Lars Johannsmeier

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Ambitious and passionate roboticist with over 8 years of experience in academic research and two years in industrial research. Worked mainly on robot manipulation learning and modelling for contact-intensive problems but also gained a lot of experience in related fields such as task planning, control, motion planning, telepresence, and human-robot interaction. Successfully transferred research results into commercial products. Proven track record of publications. Made strong contributions to successful research proposals with considerable funding. Broad spectrum of technical skills, tools, and soft skills. Highly committed to frontier research in robotics and AI.

Education

Technical University Munich (2018–2024)
Ph.D. in electrical engineering (strong focus on AI/ML in robotic manipulation) completed with *Summa Cum Laude* on the 6th of February 2024
Thesis title: Towards Autonomous Policy Synthesis: Tactile Manipulation Skills, Learning Architecture, and Process-Taxonomy-Based Planning
Committee: Prof. Sami Haddadin, Prof. Marc Toussaint, Prof. Dieter Fox

Gottfried Wilhelm Leibniz Universität Hannover (2014–2018)
Ph.D. in electrical engineering, continued at Technical University Munich

Gottfried Wilhelm Leibniz Universität Hannover (2012–2014)
Master of Science in Mechatronics
Thesis title: Development of a force/torque sensor with six degrees of freedom for robot end effectors
Examiner: Prof. Tobias Ortmaier

Gottfried Wilhelm Leibniz Universität Hannover (2008–2012)
Bachelor of Science in Mechatronics
Thesis title: Implementation and evaluation of a collision detection for manipulators
Examiner: Prof. Bernardo Wagner

Professional Career

NVIDIA Corporation (November 2024 – today)

Position: Research Scientist
Tasks:

- Research in robotics, AI and machine learning
- Development and execution of experiments
- Development of software related to the research
- Development and presentation of technology demonstrators
- Preparation of publications for top-tier research conferences and journals
- Presentation of research results at conferences

Franka Robotics GmbH (April 2022 – August 2024)

Position: Head of Robotics Learning

Tasks:

- Tech transfer of previous research on manipulation learning into industry product
- Experimental developments of LLM-based task programming and planning
- Creation of new development platform for robotics researchers
- Build-up of AI department with two development teams
- Close collaborations with universities
- Introduction of agile development methods to the teams
- Role of product owner, product manager and tech lead
- Demonstration of new products at trade fairs and conferences

Technical University Munich (April 2018 – March 2022)

Position: Research Assistant

Tasks:

- Research on manipulation learning and modelling, reinforcement learning, task planning, telepresence, control, motion planning, human-robot interaction
- Presentation of research results at conferences such as ICRA, IROS, ACC
- Development of various research demonstrators
- Presentation of demonstrators at trade fairs, conferences, and other events
- Development of complete software stack (robot control, skill modelling, communications, learning, panning, database, etc.) in C++, Python, and Simulink
- Strong contributions to writing research proposals
- Supervising students
- Preparing lectures and supervising student labs and projects

Gottfried Wilhelm Leibniz Universität Hannover (September 2014 – March 2018)

Position: Research Assistant

Tasks: Same as for Technical University Munich

German Aerospace Center – Institute of Robotics and Mechatronics (October 2013 – April 2014)

Position: Master student

Tasks:

- Design and simulation of a force/torque sensor
- Mechanical analysis using the finite-element method
- Writing master thesis

Key Performance Indicators

h-index: 11
i-index: 11
Number of citations: 982
Number of publications: 24

Publications (Selection)

Johannsmeier, L. (2024). Towards Autonomous Policy Synthesis: Tactile Manipulation Skills, Learning Architecture, and Process-Taxonomy-Based Planning (Doctoral dissertation, Technische Universität München).

Johannsmeier, L., & Haddadin, S. (2016). A hierarchical human-robot interaction-planning framework for task allocation in collaborative industrial assembly processes. *IEEE Robotics and Automation Letters*, *2*(1), 41-48.

Johannsmeier, L., Gerchow, M., & Haddadin, S. (2019, May). A framework for robot manipulation: Skill formalism, meta learning and adaptive control. In *2019 International Conference on Robotics and Automation (ICRA)* (pp. 5844-5850). IEEE.

Johannsmeier, L., & Haddadin, S. (2022, October). Can we reach human expert programming performance? A tactile manipulation case study in learning time and task performance. In *2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)* (pp. 12081-12088). IEEE.

Voigt, F., **Johannsmeier, L.**, & Haddadin, S. (2020). Multi-Level Structure vs. End-to-End-Learning in High-Performance Tactile Robotic Manipulation. In *CoRL* (pp. 2306-2316).

Haddadin, S., & **Johannsmeier, L.** (2018, October). The art of manipulation: Learning to manipulate blindly. In *2018 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)* (pp. 1-9). IEEE.

Wu, Y., Wu, F., Lingyun, C., Keija, C., Schneider, S., **Johannsmeier, L.**, Zhenshan, B., Abu-Dakka, F., Knoll, A., Haddadin, S. (2024). 1 kHz Behavior Tree for Self-adaptable Tactile Insertion. Accepted in *2024 International Conference on Robotics and Automation (ICRA).* IEEE.

Haddadin, S., **Johannsmeier, L.**, & Ledezma, F. D. (2018). Tactile robots as a central embodiment of the tactile internet. *Proceedings of the IEEE*, *107*(2), 471-487.

Grischke, J., **Johannsmeier, L.**, Eich, L., Griga, L., & Haddadin, S. (2020). Dentronics: Towards robotics and artificial intelligence in dentistry. *Dental Materials*, *36*(6), 765-778.

Shahriari, E., **Johannsmeier, L.**, Jensen, E., & Haddadin, S. (2019). Power flow regulation, adaptation, and learning for intrinsically robust virtual energy tanks. *IEEE Robotics and Automation Letters*, *5*(1), 211-218.

Shahriari, E., **Johannsmeier, L.**, & Haddadin, S. (2018, June). Valve-based virtual energy tanks: A framework to simultaneously passify controls and embed control objectives. In *2018 Annual American Control Conference (ACC)* (pp. 3634-3641). IEEE.

Grassmann, R., **Johannsmeier, L.**, & Haddadin, S. (2018, October). Smooth Point-to-Point Trajectory Planning in $ SE $(3) with Self-Collision and Joint Constraints Avoidance. In *2018 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)* (pp. 1-9). IEEE.

Chen, X., **Johannsmeier, L.**, Sadeghian, H., Shahriari, E., Danneberg, M., Nicklas, A., ... & Haddadin, S. (2022, October). On the Communication Channel in Bilateral Teleoperation: An Experimental Study for Ethernet, WiFi, LTE and 5G. In *2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)* (pp. 7712-7719). IEEE.

Haddadin, S., Parusel, S., **Johannsmeier, L.**, Golz, S., Gabl, S., Walch, F., ... & Haddadin, S. (2022). The franka emika robot: A reference platform for robotics research and education. *IEEE Robotics & Automation Magazine*, *29*(2), 46-64.

Under review
Johannsmeier, L., Schneider, S., Li, Y., Burdet, E., Haddadin, S. (2024). A Process-Centric Manipulation Taxonomy for the Organisation, Classification and Synthesis of Tactile Robot Skills. Under review in *Nature Machine Intelligence.*

Research Projects

KI.FABRIK Infrastructure Project
- Devised technical plan for required equipment
- Made a budget plan for equipment in the range of 10 million Euro

KI.FABRIK Phase 1
- Main contributor of overall project plan and content
- Organized numerous PIs and companies in terms of content
- Organized and participated in project meetings

Centre for Tactile Internet (CeTI)
- Wrote parts of the proposal

- Organized and participated in project meetings

Vodafone Collaboration

- Set up common technology demonstrators for learning and telepresence

Microsoft Collaboration

- Set up common technology demonstrators for vision-based learning

Conferences, Talks, and Presentations (Selection)

- Hannover Messe 2015: Demonstration of research on task planning
- ICRA 2016: Paper presentation and workshop participation
- automatica 2018: Presentation of research on robot learning
- ICRA 2018: Organized a tutorial on robot learning
- ACC 2018: Paper presentation and session co-chair
- Opening of the Munich Institute of Robotics and Machine Intelligence 2018: Responsible for large-scale technical demonstration
- Visit of Germany's Chancelor 2019: Presentation of research on robot learning to the German Chancelor Merkel
- Hannover Messe 2019: Demonstration of research on robot learning and telepresence
- Falling Walls 2019: Responsible for live demonstration
- ICRA 2022: Paper presentation and session co-chair
- automatica 2023: Presentation of successful tech transfer
- ReconCycle Summerschool 2023: Invited talk about robot skill synthesis and learning
- RSS 2024: Invited talk at workshop

Teaching Experience

Technical University Munich – Robotics (2018-2020)

- Prepared material and technical setups for hands-on student course on robot manipulation and learning
- Supervised groups of students during course

Gottfried Wilhelm Leibniz Universität Hannnover – Robotics and Control (2018-2020)

- Substituted Professor for lectures
- Prepared lectures, marked exams
- Prepared material and technical setups for hands-on student course on robot manipulation and learning
- Supervised groups of students during course

Professional Memberships

- IEEE (2015–present)

Research & Technical Skills

- Highly experienced in C++ and Python, experienced with Matlab/Simulink and Java
- Experienced Linux user
- Experienced with git, CI/CD tools, various IDEs, ROS, ROS 2, PyTorch, Tensorflow,

Soft Skills and Leadership Experience

- Built up a team of 12 people from scratch
- Experienced as technical and disciplinary lead
- Mentored and supervised over 10 bachelor, master and working students
- Mentored and guided junior PhD students
- Led and coordinated teams of researchers for various smaller projects

References

- Prof. Sami Haddadin – Vice president for research at Mohamed Bin Zayed University of Artificial Intelligence, sami.haddadin@tum.de
- Prof. Dieter Fox – Senior Director at NVIDIA and Professor at University of Washington, dieterf@nvidia.com
- Dr. Patrick Pfaff – Consultant and former CTO of Franka Robotics GmbH, patrickpfaff579@gmail.com

Lars Johannsmeier

Date and place: 05.11.2024, Bellevue, WA