

Barbara Jobstmann

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Research Interests

- Synthesis and repair of systems based on formal specifications
- Quantitative analysis and synthesis based on quantitative specifications
- Verification and modelling of hardware designs, transactional memories, biological systems, and business processes

Education

2004–2007 Ph.D. with honors (Dr. techn. mit Auszeichnung) in Computer Science
Graz University of Technology, Austria

Thesis: *Applications and Optimizations for LTL Synthesis*

1996–2003 M.Sc. with honors (Dipl.-Ing. mit Auszeichnung) in Telematik

Graz University of Technology, Austria

(Major: Computer Science, Minor: Electrical Engineering)

Thesis: *A Wearable Inspection Agent for Maintenance in Production Lines*

Experience

2012– **Consultant for Jasper Design Automation, Mountain View, CA, USA**

Consultant working as senior field application engineer for the European customers of Jasper Design Automation, an EDA company specialized in automated verification based on formal methods. Applies verification techniques to concrete designs, support the development of verification flows and verification plans, and identifies opportunities to improve verification tools.

2009– **CNRS/VERIMAG, Grenoble, France**

Tenured researcher of the Centre National de la Recherche Scientifique (CNRS) working on quantitative verification and synthesis and applying synthesis techniques in a component-based design framework. In particular, developing new verification and synthesis procedures for specifications that allow users to express a preference relation between different correct systems using quantitative constraints. For instance, defined a notion of efficiency that allows her to automatically construct the most efficient system. Furthermore, aims to simplify the construction of component-based systems by allowing the programmer to write simple high-level specifications instead of low-level synchronization constructs.

2007–2009 **École Polytechnique Fédérale de Lausanne (EPFL), Switzerland**

Postdoctoral researcher in Thomas Henzinger's group working on formal specifications, interface and game theory, synthesis of temporal logic, program repair, hardware and transactional memory verification. In particular, co-developed a complete formal framework to verify algorithms for software transactional memories, complemented the theory of interface automata with a shared refinement operator, defined a new notion of equivalence between two formulas in Linear Temporal Logic, used probabilistic game theory to automatically construct environment assumptions, and developed a new synthesis approach based on quantitative and probabilistic specifications allowing the user to guide the synthesis process.

2004–2007 **Graz University of Technology (TU-Graz), Austria**

Research assistant in the EU-Project PROSYD led by Roderick Bloem: Worked on property-based system design using high-level synthesis techniques that assume specifications given in temporal logics. Developed, implemented, and evaluated a seminal theory to repair hardware on the source-code level. Developed and applied optimizations for tree automata in the first synthesis tool for full Linear Temporal Logic (LTL), and developed a tool to synthesize industrial circuits from Generalized-Reactivity-1 specifications (a subset of LTL).

2003 **Neosera Systems Ltd, Dublin, Ireland**

Software developer: Developed a software tool that translates commercial hardware library cells (in particular, cells from the ARM Standard Cell Libraries) into equivalent cells suitable for the APPLIES (Associative Parallel Processor for Logic Event-driven Simulation) system.

Summer 2000 **Logim Software GmbH, Graz, Austria**

Software Developer: Modified the ALWIS C++ Software Modules to be compiled on a HP-UX architecture.

Summer 1999, 1998, 1997 **Engel Maschinenbau GmbH, Schwertberg, Austria**

Internship in the user service department: in a team of four, maintained about five hundred personal computers and workstations and provided immediate support to their users.

Teaching at Undergraduate, MSc, and PhD level

2011, 2010, 2009 *Ensimag – INP Grenoble*

Taught MSc-level course on "Embedded Systems" together with Florence Maraninchi. Prepared and gave lectures and exams (see <http://www-verimag.imag.fr/~jobstman/teaching/>)

2010 *Ecole Doctorale Grenoble*

Taught PhD-level course on "Logic and Automata Theory" together with Radu Iosif.

2010 *Scoala Normala Superioara Bucharest (SNSB)*

Taught an introductory seminar on logic, automata and game theory together with Radu Iosif.

2009 *École Polytechnique Fédérale de Lausanne*

Taught PhD-level course on "Logic and Automata Theory" together with Radu Iosif.

2007 *École Polytechnique Fédérale de Lausanne*

Taught exercises of the lecture "Model Checking" (MSc-level)

2006 *Graz University of Technology*

Taught the seminar *Selected Topics in Software Technology* (MSc-level) with Roderick Bloem.

1998-2003 *Graz University of Technology*

Teaching assistant for the lectures "Introduction in Computer Science" (2002, 2003), "Programming Methods 2" (2001), "Programming Methods 1" (1999, 2000, 2001), and "Computer Organization 1" (1998, 1999, 2000).

2011 *Summer School on Program Synthesis* at Dagstuhl Schloss, Germany.

Gave two introductory lectures on game-based program synthesis and one overview talk about quantitative synthesis and its application to constructing robust systems.

Co-supervised Internships, Master, and PhD Theses

- Christian von Essen, *Quantitative Verification and Synthesis*, PhD student, VERIMAG, since 2010
- Simon De Baets, *Front-end for the NuGAT Game Solver*, internship, VERIMAG, Summer 2011
- Rahul Varshgokul, *Symbolic Algorithms for Quantitative Synthesis*, internship, VERIMAG, Spring 2011
- Garvit Juniwal, *Synthesizing Synchronizations*, internship, VERIMAG, Spring 2010
- Rohit Singh, *Quantitative Synthesis*, internship, EPFL, Spring 2009
- Arjun Radhakrishna, *GIST: A Solver for Probabilistic Games*, internship, EPFL, Spring 2008
- Cedric Favre, *Algorithmic Verification of Business Process Models*, MSc student, EPFL, 2008
- Karin Greimel, *Open Implication*, MSc student, TU Graz, 2007

Conference Chair

ACM/IEEE International Conference on Formal Methods and Models for Codesign: 2011 (**PC chair**)
International Conference on Formal Methods in Computer Aided Design: 2011 (**Tutorial chair**)
ACM/IEEE International Conference on Formal Methods and Models for Codesign: 2010 (**PC chair**)

Program Committee Member

ACM/IEEE Symposium on Logic in Computer Science (LICS): 2013
Design, Automation and Test in Europe (DATE): 2013
International Conference on Formal Methods in Computer Aided Design (FMCAD): 2012
ACM/IEEE International Conference on Formal Methods and Models for Codesign (MEMOCODE): 2012
IEEE International Symposium on Industrial Embedded Systems (SIES): 2012
International Conference on Logic for Programming Artificial Intelligence and Reasoning (LPAR): 2012
International Workshop on Interactions, Games and Protocols (iWIGP): 2012
International Workshop on Interaction and Concurrency Experience (ICE): 2011
International Workshop on Logical Aspects of Fault-Tolerance (LAFT): 2011
International Workshop on Interactions, Games and Protocols (iWIGP): 2011
International Conference on Formal Methods in Computer Aided Design (FMCAD): 2011
International Conference on Concurrency Theory (CONCUR): 2011.
International Haifa Verification Conference (HVC): 2010
International Workshop on Formal Methods for Industrial Critical Systems (FMICS): 2010
International Workshop on Interaction and Concurrency Experience (ICE): 2010
International Workshop on Specification and Verification of Component-Based Systems: 2009
ACM/IEEE International Conference on Formal Methods and Models for Codesign (MEMOCODE): 2009

Research Network

Management committee member (representative of France) and chair of work group 4 on Synthesis of the European COST Action IC0901: Rich-Model Toolkit – An Infrastructure for Reliable Computer Systems.

Reviewer for Journals

ACM Transactions on Design Automation of Electronic Systems (TODAES): 2010.
ACM Transactions on Programming Languages and Systems (TOPLAS): 2010.
IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD): 2008, 2010.
IEEE Transactions on Computers: 2012
IEEE International Conferences on Software Engineering and Formal Methods (SEFM): 2008.
IEEE Embedded Systems Letters: 2010.
Formal Methods in System Design (FMSD): 2011.

Reviewer for Grant Offices

Agence Nationale de la Recherche (ANR)
Israel Science Foundation (ISF)

Reviewer for Conferences

ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI): 2010, 2011.
Design, Automation and Test in Europe (DATE): 2006, 2007, 2009, 2010, 2012.
International Conference on Automated Deduction (CADE): 2011.
International Conference on Computer Aided Verification (CAV): 2006, 2007, 2008, 2009, 2010, 2011, 2012.
International Conference on Computer Science Logic (CSL): 2011. International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS): 2007, 2010, 2011.
International Conference on Formal Methods in Computer-Aided Design (FMCAD): 2007, 2008.
International Conference on Runtime Verification (RV): 2011.
International Conference on Verification, Model Checking and Abstract Interpretation (VMCAI): 2008, 2010, 2011, 2012.
International Joint Conference on Automated Reasoning (IJCAR): 2008.
International Conference on Current Trends in Theory and Practice of Computer Science: 2009.
International Conference on Foundations of Software Science and Computation Structures: 2010.

International Symposium on Formal Methods (FM): 2012.
NASA Formal Methods Symposium (NFM): 2011.

Presentations

Presented 17 papers at conferences and workshops.

Gave tutorial and invited talks at:

- Dagstuhl seminar *Software Synthesis* (2009) on game-based synthesis
- *Forum for Design Languages* (FDL 2010) on synthesizing robust systems
- Dagstuhl summer school on *Program Synthesis* (2011),
- *IEEE International Symposium on Industrial Embedded Systems* (SIES 2011) on robustness
- *International Workshop on Interactions, Games and Protocols* (iWIGP2012) colocated with ETAPS 2012.

Additionally gave talks about research results

- at the IBM Research Lab in Haifa, Israel (2005),
- at the UC Santa Cruz, CA (2006),
- at the RWTH Aachen, Germany (2006),
- at the University of Lugano, Switzerland (2006),
- at the École Polytechnique Fédérale de Lausanne, Switzerland (2006),
- at the Graz University of Technology, Austria(2008),
- at the IBM Research Lab in Zurich, Switzerland (2008),
- at the VERIMAG Laboratory in Grenoble, France (2008),
- at INRIA Grenoble, France (2009),
- at the Vienna University of Technology, Austria (2010),
- at the Swiss Federal Institute of Technology Zurich, Switzerland(2010),
- at the Computing Laboratory of University of Oxford, UK (2010),
- at Fortiss, the innovation center for software-intensive systems of the TU Munich, Germany (2010),
- in the Summer Research Institute (SuRI) at EPFL, Switzerland (2011),
- at the Université Libre de Bruxelles, Belgium (2011),
- at LaBRI, the Laboratoire Bordelais de Recherche en Informatique of the University of Bordeaux, France (2011), and
- at the University of Pennsylvania, PA (2012).

Languages spoken German (native), English (fluent), French (Level B2)

Citizenship Austria

Publication Statistics (according to scholar.google.com)

H-number 13

Number of total citations 668

Most-cited publications [22] 70 citations, [24] 68 citations, [21] 52 citations

List of Publications

Peer-reviewed Publications

- [1] Barbara Jobstmann, Stefan Staber, Andreas Griesmayer, and Roderick Bloem. Finding and fixing faults. *Journal of Computer and System Sciences (JCSS)*, 78(2):441–460, 2012.
- [2] Christian von Essen and Barbara Jobstmann. Synthesizing efficient controllers. In *International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI)*, pages 428–444, 2012.
- [3] Thomas A. Henzinger, Barbara Jobstmann, and Verena Wolf. Formalisms for specifying markovian population models. *International Journal of Foundations of Computer Science (IJFCS)*, 22(4):823–841, 2011.
- [4] Roderick Bloem, Barbara Jobstmann, Nir Piterman, and Yaniv Saár. Synthesis of reactive (1) designs. *Journal of Computer and System Sciences*, 2011. In Press.
- [5] Krishnendu Chatterjee, Thomas A. Henzinger, Barbara Jobstmann, and Rohit Singh. Quasy: Quantitative synthesis tool. In *Tools and Algorithms for the Construction and Analysis of Systems (TACAS)*, pages 267–271, 2011.
- [6] Chih-Hong Cheng, Saddek Bensalem, Yu-Fang Chen, Rongjie Yan, Barbara Jobstmann, Harald Ruess, Christian Buckl, and Alois Knoll. Algorithms for synthesizing priorities in component-based systems. In *Automated Technology for Verification and Analysis, 9th International Symposium (ATVA)*, pages 150–167, 2011.
- [7] Chih-Hong Cheng, Saddek Bensalem, Barbara Jobstmann, Rongjie Yan, Alois Knoll, and Harald Ruess. Model construction and priority synthesis for simple interaction systems. In *NASA Formal Methods (NFM)*, pages 466–471, 2011.
- [8] Chih-Hong Cheng, Barbara Jobstmann, Christian Buckl, and Alois Knoll. On the hardness of priority synthesis. In *International Conference on Implementation and Application of Automata (CIAA)*, pages 110–117, 2011.
- [9] Jad Hamza, Barbara Jobstmann, and Viktor Kuncak. Synthesis for regular specifications over unbounded domains. In *Conference on Formal Methods in Computer Aided Design (FMCAD)*, pages 101–110, 2010.
- [10] Krishnendu Chatterjee, Thomas Henzinger, Barbara Jobstmann, and Rohit Singh. Measuring and synthesizing systems in probabilistic environments. In *Computer Aided Verification (CAV)*, pages 380–395, 2010.
- [11] Roderick Bloem, Krishnendu Chatterjee, Karin Greimel, Thomas Henzinger, and Barbara Jobstmann. Robustness in the presence of liveness. In *Computer Aided Verification (CAV)*, pages 410–424, 2010.
- [12] Krishnendu Chatterjee, Thomas Henzinger, Barbara Jobstmann, and Arjun Radhakrishna. GIST: A solver for probabilistic games. In *Computer Aided Verification (CAV)*, pages 665–669, 2010.
- [13] Roderick Bloem, Karin Greimel, Thomas Henzinger, and Barbara Jobstmann. Synthesizing robust systems. In *Conference on Formal Methods in Computer Aided Design (FMCAD)*, pages 85–92, 2009.
- [14] Roderick Bloem, Krishnendu Chatterjee, Thomas Henzinger, and Barbara Jobstmann. Better quality in synthesis through quantitative objectives. In Springer, editor, *Computer Aided Verification (CAV)*, pages 140–156, 2009.
- [15] Dirk Fahland, Cedric Favre, Barbara Jobstmann, Jana Koehler, Niels Lohmann, Hagen Völzer, and Karsten Wolf. Instantaneous soundness checking of industrial business process models. In Springer, editor, *Business Process Management (BPM)*, pages 278–293, 2009.

- [16] L. Doyen, T. Henzinger, B. Jobstmann, and T. Petrov. Interface theories with component reuse. In *International Conference on Embedded Software (EMSOFT)*, pages 79–88, 2008.
- [17] K. Chatterjee, T. Henzinger, and B. Jobstmann. Environment assumptions for synthesis. In *International Conference on Concurrency Theory (CONCUR)*, pages 147–161, 2008.
- [18] K. Greimel, R. Bloem, B. Jobstmann, and M. Vardi. Open implication. In *International Colloquium on Automata, Languages and Programming (ICALP)*, pages 361–372, 2008. LNCS 5126.
- [19] R. Guerraoui, T. Henzinger, B. Jobstmann, and V. Singh. Model checking transactional memories. In *Programming Language Design and Implementation (PLDI)*, pages 372–382, 2008.
- [20] B. Jobstmann, S. Galler, M. Weiglhofer, and R. Bloem. Anzu: A tool for property synthesis. In *Computer Aided Verification (CAV)*, pages 258–262, 2007.
- [21] R. Bloem, S. Galler, B. Jobstmann, N. Piterman, A. Pnueli, and M. Weiglhofer. Automatic hardware synthesis from specifications: A case study. In *Proceedings of the Conference on Design, Automation and Test in Europe (DATE)*, pages 1188–1193, 2007.
- [22] B. Jobstmann and R. Bloem. Optimizations for LTL synthesis. In *Conference on Formal Methods in Computer Aided Design (FMCAD)*, pages 117–124, 2006.
- [23] S. Staber, B. Jobstmann, and R. Bloem. Finding and fixing faults. In *Conference on Correct Hardware Design and Verification Methods (CHARME)*, pages 35–49, 2005. LNCS 3725.
- [24] B. Jobstmann, A. Griesmayer, and R. Bloem. Program repair as a game. In *Conference on Computer Aided Verification (CAV)*, pages 226–238, 2005. LNCS 3576.

Invited Papers

- [25] Roderick Bloem, Krishnendu Chatterjee, Karin Greimel, Thomas A. Henzinger, and Barbara Jobstmann. Specification-centered robustness. In *IEEE International Symposium on Industrial Embedded Systems (SIES)*, pages 176–185, 2011.
- [26] Thomas Henzinger, Barbara Jobstmann, and Verena Wolf. Formalisms for specifying markovian population models. In Springer, editor, *LIX Colloquium Reachability Problems’09*, pages 3–23, 2009.
- [27] Barbara Jobstmann. Robustness with respect to error specifications. In *Forum on specification & Design Languages (FDL)*, page 72, 2010.

Editorial Work

- [28] Klaus Schneider, Barbara Jobstmann, Luca P. Carloni, and Jens Brandt, editors. *8th ACM/IEEE International Conference on Formal Methods and Models for Codesign (MEMOCODE 2010)*, Grenoble, France, 26-28 July 2010. IEEE Computer Society, 2010.
- [29] Satnam Singh, Barbara Jobstmann, Michael Kishinevsky, and Jens Brandt, editors. *9th ACM/IEEE International Conference on Formal Methods and Models for Codesign (MEMOCODE 2011)*, Cambridge, UK 11-13 July 2011. IEEE Computer Society, 2011.
- [30] Ras Bodik and Barbara Jobstmann, editors. *Special Edition on Algorithmic Program Synthesis*. Springer Berlin/Heidelberg, 2012. To Appear.

Other Publications

- [31] Christian von Essen and Barbara Jobstmann. Synthesizing systems with optimal average-case behavior for ratio objectives. In *International Workshop on Interactions, Games and Protocols (IWIGP)*, pages 17–32, 2011.
- [32] R. Bloem, S. Galler, B. Jobstmann, N. Piterman, A. Pnueli, and M. Weiglhofer. Specify, compile, run: Hardware from PSL. In *International Workshop on Compiler Optimization Meets Compiler Verification (COCV)*, pages 3–16, 2007.
- [33] B. Jobstmann. Property synthesis. In *SIGDA Ph.D. Forum at the Design Automation Conference (DAC)*, San Francisco, California, USA, 2006.
- [34] B. Jobstmann and R. Bloem. Game-based and simulation-based improvements for LTL synthesis. In *Workshop on Games in Design and Verification (GDV)*, 2006.
- [35] S. Staber, B. Jobstmann, and R. Bloem. Diagnosis is repair. In *International Workshop on Principles of Diagnosis (DX)*, pages 169–174, 2005.

Theses

- [36] B. Jobstmann. *Applications and Optimizations for LTL Synthesis*. PhD thesis, Graz University of Technology, March 2007.
- [37] B. Jobstmann. WIA - A wearable inspection agent for maintenance in production lines. Master's thesis, Graz University of Technology, 2003.

Technical Reports

- [38] Christian von Essen and Barbara Jobstmann. Program repair revisited. Technical Report TR-2012-4, VERIMAG, 2012.
- [39] Chih-Hong Cheng, Barbara Jobstmann, Michael Geisinger, Sarah Diot-Girard, Christian Buckl, Alois Knoll, and Harald Ruess. Optimizations for game-based software synthesis. Technical Report TR-2011-12, VERIMAG, 2011.
- [40] Christian von Essen and Barbara Jobstmann. Synthesizing systems with optimal average-case behavior for ratio objectives. Technical Report TR-2010-19, VERIMAG, 2010.
- [41] Krishnendu Chatterjee, Thomas A. Henzinger, and Barbara Jobstmann. Environment assumptions for synthesis. Technical report, Ecole Polytechnique Federale de Lausanne, 2008.
- [42] R. Bloem, S. Galler, B. Jobstmann, A. Pnueli, and M. Weiglhofer. Evaluation of tools and methodology for property-based logic synthesis. Technical Report Prosyd D2.3/1, Graz University of Technology, 2006.
- [43] R. Bloem and B. Jobstmann. Manual for property-based synthesis tool. Technical Report Prosyd D2.2/3, 2006.
- [44] R. Bloem, B. Jobstmann, and A. Pnueli. Property-based logic synthesis for rapid design prototyping. Technical Report Prosyd D2.2/1, 2005.
- [45] G. Auerbach, M. Moulin, B. Jobstmann, and R. Bloem. Property-based design and implementation. Technical Report Prosyd D2.1/1, 2005.
- [46] I. Pill, B. Jobstmann, R. Bloem, R. Frank, M. Moulin, B. Sterin, M. Roveri, and S. Semprini. Property simulation. Technical report, 2005. Prosyd D1.2/1.