

Dieter Büchler

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POSITIONS

Full Professor Professor

Johannes Kepler Universität Linz, Technisch-Naturwissenschaftliche Fakultät

Assistant Professor

University of Alberta, Computing Science dept.

Research Group Leader

Max Planck Institute for Intelligent Systems, Empirical Inference dept.

Linz, Austria

March 2026 – now

Edmonton, Canada

Oct 2024 – Feb 2026

Tübingen, Germany

Jan 2020 – Feb 2026

EDUCATION

- 2014 – 2019 **Ph.D. in Computer Science**, Empirical Inference dept.,
MPI for Intelligent Systems, Tübingen (Germany) & TU Darmstadt (Germany).
Title: *Robot Learning for Muscular Systems*. Graduated with *summa cum laude*.
Committee: Jan Peters, Tamim Asfour, Oskar von Stryk, Kristian Kersting & Andre Seyfarth.
- 2012 – 2013 **M.Sc. in Biomedical Engineering**, Imperial College London (United Kingdom).
Graduated with *distinction*.
- 2007 – 2012 **B.Eng. in Electrical and Information Engineering**, HAW Hamburg (Germany).
Graduated with 'very good' (overall 1.2, ETCS: 'A').
- 2007 – 2010 **Apprenticeship as Electronic Technician**, Siemens Healthcare, Hamburg (Germany).
Part of the dual degree with Siemens and the HAW Hamburg.

PROFESSIONAL EXPERIENCE

- May – Nov 2018 **X, the Moonshot factory (formally Google X)**, Mountain View (USA)
Machine learning resident/intern. Learning force control at a project which is now intrinsic.ai.
- June – Dec 2010 **Siemens Healthcare**, Erlangen (Germany)
Research intern. Computer vision research project for magnetic guided capsule endoscopy.
- 2010 – 2014 **Siemens Healthcare**, Hamburg (Germany)
Customer service engineer. Technical onsite support for magnetic resonance imaging and computer tomography scanners. In parallel to my undergrad studies.

HONORS AND AWARDS

- 2026 **CIFAR AI Chair**
From the [CIFAR website](#): "Its goal [The Canada CIFAR AI Chairs program] is to recruit the world's leading AI researchers to Canada, while retaining our existing top talent. The program provides long-term, dedicated research funding to support their research programs and help them train the next generation of AI leaders."
- 2025 **Alberta Machine Intelligence Institute (Amii) Fellow**
Amii recognizes leaders in the field of AI across Canada as Amii Fellows. From the [Amii website](#): "Representing one of the highest concentrations of AI expertise globally, Amii is home to innovators who shape the future of AI through pioneering research, mentorship, and real-world solutions."
- 2024 **Best Paper Award @ ICRA 2024**
For the paper "Open X-Embodiment: Robotic Learning Datasets and RT-X Models".
- 2020 **The internal Max Planck Institute grant (24k Euro) for junior researchers, Grassroots**
"Performing outdoor dynamic walking and running on a biped robot."
- 2014 **Award of the Family Klee foundation, s-fk.de**
Awarded as support for my Ph.D. studies.

- 2012 **German Academic Scholarship Foundation**, studienstiftung.de
Foreign studies scholarship as support for my studies at the Imperial College London.
- 2010 **German Academic Scholarship Foundation**, studienstiftung.de
Selected as member; nominated by a professor and assessed (top 0.5% of all students in Germany).

GRANTS

- 2025 **CIFAR AI chair (CA\$100k per year over five years → CA\$ 500k in total)**
- 2025 **Amii - Research Allocation Panel fund (CA\$83k)**
"Embodied Foundation Models"
- 2025 **Amii - Research Allocation Panel fund (CA\$35k)**
"Learning Control for Muscular Robots"
- 2025 **The internal Max Planck Institute grant (27k Euro) for junior researchers, Grassroots**
"Physical Piano Play through Sim-to-Real Transfer."
- 2024 **Tübingen AI Center - Agile Research Fund (50k Euro)**
"Dynamic and Agile throwing and catching"
- 2020 **The internal Max Planck Institute grant (24k Euro) for junior researchers, Grassroots**
"Performing outdoor dynamic walking and running on a biped robot."

TEACHING EXPERIENCE

- Jan - Apr 2025 **Machine Learning Basics** @ University of Alberta (320 undergraduate students)
- Jan - Apr 2025 **Robot Learning** @ University of Alberta (20 graduate students)
- 2015 – 2019 **Max Planck Institute for Intelligent Systems**
In-house tutorials on specific techniques in machine learning on a regular basis.
- 2008 – 2012 **University of Applied Science Hamburg**
Teaching assistant for calculus (Prof. Rauscher-Scheibe) since the second semester.

SUPERVISION

- 2019 – now **Simon Guist**, *Reinforcement Learning for High-Speed Robotics with Muscular Actuation*
Master thesis & Ph.D. supervisor at the MPI for Intelligent Systems
- 2022 – now **Jan Schneider**, *Action Spaces as Inductive Biases for Reinforcement Learning*
Ph.D. supervisor at the MPI for Intelligent Systems
- 2023 – now **Le Chen**, *Generative Modeling for Motion Generation*
Ph.D. supervisor at the MPI for Intelligent Systems
- 2025 – now **Kiran Doel**, *Discovering Structure in Reinforcement Learning*
Supervisor for Master studies at the University of Alberta
- 2025 – now **Martin McLaren**, *Embodied Foundation Models*
Supervisor for Master studies at the University of Alberta
- 2024 – 2025 **Simone Parisi**
Postdoc at the University of Alberta, now ELLIS PI & Assistant Professor (TT) at Tampere University
- 2024 **Yi Zhao**, *Foundation Models for Robotic Reinforcement Learning*
Visiting Ph.D. supervisor, now PhD student at Aalto University
- 2024 **Marcel Mattes**, *Action Space Representation Learning*
Internship supervisor, now PhD student at EPFL
- 2022 – 2023 **Alexander Dittrich**, *Generation and Return of Spin in Robot Table Tennis*
Master thesis supervisor, now PhD student at EPFL

2023	Mridul Mahajan , <i>Sim-to-real for Soft Robots in Dynamic Environments</i> Internship supervisor, now PhD at Boston University
2023	Alina Böhm , <i>Table Tennis Zoo: Max Out Table Tennis Performance on Simulated & Real Robots</i> Internship supervisor, now Master student at TU Darmstadt
2021	Vivek Stefan Sehra , <i>Deep Dynamics Models for Soft Actuation</i> Internship supervisor, now PhD student at the University of Tübingen

CONTRIBUTIONS TO THE RESEARCH COMMUNITY

2021	Real Robot Challenge II at <i>NeurIPS 2021 (Competition Track)</i> with Stefan Bauer (MPI-IS), Joel Akpo (MPI-IS), Manuel Wüthrich (MPI-IS), Rosemary Nan Ke (MILA, Deepmind), Anirudh Goyal (MILA), Thomas Steinbrenner (MPI-IS), Felix Widmaier (MPI-IS), Annika Buchholz (MPI-IS), Bernhard Schölkopf (MPI-IS), Ludovic Righetti (NYU), Franziska Meier (MAIR).
2024 & 2025	Awards Co-Chair at <i>Robotics & Intelligent Systems Expo (RISE)</i> A local robotics conference in Alberta (Canada) brining together students from Robot Learning community, industry leaders, and political key decision makers.

EDITORIAL AND REVIEW EXPERIENCE

Associate Editor	IEEE Transactions on Robotics, T-RO (since 2025), IEEE International Conference on Intelligent Robots and Systems, IROS (2024, 2022), Reinforcement Learning Conference, RLC (2026)
Reviewing	IEEE International Conference on Intelligent Robots and Systems, IROS (2023, 2022, 2021, 2020, 2017), IEEE International Conference on Robotics and Automation, ICRA (2024, 2023, 2022, 2021), IEEE International Conference on Humanoid Robots, Humanoids (2023, 2022, 2018), IEEE International Conference on Biomedical Robotics and Biomechatronics, BioRob (2024), Robotics: Science & Systems, R:SS (2024, 2023, 2017), IEEE Robotics and Automation Letters, RA-L (2024, 2023, 2022, 2021, 2017), IEEE Transactions on Robotics, TRO (2023, 2022, 2021), Conference on Robot Learning, CoRL (2023, 2022, 2021), Neural Information Processing Systems, NeurIPS (2024, 2023, 2017), International Conference on Learning Representations, ICLR (2024)

INVITED TALKS

July 2026	Deutsches Luft und Raumfahrtzentrum (DLR) , Host: João Silvério
June 2026	University of Oxford , Host: Ingmar Posner
June 2025	University of Technology Nuremberg , Host: Michael Roth
May 2025	RoboLetics 2.0: Workshop on Athletic Robots and Dynamic Motor Skills @ ICRA 2025, Atlanta (USA) , Hosts: Matthew Gombolay, Zulfiqar Zaidi, Alap Kshirsagar, Kin Man Lee, Kai Ploeger, Zixuan Wu, Qingyu Xiao
May 2024	Impulsive Motion in Soft Robotic and Microrobotic Systems workshop @ ICRA 2024, Yokohama (Japan) , Hosts: Kevin Chen, Pakpong Chirarattananon, Mirko Kovac, Siyi Xu
Sept 2024	JKU Linz , Host: Andreas Müller
March 2024	IGSTC Workshop on Frontiers of Robot Learning, Mumbai (India) , Hosts: Arpita Sinha, Leena Vachhani, Alap Kshirsagar, Jan Peters
Feb 2024	University of Alberta , Host: Joerg Sander
Sept 2023	Karlsruhe Institute of Technology , Host: Gerhard Neumann
July 2023	University of Osaka , Host: Koh Hosoda
April 2023	University of Pisa , Host: Andrea Asperti, "Deep Fridays" talk series
April 2023	University of Bayreuth , Host: Aldo Faisal
March 2023	University of Leeds , Host: Yanlong Huang
Dec 2022	University of Bristol , Host: Helmut Hauser
Nov 2022	University College London , Host: Marc Deisenroth

Oct 2022	Technische Universität Darmstadt , Host: Jan Peters
Sept 2022	Technische Universität Berlin , Host: Oliver Brock
June 2022	New York University , Host: Ludovic Righetti
June 2022	Carnegie Mellon University , Host: Oliver Krömer
Feb 2020	Robust Action Learning workshop at Tue.AI symposium , Host: Georg Martius
Apr 2018	Bosch AI Center , Host: Christian Daniel

- Journal [1] Guist, S., Schneider, J., Chen, L., Schölkopf, B., Parisi, S., **Büchler, D.**, "Offline Robot Table Tennis via Diverse Exploration.", under review at *IEEE Robotics & Automation Letters*, *RA-L* (2026).
- [2] Chen, L., Zhao, Y., Schneider, J., Gao, Q., Guist, S., Qian, C., Kannala, J., Schölkopf, B., Pajarinen, J., **Büchler, D.**, "Dexterous Robotic Piano Playing at Scale.", under review at *IEEE Transactions on Pattern Analysis and Machine Intelligence*, *TPAMI* (2025).
- [3] Ma, H., **Büchler, D.**, Schölkopf, B., Mühlebach, M., "Reinforcement learning with model-based feedforward inputs for robotic table tennis.", *Autonomous Robots* (2023).
- [4] **Büchler, D.**, Guist, S., Calandra, R., Berenz, V., Schölkopf, B., Peters, J., "Learning to play table tennis from scratch using muscular robots.", *IEEE Transactions on Robotics*, *TRO* (2022).
- [5] **Büchler, D.**, Calandra, R., Peters, J., "Learning to Control Highly Accelerated Ballistic Movements on Muscular Robots", *Robotics and Autonomous Systems*, *RAS* (2022).
- [6] Berenz, V., Naveau, M., Widmaier, F., Wüthrich, M., Passy, J.C., Guist, S., **Büchler, D.**, "The o80 C++ Templated Toolbox: Designing Customized Python APIs for Synchronizing Realtime Processes.", *Journal of Open Source Software*, *JOSS* (2020).
- [7] **Büchler, D.**, Calandra, R., Schölkopf, B., Peters, J., "Control of Musculoskeletal Systems using Learned Dynamics Models.", *IEEE Robotics and Automation Letters*, *RA-L* (2018).
- Conference [1] Schneider, J., Mahajan, M., Chen, L., Guist, S., Schölkopf, B., Posner, I., **Büchler, D.**, "Sim-to-Real Transfer for Muscle-Actuated Robots via Generalized Actuator Networks", under review at *Conference on Robot Learning*, *CoRL* (2026).
- [2] Kekić, A., Schneider, J., **Büchler, D.**, Schölkopf, B., Besserve, M., "Learning Nonlinear Causal Reductions to Explain Reinforcement Learning Policies", *International Conference on Learning Representations*, *ICLR* (2026).
- [3] Zhao, Y., Scannell, A., Cui, T., Chen, L., **Büchler, D.**, Solin, A., Kannala, J., Pajarinen, J., "Efficient Reinforcement Learning by Guiding World Models with Non-Curated Data.", *International Conference on Learning Representations*, *ICLR* (2026).
- [4] Chen, L., Zhao, Y., Schneider, J., Gao, Q., Kannala, J., Schölkopf, B., Pajarinen, J., **Büchler, D.**, "RP1M: A Large-Scale Motion Dataset for Piano Playing with Bi-Manual Dexterous Robot Hands.", *Conference on Robot Learning*, *CoRL* (2024).
- [5] Guist, S., Schneider, J., Ma, H., Berenz, V., Martus, J., Grüninger, F., Mühlebach, M., Fiene, J., Schölkopf, B., **Büchler, D.**, "Safe & Accurate at Speed with Tendons: A Robot Arm for Exploring Dynamic Motion.", *Robotics: Science & Systems*, *R:SS* (2024).
- [6] Schneider, J., Schumacher, P., Guist, S., Häufle, D., Schölkopf, B., **Büchler, D.**, "Identifying Policy Gradient Subspaces.", *International Conference on Learning Representations*, *ICLR* (2024).
- [7] Open X-Embodiment Collaboration [including **Büchler, D.**], "Open X-Embodiment: Robotic Learning Datasets and RT-X Models.", *IEEE International Conference on Robotics and Automation*, *ICRA* (2024).
- [8] Schumacher, P., Krause, L., Schneider, J., **Büchler, D.**, Martius, G., Haeufle, D., "Learning to Control Emulated Muscles in Real Robots: Towards Exploiting Bio-Inspired Actuator Morphology.", *IEEE International Conference on Biomedical Robotics and Biomechatronics*, *BioRob* (2024).
- [9] Guist, S., Schneider, J., Berenz, V., Schölkopf, B., **Büchler, D.**, "Hindsight States: Blending Sim & Real Task Elements for Efficient Reinforcement Learning.", *Robotics: Science & Systems*, *R:SS* (2023).
- [10] Achterhold, J., Tobuschat, P., Ma, H., **Büchler, D.**, Schölkopf, B., Mühlebach, M., Stückler, J., "Black-Box vs. Grey-Box: A Case Study on Learning Ping Pong Ball Trajectory Prediction with Spin and Impacts.", *Learning for Dynamics and Control*, *L4DC* (2023).
- [11] Dittrich, A., Schneider, J., Guist, S., Schölkopf, B., **Büchler, D.**, "AIMY: An Open-source Table Tennis Ball Launcher for Versatile and High-fidelity Trajectory Generation.", *IEEE International Conference on Robotics and Automation*, *ICRA* (2023).
- [12] Tobuschat, P., Ma, H., **Büchler, D.**, Schölkopf, B., Muehlebach, M., "Data-Efficient Online Learning of Ball Placement in Robot Table Tennis.", *IEEE International Conference on Intelligent Robots and Systems*, *IROS* (2023).

- [13] Schumacher, P., Häufle, D., **Büchler, D.**, Schmitt, S., Martius, G., "DEP-RL: Embodied Exploration for Reinforcement Learning in Overactuated and Musculoskeletal Systems.", *International Conference on Learning Representations, ICLR* (2023).
 - [14] Wochner, I., Schumacher, P., Martius, G., **Büchler, D.**, Schmitt, S., Häufle, D., "Learning with Muscles: Benefits for Data-Efficiency and Robustness in Anthropomorphic Tasks.", *Conference on Robot Learning, CoRL* (2022).
 - [15] Ma, H., **Büchler, D.**, Schölkopf, B., Mühlebach, M., "A Learning-based Iterative Control Framework for Controlling a Robot Arm with Pneumatic Artificial Muscles.", *Robotics: Science and Systems, R:SS* (2022).
 - [16] Gürtler, N., **Büchler, D.** and Martius, G., "Hierarchical Reinforcement Learning with Timed Subgoals.", *Advances in Neural Information Processing Systems, NeurIPS* (2021).
 - [17] Shaj, V., **Büchler, D.**, Sonker, R., Becker, P. Neumann, G., "Hidden Parameter Recurrent State Space Models For Changing Dynamics Scenarios.", *International Conference on Learning Representations, ICLR* (2021).
 - [18] Shaj, V., Becker, P., **Büchler, D.**, Pandya, H., van Duijkeren, N., Taylor, C.J., Hanheide, M. and Neumann, G., "Action-Conditional Recurrent Kalman Networks For Forward and Inverse Dynamics Learning.", *Conference on Robot Learning, CoRL* (2020).
 - [19] Huang, Y., **Büchler, D.**, Koç, O., Schölkopf, B. and Peters, J., "Jointly learning trajectory generation and hitting point prediction in robot table tennis.", *IEEE International Conference on Humanoid Robots, Humanoids* (2016).
 - [20] **Büchler, D.**, Ott, H., Peters, J., "A Lightweight Robotic Arm with Pneumatic Muscles for Robot Learning.", *IEEE International Conference on Robotics and Automation, ICRA* (2016).
- Workshop
- [1] Schneider, J., Schumacher, P., Häufle, D., Schölkopf, B., **Büchler, D.**, "Investigating the Impact of Action Representations in Policy Gradient Algorithms.", *Workshop on Effective Representations, Abstractions, and Priors for Robot Learning at ICRA* (2023).
 - [2] Berenz, V., Widmaier, F., Guist, S., Schölkopf, B., **Büchler, D.**, "Synchronizing Machine Learning Algorithms, Realtime Robotic Control and Simulated Environment with o80.", *Workshop on Robot Software Architectures at ICRA* (2023).
 - [3] Open X-Embodiment Collaboration [including **Büchler, D.**], "Open X-Embodiment: Robotic Learning Datasets and RT-X Models.", *Workshop on Towards Generalist Robots: Learning Paradigms for Scalable Skill Acquisition at CoRL* (2023).
 - [4] **Büchler, D.**, Calandra, R., Peters, J., "Modeling Variability of Musculoskeletal Systems with Heteroscedastic Gaussian Processes.", *Workshop on Neurorobotics at NeurIPS* (2016).

LIST OF REFERENCES

I have been interacting frequently with the following scientist, who are well-aware of my research. They are willing to act as references. To obtain further references please contact me.

- Prof. Dr. Jan Peters
Technische Universität Darmstadt, Institute for Intelligent Autonomous Systems, Computer Science dept.
Hochschulstr. 10, 64289 Darmstadt, Germany
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- Prof. Dr. Roberto Calandra
Technische Universität Dresden, Learning, Adaptive Systems and Robotics Lab, Faculty of Computer Science
Barkhausen-Bau (BAR), Helmholtzstr. 18, 01069 Dresden, Germany
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- Prof. Dr. Gerhard Neumann
Karlsruhe Institute of Technology, Autonomous Learning Robots Lab, Institute for Anthropomatics and Robotics (IAR)
Engler-Bunte-Ring 8, 76131 Karlsruhe, Germany
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- Dr.-Ing. Stefan Schaal
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- Prof. Dr. Bernhard Schölkopf
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SELECTED PUBLICATIONS

- "Learning to Play Table Tennis From Scratch using Muscular Robots."
Dieter Büchler, Simon Guist, Roberto Calandra, Vincent Berenz, Bernhard Schölkopf, Jan Peters
IEEE Transactions on Robotics, 2022
- "Safe and Accurate at Speed with Tendons: A Robot Arm for Exploring Dynamic Motion."
Simon Guist, Jan Schneider, Hao Ma, Vincent Berenz, Julian Martus, Felix Grüninger, Michael Mühlebach, Jonathan Fiene, Bernhard Schölkopf, Dieter Büchler
Robotics: Science and Systems (R:SS), 2024
- "Identifying Policy Gradient Subspaces."
Jan Schneider, Pierre Schumacher, Simon Guist, Le Chen, Daniel Häufle, Bernhard Schölkopf, Dieter Büchler
International Conference on Learning Representations (ICLR), 2024
- "RP1M: A Large-Scale Motion Dataset for Piano Playing with Bi-Manual Dexterous Robot Hands."
Yi Zhao, Le Chen, Jan Schneider, Quankai Gao, Juho Kannala, Bernhard Schölkopf, Joni Pajarinen, Dieter Büchler
Conference on Robot Learning (CoRL), 2024
- "Open X-Embodiment: Robotic Learning Datasets and RT-X Models."
Open X-Embodiment Collaboration [including Büchler, D.]
International Conference on Robotics and Automation (ICRA), 2024