Lukas Schäfer

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🎓 EDUCATION

PhD Data Science & Artificial Intelligence	12/2019 - 10/2024
UNIVERSITY OF EDINBURGH - GRADE: PASS WITH NO CORRECTIONS	EDINBURGH, UNITED KINGDOM

> Supervisors: **Stefano V. Albrecht** (primary) and **Amos Storkey** (secondary)
> Thesis: **Efficient Exploration in Single-Agent and Multi-Agent Deep Reinforcement Learning**

M.Sc. Informatics	09/2018 - 08/2019
UNIVERSITY OF EDINBURGH - GRADE: DISTINCTION	EDINBURGH, UNITED KINGDOM

> Thesis: Curiosity in Multi-Agent Reinforcement Learning, advised by Stefano V. Albrecht

B.Sc. Computer Science, minor subject Japanese	10/2015 - 09/2018
SAARLAND UNIVERSITY - WITHIN TOP 5% OF YEAR	SAARBRÜCKEN, GERMANY

> Thesis: Domain-Dependent Policy Learning using Neural Networks in Classical Planning, advised by Jörg Hoffmann

💼 EXPERIENCE

Researcher	10/2024 - Present
MICROSOFT RESEARCH	CAMBRIDGE, UNITED KINGDOM

> Researching decision-making agents that learn to imitate behaviour in complex environments from few demonstrations
> Developed gameplay recording and data cleaning pipeline used to train real-time world models deployed on Copilot Labs

Textbook Author	03/2022 - 10/2023

Designed and wrote an introductory **textbook on multi-agent reinforcement learning** with **Stefano V. Albrecht** and **Filippos Christianos** (equal contributions). The book will be published with **MIT Press** in 2024 [1].

Research Intern	04/2023 - 10/2023
MICROSOFT RESEARCH	CAMBRIDGE, UNITED KINGDOM

> Conducted an empirical study on the effectiveness of various **visual encoders**, including pre-trained **vision foundation models**, for **imitation learning in modern video games** under mentorship of **Sam Devlin** and **Tabish Rashid** [11]
> Developed **novel platform** for imitation learning in Minecraft Dungeons **from scratch**, including human gameplay recorder, imitation learning framework using **PyTorch Lightning**, and programmatic interface for online evaluation

Young Research Attendee	09/2022 - 09/2022
HEIDELBERG LAUREATE FORUM	HEIDELBERG, GERMANY

> Selected as one of 100 international young researchers in computer science to network and discuss research

Research Intern	07/2022 - 12/2022
HUAWEI NOAH'S ARK LAB	LONDON, UNITED KINGDOM

> Researched the application of **ensemble models** to guide exploration and improve training stability of **multi-agent reinforcement learning** under the supervision of **David Mguni** [2]

Research Intern	11/2020 - 03/2021
DEMATIC - TECHNOLOGY AND INNOVATION	REMOTE

> Applied multi-agent reinforcement learning to automate **robotic warehouse logistics** and **scale to real-world settings** [4]
> My internship led to four further internship projects and a **fellowship-funded research collaboration**

📊 SKILLS

Machine Learning & Data Science
Python: PyTorch · PyTorch Lightning · NumPy · Pandas · Scikit-Learn · Matplotlib · Jupyter · Anaconda

Software Engineering
C++ · C · Bash · Git · Docker · HTML · CSS · JavaScript

Natural Languages
German (native) · English (fluent) · Chinese (beginner)

Soft Skills
Teamwork · Teaching · Communication · Organisation

📖 SELECTED PUBLICATIONS

Textbook

[1] S. V. Albrecht, F. Christianos, and **Lukas Schäfer** (equal contributions), *Multi-Agent Reinforcement Learning: Foundations and Modern Approaches*. To be published with **MIT press**, 2024.

Conferences and Journals

[2] **Lukas Schäfer**, O. Slumbers, S. McAleer, Y. Du, S. V. Albrecht, and D. Mguni, "Ensemble value functions for efficient exploration in multi-agent reinforcement learning," in *AAMAS*, 2025.

[3] A. A. Fernandez, **Lukas Schäfer**, E. Villar-Rodriguez, S. V. Albrecht, and J. Del Ser, "Using offline data to speed-up reinforcement learning in procedurally generated environments," *Neurocomputing*, 2024.

[4] A. Krnjaic, R. D. Steleac, J. D. Thomas, G. Papoudakis, **Lukas Schäfer**, A. W. K. To, K.-H. Lao, M. Cubuktepe, M. Haley, P. Börsting, and S. V. Albrecht, "Scalable multi-agent reinforcement learning for warehouse logistics with robotic and human co-workers," in *IROS*, 2024.

[5] T. McInroe, **Lukas Schäfer**, and S. V. Albrecht, "Learning representations for control with hierarchical forward models," *TMLR*, 2023.

[6] **Lukas Schäfer**, F. Christianos, J. P. Hanna, and S. V. Albrecht, "Decoupled reinforcement learning to stabilise intrinsically-motivated exploration," in *AAMAS*, 2022.

[7] **Lukas Schäfer**, "Task generalisation in multi-agent reinforcement learning," in *AAMAS*, *Doctoral Consortium*, 2022.

[8] R. Zhong, D. Zhang, **Lukas Schäfer**, S. V. Albrecht, and J. P. Hanna, "Robust on-policy data collection for data efficient policy evaluation," in *NeurIPS*, 2022.

[9] G. Papoudakis, F. Christianos, **Lukas Schäfer**, and S. V. Albrecht, "Benchmarking multi-agent deep reinforcement learning algorithms in cooperative tasks," in *NeurIPS*, *Datasets and Benchmarks Track*, 2021.

[10] F. Christianos, **Lukas Schäfer**, and S. V. Albrecht, "Shared experience actor-critic for multi-agent reinforcement learning," in *NeurIPS*, 2020.

Workshops

[11] **Lukas Schäfer**, L. Jones, A. Kanervisto, Y. Cao, T. Rashid, R. Georgescu, D. Bignell, S. Sen, A. T. Gavito, and S. Devlin, "Visual encoders for data-efficient imitation learning in modern video games," in *Adaptive and Learning Agents Workshop at AAMAS*, 2025.

[12] **Lukas Schäfer**, F. Christianos, A. Storkey, and S. V. Albrecht, "Learning task embeddings for teamwork adaptation in multi-agent reinforcement learning," in *Generalization in Planning Workshop at NeurIPS*, 2023.

Theses

[13] **Lukas Schäfer**, "Efficient exploration in single-agent and multi-agent deep reinforcement learning," PhD Thesis, University of Edinburgh, 2024.

[14] **Lukas Schäfer**, *Curiosity in multi-agent reinforcement learning*, Master's Thesis, 2019.

[15] **Lukas Schäfer**, *Domain-dependent policy learning using neural networks in classical planning*, Bachelor's Thesis, 2018.

🔍 COMMUNITY

Organisation

› Co-lead organiser of the **UK Multi-Agent Systems Symposium 2025** with 200 participants in collaboration with the Alan Turing Institute and King's College London.

› Organisation and hosting of **RL reading group** at University of Edinburgh with speakers from industry (e.g. DeepMind, MSR, FAIR) and academia (e.g. Oxford University, McGill University, NUS)

Reviewing

› 2025: ICML (**best reviewer award**), RLDM

› 2024: ICML (**best reviewer award**), RLC, AAMAS, TMLR

› 2023: NeurIPS, NeurIPS Datasets and Benchmark Track, ICML, AAMAS

› 2022: NeurIPS, NeurIPS Datasets and Benchmark Track, ICML (**top 10% outstanding reviewer award**), AAMAS

› 2021: NeurIPS

› 2020: Pre-registration experiment workshop at NeurIPS

🖥 TEACHING AND SUPERVISION EXPERIENCE

Visiting PhD Student Supervision, University of Edinburgh   05/2022 - 05/2023
> Supervised Alain Andres Fernandez from Tecnalia, Spain, during his 3-month research visit and subsequent collaboration
> Jointly developed and executed research project investigating the efficacy of imitation learning for pre-training and concurrent training of reinforcement learning agents in procedurally generated environments [**andres2023using**]

Teaching Assistant, University of Edinburgh   10/2019 - 06/2022
REINFORCEMENT LEARNING, SCHOOL OF INFORMATICS
> **Delivered lectures** and **designed coursework** on reinforcement learning (including deep and multi-agent RL) for last year undergraduate and M.Sc. students
> **Supervised and marked coursework** and **exam scripts** for 100+ students

M.Sc. Student Supervision, University of Edinburgh   02/2021 - 08/2021
> Co-supervised two M.Sc. students through project proposal, refinement and execution towards final thesis
> Rujie Zhong: Data Collection for Policy Evaluation in Reinforcement Learning
> Revised paper accepted at Workshop on Offline Reinforcement Learning at NeurIPS 2021, and later as a **main conference paper at NeurIPS 2022** [8]
> Panagiotis Kyriakou: Reinforcement Learning with Function Approximation in Continuing Tasks: Discounted Return or Average Reward?

Voluntary Lecturer and Coach, Saarland University   09/2017 - 10/2017
MATHEMATICS PREPARATION COURSE
> Delivered daily **lectures** on formal languages and predicate logic **to 250 participants** in first week
> The course received **BESTE-award** for special student commitment 2017 of Saarland University

Teaching Assistant, Saarland University   10/2016 - 03/2017
PROGRAMMING 1, DEPENDABLE SYSTEMS AND SOFTWARE GROUP
> Taught functional programming, basic complexity theory, and inductive proofs to first-year undergraduate students in weekly tutorials and office hours
> Collectively created learning materials and discussed student progress as part of the whole teaching team
> Marked weekly tests, mid-term and final exams

🏆 AWARDS

> Best reviewer award at ICML 2022, 2024, and 2025   06/2025
> Principal's Career Development Scholarship   12/2019 – 06/2024
> DAAD graduate scholarship   09/2018 - 08/2019
> Stevenson Exchange Scholarship   09/2018 - 08/2019
> BESTE-award for special student commitment 2017 of Saarland University   10/2017

[REFERENCES AVAILABLE ON REQUEST]