

Exploring NVIDIA Omniverse for Future Space Resources Missions

X. LI¹, B. C. YALCIN¹, C. MARTINEZ¹, O. CHRISTIDI-LOUMPASEFSKI¹, M. HUBERT DELISLE¹, G. RODRIGUEZ², J. ZHENG² and M. OLIVARES-MENDEZ¹

¹University of Luxembourg, Luxembourg, ²Spacety Luxembourg, Luxembourg

On-ground V&V facility for system testing

Verifying and validating space resource technologies on Earth conditions require the following capabilities:

- Photorealistic simulations (real-time during HIL testing)
- Software-in-the-loop testing
- Floating platforms and/or robotic arms for hardware-in-the-loop (HIL) testing to simulate the microgravity environment (Figure 1)

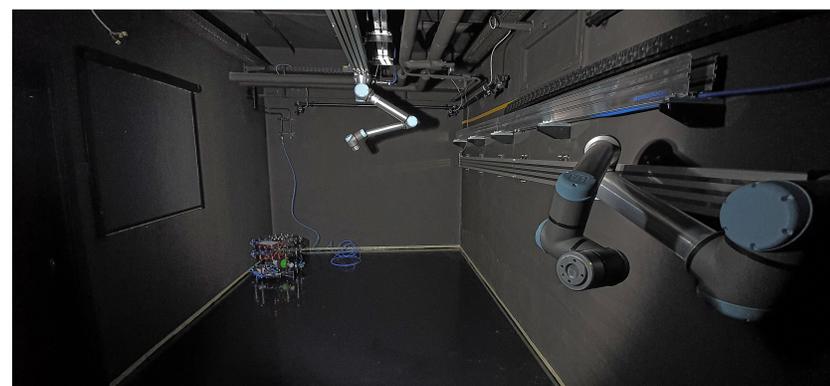


Figure 1: Zero-G laboratory at the University of Luxembourg

Nvidia Omniverse for real-time high-fidelity simulations

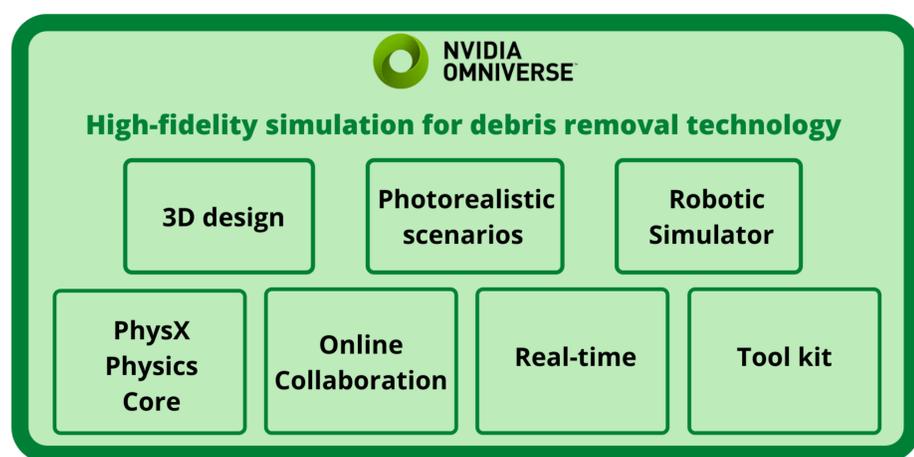


Figure 2: Nvidia Omniverse for high-fidelity simulations

- PhysX physics core provides physical accuracy
- Pixar Universal Scene Description generates faithful on-orbit scenarios
- Connectors between Omniverse and other platforms such as Unreal Engine, Autodesk
- Robotic simulator for building virtual robotic experiments

Project description

Within the joint project between SpaceR and Spacety (the HELEN project) for recreating reliable testing conditions for space debris removal technology:

- Omniverse will be used to integrate virtual and physical components
- High-fidelity photorealistic on-orbit simulations and the Zero-G robotic facility will be integrated

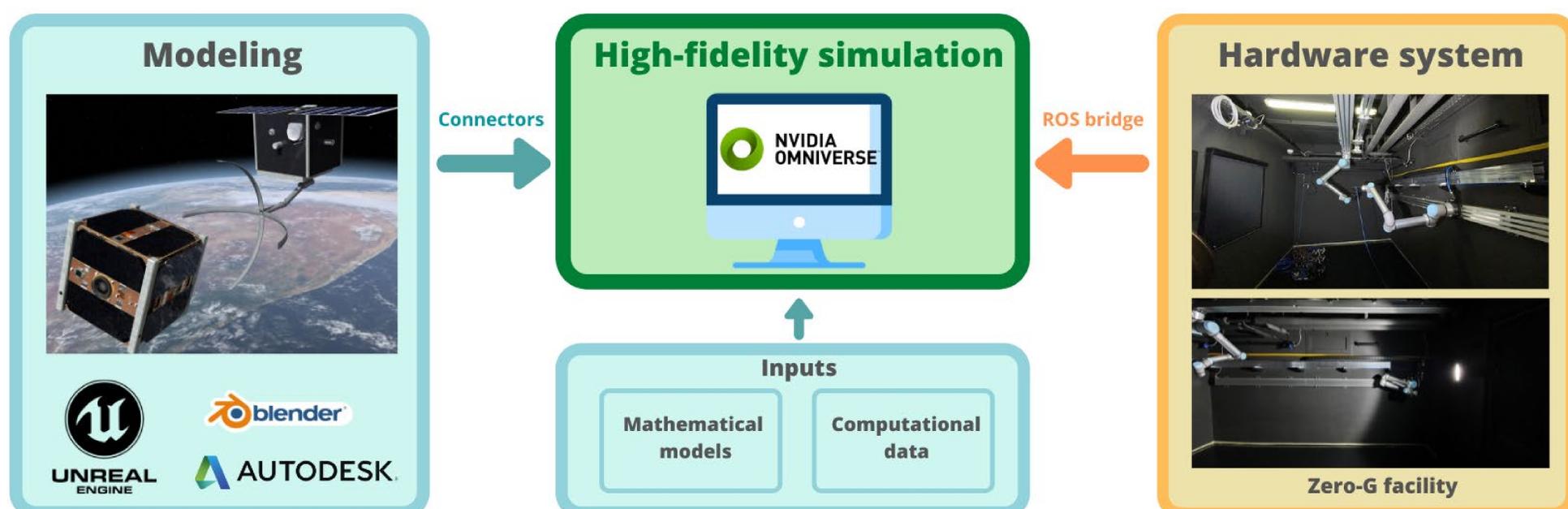


Figure 3: Digital twin concept for on-orbit operations

Modeling image credit: CleanSpace One of EPFL