NICOLA PAOLETTI

Department of Informatics, King's College London

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Professional Experience

Since Sep 2022 **Senior Lecturer in Computer Science,** Department of Informatics, King's College London (UK)

2018 – 2022 **Lecturer in Computer Science,** Department of Computer Science, Royal Holloway, University of London (UK)

2016–2018 **Postdoctoral Associate,** Department of Computer Science, Stony Brook University (USA)
Supervisor: *Prof. Scott A. Smolka.* Supported by NSF project *"CyberCardia: Compositional, Approximate and Quantitative Reasoning for Medical Cyber Physical Systems"*

2014–2016 **Research Assistant,** Department of Computer Science, University of Oxford (UK)
Supervisor: *Prof. Marta Z. Kwiatkowska.* Supported by ERC project *"VERIWARE: From Software to 'Everyware' Verification"*

Oct–Dec 2013 **Research Internship,** Microsoft Research, Cambridge (UK)
Supervisor: *Dr. Hillel Kugler*

Education

Mar 24, 2014 **Ph.D. in Information Sciences and Complex Systems,** University of Camerino (IT)
Supervisor: *Prof. Emanuela Merelli*
Thesis: ''Formal Computational Modelling of Bone Physiology and Disease Processes''

Oct 14, 2010 **Laurea Specialistica in Computer Science.** University of Camerino (IT)
Marks: 110/110 cum laude

Jul 17, 2008 **Laurea Triennale in Informatica.** University of Camerino (IT)
Marks: 110/110 cum laude

Grants

2022 – 2025 **WP leader in EC HORIZON-RIA grant "REXASI-PRO: REliable & eXplAinable Swarm Intelligence for People with Reduced mObility"**
Amount: €4M total, of which €447,877 to my unit

2022 – 2025 **PI in EPSRC New Investigator Award grant "MedCPS-Verisec: Model-based security of medical cyber-physical systems"**
Amount: £416,069

2019 – 2020 **Grant on Predictive Monitoring of Cyber-Physical Systems**
Amount: £38,487
Funded by Research Inst. in Verified Trustworthy Software Systems and National CyberSecurity Center.

2012 **TOPDRIM** – Topology-driven methods for complex systems (EC FP7-ICT-318121)
Amount: €1,920,000 total (€467,576 to my unit)
Named researcher. Co-author of proposal text.

2011 **HPC-EUROPA2 fellowship** on parallel agent-based simulation for bone remodeling
Funding for two-month visiting period at the Computer Laboratory, University of Cambridge (UK), and at the Edinburgh Parallel Computing Centre, University of Edinburgh (UK)

Since 2018, I worked at seven grant applications that didn't get awarded, including one EU H2020 FET-Open proposal and a Leverhulme Trust research grant (that passed the outline stage).

Awards

2022 **Best Paper Award** at FORMATS 2022, 20th International Conference on Formal Modeling and Analysis of Timed Systems

2020 **Associate professorship habilitation in Computer Science in Italy**

2016 **MCED Award, 2nd prize,** from Ecological Society of Germany, Austria and Switzerland for innovative contributions to ecological modelling, awarded to co-author M. Taffi.

2015 **Best Young Researcher Paper Award** from International Society for Ecological Modelling, awarded to co-author M. Taffi.

2014 **Best Paper Award** at IEEE ICHI 2014, International Conference on Healthcare Informatics

2013 **Best Young Researcher Award** from School of Advanced Studies, University of Camerino

In addition, one of my papers was featured in a **commentary in Frontiers in Genetics** journal. I was co-recipient of the **Valuable Artefacts Prize** from Department of Computer Science, University of Oxford, for my work on quantitative verification of cardiac pacemakers, and of **five best poster awards** between 2011 and 2017. In 2006–2009, I received **four annual merit scholarships** from the University of Camerino.

Teaching and Student Supervision

since 2018 **Department of Computer Science, Royal Holloway, University of London**

- Lecturer of Deep Learning (MSc) — 2022
- Lecturer of Programming Laboratory (BSc) — 2022
- (3x) Lecturer of Experimental Design (MSc) — 2019–2021
- (2x) Lecturer of Team Project (BSc) — 2020, 2021
- (2x) Lecturer of Interconnected Devices (MSc) — 2018, 2019
- (4x) Tutor of Machine Fundamentals (MSc) — 2019–2022
- (4x) Tutor of Mathematical Structures (MSc) — 2018–2021

- (Co-)supervision of two PhD students and one MSc-by-research student — since Feb 2019
- (Co-)supervision of 7 summer undergraduate research projects — since Jun 2020
- Supervision of 15 final-year BSc/MSci projects and 25+ final-year MSc projects (Comp Sci) — since 2018
- Supervision of three MSc student projects (Information Security) — since Feb 2019

2017 – 2018 **Department of Computer Science, Stony Brook University**

- Co-supervised (with Prof. Scott A. Smolka) two students for high-school research competitions

2014 – 2016 **Department of Computer Science, University of Oxford**

- (2x) Teaching Assistant in Object-Oriented Design (Software Engineering Programme) — Feb, Sep 2016
- Class Tutor in Object-Oriented Programming (MSc) — 2015

- Co-supervised (with Prof. Marta Z. Kwiatkowska) three 3-month internships — 2014-2015

2011 – 2013 **Department of Computer Science, University of Camerino**

- Teaching assistant in Programming (BSc) — 2013
- (2x) contract lecturer in Computer Science (Maths BSc) — 2012, 2013
- Teaching assistant in Distributed Calculus and Coordination (MSc) — 2011
- (3x) teaching assistant in Computer Architecture (BSc) — 2011, 2012, 2013

- Co-supervised (with Prof. Emanuela Merelli) a BSc thesis student — 2009

Invited Talks and Visits

Invited Talks and Seminars

- Joint ICE-TCS@Reykjavik University and Gran Sasso Science Institute virtual seminar series — Jun 2020
- AI for Security and the Security of AI workshop, King's College London (UK) — Jan 2020
- Information Security Group seminar series, Royal Holloway, University of London (UK) — Mar 2019
- Seminar for Computer Science PhD students at Stony Brook University (USA) — Oct 2018
- MathWorks Research Summit 2018, Newton MA (USA) – (link to video) — Jun 2018
- 1st Meeting of Italian American Scientist of Long Island, Stony Brook University (USA) — Sep 2017
- $I(CO)_2S$ group seminar series, Newcastle University (UK) — Jun 2017
- MathWorks Research Summit 2017, Newton MA (USA) — Jun 2017
- METABLE 2015 Training School, University of Cambridge (UK) — Mar 2015
- Molecular Walkers Workshop, University of Oxford (UK) — Jul 2014
- Biological Computation Group, Microsoft Research, Cambridge (UK) — Jun 2013

Research visits

- Faculty of Informatics, Vienna University of Technology (AT) — Dec 2015
- Faculty of Informatics, Masaryk University (CZ) — Jan 2015
- School of Computer Science, Reykjavik University (IS) — Aug–Sep 2013
- Computer Laboratory, University of Cambridge (UK) — Aug–Oct 2011
- School of Computer Science, Reykjavik University (IS) — Feb–Mar 2011

Professional Service

Academic Services (at Royal Holloway)

- Comp Sci representative of the steering committee of the College's Engineering Centre — since Nov 2020
- Director of outreach for Computer Science — since Apr 2019
- Director of Comp Sci undergraduate research opportunities programme — Dec 2018 – Dec 2020
- Undergraduate admissions tutor for Computer Science — Oct 2018 – Apr 2019

I have been also member of the Postdoc Advisory Committee of Stony Brook University

Conference Organisation

PC chair of HSB 2019; VEMDP 2018; CMSB 2016. Publicity chair of ICCPS 2023 and HSCC 2022.

Member of Steering Committee

CMSB 2020, 2019, 2018, 2017; HSB 2020

Member of Programme Committee

HSCC 2022,2021; AAAI 2021; RV 2022, 2021,2020; CMSB 2022, 2021,2019, 2018, 2017; NSV 2022, 2021; MOVEP 2020 school; TACAS 2020 (repeatability evaluation); HSB 2020, 2016, 2015; DARS 2019; EMSOFT 2018 (work in progress track); SASB 2019, 2018, 2017, 2016; MedicalCPS 2019, 2018, 2016; HSCC 2017 (repeatability evaluation); DataMod 2019, 2018, 2017, 2016; MASAMB 2016; CAV 2016 (artifact evaluation); QAPL 2016

Reviewer

Besides being a reviewer for the above conferences, I have reviewed papers published in 15+ different journals and 15+ different international conferences and workshops.

Project reviewer

Reviewed project for the ANR-DFG PRCI 2019 scheme (French and German National Research Agencies).

Advisory roles

- Since December 2021, Member of Selection Committee and Personal Interview Panel of the Doctoral Program "Logics for Computer Science" at TU Wien, funded by the EU, which will offer 20 full-time 4-year PhD scholarships.
- From March 2019 to March 2020, I have been a Red Judge for the IBM Watson AI XPRIZE, a global $5M-competition to develop AI solutions to tackle the world's Grand Challenges.

PhD examiner

- Internal examiner for PhD viva of Dr Valery Manokin, Royal Holloway, University of London — Nov 2021
- Internal examiner for PhD viva of Dr Diego Galeano, Royal Holloway, University of London — Dec 2019
- Committee member in PhD preliminary exam of Hongkai Chen, Stony Brook University (USA) — May 2019

Membership to Professional Associations

ACM, Association for Computing Machinery and **EATCS**, European Association for Theoretical Computer Science

Selected Publications (see nicolapaoletti.com/publications.php for a comprehensive and up-to-date list of publications)

[FORMATS22] H. Chen, S. Lin, S.A. Smolka and **N. Paoletti** An STL-Based Formulation of Resilience in Cyber-Physical Systems. *20th International Conference on Formal Modeling and Analysis of Timed Systems (FORMATS 2022)*, pp. 117–135, 2022

[CDC21] H. Chen, **N. Paoletti**, S.A. Smolka and S. Lin. MPC-guided Imitation Learning of Neural Network Policies for the Artificial Pancreas. *60th IEEE Conference on Decision and Control (CDC)*, pp. 2525–2532, 2021

[IJCAI21] E. La Malfa, A. Zbrzezny, R. Michelmore, **N. Paoletti** and M. Kwiatkowska, On Guaranteed Optimal Robust Explanations for NLP Models. *International Joint Conference on Artificial Intelligence (IJCAI 2021)*, pp. 2658–2665, 2021

[UAI21] M. Wicker, L. Laurenti, A. Patanè, **N. Paoletti**, A. Abate and M. Kwiatkowska, Certification of Iterative Predictions in Bayesian Neural Networks. *Uncertainty in Artificial Intelligence (UAI 2021)*, pp. 1713–1723, 2021

[RV21] L. Bortolussi, F. Cairoli, and **N. Paoletti**. Neural predictive monitoring under partial observability. *International Conference on Runtime Verification*, pp. 121–141, 2021.

[AAMS21] P. Bagga, **N. Paoletti**, B. Alrayes and K. Stathis ANEGMA: an automated negotiation model for e-markets. *Autonomous Agents and Multi-Agent Systems 35*, article num 27, 2021.

[IEEE Fuzz21] P. Bagga, **N. Paoletti** and K. Stathis Pareto Bid Estimation for Multi-Issue Bilateral Negotiation under User Preference Uncertainty. *IEEE International Conference on Fuzzy Systems (FUZZ-IEEE 2021)*, pp. 1–6, 2021.

[STTT21] L. Bortolussi, F. Cairoli, **N. Paoletti**, S. A. Smolka, and S. D. Stoller. Neural Predictive Monitoring and a Comparison of Frequentist and Bayesian Approaches. *International Journal on Software Tools for Technology Transfer*, pp. 615–640, 2021.

[IEEE Acc20] F. Shmarov, S. Soudjani, **N. Paoletti**, E. Bartocci, S. Lin, S. A. Smolka, and P. Zuliani. Automated Synthesis of Safe Digital Controllers for Sampled-Data Stochastic Nonlinear Systems. *IEEE Access* 8, pp. 180825–180843, 2020.

[IJCAI20] P. Bagga, **N. Paoletti**, B. Alrayes and K. Stathis A Deep Reinforcement Learning Approach to Concurrent Bilateral Negotiation. *International Joint Conference on Artificial Intelligence (IJCAI 2020)*, pp. 297–303, 2020.

[NFM20] D. Phan, R. Grosu, N. Jansen, **N. Paoletti**, S. A. Smolka and S. D. Stoller Neural Simplex Architecture. *NASA Formal Methods Symposium (NFM 2020)*, pp. 97–114, 2020.

[IJCAI19] L. Cardelli, M. Kwiatkowska, L. Laurenti, **N. Paoletti**, A. Patanè, and M. Wicker. Statistical Guarantees for the Robustness of Bayesian Neural Networks. *International Joint Conference on Artificial Intelligence (IJCAI 2019)*, pp. 5693–5700, 2019.

[RV19] L. Bortolussi, F. Cairoli, **N. Paoletti**, S. A. Smolka, and S. D. Stoller. Neural predictive monitoring. In *International Conference on Runtime Verification (RV 2019)*, pp. 129–147, 2019.

[ICCPS19] **N. Paoletti**, Z. Jiang, M.A. Islam, H. Abbas, R. Mangharam, S. Lin, Z. Gruber and S.A. Smolka. Synthesizing Stealthy Reprogramming Attacks on Cardiac Devices. In *ACM/IEEE Intl Conf. on Cyber-Physical Systems (ICCPS 2019)*, pp. 13–22, 2019.

[IEEE TCCB19] **N. Paoletti**, K.S. Liu, H. Chen, S.A. Smolka and S. Lin. Data-Driven Robust Control for a Closed-Loop Artificial Pancreas. *IEEE/ACM Transactions on Computational Biology and Bioinformatics*, 17(6), pp. 1981–1993, 2019.

[ACC19] H. Chen, **N. Paoletti**, S.A. Smolka and S. Lin. Committed Moving Horizon Estimation for Meal Detection and Estimation in Type 1 Diabetes. In *American Control Conference (ACC 2019)*, pp. 4765–4772, 2019.

[ATVA18] D. Phan, **N. Paoletti**, T. Zhang, R. Grous, S. A. Smolka and S. D. Stoller. Neural State Classification for Hybrid Systems. In *International Symposium on Automated Technology for Verification and Analysis (ATVA 2018)*, pp. 422–440, 2018.

[ACM TCPS18] **N. Paoletti**, A. Patanè, and M. Kwiatkowska. Closed-loop quantitative verification of rate-adaptive pacemakers. *ACM Transactions on Cyber-Physical Systems* 2(4), pp. 33:1–33:31, 2018.

[JSS18] R. Calinescu, M. Ceska, S. Gerasimou, M. Kwiatkowska and **N. Paoletti**. Efficient Synthesis of Robust Models for Stochastic Systems. *Journal of Systems and Software* 143, pp. 140–158, 2018.

[ICSA17] R. Calinescu, M. Ceska, S. Gerasimou, M. Kwiatkowska and **N. Paoletti**. Designing Robust Software Systems through Parametric Markov Chain Synthesis. In *IEEE International Conference on Software Architecture (ICSA 2017)* pp. 131–140, 2017.

[NDSS17] S. Eberz, **N. Paoletti**, M. Roeschlin, M. Kwiatkowska, I. Martinovic, and A. Patanè. Broken hearted: How to attack ECG biometrics. *NDSS 2017, Network, and Distributed System Security Symposium*, 2017.

[CAV17] L. Cardelli, M. Ceska, M. Fränzle, M. Kwiatkowska, L. Laurenti, **N. Paoletti** and M. Whitby. Syntax-Guided Optimal Synthesis for Chemical Reaction Networks. *CAV 2017, International Conference on Computer Aided Verification*, pp. 375–395, 2017.

[ActaInf17] M. Ceska, F. Dannenberg, **N. Paoletti**, M. Kwiatkowska and L. Brim. Precise Parameter Synthesis for Stochastic Biochemical Systems. *Acta Informatica*, 54, pp. 589–623, 2017

[HSCC16] B. Barbot, M. Kwiatkowska, A. Mereacre, and **N. Paoletti**. Building Power Consumption Models from Executable Timed I/O Automata Specifications. *ACM International Conference on Hybrid Systems: Computation, and Control (HSCC 2016)*, pp. 195–204, 2016.

[TACAS16] M. Ceska, P. Pilar, **N. Paoletti**, L. Brim and M. Kwiatkowska. PRISM-PSY: Precise GPU Accelerated Parameter Synthesis for Stochastic Systems. *Tools and Algorithms for the Construction and Analysis of Systems (TACAS 2016)*, pp. 367–384, 2016.

[EcoMod15] M. Taffi, **N. Paoletti**, P. Liò, S. Pucciarelli and M. Marini. Bioaccumulation modelling and sensitivity analysis for discovering key players in contaminated food webs: the case study of PCBs in the Adriatic Sea. *Ecological Modelling* 306, pp. 205–215, 2015.

[Frontiers14] M. Taffi, **N. Paoletti**, C. Angione, S. Pucciarelli, M. Marini and P. Liò. Bioremediation in marine ecosystems: a computational study combining ecological modelling and flux balance analysis. *Frontiers in Genetics*, 5(319), 2014.

[CAV14] **N. Paoletti**, B. Yordanov, Y. Hamadi, C.M. Wintersteiger and H. Kugler. Analyzing and Synthesizing Genomic Logic Functions. *CAV 2014, the 26th International Conference on Computer Aided Verification*, LNCS 8559, pp. 343-357, 2014.

[BMC BioInf12] P. Liò, **N. Paoletti**, M.A. Moni, K. Atwell, E. Merelli and M. Viceconti. Modelling osteomyelitis. *BMC Bioinformatics* 13(Suppl 14): S12, 2012.

[IEEE TCCB12] **N. Paoletti**, P. Liò, E. Merelli and M. Viceconti. Multilevel computational modeling and quantitative analysis of bone remodeling. *IEEE/ACM Transactions on Computational Biology and Bioinformatics* 9(5), pp. 1366–1378, 2012.