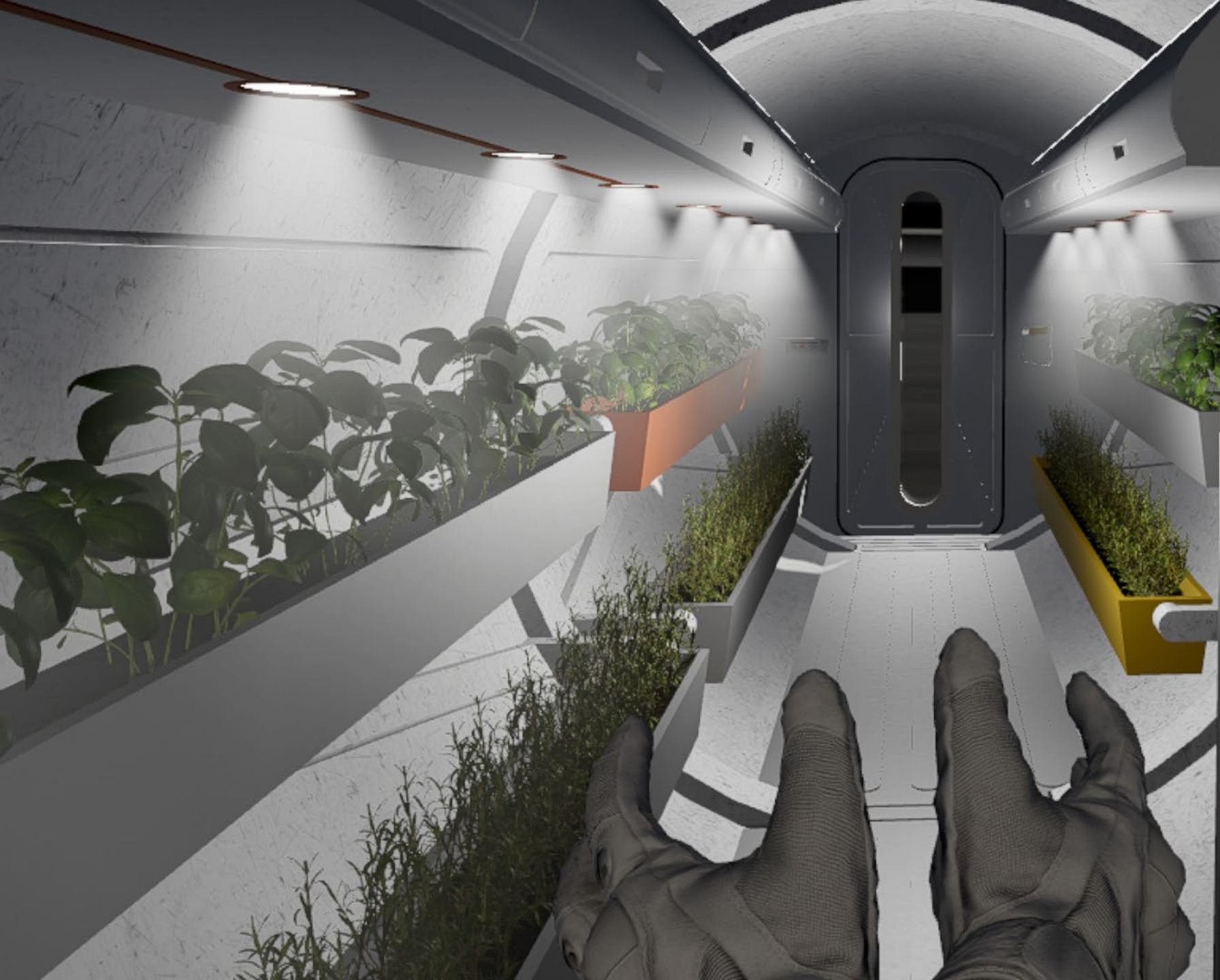




NESTOR



NESTOR



NESTOR

OPPORTUNI

SPIRIT

PRESS "Δ" TO STOP

NESTOR

THANKS

NESTOR VR NOMADS IN THE SOLAR SYSTEM 2023



Design for resilience in the space ecosystem: A cosmopolitan approach

Gianmarco Luggeri

MSc. graduation thesis
Strategic Product Design

Houston, we have a problem ...

More than 100
millions
<1 cm size

More than 1
million
>1 cm size

More than
36.000
>10 cm size

More than
3.000
defunct
satellites

More than
2.000
discarded
rockets

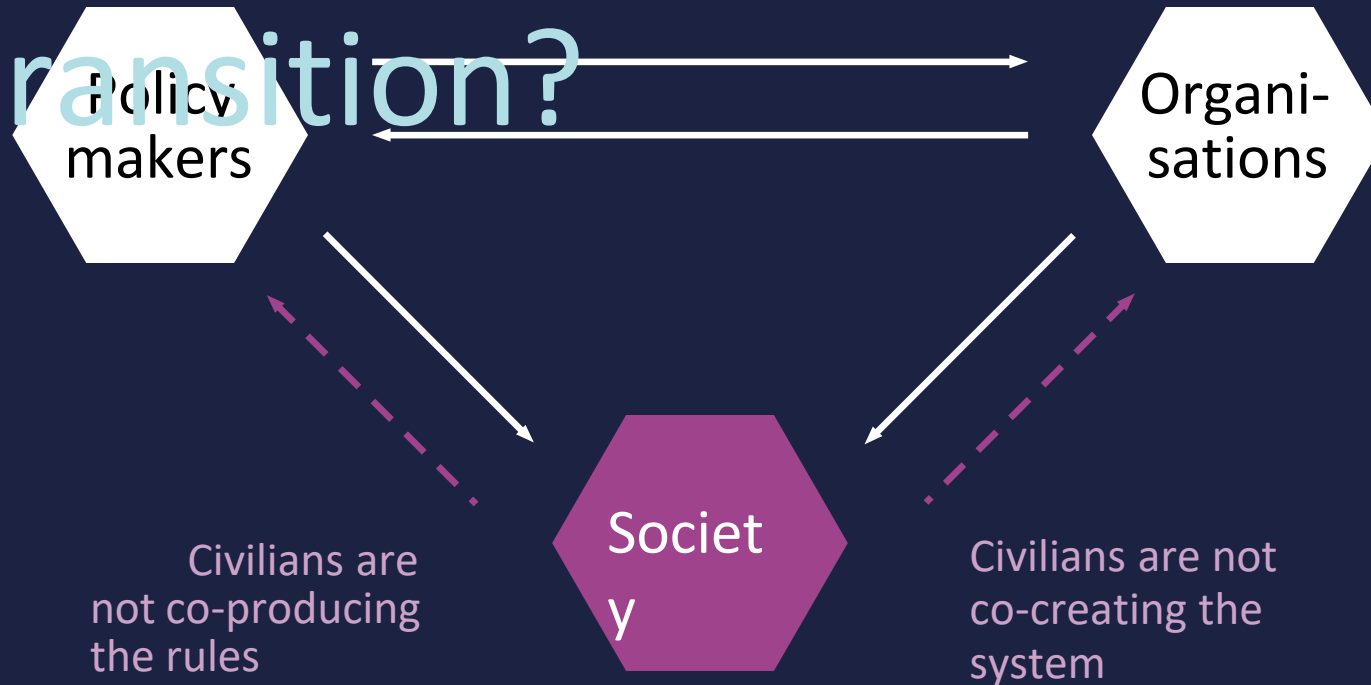
Running at 30.000 km/h

Debris of 10 cm size
can destroy a satellite

Over 3.300 satellites
share their orbits with
about
10.000 tones of waste



Do we need a transition?



Geels, F.W. & Schot, J. (2010): "The Dynamics of Transitions: A Socio-Technical Perspective"

ONE: League for the Planet



A cultural metaverse for space,
to educate the next generations
of space citizens

- Make people experience space in XR
- Transform Space Situational Awareness into an open public service
- Convert space debris into NFTs

The target user:

Children



- Educate the next generation of space citizens (gamers)
- Create a network of civilians to watch over outer space

Safe,
anonymous
authentication
n



- Buy a ONE NFT, linked to a piece of space debris
- Use it as an authentication token
- Access the ONE metaverse and its services

A universe of experience



- Immersive courses, certified by space agencies
- Real-time data from actual objects in orbit
- Also gaming and entertainment
- Co-create future services with companies
- Contribute to scientific research

Social feature

Hi PathfinderX1,

Your debris is in collision route with
Guardian09, time remaining 2h 34'.

Do you want to open the chat?



- Track your debris, check when it passes over your head.
- Find many others and meet their owners, build social constellations.
- Cross satellites' trajectory and jump inside their world

Museum of Space Resilience



- If the debris collides, you lose your NFT
- When removed, it enters a museum
- A virtual environment to pay tribute to:
 - the NFT owner user
 - the mission that removed the piece
 - the government that allowed it

2030: A human-driven digital twin



- Train algorithms through users' interactions
- Test physical simulations + psychological behaviours
- For academia and research centers
- eg: Improve astronaut's comfort

***“Such a project has the
potential to save 20 years
of PhD research”***

- Innovation

Director Swiss

Space Agency

Wired (2021): “EVE Online Gamers Role-Play as Covid-19
Researchers”



Thank you!

Questions? Get in touch!


Gianmarco Luggeri
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VaRIaS project demo

Virtual and Augmented Reality for Industry And Space

Martin Klima, Kristopher Blom

Item Info.



Item Number : AWER-PIE-129
Quality : 30 pieces



Augmented
Reality



Who are we?

Misterine s.r.o.



Web: www.misterine.com

YouTube: <https://www.youtube.com/watch?v=cQbHIHtmCl4>

Scenarios

Training and re-training of procedures

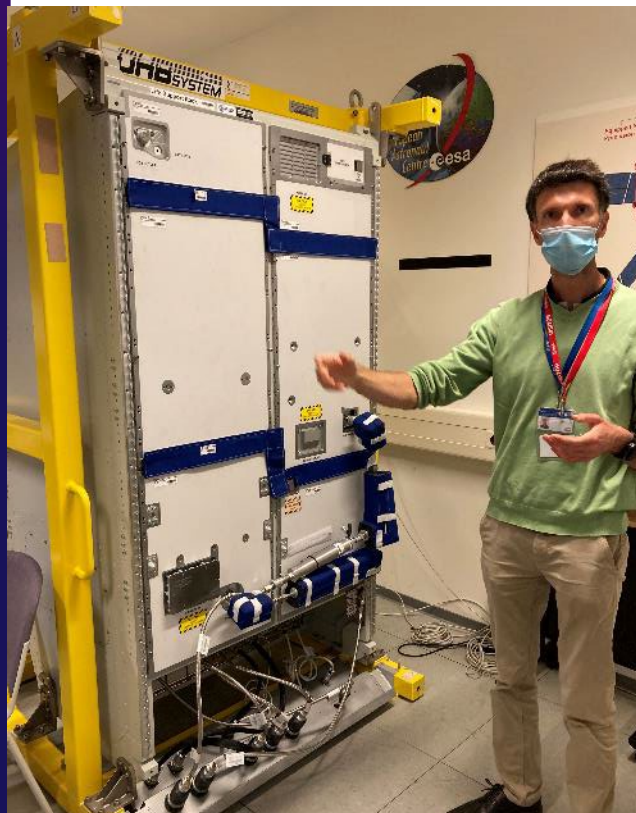
- In VR environment
- Maintenance
- Step by step
- Using tools, materials
- With or without expert avatar
- Microgravity
- Voice and laser pointer with expert observers

Major use case

- Life Support Rack maintenance



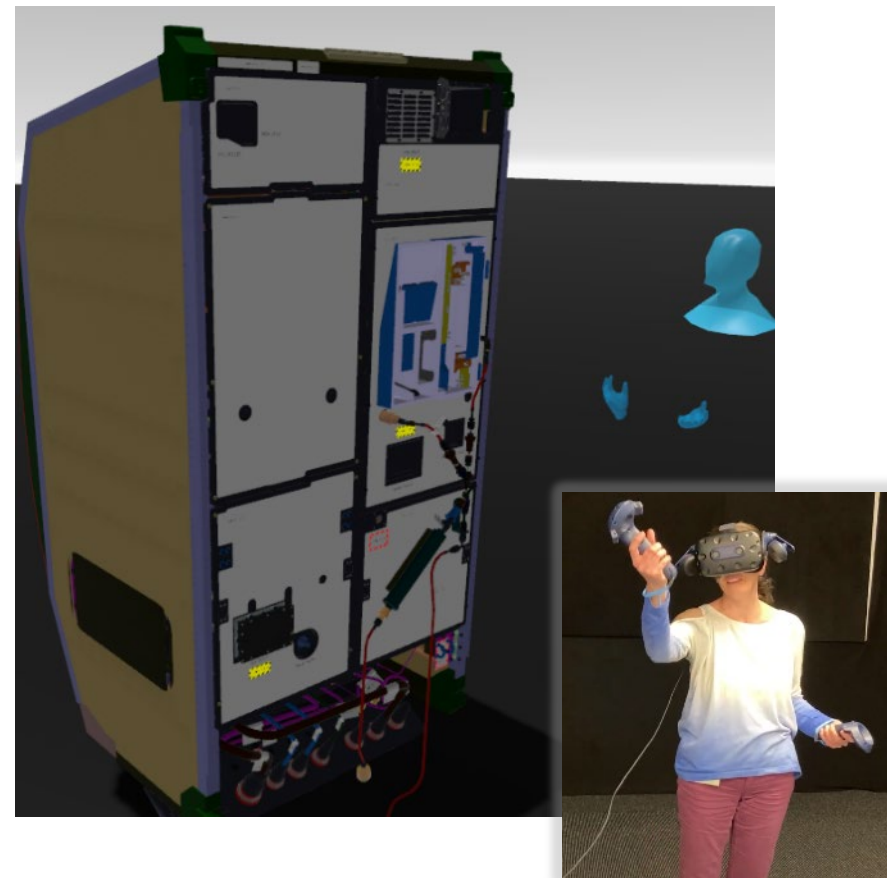
Reality



Model in VR Studio



Interactive session in VR



We Brought Something New Today

Haptic Gloves



misterine

Underwater VR for Astronaut Training

Demonstration ESA OSIP Study

Sven Jörissen, Michael Bleier, David Hilbert,
Dorit Bormann and Andreas Nüchter

Computer Science XVII – Robotics
Julius-Maximilians-Universität Würzburg

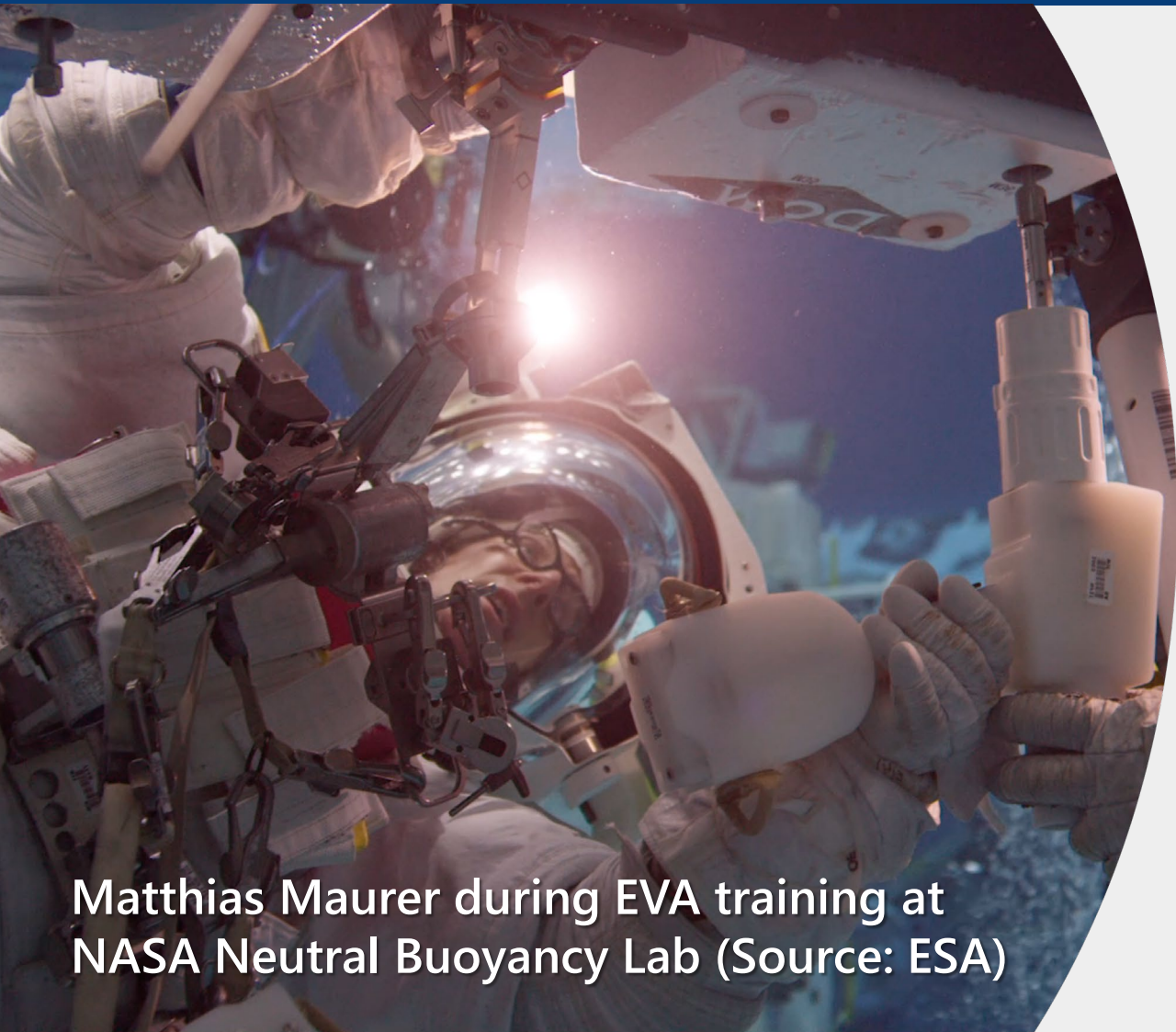
11. December 2023

Julius-Maximilians-

**UNIVERSITÄT
WÜRZBURG**



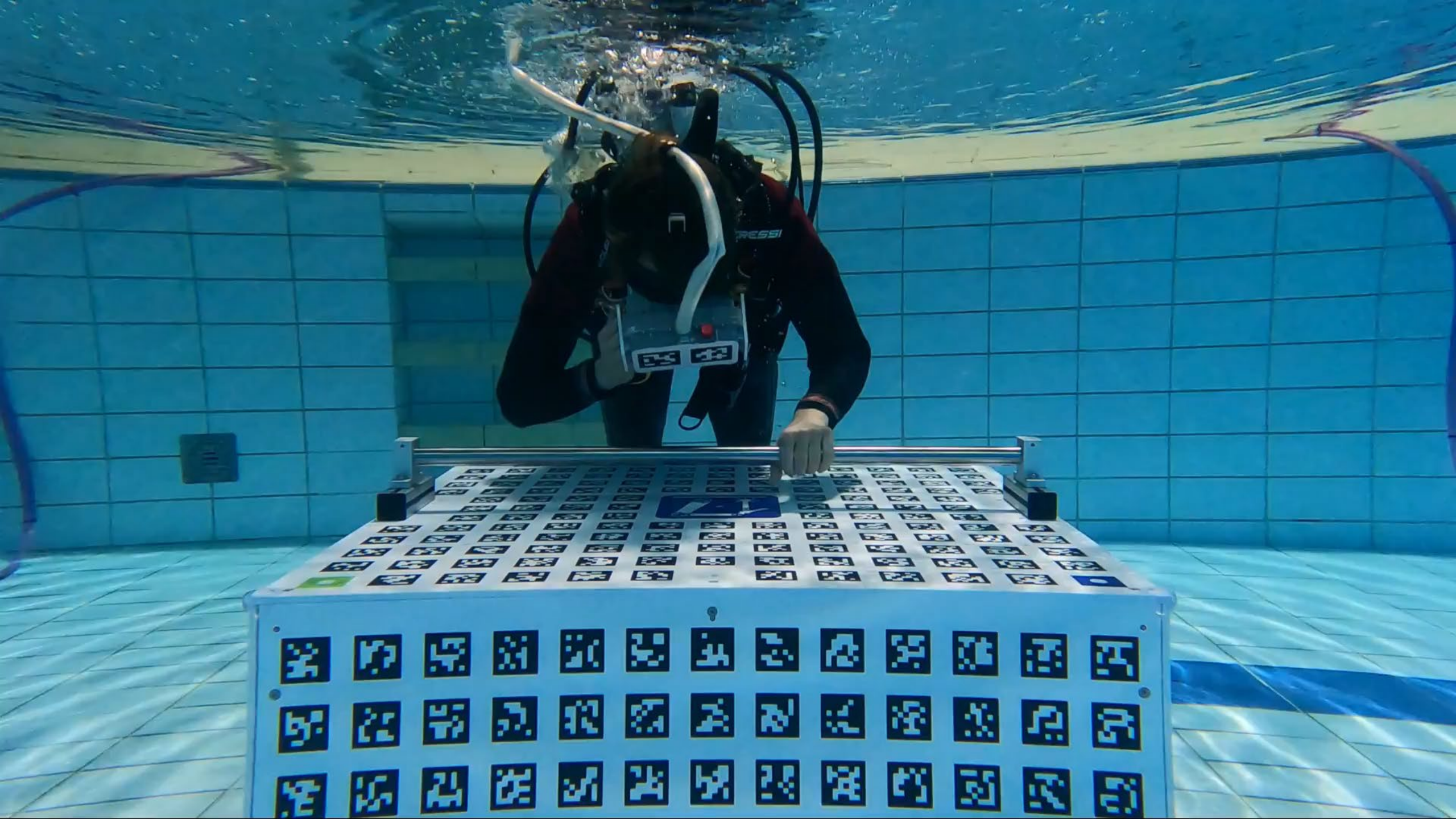
Virtual Reality for EVA Training



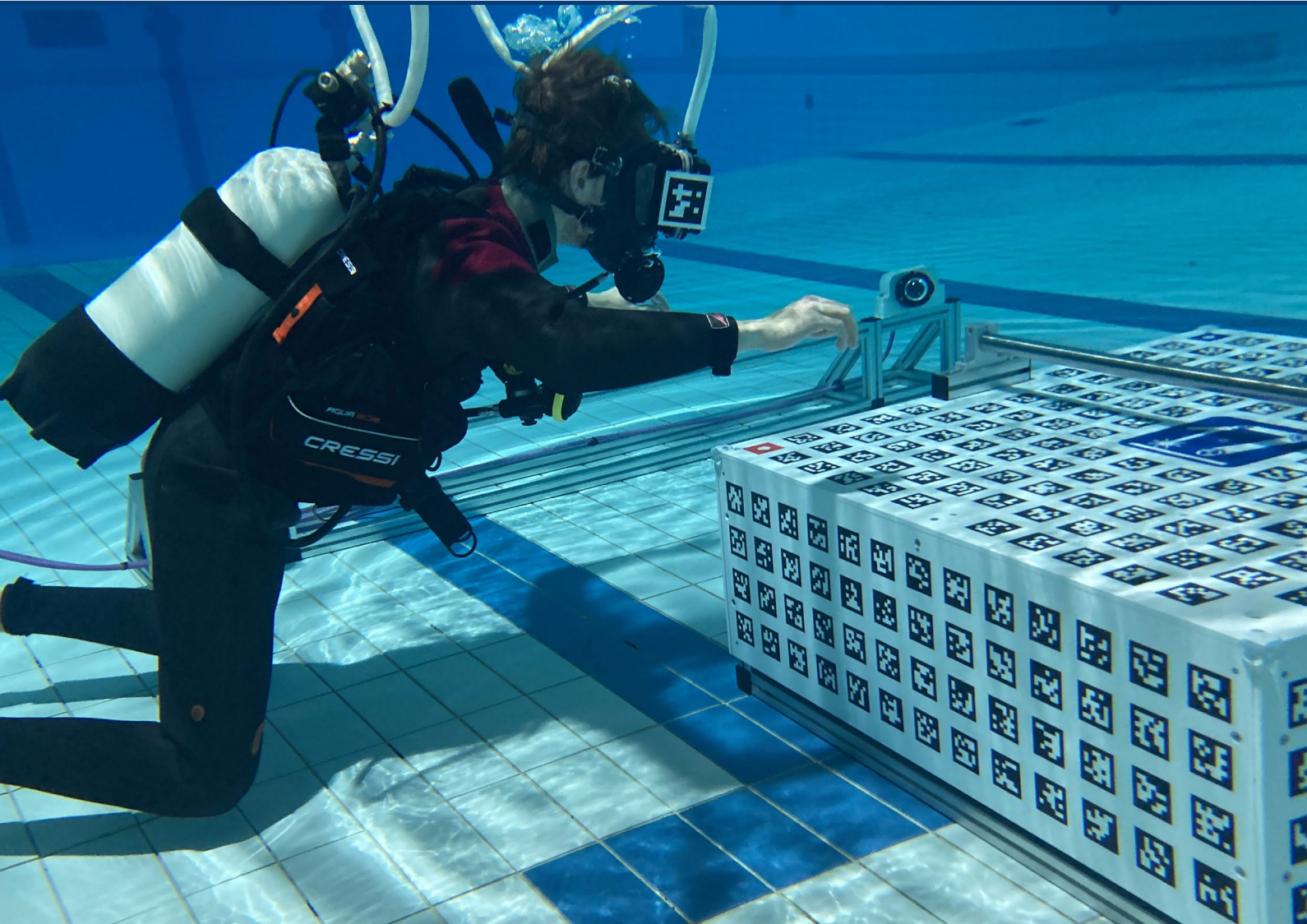
Matthias Maurer during EVA training at NASA Neutral Buoyancy Lab (Source: ESA)

- Simulated EVA exercises underwater are a standard part of astronaut training
- How to apply **Virtual Reality** for training at neutral buoyancy labs?





Demonstration



- VR headset integrated with full face diving mask
- Head tracking using underwater camera system
- Physical hand rail replicated in VR environment

Stop by at our demo!

