

Curriculum Vitae - Nils Jansen

Personal information

Name Nils Jansen
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Born April 22, 1982—Simmerath, Germany
Nationality German

Appointments held

Since June 2017 Assistant Professor at the Radboud University, Nijmegen, The Netherlands (tenure track position)
Jan 2017–May 2017 Research Associate at the University of Texas at Austin with Prof. Dr. Ufuk Topcu (tenured position)
2016–2017 Postdoctoral Research Fellow at the University of Texas at Austin with Prof. Dr. Ufuk Topcu (fixed term position)
2015–2016 Postdoctoral Researcher at RWTH Aachen University with Prof. Dr. Ir. Joost-Pieter Katoen (fixed term position)
2014–2015 Research Assistant at RWTH Aachen University (fixed term position) with Prof. Dr. Ir. Joost-Pieter Katoen
2009–2013 Research Assistant and PhD Student at RWTH Aachen University with Prof. Dr. Erika Ábrahám (fixed term position)

Education

2015 PhD in Computer Science (*summa cum laude*)
Thesis: *Counterexamples in Probabilistic Verification*, supervised by Prof. Dr. Erika Ábrahám and Prof. Dr. Ir. Joost-Pieter Katoen
2009 Diploma in Computer Science with minor business administration
Thesis: *Automaton-definable Tree Relations with Cardinality Constraints*, supervised by Prof. Dr. Dr.h.c. Wolfgang Thomas

Awards

[Borchers Badge](#) of RWTH Aachen University for PhD examination “with distinction”

Research

Area of specialization

- Formal verification
- Verified and explainable machine learning
- Analysis and synthesis of stochastic and uncertain systems
- Probabilistic programs
- Formal methods and control theory
- Formal methods for robotics applications

Research stays

March 2018	TU Graz, Austria, with Prof. Dr. Roderick Bloem
October 2017	Oxford University, UK, with Prof. Dr. Marta Kwiatkowska
September 2017	RWTH University, Germany, with Prof. Dr. Ir. Katoen
March 2017	Stony Brook University, NY, USA, with Prof. Dr. Scott Smolka
March 2016	RWTH University, Germany, with Prof. Dr. Ir. Katoen
April 2015	University of Pennsylvania, USA, with Prof. Dr. Ufuk Topcu
Feb 2013, Aug 2013, Mar 2014	Universidad Nacional de Cordoba, Argentina, with Prof. Dr. Pedro R. d'Argenio
2010–2014	Frequent stays at University of Freiburg, Germany, with Prof. Dr. Bernd Becker and Dr. Ralf Wimmer

Professional activities

Program committee member

- International Conference on Quantitative Evaluation of SysTems (QEST 2019)
- International Conference on Formal Techniques for Distributed Objects, Components, and Systems (FORTE) 2018
- Artifact Evaluation for the International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS) 2018
- PhD Symposium at International Conference on integrated Formal Methods (iFM) 2018
- Conference for ICT-Research in the Netherlands (ICT.OPEN) 2018
- SKILL 2018

Event organization and program chair

- Formal approaches to Explainable VERification (FEVER), colocated with CAV 2017
- Dagstuhl Seminar 18121: Machine Learning and Model Checking Join Forces, 2018
- Robots, Morality, and Trust through the Verification Lens, colocated with CAV 2018
- Big Data meets Formal Methods (BOOM!), colocated with CONFESTA 2018

External reviewer

ACC, ACM Transactions on Modeling and Computer Simulation, ATVA, CAV, CDC, CONCUR, FACS, FM, FMOODS–FORTE, FORMATS, FOSSACS, FSEN, FSTTCS, FTSCS, HSCC, IFM, Petri Nets, QEST, SIMULTECH, Journal of Systems and Software, International Journal of Robotics Research, TACAS, TASE, Theoretical Computer Science, IEEE Transactions of Reliability, IEEE Transactions of Automatic Control, VMCAI

Further activities

2014–2016	Member of the examination board in Computer Science at RWTH Aachen University
2011–2015	Member of the commission for teaching in Computer Science at RWTH Aachen University
2010–2011	Member of the steering committee of the graduate school AlgoSyn
2011	Participation in local organization for CONCUR 2011, QEST 2011 and TGC 2011

Teaching experience

Lecturer

- Model Checking 2018
- Processors 2018
- Operating Systems 2017 and 2018

Teaching assistance

- Introduction to model checking
- Modeling and verification of probabilistic systems
- Modeling and analysis of hybrid systems
- Satisfiability checking
- Automata and reactive systems
- Applied automata theory
- Formal systems, automata, and processes

Supervision of Bachelor, Master, and Diploma theses

- Convex optimization for uncertain Markov decision processes
- On-the-fly model checking for probabilistic programs
- Counterexamples for expected rewards on discrete-time Markov chains
- Verification and synthesis for parametric Markov chains
- Minimal critical subsystems for probabilistic models with nondeterminism
- Compositional counterexamples for MDPs

- Verification and synthesis for parametric Markov chains
- Hierarchical counterexamples for DTMCs—case studies
- Minimal critical subsystems for PCTL properties of Markov models

Publications

Book chapters

- [1] Radu Calinescu, Marco Autili, Javier Cámara, Antinisca Di Marco, Simos Gerasimou, Paola Inverardi, Alexander Perucci, Nils Jansen, Joost-Pieter Katoen, Marta Kwiatkowska, et al. “Synthesis and Verification of Self-aware Computing Systems”. In: *Self-Aware Computing Systems*. Springer International Publishing, 2017, pp. 337–373.

Refereed articles

- [1] Mohamadreza Ahmadi, Murat Cubuktepe, Nils Jansen, and Ufuk Topcu. *Verification of Uncertain POMDPs Using Barrier Certificates*. In: *Allerton Conference on Communication, Control, and Computing*. to appear. 2018.
- [2] Steven Carr, Nils Jansen, Ralf Wimmer, Jie Fu, and Ufuk Topcu. *Human-in-the-Loop Synthesis for Partially Observable Markov Decision Processes*. In: *ACC*. to appear. 2018.
- [3] Murat Cubuktepe, Nils Jansen, Sebastian Junges, Joost-Pieter Katoen, and Ufuk Topcu. *Synthesis in pMDPs: A Tale of 1001 Parameters*. In: *ATVA*. Vol. 11138. LNCS. Springer, 2018, pp. 160–176.
- [4] Sebastian Junges, Nils Jansen, Ralf Wimmer, Tim Quatmann, Leonore Winterer, Joost-Pieter Katoen, and Bernd Becker. *Finite-state Controllers of POMDPs via Parameter Synthesis*. In: *UAI*. to appear. 2018.
- [5] Sebastian Junges, Nils Jansen, Joost-Pieter Katoen, Ufuk Topcu, Ruohan Zhang, and Mary M. Hayhoe. *Model Checking for Safe Navigation Among Humans*. In: *QEST*. Vol. 11024. LNCS. Springer, 2018, pp. 207–222.
- [6] Federico Olmedo, Friedrich Gretz, Nils Jansen, Benjamin Lucien Kaminski, Joost-Pieter Katoen, and Annabelle McIver. *Conditioning in Probabilistic Programming*. In: *ACM Trans. Program. Lang. Syst.* 40.1 (2018), 4:1–4:50.
- [7] Murat Cubuktepe, Nils Jansen, Sebastian Junges, Joost-Pieter Katoen, Ivan Papusha, Hasan A. Poonawala, and Ufuk Topcu. *Sequential Convex Programming for the Efficient Verification of Parametric MDPs*. In: *TACAS*. Vol. 10206. LNCS. 2017, pp. 133–150.
- [8] Nils Jansen, Murat Cubuktepe, and Ufuk Topcu. *Synthesis of Shared Control Protocols with Provable Safety and Performance Guarantees*. In: *ACC*. IEEE, 2017, pp. 1866–1873.
- [9] Leonore Winterer, Sebastian Junges, Ralf Wimmer, Nils Jansen, Ufuk Topcu, Joost-Pieter Katoen, and Bernd Becker. *Motion planning under partial observability using game-based abstraction*. In: *CDC*. IEEE, 2017, pp. 2201–2208.
- [10] Nils Jansen, Christian Dehnert, Benjamin Lucien Kaminski, Joost-Pieter Katoen, and Lukas Westhofen. *Bounded Model Checking for Probabilistic Programs*. In: *ATVA*. Vol. 9938. LNCS. 2016, pp. 68–85.

- [11] Sebastian Junges, Nils Jansen, Joost-Pieter Katoen, and Ufuk Topcu. *Probabilistic Verification for Cognitive Models*. In: *CDCAS*. AAAI Technical Reports FS-16. AAAI Press, 2016.
- [12] Sebastian Junges, Nils Jansen, Christian Dehnert, Ufuk Topcu, and Joost-Pieter Katoen. *Safety-Constrained Reinforcement Learning for MDPs*. In: *TACAS*. Vol. 9636. LNCS. Springer, 2016, pp. 130–146.
- [13] Francesco Leofante, Simone Vuotto, Erika Ábrahám, Armando Tacchella, and Nils Jansen. *Combining Static and Runtime Methods to Achieve Safe Standing-Up for Humanoid Robots*. In: *ISOLA*. Vol. 9952. LNCS. 2016, pp. 496–514.
- [14] Tim Quatmann, Christian Dehnert, Nils Jansen, Sebastian Junges, and Joost-Pieter Katoen. *Parameter Synthesis for Markov Models: Faster Than Ever*. In: *ATVA*. Vol. 9938. LNCS. 2016, pp. 50–67.
- [15] Christian Dehnert, Sebastian Junges, Nils Jansen, Florian Corzilius, Matthias Volk, Harold Brintjes, Joost-Pieter Katoen, and Erika Abraham. *PROPhESY: A PRObabilistic ParamETER SYnthesis Tool*. In: *CAV*. Vol. 9206. 2015, pp. 214–231.
- [16] Nils Jansen. “Counterexamples in Probabilistic Verification”. Dissertation. RWTH Aachen University, 2015.
- [17] Nils Jansen, Benjamin Lucien Kaminski, Joost-Pieter Katoen, Federico Olmedo, Friedrich Gretz, and Annabelle McIver. *Conditioning in Probabilistic Programming*. In: *Electr. Notes Theor. Comput. Sci.* 319 (2015), pp. 199–216.
- [18] Joost-Pieter Katoen, Friedrich Gretz, Nils Jansen, Benjamin Lucien Kaminski, and Federico Olmedo. *Understanding Probabilistic Programs*. In: *Correct System Design - Symposium in Honor of Ernst-Rüdiger Olderog on the Occasion of His 60th Birthday*. Vol. 9360. LNCS. Springer, 2015, pp. 15–32.
- [19] Shashank Pathak, Erika Ábrahám, Nils Jansen, Armando Tacchella, and Joost-Pieter Katoen. *A Greedy Approach for the Efficient Repair of Stochastic Models*. In: *NFM*. Vol. 9058. LNCS. Springer, 2015, pp. 295–309.
- [20] Tim Quatmann, Nils Jansen, Christian Dehnert, Ralf Wimmer, Erika Abraham, Joost-Pieter Katoen, and Bernd Becker. *Counterexamples for Expected Rewards*. In: *FM*. Vol. 9109. LNCS. Springer, 2015, pp. 435–452.
- [21] Ralf Wimmer, Nils Jansen, Erika Abraham, and Joost-Pieter Katoen. *High-level Counterexamples for Probabilistic Automata*. In: *Logical Methods in Computer Science* 11.1:15 (2015).
- [22] Erika Ábrahám, Bernd Becker, Christian Dehnert, Nils Jansen, Joost-Pieter Katoen, and Ralf Wimmer. *Counterexample Generation for Discrete-Time Markov Models: An Introductory Survey*. In: *SFM*. Vol. 8483. LNCS. Springer, 2014, pp. 65–121.
- [23] Christian Dehnert, Nils Jansen, Ralf Wimmer, Erika Ábrahám, and Joost-Pieter Katoen. *Fast Debugging of PRISM Models*. In: *ATVA*. Vol. 8837. LNCS. Springer, 2014, pp. 146–162.
- [24] Nils Jansen, Florian Corzilius, Matthias Volk, Ralf Wimmer, Erika Ábrahám, Joost-Pieter Katoen, and Bernd Becker. *Accelerating Parametric Probabilistic Verification*. In: *QEST*. Vol. 8657. LNCS. Springer, 2014, pp. 404–420.

- [25] Nils Jansen, Ralf Wimmer, Erika Ábrahám, Barna Zajzon, Joost-Pieter Katoen, Bernd Becker, and Johann Schuster. *Symbolic counterexample generation for large discrete-time Markov chains*. In: *Science of Computer Programming* 91.A (2014), pp. 90–114.
- [26] Ralf Wimmer, Nils Jansen, Erika Ábrahám, Joost-Pieter Katoen, and Bernd Becker. *Minimal counterexamples for linear-time probabilistic verification*. In: *Theoretical Computer Science* 549 (2014), pp. 61–100.
- [27] Daniel Neider and Nils Jansen. *Regular Model Checking Using Solver Technologies and Automata Learning*. In: *NFM*. Vol. 7871. LNCS. Springer, 2013, pp. 16–31.
- [28] Ralf Wimmer, Nils Jansen, Andreas Vorpahl, Erika Ábrahám, Joost-Pieter Katoen, and Bernd Becker. *High-level Counterexamples for Probabilistic Automata*. In: *QEST*. Vol. 8054. LNCS. Springer, 2013, pp. 18–33.
- [29] Nils Jansen, Erika Ábrahám, Barna Zajzon, Ralf Wimmer, Johann Schuster, Joost-Pieter Katoen, and Bernd Becker. *Symbolic Counterexample Generation for Discrete-time Markov Chains*. In: *FACS*. Vol. 7684. LNCS. Springer, 2012, pp. 134–151.
- [30] Nils Jansen, Erika Ábrahám, Matthias Volk, Ralf Wimmer, Joost-Pieter Katoen, and Bernd Becker. *The COMICS Tool – Computing Minimal Counterexamples for DTMCs*. In: *ATVA*. Vol. 7561. LNCS. Springer, 2012, pp. 349–353.
- [31] Ralf Wimmer, Nils Jansen, Erika Ábrahám, Joost-Pieter Katoen, and Bernd Becker. *Minimal Critical Subsystems for Discrete-Time Markov Models*. In: *TACAS*. Vol. 7214. LNCS. Springer, 2012, pp. 299–314.
- [32] Erika Ábrahám, Nadine Bergner, Philipp Brauner, Florian Corzilius, Nils Jansen, Thiemo Leonhardt, Ulrich Loup, Johanna Nellen, and Ulrik Schroeder. *On Collaboratively Conveying Computer Science to Pupils*. In: *KOLI*. ACM. 2011, pp. 132–137.
- [33] Bettina Braitling, Ralf Wimmer, Bernd Becker, Nils Jansen, and Erika Ábrahám. *Counterexample Generation for Markov Chains using SMT-based Bounded Model Checking*. In: *FMOODS/FORTE*. Vol. 6722. LNCS. Springer, 2011, pp. 75–89.
- [34] Nils Jansen, Erika Ábrahám, Jens Katelaan, Ralf Wimmer, Joost-Pieter Katoen, and Bernd Becker. *Hierarchical Counterexamples for Discrete-Time Markov Chains*. In: *ATVA*. Vol. 6996. LNCS. Springer, 2011, pp. 443–452.
- [35] Erika Ábrahám, Nils Jansen, Ralf Wimmer, Joost-Pieter Katoen, and Bernd Becker. *DTMC Model Checking by SCC Reduction*. In: *QEST*. IEEE Computer Society, 2010, pp. 37–46.
- [36] Erika Ábrahám, Philipp Brauner, Nils Jansen, Thiemo Leonhardt, Ulrich Loup, and Ulrik Schroeder. *Podcastproduktion als kollaborativer Zugang zur theoretischen Informatik*. In: *DeLFI*. Vol. 169. LNI. Duisburg: Gesellschaft für Informatik, 2010, pp. 239–251.

Informal publications and technical reports

- [1] Steven Carr, Nils Jansen, Ralf Wimmer, Jie Fu, and Ufuk Topcu. *Human-in-the-Loop Synthesis for Partially Observable Markov Decision Processes*. In: *CoRR* abs/1802.09810 (2018).
- [2] Murat Cubuktepe, Nils Jansen, Sebastian Junges, Joost-Pieter Katoen, and Ufuk Topcu. *Synthesis in pMDPs: A Tale of 1001 Parameters*. In: *CoRR* abs/1803.02884 (2018).

- [3] Nils Jansen, Joost-Pieter Katoen, Pushmeet Kohli, and Jan Kretinsky. *Machine Learning and Model Checking Join Forces (Dagstuhl Seminar 18121)*. In: *Dagstuhl Reports* 8.3 (2018), pp. 74–93.
- [4] Nils Jansen, Bettina Könighofer, Sebastian Junges, and Roderick Bloem. *Shielded Decision-Making in MDPs*. In: *CoRR* abs/1807.06096 (2018).
- [5] Nils Jansen, Laura Humphrey, Jana Tumova, and Ufuk Topcu. *Structured Synthesis for Probabilistic Systems*. In: *CoRR* abs/1807.06106 (2018).
- [6] Sebastian Junges, Nils Jansen, Ralf Wimmer, Tim Quatmann, Leonore Winterer, Joost-Pieter Katoen, and Bernd Becker. *Permissive Finite-State Controllers of POMDPs using Parameter Synthesis*. In: *CoRR* abs/1710.10294 (2018).
- [7] Murat Cubuktepe, Nils Jansen, Sebastian Junges, Joost-Pieter Katoen, Ivan Papusha, Hasan A. Poonawala, and Ufuk Topcu. *Sequential Convex Programming for the Efficient Verification of Parametric MDPs*. In: *CoRR* abs/1702.00063 (2017).
- [8] Leonore Winterer, Sebastian Junges, Ralf Wimmer, Nils Jansen, Ufuk Topcu, Joost-Pieter Katoen, and Bernd Becker. *Motion Planning under Partial Observability using Game-Based Abstraction*. In: *CoRR* abs/1708.04236 (2017).
- [9] Christian Dehnert, Sebastian Junges, Nils Jansen, Florian Corzilius, Matthias Volk, Joost-Pieter Katoen, Erika Ábrahám, and Harold Brountjes. *Parameter Synthesis for Probabilistic Systems*. In: *MBMV*. Albert-Ludwigs-Universität Freiburg, 2016, pp. 72–74.
- [10] Nils Jansen, Murat Cubuktepe, and Ufuk Topcu. *Synthesis of Shared Control Protocols with Provable Safety and Performance Guarantees*. In: *CoRR* abs/1610.08500 (2016). URL: <https://arxiv.org/abs/1610.08500v1>.
- [11] Nils Jansen, Christian Dehnert, Benjamin Lucien Kaminski, Joost-Pieter Katoen, and Lukas Westhofen. *Bounded Model Checking for Probabilistic Programs*. In: *CoRR* abs/1605.04477 (2016). URL: <https://arxiv.org/abs/1605.04477>.
- [12] Sebastian Junges, Nils Jansen, Ufuk Topcu, and Joost-Pieter Katoen. *Probabilistic Model Checking for Complex Cognitive Tasks – A case study in human-robot interaction*. In: *CoRR* (2016).
- [13] Tim Quatmann, Christian Dehnert, Nils Jansen, Sebastian Junges, and Joost-Pieter Katoen. *Parameter Synthesis for Markov Models: Faster Than Ever*. In: *CoRR* abs/1602.05113 (2016). URL: <https://arxiv.org/abs/1602.05113>.
- [14] Friedrich Gretz, Nils Jansen, Benjamin Lucien Kaminski, Joost-Pieter Katoen, Annabelle McIver, and Federico Olmedo. *Conditioning in Probabilistic Programming*. In: *CoRR* abs/1504.00198 (2015). URL: <http://arxiv.org/abs/1504.00198>.
- [15] Nils Jansen. *A Greedy Approach for the Efficient Repair of Stochastic Models*. In: *Frontiers of Formal Methods*. Vol. AIB-2011-11. RWTH Aachen University, 2015.
- [16] Nils Jansen, Benjamin Lucien Kaminski, Joost-Pieter Katoen, Christoph Matheja, and Federico Olmedo. *Probabilistic Programs - A Natural Model for Approximate Computations*. In: *AC15 - Workshop on Approximate Computing*. Paderborn, Germany, Oct. 2015.
- [17] Sebastian Junges, Nils Jansen, Christian Dehnert, Ufuk Topcu, and Joost-Pieter Katoen. *Safety-Constrained Reinforcement Learning for MDPs*. In: *CoRR* abs/1510.05880 (2015). URL: <http://arxiv.org/abs/1510.05880>.

- [18] Nils Jansen, Florian Corzilius, Matthias Volk, Ralf Wimmer, Erika Ábrahám, Joost-Pieter Katoen, and Bernd Becker. *Accelerating Parametric Probabilistic Verification*. In: *CoRR* abs/1312.3979 (2013). URL: <https://arxiv.org/abs/1312.3979>.
- [19] Ralf Wimmer, Nils Jansen, Andreas Vorpahl, Erika Ábrahám, Joost-Pieter Katoen, and Bernd Becker. *High-level Counterexamples for Probabilistic Automata*. In: *CoRR* abs/1305.5055 (2013). URL: <https://arxiv.org/abs/1305.5055>.
- [20] Nils Jansen, Erika Ábrahám, Maik Scheffler, Matthias Volk, Andreas Vorpahl, Ralf Wimmer, Joost-Pieter Katoen, and Bernd Becker. *The COMICS Tool - Computing Minimal Counterexamples for Discrete-time Markov Chains*. In: *CoRR* abs/1206.0603 (2012). URL: <https://arxiv.org/abs/1206.0603>.
- [21] Ralf Wimmer, Nils Jansen, Erika Ábrahám, Joost-Pieter Katoen, and Bernd Becker. *Minimal Counterexamples for Refuting ω -Regular Properties of Markov Decision Processes*. Reports of SFB/TR 14 AVACS 88. ISSN: 1860-9821, <http://www.avacs.org>. Sept. 2012.
- [22] Ralf Wimmer, Nils Jansen, Erika Ábrahám, Joost-Pieter Katoen, and Bernd Becker. *Minimal Critical Subsystems as Counterexamples for ω -Regular DTMC Properties*. In: *MBMV*. Verlag Dr. Kovač, 2012, pp. 169–180.
- [23] Bettina Braitling, Ralf Wimmer, Bernd Becker, Nils Jansen, and Erika Ábrahám. *SMT-based Counterexample Generation for Markov Chains*. In: *MBMV*. Offis Oldenburg, 2011, pp. 19–28. ISBN: 978-3-00-033820-5.
- [24] Nils Jansen, Erika Ábrahám, Jens Katelaan, Ralf Wimmer, Joost-Pieter Katoen, and Bernd Becker. *Hierarchical Counterexamples for Discrete-time Markov Chains*. Tech. rep. AIB-2011-11. RWTH Aachen University, 2011.