Daniel Swoboda

Doctoral Researcher

Born September 2nd, 1997 in Vienna, Austria

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Doctoral researcher at the Chair of Machine Learning and Reasoning, RWTH Aachen University, working between machine learning and symbolic planning. My current work brings the two together for robotics — learning to guide task and motion planning with signals about what is geometrically feasible, and learning to connect abstract symbolic plans to the continuous goals a robot can execute — bridging the pattern-recognition strength of deep learning with the structure and transparency of symbolic reasoning.

EDUCATION

PhD Candidate — Computer Science April 2024 – Present
RWTH Aachen University · Aachen, Germany

- Chair of Machine Learning and Reasoning; advised by Prof. Hector Geffner
- Focus: Artificial Intelligence, Robotics, Task and Motion Planning, Neuro-Symbolic AI

Master of Science — Computer Science (Minor in Philosophy) October 2020 – March 2024
RWTH Aachen University · Aachen, Germany

- Final grade 1.3 (German scale; 1.0 = best), with Distinction
- Thesis: Jointly Learning Skill Execution and Domain Grounding; advised by Prof. Hector Geffner

Visiting Graduate Student — Kim Jaechul Graduate School of AI February 2022 – August 2022
Korea Advanced Institute of Science and Technology (KAIST) · Daejeon, South Korea

- Coursework in Robot Task and Motion Planning

Bachelor of Science — Computer Science (Minor in Philosophy) October 2017 – September 2020
RWTH Aachen University · Aachen, Germany

- Thesis: Sharing Promises and Requests in Multi-Agent Goal Reasoning for Logistics Robots; advised by Prof. Gerhard Lakemeyer

EXPERIENCE

Doctoral Researcher April 2024 – Present
Chair of Machine Learning and Reasoning, RWTH Aachen University · Aachen, Germany

- Bringing learning and symbolic planning together for robot task and motion planning — guiding planning with signals about geometric feasibility, and grounding symbolic plans into continuous control.

Student Research Assistant January 2024 – March 2024
Chair of Machine Learning and Reasoning, RWTH Aachen University · Aachen, Germany

- Neuro-symbolic AI for robotics: integrating skill learning from demonstration with symbolic planning for long-horizon tasks on domestic robots.

Student Research Assistant March 2020 – December 2023
Knowledge-Based Systems Group (UnRAVeL Research Training Group), RWTH Aachen University · Aachen, Germany

- Multi-robot cooperation in goal reasoning: designed a lightweight form of high-level multi-agent cooperation based on sharing partial world states.
- Contributed to an open-source goal-reasoning framework for ROS 2.

PUBLICATIONS & THESES

Wenbo Ma, **Daniel Swoboda**, Matteo Tschesche, Till Hofmann (2026). WorkBenchMark: A LEGO-Based Assembly Benchmark with an Assembly-by-Disassembly Baseline for the Smart Manufacturing League. *RoboCup Symposium · Oral Presentation*. (accepted)

Tarik Viehmann, **Daniel Swoboda**, Samridhi Kalra, Himanshu Grover, Gerhard Lakemeyer (2026). Making Robots Play by the Rules: The ROS 2 CLIPS-Executive. *18th International Conference on Agents and Artificial Intelligence (ICAART)*.

Supun Dissanayaka, Alexander Ferrein, Till Hofmann, Kosuke Nakajima, Mario Sanz-Lopez, Jesus Savage, **Daniel Swoboda**, Matteo Tschesche, Wataru Uemura, Tarik Viehmann, Shohei Yasuda (2025). From Production Logistics to Smart Manufacturing: The Vision for a New RoboCup Industrial League. *2025 RoboCup Symposium, Salvador, Bahia*.

Soren Munker, **Daniel Swoboda**, Karim El Zaatari, Nehel Malhotra, Lucas Manasses Pinheiro de Souza, Amon Goppert, Chi-Guhn Lee, Robert H Schmitt (2023). CAD-Based Product Partitioning for Automated Disassembly Sequence Planning with Community Detection. *Proceedings of the Changeable, Agile, Reconfigurable and Virtual Production Conference*.

Daniel Swoboda, Tarik Viehmann, Matteo Tschesche, Alexander Ferrein, Gerhard Lakemeyer (2023). The Carologistics RoboCup Logistics Team 2023. *RoboCup Logistics League — Team Description Paper*.

Daniel Swoboda, Till Hofmann, Tarik Viehmann, Gerhard Lakemeyer (2022). Towards Using Promises for Multi-Agent Cooperation in Goal Reasoning. *2022 Workshop on Planning and Robotics*.

Daniel Maximilian Swoboda (2024). Jointly Learning Skill Execution and Domain Grounding for Robot Task and Motion Planning. *Master's Thesis, RWTH Aachen University*.

Daniel M Swoboda, Till Hofmann, Gerhard Lakemeyer, Matthias Jarke (2020). Sharing Promises and Requests in Multi-Agent Goal Reasoning for Logistics Robots. *Bachelor's Thesis, RWTH Aachen University*.

INVITED TALKS

General Policies, Planning, and Robotics. *1st Mexican Conference on Intelligent Robotics (MEXCIR), Mexico*. Plenary Talk, 2025.

Building a Robotics Software Stack. *compAIR Competition, Online*. Invited Talk, 2021.

TEACHING

AI for Robotics — Summer 2026
Lead Instructor & Course Coordinator · RWTH Aachen University

Lab Course Planning for Robotics — Summer 2025
Lead Instructor & Course Coordinator · RWTH Aachen University

Lab Course Robot Task and Motion Planning — Winter 2024/25
Lead Instructor & Course Coordinator · RWTH Aachen University

STUDENT SUPERVISION

Jaxon Cheng — Combining Goal-Conditioned RL with Hierarchical RL for Long-Horizon Robot Manipulation Tasks (Master's Thesis, ongoing)

Fabian Hamm — Integrating Symbolic Planning and Continuous Control via Multi-Modal Goal Embeddings (Master's Thesis, ongoing)

Hani Alassiri — Semantic Partitioning for Partially Observable Deterministic Task and Motion Planning (Master's Thesis, 2026)

Wenbo Ma — Open-World Robotic Assembly with Physically Feasible Planning (Bachelor's Thesis, 2026)

Ümit Diker — Learning Robot Motion Policies for Pushing Objects that Generalize (Master's Thesis, 2025)

AWARDS & HONOURS

RoboCup — 1st Place, Logistics League — World champions — Salvador, Brazil 2025

RWTH Certificate International — For exceptional dedication to internationalisation 2023

RoboCup — 1st Place, Logistics League — World champions — Bangkok, Thailand 2022

RoboCup Asia-Pacific — 1st Place, Logistics League — Remote 2021

RoboCup — 1st Place, Logistics League — Remote 2021

International Micro Air Vehicle Competition — 3rd Place, Indoor Competition — Madrid, Spain 2019

ACADEMIC SERVICE

Co-Organiser, Aachen Symposium on Representation Learning to Act and Plan (2024–Present)

Program Committee Member, RoboCup Symposium (2024–Present)

Member, Technical Committee, RoboCup Logistics League / Smart Manufacturing League (2021–Present)

SERVICE & OUTREACH

Team Lead & Core Developer — Carologistics (RoboCup Logistics League) March 2020 – Present

RWTH Aachen University · Aachen, Germany

Core developer since 2020 and team lead 2024–2026, leading the centralized goal-reasoning agent for a production-logistics scenario and co-developing a new ROS 2 agent framework. Three-time RoboCup Logistics League world champions (2021, 2022, 2025).

Mentor — RWTH BeBuddy Program October 2022 – Present

RWTH Aachen University · Aachen, Germany

Supporting incoming international students through their first semester, helping them navigate academic life and integration.

SKILLS & LANGUAGES

Programming	Python, C++
Frameworks & Tools	PyTorch, ROS 2, PDDLStream, Docker, Linux
Languages	German — Native, English — C2 (IELTS 8.5), Korean — A2