

# MALTE MOSBACH

E-Mail

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Website

<https://maltemosbach.github.io>

Location

Bonn, Germany

## Professional Profile

I develop reinforcement learning algorithms that enable robots to acquire dexterous manipulation skills from visual inputs. My research spans object-centric world models for relational reasoning (ICML 2025), sample-efficient RL for human-like grasping (ICRA 2024, 2025), and language-conditioned diffusion policies and world models (FAIR). I am completing my PhD at the University of Bonn in Summer 2026.

## Education

### Ph.D. Computer Science

January 2021 – Present

University of Bonn

- **World Models & Predictive Dynamics** [1]: Developed the first model-based RL algorithm to learn object-centric dynamics directly from pixel inputs, enabling agents to reason about relationships and outperform DreamerV3 and TD-MPC2 on tasks requiring instance-level understanding and relational reasoning.
- **Promptable Dexterous Control** [2–5]: Designed algorithms for human-like grasping from clutter by integrating RL with human demonstrations [5, 6] and shaped representations [4] to improve convergence and sample efficiency. Developed real-world systems leveraging visual foundation models and 3D visual inputs to enable prompt-responsive hardware control.
- **Generalization and Transfer Learning** [6, 7]: Built approaches to improve generalization and knowledge transfer in RL, including hierarchical RL for transferring motor skills across tasks [7] and shape-space representations for intra-class transfer of grasping demonstrations [6].

### M.S. Mechanical Engineering

October 2018 – April 2020

RWTH Aachen University

- Concentration in simulation science and thesis on hierarchical RL for robotics [7]. Awarded with Distinction (Grade: 1.2/1.0).

## Work Experience

### Research Scientist Intern

July 2025 – January 2026

Meta AI (FAIR)

*Menlo Park, CA, USA*

- Developed language-guided control strategies for world models and diffusion policies at scale. Supervised by Arjun Majumdar and Franziska Meier.

### Research Assistant

January 2019 – March 2020

RWTH Chair CATS

*Aachen, Germany*

- Developed high-performance methods for shape optimization in fluid dynamics.

## Skills

- **Core Expertise:** Robot Foundation Models, Reinforcement Learning, Imitation Learning, World Models, Diffusion Policies, Dexterous Manipulation, Perception, Vision-Language-Action Models.
- **Systems & Infrastructure:** Large-scale Model Training, Distributed Training, Physics Simulation (Isaac Lab/Gym, MuJoCo), Real-robot System Integration, Scalable Embodied AI Infrastructure.
- **Languages & Tools:** Python, C/C++, PyTorch, ROS/ROS2, Docker, Unix/Linux environments, Bash.
- **Open Source & Code Examples:** Demonstrated software engineering via open-source repositories: [sold](#), [il-games](#), [multi-object-fetch](#).

## Honors & Awards

- **CASE Best Conference Paper Award** (2023).
- **Dean's List**, RWTH Aachen (Top 5% of academic year 2019/20).
- **Rheinstahl Scholarship** for outstanding engineering students.

## Selected Publications

- [1] Malte Mosbach, Jan Niklas Ewertz, Angel Villar-Corrales, and Sven Behnke. Sold: Slot object-centric latent dynamics models for relational manipulation learning from pixels. In *International Conference on Machine Learning (ICML)*, 2025. URL <https://arxiv.org/abs/2410.08822>.
- [2] Malte Mosbach and Sven Behnke. Grasp anything: Combining teacher-augmented policy gradient learning with instance segmentation to grasp arbitrary objects. In *International Conference on Robotics and Automation (ICRA)*, 2024. URL <https://arxiv.org/abs/2403.10187>.
- [3] Malte Mosbach and Sven Behnke. Prompt-responsive object retrieval with memory-augmented student-teacher learning. In *International Conference on Robotics and Automation (ICRA)*, 2025. URL <https://arxiv.org/abs/2505.02232v1>.
- [4] Malte Mosbach and Sven Behnke. Efficient representations of object geometry for reinforcement learning of interactive grasping policies. In *International Conference on Robotic Computing (IRC)*, pages 156–163, 2022. URL <https://arxiv.org/abs/2211.10957>.
- [5] Malte Mosbach, Kara Moraw, and Sven Behnke. Accelerating interactive human-like manipulation learning with gpu-based simulation and high-quality demonstrations. In *International Conference on Humanoid Robots (Humanoids)*, pages 435–441, 2022. URL <https://arxiv.org/abs/2212.02126>.
- [6] Malte Mosbach and Sven Behnke. Learning generalizable tool use with non-rigid grasp-pose registration. In *International Conference on Automation Science and Engineering (CASE)*, 2023. URL <https://arxiv.org/abs/2307.16499>.
- [7] Christian Scheiderer, Malte Mosbach, Andrés Felipe Posada-Moreno, and Tobias Meisen. Transfer of hierarchical reinforcement learning structures for robotic manipulation tasks. In *International Conference on Computational Science and Computational Intelligence (CSCI)*, pages 504–509, 2020. URL <https://ieeexplore.ieee.org/document/9458186>.