Curriculum Vitae — Dr Panagiotis Kouvaros

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RESEARCH BACKGROUND

My work has so far primarily concerned the development of formal methods for assessing the safety and robustness of AI systems. It covered both symbolic and connectionist systems, including

- optimisation-based approaches for the verification of adversarial robustness properties of neural networks,

- logic-based approaches for the verification of temporal-epistemic properties of multi-agent systems, and

- hybrid approaches for the verification of strategic properties of neuro-symbolic systems.

Part of my work implements several core components of the verification engine of Safe Intelligence, a spinout company of Imperial College London.

MOST RECENT EMPLOYMENT (ACADEMIA)

Years	Position	Organisation
2023-Now	Assistant Professor	Technology and Innovation School, University of Limassol
2022-2023	Research Fellow, *DARPA Assured Autonomy Program*	Department of Computing, Imperial College London
2018-2022	Research Associate, *DARPA Assured Autonomy Program*	Department of Computing, Imperial College London

EMPLOYMENT (OTHER)

Years	Position	Organisation
2022-Now	Senior Research Engineer (Verification Lead)	*Safe Intelligence*
2019-2020	Research Consultant	*Safe.AI*

EDUCATION

Year	Degree	University
2016	PhD in Formal Methods in AI, *Thesis: Parameterised Verification for Multi-Agent Systems*, Supervisor: Prof. Alessio Lomuscio	Department of Computing, Imperial College London
2011	MSc in Advanced Computing, *Thesis: A Characterisation Theorem for Hybrid Logic with the for-all Binder*, Supervisor: Prof. Ian Hodkinson	Department of Computing, Imperial College London
2010	Diploma in Computer Engineering and Informatics, *Thesis: Computational Prediction of Protein-Protein Interactions*, Supervisor: Prof. Likothanasis Spiridon	Computer Engineering & Informatics Department, University of Patras

HONOURS & AWARDS

- Invited spotlight talk in the Early Career Spotlight Track at the International Joint Conference on Artificial Intelligence (IJCAI) 2023. Since 1969, IJAI is the leading conference in Artificial Intelligence. The purpose of the Early Career Spotlight Track is to offer a small number of outstanding young researchers an opportunity to present their research vision and accomplishments.

- EPSRC Doctoral Prize Fellowship Award, 2016.

MOST RECENT PROFESSIONAL SERVICE

- PC Member for the *Twelfth International Conference on Learning Representations (ICLR 2024)*.

- PC Member for the *Thirty-Eighth AAAI Conference on Artificial Intelligence (AAAI 2024)*.

- PC Member for the *Thirty-seventh Conference on Neural Information Processing Systems (NeurIPS 2024)*.

- PC Member for the *Fortieth International Conference on Machine Learning (ICML 2023)*.

- PC Member for the *Thirty-Third International Joint Conference on Artificial Intelligence (IJCAI 2023)*.

INVITED TALKS

Year	Title	Venue
2023	*Towards Formal Verification of Neuro-symbolic Multi-agent Systems*	Spotlight talk in the Early Career Spotlight Track at IJCAI 2023
2017	*Parameterised Verification for Multi-Agent Systems*	3rd International Workshop on Parameterized Veriification
2017	*Model Checking for Unbounded Multi-Agent Systems*	1st Workshop on Formal Methods in AI
2016	*Parameterised Verification for Multi-Agent Systems*	Laboratory IBISC seminars, Departement d'Informatique, Université d'Evry
2016	*Parameterised Model Checking for Multi-Agent Systems*	TIBAD Seminar, Institute of Computer Science, University of Wroclaw

TEACHING

Year	Position	Course	Organisation
2019	Guest Lecturer	*Systems Verification*	Department of Computing Imperial College London
	Guest Lecturer	*Safe & Trusted AI Lectures*	Department of Computing Imperial College London
2017	Lecturer	*Data Structures and Algorithms*	Department of Computer Science University of Cyprus
	Lecturer	*Computer Science and Information Systems*	Department of Computer Science University of Cyprus
2016	Guest Lecturer	*Systems Verification*	Department of Computing Imperial College London
	Tutor	*Systems Verification*	Department of Computing Imperial College London
2015	Tutor	*Modal Logic*	Department of Computing Imperial College London
	Tutor	*Systems Verification*	Department of Computing Imperial College London
2014	Tutor	*Modal and Temporal Logic*	Department of Computing Imperial College London

STUDENT SUPERVISION

- *Sound Interval Arithmetic for Neural Network Verification on GPUs*, Hao Huang, MSs Individual Project, Imperial College London, 2022. (Co-supervised with Prof. Alessio Lomuscio.)

- *Verifying Emergent Properties in Swarms*, Jaspreet Randhawa, JMC MEng Individual Project, Imperial College London, 2019. (Co-supervised with Prof. Alessio Lomuscio.)

- *Using Verification to Investigate the Adversarial Robustness of Convolutional Neural Networks*, Mark Aduol, MEng Individual Project, Imperial College London, 2019. (Co-supervised with Prof. Alessio Lomuscio.)

MOST RECENT PUBLICATIONS

For a full list of publications see https://pkouvaros.github.io/.

- P. Kouvaros. Towards Formal Verification of Neuro-symbolic Multi-agent Systems. In *Proceedings of the 33th International Joint Conference on Artificial Intelligence (IJCAI23)*, 2023. (Core A*; full paper.)

- P. Kouvaros, F. Leofante, B. Edwards, C. Chung, D. Margineantu and A. Lomuscio. Verification of Semantic Key Point Detection for Aircraft Pose Estimation. In *Proceedings of the 20th International Conference on Principles of Knowledge Representation and Reasoning (KR23)*, 2023. (Core A*; full paper.)

- M. Akintunde, E. Botoeva, P. Kouvaros, A. Lomuscio. Formal Verification of Neural Agents in Non-deterministic Environments. *Journal of Autonomous Agents and Multi-Agent Systems*, 2022.

- P. Kouvaros, T. Kyono, F. Leofante, A. Lomuscio, D. Margineantu, D. Osipychev, Y. Zheng. Formal Analysis of Neural Network-based Systems in the Aircraft Domain. In *Proceedings of the 24th International Symposium on Formal Methods (FM21)*, 2021. (Core A; full paper.)

- P. Kouvaros, A. Lomuscio. Towards Scalable Complete Verification of ReLU Neural Networks via Dependency-based Branching. In *Proceedings of the 30th International Joint Conference on Artificial Intelligence (IJCAI21)*, 2021. (Core A*; full paper.)

OTHER SELECTED PUBLICATIONS

For a full list of publications see https://pkouvaros.github.io/.

- P. Kouvaros, A. Lomuscio. Parameterised Verification for Multi-Agent Systems. *Artificial Intelligence*, 2016. (Top 3 AIJ downloaded papers of 2016.)

- E. Botoeva, P. Kouvaros, J. Kronqvist, A. Lomuscio, R. Misener. Efficient Verification of ReLU-based Neural Networks via Dependency Analysis. In *Proceedings of the 34th AAAI Conference on Artificial Intelligence (AAAI20)*, 2020. (Core A*; full paper.)

- M. Akintunde, E. Botoeva, P. Kouvaros, A. Lomuscio. Verifying Strategic Abilities of Neural Multi-Agent Systems. In *Proceedings of the 17th International Conference on Principles of Knowledge Representation and Reasoning (KR20)*, 2020. (Core A*; full paper.)

- B. Batten, P. Kouvaros, A. Lomuscio, Y. Zheng. Efficient Neural Network Verification via Layer-based Semidefinite Relaxations and Linear Cuts. In *Proceedings of the 30th International Joint Conference on Artificial Intelligence (IJCAI21)*, 2021. (Core A*; full paper.)

- P. Kouvaros, A. Lomuscio. Verifying Emergent Properties of Swarms. In *Proceedings of the 24th International Joint Conference on Artificial Intelligence (IJCAI15)*, 2015. (CORE A*; full paper.)