DANIEL BEECHEY

Email ◇ Google Scholar ◇ Website ◇ GitHub

RESEARCH INTERESTS

Reinforcement Learning, LLM-based agents, Explainable AI, Hierarchical RL, Continual Learning, Open-ended Learning, Exploration, Bounded Rationality

EDUCATION

PhD in Reinforcement Learning *present*
University of Bath, UK
Supervisors: Özgür Şimşek (Computer Science), Emma Carmel (Social Policy)
Dissertation: *Explaining Reinforcement Learning with Shapley Values: Theory and Algorithms*

MRes in Accountable, Responsible, and Transparent AI *2022*
University of Bath, UK
Dissertation: *Explaining Reinforcement Learning with Shapley Values*
Grade: Distinction

MSc in Data Science *2021*
University of Bath, UK
Dissertation: *Autonomous Routing of Printed Circuit Boards with Hierarchical Reinforcement Learning*
Grade: Distinction

BSc (Hons) in Mathematics *2020*
University of Bath, UK
Grade: First Class

WORK EXPERIENCE

Research Scientist, *Huawei Noah's Ark Lab* *2025 - present*
Leading research on open-ended reinforcement learning for LLM-based agents.
Developed *Darwin Mobile Agent*, the first fully open-source, end-to-end pipeline for large-scale online reinforcement learning and inference of mobile GUI agents.

Co-Manager of the Bath RL Lab, *University of Bath* *2023 - 2025*
Organised lab activities, including weekly lab meetings, research sessions, paper discussions, and social events.

Teaching Assistant, *University of Bath* *2020 - 2025*
Modules: Reinforcement Learning; Statistics for Data Science; Software Technologies for Data Science; Programming, Foundations, and Connections; Programming and Discrete Mathematics; Mathematical Methods and Applications
Supervised 10 MSc and 5 BSc students.

AI Lecturer, *University of Bath* *2022 - 2023*
Lectured MSc Reinforcement Learning.
Supervised 5 MSc and 2 BSc students.

AWARDS

University of Bath, **Doctoral Recognition Award** *2024*
Bath Conference of Computer Science, **Best Overall Contribution** *2023*
Inter-CDT Conference on AI, **Best Poster** *2023*

PUBLICATIONS

Darwin Mobile Agent: A Roadmap for Self-Evolution — *Preprint, 2025*
Daniel Beechey, Derek Yuen, Jianheng Liu, et al.

A Theoretical Framework for Explaining Reinforcement Learning with Shapley Values — *Preprint, 2025*
Daniel Beechey, Thomas M. S. Smith, and Özgür Şimşek

Approximating Shapley Explanations in Reinforcement Learning — *NeurIPS, 2025*
Daniel Beechey and Özgür Şimşek

Reformulating Reactivity Design for Data-Efficient Machine Learning — *ACS Catalysis, 2023*
Toby Lewis-Atwell, **Daniel Beechey**, et al.

Explaining Reinforcement Learning with Shapley Values — *ICML, 2023*
Daniel Beechey, Thomas M. S. Smith, and Özgür Şimşek

OPEN-SOURCE PROJECTS

`Darwin Mobile Agent` (*core contributor*): An end-to-end pipeline for large-scale online reinforcement learning of mobile GUI agents.

`FastSVERL` (*lead developer*): A scalable library for approximating Shapley value explanations in reinforcement learning.

SELECTED TALKS

Explaining Reinforcement Learning with Shapley Values: Theory and Algorithms
MARBLE Research Group, University of Edinburgh — *2025*

A Theoretical Framework for Explaining Reinforcement Learning with Shapley Values
ART-AI Colloquium Series — *2025*
Bath Doctoral Festival of Ideas — *2024*

An Introduction to Explainable and Hierarchical Reinforcement Learning
Bath AI Society — *2024*

Explaining Reinforcement Learning with Shapley Values
Bath Conference of Computer Science — *2023*
Alan Turing Institute — *2023*

TECHNICAL SKILLS

Frameworks & Libraries	PyTorch, HF Transformers, VeRL, Ray, Gym, NumPy, Matplotlib
Programming Languages	Python (Proficient), Bash, R, Matlab
Tools & Platforms	Git, Linux, SLURM, wandb, Jupyter, Conda
RL Algorithms	PPO, GRPO, DQN, DDPG, SAC, Hierarchical RL
Model Architectures	LLMs, Transformers, VAE, CNN, MLP

REVIEWING

Reinforcement Learning Conference (RLC) — *2025*
European Workshop on Reinforcement Learning (EWRL) — *2024*