Laura Nenzi

Curriculum Vitae

PERSONAL DETAILS

Birth	December 10, 1984
Address	Treitlstrasse 3, E182-2, 1040, Wien, Austria
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RESEARCH INTERESTS

My research interests are focused on *formal methods* applied to design and analysis of complex systems such as *Cyber Physical Systems* and *Collective Adaptive Systems*. I worked in the development of original frameworks to control and optimise the behavior of such systems, keeping track of their spatio-temporal dynamics. In particular, I developed a *spatio-temporal logic* to express formal requirements on their performance, and scalable *monitoring algorithms* to verify them. I am further interested in the investigation of *non-deterministic imprecisions* in spatio-temporal logics, both from the point of view of samples and parameter formula imprecision and in discovering more precise and expressive specifications. Moreover, I am familiar with the analysis of *stochastic systems* and *statistical verification* routines; specifically, I worked in the design of a methodology for *parameter estimation* and synthesis that combines formal methods and *machine learning* techniques. This methodology can be also used to learn temporal logic requirements from data, providing an automatic way to describe unwanted (or desired) behaviors that the system needs to satisfy.

EDUCATION

PhD in Computer Science (XVIII Cycle) 2013-2016
IMT, Lucca, Italy

Thesis: A logic-based approach to specify and design spatio-temporal behaviours of complex systems. Supervisors: Prof. Luca Bortolussi and Prof. Rocco De Nicola. Final grade: Excellent

Master of Science degree in Mathematics 2010-2012
University of Trieste, Italy

Thesis: Characterization of motif behaviors by quantitative temporal logic. Supervisor: Prof. Luca Bortolussi. Final grade: 110/110

Bachelor of Science degree in Mathematics 2006-2010
University of Padova, Italy

Thesis: Biomechanical models for pattern formation. Supervisors: Prof. Francesco Fassò and Prof. Marco Favretti.

Bachelor of Science degree in Biotecnology 2003-2006
University of Padova, Italy

Thesis: Adult stem cells in the tissue engineering: epithelium reconstruction. Supervisor: Prof. Lucia Celotti. Final grade: 105/110

ACADEMIC APPOINTMENTS

Research Assistant June 2017-
TU Wien, Wien, Austria

Research Collaborator Sept. 2016-May 2017
IMT, Lucca, Italy

SKILLS

Languages	Italian (mother tongue)
	English (fluent)
	German (basic)
Software	MATLAB, PYTHON, JAVA, C, MATHEMATICA, LaTeX, EXCEL

VISITING POSITIONS

Saarland University 2014/2015
Research visit (7 months) in the MoSi (Modelling and Simulation) group, at the Saarland University, Saarbrücken, Germany, during the PhD studies.

University of Edinburgh 08-10/2012
Research visit (3 months) in the PEPA (Performance Evaluation Process Algebra) group, at the School of Informatics of the University of Edinburgh, United Kingdom, working on my master thesis.

University of Warwick 2008-2009
Student visit (9 months) at the University of Warwick during the Bachelor in Mathematics.

GRANTS AND FUNDINGS

Christiana HÖRBIGER Preis 2017/2018
Award for the promotion of international mobility of young scientists.

Short Term Scientific Mission (STSM) 10/2017
The COST Action IC1402, Runtime Verification beyond Monitoring (ARVI), has awarded me of a STSM grant to collaborate with the University of Trieste on Monitoring of mobile and spatially distributed Cyber-Physical Systems.

Erasmus Mobility for Traineeship 2014/2015
IMT Lucca-Saarland University

International Mobility Scolarship 08-10/2012
University of Trieste-University of Edinburgh

Erasmus Mobility Scolarship 2008-2009
University of Padova-University of Warwick

PROJECTS

RISE June 2017-
Member of the TU Wien unit.

EU FP7 QUANTICOL 2013-2017
Member of the IMT Lucca unit.

COMMUNITY SERVICE

- PC member and reviewer of CMSB 2018, COMPUTATION TOOLS 2018, CILC 2017, DataMod 2017
- Reviewer for the journals: *Formal Methods in System Design*,*Theoretical Computer Science*
- Subreviewer for SAC 2018, InfQ 2017, VALUETOOLS 2017, ALPA 2017, QEST 2017, ENASE 2017, ICTS 2016, QEST 2016, CONCUR 2016, HSCC 2016, RV 2015, FoCAS 2014.

TEACHING

2017: **Python**, (3 CFU-Summer Semester), Bachelor program in Mathematics, University of Trieste.

(CO)SUPERVISION

2017: Davide Prandini, Thesis: *Robust Monitoring of Imprecise Signals*, Laurea Triennale in Matematica, Università di Trieste.

CONFERENCES AND SCHOOLS ATTENDED

MEMOCODE 2017 29/09-02/10/2017
Wien, Austria
15th ACM-IEEE International Conference on Formal Methods and Models for System Design

AVM 2017 18-23/09/2017
Visegrád, Hungary,
Alpine Verification Meeting

VALUETOOLS 2016 25-28/10/2016
Taormina, Italy
10th International Conference on Performance Evaluation Methodologies and Tools

RV 2015 22-25/09/2015
Vienna, Austria

15th International Conference on Runtime Verification

HSB 2015 04-05/09/2015
Madrid, Spain
4th International Workshop on Hybrid Systems and Biology

Dagstuhl Seminar 14521 14-19/12/2014
Dagstuhl, Germany
Collective Adaptive Systems: Qualitative and Quantitative Modelling and Analysis

VALUETOOLS 2014 08-10/12/2014
Bratislava, Slovakia
8th International Conference on Performance Evaluation Methodologies and Tools

QEST 2014 08-10/09/2014
Florence, Italy
11th International Conference on Quantitative Evaluation of SysTems

MOVEP 2014 07-13/07/2014
Nantes, France
11th Summer School on Modelling and Verification of Parallel Processes

HSB 2013 02/09/2013
Taormina, Italy
Second International Workshop on Hybrid Systems and Biology

PhD Summer School 10-14/09/2012
Udine, Italy
Biology, Computation and Information

MLQA Workshop 09/08/2012
School of Informatics, Edinburgh
Compositional Modelling and Analysis of Quantitative Systems

CONFERENCE AND WORKSHOP TALKS

28/10/2017: *"Monitoring Mobile and Spatially Distributed Cyber-Physical Systems'*, 15th ACM-IEEE International Conference on Formal Methods and Models for System Design, Wien, Austria.

28/10/2016: *"jSSTL - A Tool to Monitor Spatio-Temporal Properties"*, 10th International Conference on Performance Evaluation Methodologies and Tools, Taormina, Italy.

24/09/2015: *"Qualitative and Quantitative Monitoring of Spatio-Temporal Properties"*, 15th International Conference on Runtime Verification,Vienna, Austria.

05/09/2015: *"Studying Emergent Behaviours in Morphogenesis using Signal Spatio-Temporal Logic"*, 4th International Workshop on Hybrid Systems and Biology,Madrid, Spain.

09/12/2014: *"Specifying and Monitoring Properties of Stochastic Spatio-Temporal Systems in Signal Temporal Logic"*, 8th International Conference on Performance Evaluation Methodologies and Tools, Bratislava, Slovakia.

02/09/2013: *" On the Robustness of Temporal Properties for Stochastic Models"*, 2nd International Workshop on Hybrid Systems and Biology, Taormina, Italy

INVITED SEMINAR TALKS

15/12/2017: *"System design of stochastic models using robustness of temporal properties"*, Masaryk University, Brno, Czech Republic.

02/12/2016: *"A logic-based approach to specify and design spatio-temporal behaviours of complex systems"*, University of Edinburgh, Edinburgh, United Kingdom.

22/11/2016: *"Monitoring Spatio-Temporal Properties"*, University of Trieste, Trieste, Italy.

12/01/2016: *"Reinforcement Learning in Quantitative Formal Methods"*, University of Trieste, Trieste, Italy.

24/05/2015: *"Qualitative and Quantitative Monitoring of Spatio-Temporal Properties"*, Saarland University, Saarbrüchen, Germany.

28/05/2013: *"A temporal logic approach to modular design of synthetic biological circuits"*, ISTI, Pisa, Italy.

OTHER TALKS

21/09/2017: *"System design of stochastic models using robustness of temporal properties."*, AVM 2017, Visegrád, Hungary.

20/05/2017: *"Monitoring CaSL systems with jSSTL"*, Final review of the QUANTICOL project, Lucca, Italy.

08/02/2017: *"Monitoring the London BSS with jSSTL"*, QUANTICOL plenary meeting, Pisa, Italy.

13/07/2016: *"A Logic-Based Approach to Specify and Design Spatio-Temporal Behaviours of Complex Systems"*, Thesis defense, Lucca, Italy.

15/12/2015: *"Qualitative and Quantitative Monitoring of Spatio-Temporal Properties"*, QUANTICOL plenary meeting, Lucca, Italy.

05/02/2015: *"Specifying and Monitoring Properties of Stochastic Spatio-Temporal Systems in SSTL"*, QUANTICOL plenary meeting, Grenoble, France.

14/11/2014: *"Specifying and Monitoring Properties of Stochastic Spatio-Temporal Systems in Signal Temporal Logic"*, Lucca, Italy.

11/07/2014: *"Verification of stochastic and spatial behaviours of complex systems"*, 11th Summer School on Modelling and Verification of Parallel Processes, Nantes, France.

24/06/2014: *"SSTL: The Signal Spatio-Temporal Logic,"*, QUANTICOL scientific meeting, Lucca, Italy.

06/02/2014: *"Spatio-Temporal logics for CAS"*, Thesis Proposal, Lucca, Italy.

30/10/2013: *"Modelling bike sharing in StoKlaim"*, QUANTICOL Space Workshop, Informatics Forum, Edinburgh.

21/02/2013: *"Signal Temporal Logic: a good logic for quantitative analysis"*, QUANTICOL pre kick-off meeting, Lucca, Italy.

27/10/2012: *"A logic-based approach to determine the connection between modules and their behavioral properties"*, Informatics Forum, Edinburgh.

PUBLICATIONS

Journal Papers:

- L. Nenzi, L. Bortolussi, V. Ciancia, M. Loreti, M. Massink, **Qualitative and Quantitative Monitoring of Spatio-Temporal Properties with SSTL**, (resubmitted after first revision to *Logical Methods in Computer Science*).
- L. Bortolussi, R. Lanciani, L. Nenzi, **Model Checking Markov Population Models by Stochastic Approximations**, (resubmitted after first revision to *Information and Computation*).
- E. Bartocci, L. Bortolussi, L. Nenzi, G. Sanguinetti, **System Design of Stochastic Models using Robustness of Temporal Properties**, in *Theoretical Computer Science*, vol. 587, pp. 3-25, 2015.

Conference Papers:

- E. Bartocci, L. Bortolussi, M. Loreti, L. Nenzi, **Monitoring Mobile and Spatially Distributed Cyber-Physical Systems**, in Proc. of *MEMOCODE 2017: the 10th International Conference on Formal Methods and Models for System Design*, Vienna, Austria, 2017.
- L. L. Vissat, M. Loreti, L. Nenzi, J. Hillston and G. Marion, **Three-Valued Spatio-Temporal Logic: a further analysis on spatio-temporal properties of stochastic systems**, in Proc. of *QEST 2017: the 14th International Conference on Quantitative Evaluation of SysTems*, Berlin, Germany, 2017.
- L. Bortolussi, M. Loreti, L. Nenzi, **jSSTL - A Tool to Monitor Spatio-Temporal Properties**, in Proc. of *VALUETOOLS 2016: the 10th International Conference on Performance Evaluation Methodologies and Tools*, Taormina, Italy, 2016.
- E. Bartocci, L. Bortolussi, L. Nenzi, D. Milios, G. Sanguinetti, **Studying Emergent Behaviours in Morphogenesis using Signal Spatio-Temporal Logic**, in Proc. of *HSB 2015: the 4nd Intern. Workshop on Hybrid Systems and Biology*, Madrid, Spain, 2015.
- L. Nenzi, L. Bortolussi, V. Ciancia, M. Loreti, M. Massink, **Qualitative and Quantitative Monitoring of Spatio-Temporal Properties**, in Proc. of *Runtime Verification 2015: The 15th International Conference on Runtime Verification*, Vienna, Austria, 2015.
- L. Bortolussi, L. Nenzi, **Specifying and monitoring properties of stochastic spatio-temporal systems in signal temporal logic**, in Proc. of *VALUETOOLS 2014: the 8th International Conference on Performance Evaluation Methodologies and Tools*, Bratislava, Slovakia, pp. 66-73, 2014.
- E. Bartocci, L. Bortolussi, L. Nenzi, G. Sanguinetti, **On the robustness of temporal properties for stochastic models**, in Proc. of *HSB 2013: the 2nd Intern. Workshop on Hybrid Systems and Biology*, Taormina, Italy, vol. 125(1), pp. 3-19, 2013.
- E. Bartocci, L. Bortolussi, L. Nenzi, **A temporal logic approach to modular design of synthetic biological circuits**, in Proceedings of *CMSB 2013: the 11th International Conference on Computational Methods in Systems Biology*, Austria, Springer-Verlag, Lecture Notes in Computer Science, vol. 8130, pp. 164-178, 2013.