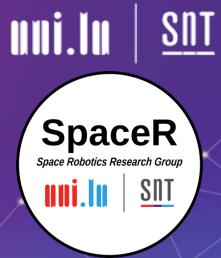


Enabling Intelligent Robotic Manipulation In Space

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Robotic Manipulation

- A key technology for sustainable space exploration and commercialisation.
- There is an urgent need for **Autonomous Robotic Systems** that perceive, reason and respond to dynamic changes.

Challenges: Harsh space conditions and computational constraints

Gaps: Data, test and validation, benchmark, sim2real

Applications

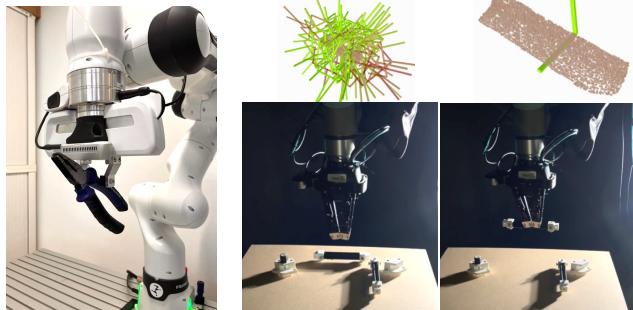
- In-Orbit Servicing
- Sample Collection
- In-Space Assembly and Manufacturing ISAM
- Outpost Construction



Visual Intelligence

Object-Centric 6-DoF Grasp Generation

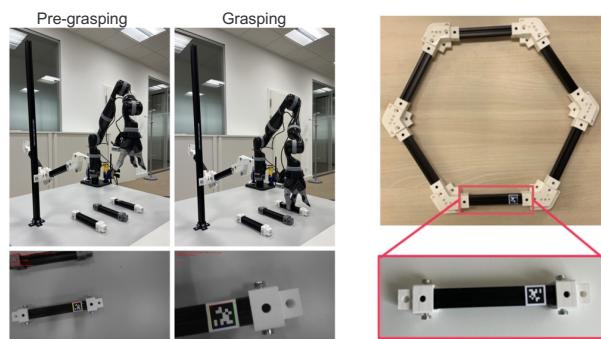
- How to grasp unknown objects in orbit?



- Industry Collaboration with

Visual Servoing for ISAM

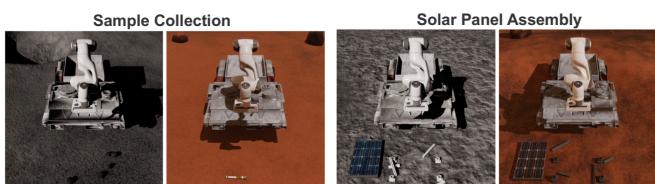
- How to precisely maneuver in space based on visual data?



Simulations

The Space Robotics Bench

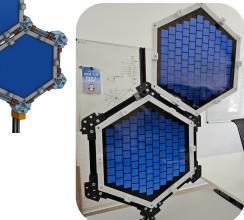
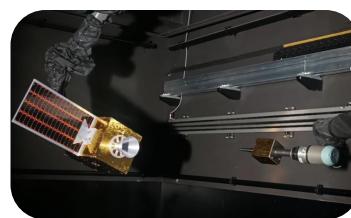
- Randomised simulations
- Parallelised simulations
- ROS 2 & Space ROS
- Planetary and Orbital scenarios
- Procedural Generation



On-Ground Testing

Benchmarking Skills

- Grasping
- Pick and place
- Two pin insertion
- Screwing / Unscrewing

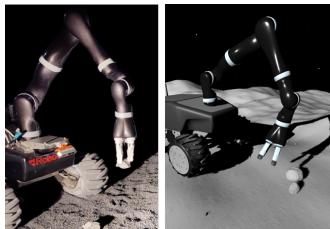


Emulation of In-Orbit Operations

Reinforcement Learning

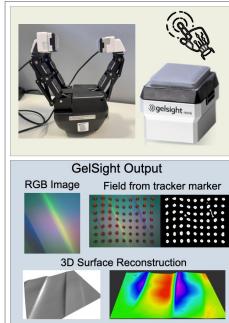
- Can robots in Space learn transferable skills?

- Learning a world-model
- Visual observations



Other Technologies

Tactile Sensing



Compliant End-Effectors

Gecko Material

Fractal Design

