Fabian **Otto**

Research Scientist · Software Engineer

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Education

PhD in Computer Science
Tübingen, Germany

University of Tübingen
11/2019–02/2024

- Thesis: Differentiable Trust Region Projection Layers for Deep Reinforcement Learning
- Advisor: Prof. Gerhard Neumann

Master of Science in Computer Science (with distinction), Minor in Psychology
Darmstadt, Germany

Technical University of Darmstadt
10/2017–10/2019

- GPA: 1.0 (on a scale of 1-5, with 1 being the highest score)
- Honors & Awards: ECTS A Ranking; Germany Scholarship; Schaeffler Top Student Scholarship

Bachelor of Science in Business Information Systems – Software Engineering
Mannheim, Germany

Baden-Württemberg Cooperative State University
10/2014–09/2017

- GPA: 1.4 (on a scale of 1-5, with 1 being the highest score)
- Honors & Awards: ECTS A Ranking

Research Experience

Machine Learning Researcher
Cambridge, United Kingdom

Microsoft Research
03/2024–Present

- Led research and development of Vision-Language-Action models for decision-making and physically embodied AI, focusing on deploying versatile robotic manipulation systems in data center environments to improve operational efficiency.

Doctoral Researcher
Tübingen, Germany

Bosch Center for Artificial Intelligence
11/2019–11/2023

- Developed novel **trust region methods** for deep reinforcement learning using **PyTorch**, benchmarking against baselines including **PPO**, **SAC**, **TD3**, and **MPO**, on **MuJoCo** manipulation and locomotion tasks.
- Integrated **movement primitives** into deep reinforcement learning frameworks, effectively combining the benefits of **episode-based** and **step-based** approaches, especially for scenarios with **sparse** and **non-Markovian** rewards.

Research Assistant
Darmstadt, Germany

Technical University of Darmstadt
10/2017–04/2019

- Implemented and evaluated reinforcement learning algorithms, including **DQN**, **A3C**, and **PILCO**, using **PyTorch** for **simulated** and **physical** robotic systems.

Research Intern: Animal Biometrics
Darmstadt, Germany

Fraunhofer Institute for Computer Graphics Research
04/2018–09/2018

- Implemented **ResNet** and **RetinaNet** in **TensorFlow** to classify individual animals and species from **low-quality camera trap images**.
- Reduced biologists' workload by reducing manual image review by approximately 90%, enabling greater focus on critical cases, and aiding **wildlife conservation efforts** and **ecological research**.

Occupational Experience

Data Scientist (Part-time)/Top Student Scholarship
Langen, Germany

Schaeffler Group
10/2017–10/2019

- Recognized as exceptional dual student, selected for **Schaeffler's Top Student Scholarship**, pursuing an MSc degree and working part-time.
- Conducted a comprehensive evaluation of **traditional**, **deep learning**, and **hybrid** approaches to enhance **demand forecasting**, achieving a **30% improvement in forecast quality** compared to the existing system.
- **Strategized and optimized the data landscape**, driving enhancements in analytics capabilities for business decision-making.

Dual Student
Herzogenaurach, Germany

Schaeffler Group
10/2014–09/2017

- Designed and implemented a **user-friendly graphical editor** for production machine configuration management.
- Led the development of a global **document security concept**, ensuring the protection and integrity of sensitive information.
- Supported **project management** in the successful rollout of an SAP system, collaborating with **cross-functional teams**, ensuring smooth and timely **communication**, as well as efficient **issue resolution**. Contributed to system configuration, **user training**, and seamless transition, maximizing SAP utilization.
- Engineered a data mapping tool with **Java**, optimizing the loading process of CAD models, saving approximately 10 minutes per model loaded.

Intern: Disaster Recovery and Business Continuity Planning *Wooster, OH, USA*

Schaeffler Transmission, LLC *05/2016–08/2016*

- Assessed the **reliability** of the site's network infrastructure and the potential repercussions along the supply chain in the event of an **outage**.
- Identified critical vulnerabilities, enabling preemptive **risk management** and **continuity planning** to mitigate downtime risks.

Publications

[1] **Fabian Otto**, Philipp Becker, Vien Anh Ngo, and Gerhard Neumann. "Vlearn: Off-Policy Learning with Efficient State-Value-Function Estimation". Under submission. 2024.

[2] Ge Li, Hongyi Zhou, Dominik Roth, Serge Thilges, **Fabian Otto**, Rudolf Lioutikov, and Gerhard Neumann. "Open the Black Box: Step-based Policy Updates for Temporally-Correlated Episodic Reinforcement Learning". In: *International Conference on Learning Representations (ICLR)*. 2024.

[3] Philipp Becker, Sebastian Mossburger, **Fabian Otto**, and Gerhard Neumann. "Combining Reconstruction and Contrastive Methods for Multimodal Representations in RL". In: *Reinforcement Learning Conference (RLC)*. 2024.

[4] **Fabian Otto***, Hongyi Zhou*, Onur Celik, Ge Li, Rudolf Lioutikov, and Gerhard Neumann. "MP3: Movement Primitive-Based (Re-)Planning Policy". In: *CoRL Workshop on Learning Effective Abstractions for Planning (LEAP)*. 2023.

[5] Ge Li, Zeqi Jin, Michael Volpp, **Fabian Otto**, Rudolf Lioutikov, and Gerhard Neumann. "ProDMP: A Unified Perspective on Dynamic and Probabilistic Movement Primitives". In: *IEEE Robotics and Automation Letters (RA-L)* 8.4 (2023), pp. 2325–2332.

[6] **Fabian Otto**, Onur Celik, Hongyi Zhou, Hanna Ziesche, Vien Anh Ngo, and Gerhard Neumann. "Deep Black-Box Reinforcement Learning with Movement Primitives". In: *Conference on Robot Learning (CoRL)*. PMLR. 2022, pp. 1244–1265.

[7] **Fabian Otto**, Philipp Becker, Ngo Anh Vien, Hanna Ziesche, and Gerhard Neumann. "Differentiable Trust Region Layers for Deep Reinforcement Learning". In: *International Conference on Learning Representations (ICLR)*. 2021.

[8] **Fabian Otto**. "Model-Free Deep Reinforcement Learning — Algorithms and Applications". In: *Reinforcement Learning Algorithms: Analysis and Applications*. Ed. by Boris Belousov, Hany Abdulsamad, Pascal Klink, Simone Parisi, and Jan Peters. Springer Cham: Springer International Publishing, 2021, pp. 109–121. ISBN: 978-3-030-41188-6.

Teaching Experience

Student Supervision

Tübingen, Germany

University of Tübingen & Karlsruhe Institute of Technology

- **Dominik Roth**: Exploration Strategies in Deep Reinforcement Learning (B.Sc., 3x Intern) *08/2022–today*
- **"AirHocKIT" student team**: NeurIPS 2023 Competition Track: Robot Air Hockey Challenge (Intern) *04/2023–12/2023*
- **Leonhard Kraft**: Deep Black-Box Reinforcement Learning with Movement Primitives on Infinite-Horizon Problems (B.Sc.) *05/2023–10/2023*
- **Moritz Behr**: Deep Black-Box Reinforcement Learning with NeRFs (M.Sc.) *11/2022–05/2023*
- **Dhimiter Pikuli**: Learning Complex Robot Arm Manipulations with Deep Reinforcement Learning (M.Sc., Intern) *09/2022–03/2023*
- **Denis Megerle**: Stable Optimization of Gaussian Likelihoods (M.Sc.) *03/2022–09/2022*
- **Ahmed Agha**: Improved Trust Regions for Adversarial Imitation Learning (M.Sc.) *03/2021–09/2022*
- **Ricardo Dominguez**: Action Correlations for Deep Reinforcement Learning (2x Intern) *06/2021–02/2022*

Community Service

Workshop Organization

- **IROS 2023:** Policy Learning in Geometric Spaces (Main Organizer)
- **CoRL 2022:** Geometry, Physics, and Human Knowledge as Inductive Bias in Robot Learning (Main Organizer)

Reviewing

- Conference on Neural Information Processing Systems (NeurIPS)
- International Conference on Machine Learning (ICML)
- Conference on Robot Learning (CoRL)
- IEEE International Conference on Robotics and Automation (ICRA)
- IEEE Robotics and Automation Letters (RA-L)
- Springer Nature, Machine Learning

Open Source Contributions

- **Farama Foundation:** Contributions to Shimmy and Meta-World
- **Fancy Gym:** Core Maintainer

Skills

Language	German (native), English (fluent)
Machine Learning	ACME, CleanRL, Gymnasium, Jax, MuJoCo, Numpy, Pandas, Pytorch, RLlib, stable-baselines, Scipy, Tensorflow
Programming	Azure, Docker, Git, Java, Jira, Jupyter, Kafka, LSF, Optuna, Slurm, Spark, SQL, Unitest
Other	LaTeX, Linux–Ubuntu, Microsoft Office