SPECIES Student Scholarships 2024: Lancaster University Leipzig

James Stovold May 17, 2024

James Stovold MEng PhD FHEA

Contact Details

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Education

2012–2016: **PhD Computer Science**, York Centre for Complex Systems Analysis, University of York
Thesis: *"Distributed Cognition as the Basis for Adaptation and Homeostasis in Robots"*, supervised by Prof. Jon Timmis and Dr Simon O'Keefe

2007–2012: **MEng (hons) Computer Systems and Software Engineering**, Department of Computer Science, University of York
Dissertation: *"Extending the Computational Application of Reaction–Diffusion Chemistry by Modelling Artificial Neural Networks"*, supervised by Dr Simon O'Keefe

Academic Positions

2022–Present: **Assistant Professor in Computer Science**, Lancaster University Leipzig, Germany
2021–2022: **Senior Lecturer in Computer Science**, British University Vietnam, Hanoi
2019–2021: **Lecturer in Artificial Intelligence**, University of York, UK
2017–2019: **Associate Lecturer in Computer Science**, Swansea University, UK

Research

My research focusses on interactions and emergent behaviour. This has included chemical reactions, cellular interaction, robots, and humans working with AI tools. The project in which this studentship would be based is centred on how humans interact with AI tools, and how we can develop adaptations for those AI tools to better enable this.

Selected Publications

Walton S.P, Evans B.J, Rahat A.A.M, Stovold J and Vincalek J (2024), *"Does mapping elites illuminate search spaces? A large-scale user study of MAP–Elites applied to human–AI collaborative design"*, ACM Transactions on Interactive Intelligent Systems (under review), arXiv doi: 10.48550/arXiv.2402.07911

Stovold J (2023) *"Neural Cellular Automata Can Respond to Signals"*, Proc. ALIFE 2023, vol. 35, MIT Press, doi: 10.1162/isal_a_00567

Walton S.P, Vincalek J, Rahat A.A.M, Stovold J and Evans B.J (2023), *"Genetic Car Designer: A Large-Scale User Study of a Mixed-Initiative Design Tool"*, Proc. AISB Convention 2023

Walton S.P, Rahat A.A.M, Stovold J (2022) *"Evaluating Mixed-initiative Procedural Level Design Tools using a Triple-Blind User Study"*, IEEE Transactions on Games, vol. 14, no. 3, pp. 413–422, doi: 10.1109/TG.2021.3086215

Stovold J, O'Keefe S (2017) *"Reaction–Diffusion Chemistry Implementation of Associative Memory Neural Networks"*, IJPEDS, vol. 32, no. 1, pp. 74–94, doi: 10.1080/17445760.2016.1155579

Research Group

The research on this project is conducted by a team across two locations: Swansea University (Wales) and Lancaster University Leipzig (Germany). The student would be based at the Leipzig location. The team consists of Dr Sean Walton, Dr Alma Rahat, and Dr James Stovold.

Dr James Stovold is an Assistant Professor (Lecturer) in Computer Science at Lancaster University Leipzig. His research centres around unconventional computing, distributed cognition, and artificial life. Recently this has included more topics relating to how humans interact with AI systems, in particular genetic algorithms used for procedural content generation (PCG) in games. He received his PhD from York Centre for Complex Systems Analysis (YCCSA) at the University of York in 2017, and has worked as a lecturer at Swansea, York, British University Vietnam, and now Lancaster University's new branch campus in Leipzig, Germany.

Dr Sean Walton is a Senior Lecturer in the Computational Foundry, Swansea University, a Turing Fellow, Founding Director of Pill Bug Interactive (https://www.pillbug.zone/), Sêr Cymru II Fellow and former secondary school science teacher. Sean originally studied Physics at Aberystwyth University before undertaking a PGCE at the University of Cambridge (2006). Following two years of teaching Physics in a Welsh Valley school he studied for and gained his PhD in the Civil Engineering department at Swansea University (2013). His PhD and subsequent postdoctoral research position were in developing novel techniques for generating high quality meshes required for computational fluid dynamics simulations. In 2016, he was awarded a Sêr Cymru II Research Fellowship, with support from Rolls Royce, and became a lecturer in Computer Science at Swansea University. He is a two time recipient of the Swansea University Excellence in Learning and Teaching Award (2016, 2022) and was nominated for best educational game in the 8th International Educational Games Competition (2020). In 2016 he also founded Pill Bug Interactive, an independent video games development studio which was nominated for the BAFTA Cymru Award for Best Video Game in 2019.

Dr Alma Rahat is an Associate Professor of Data Science at Swansea University, and a Turing Fellow. His expertise is in evolutionary and Bayesian search and optimisation. Particularly, he has worked on developing effective acquisition functions for optimising single and multi-objective problems and locating the feasible space of solutions. He has a strong track record of working with industry on a broad range of optimisation problems, which resulted in numerous articles in top journals and conferences, including a best paper in the Real-World Applications track at GECCO, and a patent with Hydro International Ltd. Recently, he has been actively contributing to the Welsh Government's response to the pandemic using his expertise in machine learning and parameter optimisation with funding from both the Welsh Government (Co-PI and Co-I; £750k) and EPSRC (EP/W01226X/1, PI; £230k). His work, with colleagues at Swansea, has resulted in generating medium-term projections of admissions and deaths every week for the First Minister of Wales, and the UK Health Security Agency.

Project Description

Human-in-the-Loop Quality-Diversity Algorithms

This project is focussed on procedural content generation (PCG) for video game level design. We are working to improve the human experience of working with an AI-based PCG tool; based on our recent findings [1, 2] we are planning the development of a new form of human-in-the-loop quality-diversity algorithm. Through this project, the student will be involved in the early development stages of this new algorithm, helping to determine which approaches are appropriate for including humans in the algorithm, formulating different forms of the algorithm and (time permitting) developing a benchmark for simulated human behaviour.

The ideal student for this project would have a solid background in evolutionary algorithms, with a good knowledge of quality-diversity algorithms (such as Novelty Search, MAP-Elites, BOP-Elites, etc.). We are particularly interested in working with students who have ambitious ideas and want to help develop new collaborative human–AI tools.

References

[1] Walton S.P, Evans B.J, Rahat A.A.M, Stovold J and Vincalek J (2024), *"Does mapping elites illuminate search spaces? A large-scale user study of MAP–Elites applied to human–AI collaborative design"*, ACM Transactions on Interactive Intelligent Systems (under review), arXiv doi: 10.48550/arXiv.2402.07911

[2] Walton S.P, Rahat A.A.M, Stovold J (2022) *"Evaluating Mixed-initiative Procedural Level Design Tools using a Triple-Blind User Study"*, IEEE Transactions on Games, vol. 14, no. 3, pp. 413–422, doi: 10.1109/TG.2021.3086215

Lancaster University Leipzig

Lancaster University Leipzig is a European branch campus of Lancaster University (UK). Lancaster is a research-intensive university, with 35% of our research classed as world-leading and 48% classed as internationally excellent in the UK Government's most recent independent review, the Research Excellence Framework (REF).

In the last Research Excellence Framework (REF) survey, 83% of our research was rated as either internationally excellent or world leading.

The Leipzig campus is in Strohsack-Passage, Nikolaistrasse 10, which is situated inside the pedestrianised city centre and next to the city's historic icon 'Nikolaikirche'/St. Nicolas Church—the place of origin of the Peaceful Revolution in 1989—it is an unparalleled location to support a dynamic and exciting student experience.

Further details about the campus can be found at lancasterleipzig.de