

Damien Zufferey

Research Interests

Programming Languages, Formal Methods, Program Analysis and Verification, and Distributed Systems.

Professional and Academic Experience

from 2016.12 **Research group leader**, *Max Planck Institute for Software Systems*, Kaiserslautern, Germany.

2013.10–2016.9 **Postdoctoral researcher**, *MIT CSAIL*, Cambridge, USA.
In Martin C. Rinard's group.

Education

09.2009–09.2013 **PhD**, *Institute of Science and Technology Austria*, Klosterneuburg, Austria.
Under supervision of Thomas A. Henzinger

09.2007–07.2009 **Master**, *École Polytechnique Fédérale*, Lausanne, Switzerland.
Master in Computer Science with specialisation in Foundations of Software

09.2004–07.2007 **Bachelor**, *École Polytechnique Fédérale*, Lausanne, Switzerland.
Bachelor in Computer Science

08.1999–06.2004 **Maturité gymnasiale**, *Lycée Collège des Creusets*, Sion, Switzerland.
High School in math section (specialisation: physics and numerical methods)

Internships

07.2012–08.2012 **Intern**, *Max Planck Institute for Software Systems*, Saarbrücken, Germany.
One month internship under supervision of Ruzica Piskac on the reduction of decidable fragments of separation logic to a decidable first-order theory.

05.2012–06.2012 **Research consultant**, *Microsoft Research*, Redmond, USA.
Three weeks consulting mandate to work on the P domain specific language with Shaz Qadeer and Ethan Jackson.

11.2011–03.2012 **Research intern**, *Microsoft Research*, Redmond, USA.
Three months internship on the verification of asynchronous state machines with Shaz Qadeer.

07.2007–09.2007 **Intern**, *Simon Fraser University*, Vancouver, Canada.
Two months internship at the Software Reliability Lab with Dirk Beyer on the integration of SMT solvers in the model checker BLAST.

2006–2008 **Research assistant**, *École Polytechnique Fédérale*, Lausanne, Switzerland.
Part-time research assistant at MTC laboratory in parallel with my studies, worked under supervision of Dirk Beyer, Andrey Rybalchenko, and Gregory Théoduloz.

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Publications

Conference Papers

- [1] Gregor B. Banušić, Rupak Majumdar, Marcus Pirron, Anne-Kathrin Schmuck, and Damien Zufferey. “PGCD: Robot Programming and Verification with Geometry, Concurrency, and Dynamics”. In: *Proceedings of the 10th International Conference on Cyber-Physical Systems (ICCPs 2019)*. Ed. by Liu Xue and Paulo Tabuada. ACM/IEEE, 2019.
- [2] Rupak Majumdar, Marcus Pirron, Nobuko Yoshida, and Damien Zufferey. “Motion Session Types for Robotic Interactions (Brave New Idea Paper)”. In: *33rd European Conference on Object-Oriented Programming, ECOOP 2019, July 15-19, 2019, London, United Kingdom*. Ed. by Alastair F. Donaldson. Vol. 134. LIPIcs. Schloss Dagstuhl - Leibniz-Zentrum fuer Informatik, 2019, 28:1–28:27.
- [3] Ivan Gavran, Ortwin Mailahn, Rainer Müller, Richard Peifer, and Damien Zufferey. “Tool: accessible automated reasoning for human robot collaboration”. In: *Proceedings of the 2018 ACM SIGPLAN International Symposium on New Ideas, New Paradigms, and Reflections on Programming and Software, Onward! 2018, Boston, MA, USA, November 7-8, 2018*. Ed. by Elisa Gonzalez Boix and Richard P. Gabriel. ACM, 2018, pp. 44–56.
- [4] Arjun Radhakrishna, Nicholas V. Lewchenko, Shawn Meier, Sergio Mover, Krishna Chaitanya Sripada, Damien Zufferey, Bor-Yuh Evan Chang, and Pavol Cerný. “DroidStar: Callback Typestates for Android Classes”. In: *Proceedings of the 40th International Conference on Software Engineering: Companion Proceedings, ICSE 2018, Gothenburg, Sweden, May 27 - June 03, 2018*. Ed. by Michel Chaudron, Ivica Crnkovic, Marsha Chechik, and Mark Harman. ACM, 2018.
- [5] Cezara Drăgoi, Thomas A. Henzinger, and Damien Zufferey. “PSync: A Partially Synchronous Language for Fault-Tolerant Distributed Algorithms”. In: *Proceedings of the Symposium on Principles of Programming Languages, POPL 2016*. Ed. by Rastislav Bodík and Rupak Majumdar. ACM, 2016.
- [6] Sicun Gao and Damien Zufferey. “Interpolants in Nonlinear Theories over the Reals”. In: *Tools and Algorithms for the Construction and Analysis of Systems - 22th International Conference, TACAS 2016, Held as Part of the European Joint Conferences on Theory and Practice of Software, ETAPS 2016, Eindhoven, The Netherlands, April 2-8, 2016. Proceedings*. Ed. by Marsha Chechik and Jean-Francois Raskin. Springer, 2016.
- [7] Cezara Drăgoi, Thomas A. Henzinger, and Damien Zufferey. “The Need for Language Support for Fault-Tolerant Distributed Systems”. In: *1st Summit on Advances in Programming Languages, SNAPL 2015, May 3-6, 2015, Asilomar, California, USA*. Ed. by Thomas Ball, Rastislav Bodík, Shriram Krishnamurthi, Benjamin S. Lerner, and Greg Morrisett. Vol. 32. LIPIcs. Schloss Dagstuhl - Leibniz-Zentrum fuer Informatik, 2015.
- [8] Cezara Drăgoi, Thomas A. Henzinger, Helmut Veith, Josef Widder, and Damien Zufferey. “A Logic-Based Framework for Verifying Consensus Algorithms”. In: *Verification, Model Checking, and Abstract Interpretation - 15th International Conference, VMCAI 2014, San Diego, CA, USA, January 19-21, 2014. Proceedings*. Ed. by Kenneth L. McMillan and Xavier Rival. LNCS 8318. Springer, 2014, pp. 181–201.

- [9] Shahram Esmailsabzali, Rupak Majumdar, Thomas Wies, and Damien Zufferey. “Dynamic Package Interfaces”. In: *Fundamental Approaches to Software Engineering, 17th International Conference, FASE 2014, Held as Part of the Joint European Conferences on Theory and Practice of Software, ETAPS 2014, Grenoble, France, April 5-13, 2014. Proceedings*. Ed. by Stefania Gnesi and Arend Rensink. Springer, 2014.
- [10] Ruzica Piskac, Thomas Wies, and Damien Zufferey. “Automating Separation Logic with Trees and Data”. In: *Computer Aided Verification - 26th International Conference, CAV 2014, Held as Part of the Vienna Summer of Logic, VSL 2014, Vienna, Austria, July 18-22, 2014. Proceedings*. Ed. by Armin Biere and Roderick Bloem. LNCS 8559. Springer, 2014, pp. 711–728.
- [11] Ruzica Piskac, Thomas Wies, and Damien Zufferey. “GRASShopper: Complete Heap Verification with Mixed Specifications”. In: *Tools and Algorithms for the Construction and Analysis of Systems - 20th International Conference, TACAS 2014, Held as Part of the European Joint Conferences on Theory and Practice of Software, ETAPS 2014, Grenoble, France, April 5-13, 2014. Proceedings*. Ed. by Erika Ábrahám and Klaus Havelund. Springer, 2014.
- [12] Kshitij Bansal, Eric Koskinen, Thomas Wies, and Damien Zufferey. “Structural Counter Abstraction”. In: *Tools and Algorithms for the Construction and Analysis of Systems - 19th International Conference, TACAS 2013, Held as Part of the European Joint Conferences on Theory and Practice of Software, ETAPS 2013, Rome, Italy, March 16-24, 2013. Proceedings*. Ed. by Nir Piterman and Scott A. Smolka. LNCS 7795. Springer, 2013, pp. 62–77.
- [13] Ankush Desai, Vivek Gupta, Ethan K. Jackson, Shaz Qadeer, Sriram K. Rajamani, and Damien Zufferey. “P: safe asynchronous event-driven programming”. In: *ACM SIGPLAN Conference on Programming Language Design and Implementation, PLDI '13, Seattle, WA, USA, June 16-19, 2013*. Ed. by Hans-Juergen Boehm and Cormac Flanagan. ACM, 2013, pp. 321–332. ISBN: 978-1-4503-2014-6.
- [14] Ruzica Piskac, Thomas Wies, and Damien Zufferey. “Automating Separation Logic Using SMT”. In: *Computer Aided Verification - 25th International Conference, CAV 2013, Saint Petersburg, Russia, July 13-19, 2013. Proceedings*. Ed. by Natasha Sharygina and Helmut Veith. LNCS 8044. Springer, 2013, pp. 773–789. ISBN: 978-3-642-39798-1.
- [15] Damien Zufferey, Thomas Wies, and Thomas A. Henzinger. “Ideal Abstractions for Well-Structured Transition Systems”. In: *Verification, Model Checking, and Abstract Interpretation - 13th International Conference, VMCAI 2012, Philadelphia, PA, USA, January 22-24, 2012. Proceedings*. Ed. by Viktor Kuncak and Andrey Rybalchenko. LNCS 7148. Springer, 2012, pp. 445–460.
- [16] Thomas A. Henzinger, Vasu Singh, Thomas Wies, and Damien Zufferey. “Scheduling large jobs by abstraction refinement”. In: *EuroSys*. Ed. by Christoph M. Kirsch and Gernot Heiser. ACM, 2011, pp. 329–342.
- [17] Dirk Beyer, Thomas A. Henzinger, Grégory Théoduloz, and Damien Zufferey. “Shape Refinement through Explicit Heap Analysis”. In: *Fundamental Approaches to Software Engineering, 13th International Conference, FASE 2010, Held as Part of the Joint European Conferences on Theory and Practice of Software, ETAPS 2010, Paphos, Cyprus, March 20-28, 2010. Proceedings*. Ed. by David S. Rosenblum and Gabriele Taentzer. LNCS 6013. Springer, 2010, pp. 263–277.

- [18] Pavol Cerný, Arjun Radhakrishna, Damien Zufferey, Swarat Chaudhuri, and Rajeev Alur. “Model Checking of Linearizability of Concurrent List Implementations”. In: *Computer Aided Verification, 22nd International Conference, CAV 2010, Edinburgh, UK, July 15-19, 2010. Proceedings*. Ed. by Tayssir Touili, Byron Cook, and Paul Jackson. LNCS 6174. Springer, 2010, pp. 465–479.
- [19] Thomas A. Henzinger, Anmol V. Singh, Vasu Singh, Thomas Wies, and Damien Zufferey. “A marketplace for cloud resources”. In: *EMSOFT*. Ed. by Luca P. Carloni and Stavros Tripakis. ACM, 2010, pp. 1–8.
- [20] Thomas A. Henzinger, Anmol V. Singh, Vasu Singh, Thomas Wies, and Damien Zufferey. “FlexPRICE: Flexible Provisioning of Resources in a Cloud Environment”. In: *IEEE Conference on Cloud Computing*. 2010.
- [21] Thomas Wies, Damien Zufferey, and Thomas A. Henzinger. “Forward Analysis of Depth-Bounded Processes”. In: *Foundations of Software Science and Computational Structures, 13th International Conference, FOSSACS 2010, Held as Part of the Joint European Conferences on Theory and Practice of Software, ETAPS 2010, Paphos, Cyprus, March 20-28, 2010. Proceedings*. Ed. by C.-H. Luke Ong. LNCS 6014. Springer, 2010, pp. 94–108.
- [22] Dirk Beyer, Damien Zufferey, and Rupak Majumdar. “CSIsat: Interpolation for LA+EUF”. In: *Proceedings of the 20th International Conference on Computer Aided Verification (CAV 2008, Princeton (NY), July 7-14)*. Ed. by A. Gupta and S. Malik. LNCS 5123. Springer-Verlag, Berlin, 2008, pp. 304–308. ISBN: 978-3-540-70543-7.

Journal Papers

- [23] Krishnendu Chatterjee, Damien Zufferey, and Martin A. Nowak. “Evolutionary game dynamics in populations with different learners”. In: *Journal of Theoretical Biology* 301.0 (2012), pp. 161–173. ISSN: 0022-5193.

Thesis

- [24] Damien Zufferey. “Analysis of Dynamic Message Passing Programs (a framework for the analysis of depth-bounded systems)”. PhD thesis. Institute of Science and Technology Austria, 2013.

Workshop Papers

- [25] Calvin Huang, Soonho Kong, Sicun Gao, and Damien Zufferey. “Evaluating Branching Heuristics in Interval Constraint Propagation for Satisfiability”. In: *Numerical Software Verification - 12th International Workshop, NSV@CAV 2019, New York City, NY, USA, July 13-14, 2019, Proceedings*. Ed. by Majid Zamani and Damien Zufferey. Vol. 11652. Lecture Notes in Computer Science. Springer, 2019, pp. 85–100. ISBN: 978-3-030-28422-0.
- [26] Thomas A. Henzinger, Anmol V. Singh, Vasu Singh, Thomas Wies, and Damien Zufferey. “Static Scheduling in Clouds”. In: *Proceedings of the 3rd USENIX Workshop on Hot Topic in Cloud Computing (HotCloud’11)*. 2011.

Technical Report

- [27] Rupak Majumdar, Aman Shankar Mathur, Marcus Pirron, Laura Stegner, and Damien Zufferey. “Paracosm: A Language and Tool for Testing Autonomous Driving Systems”. In: *CoRR* abs/1902.01084 (2019). arXiv: 1902.01084.

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- [28] Phillip Stanley-Marbell, Armin Alaghi, Michael Carbin, Eva Darulova, Lara Dolecek, Andreas Gerstlauer, Ghayoor Gillani, Djordje Jevdjic, Thierry Moreau, Mattia Cacciotti, Alexandros Daglis, Natalie D. Enright Jerger, Babak Falsafi, Sasa Misailovic, Adrian Sampson, and Damien Zufferey. "Exploiting Errors for Efficiency: A Survey from Circuits to Algorithms". In: *CoRR* abs/1809.05859 (2018). arXiv: 1809.05859.
- [29] Shahram Esmailsabzali, Rupak Majumdar, Thomas Wies, and Damien Zufferey. "A Notion of Dynamic Interface for Depth-Bounded Object-Oriented Packages". In: *CoRR* abs/1311.4615 (2013).
- [30] Shahram Esmailsabzali, Rupak Majumdar, Thomas Wies, and Damien Zufferey. "Dynamic Package Interfaces - Extended Version". In: *CoRR* abs/1311.4934 (2013).
- [31] Ruzica Piskac, Thomas Wies, and Damien Zufferey. *Automating Separation Logic Using SMT*. Tech. rep. TR2013-954. New York University, 2013.
- [32] Kshitij Bansal, Eric Koskinen, Thomas Wies, and Damien Zufferey. *Structural Counter Abstraction*. Tech. rep. TR2012-947. New York University, 2012.
- [33] Ankush Desai, Vivek Gupta, Ethan K. Jackson, Shaz Qadeer, Sriram K. Rajamani, and Damien Zufferey. *P: safe asynchronous event-driven programming*. Tech. rep. MSR-TR-2012-116. Microsoft Research, 2012.
- [34] Pavol Cerný, Arjun Radhakrishna, Damien Zufferey, Swarat Chaudhuri, and Rajeev Alur. *Model Checking of Linearizability of Concurrent List Implementations*. Tech. rep. IST-2010-0001. IST Austria, 2010.

Proceedings

- [35] Majid Zamani and Damien Zufferey, eds. *Numerical Software Verification - 12th International Workshop, NSV@CAV 2019, New York City, NY, USA, July 13-14, 2019, Proceedings*. Vol. 11652. Lecture Notes in Computer Science. Springer, 2019. ISBN: 978-3-030-28422-0.

Professional Services

Program Committee (co-)Chair

- 22th International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI) 2020
- 12th International Workshop on Numerical Software Verification (NSV) 2019
- Verification Mentoring Workshop (VMW) 2017

Program Committee Member

- 17th Asian Symposium on Programming Languages and Systems (APLAS) 2019
- 20th International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI) 2019
- 21st International Symposium on Symbolic and Numeric Algorithms for Scientific Computing (SYNASC) 2019.
- 9th ACM SIGPLAN Symposium on Scala (Scala) 2018
- 25th Static Analysis Symposium (SAS) 2018
- 30th International Conference on Computer-Aided Verification (CAV) 2017
- 10th Working Conference on Verified Software: Theories, Tools, and Experiments (VSTTE) 2018
- Student Research Competition at PLDI 2018

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- 24th International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS) 2018
- 29th International Conference on Computer-Aided Verification (CAV) 2017
- 15th International Conference on Formal Methods and Models for System Design (MEMOCODE) 2017
- 6th Workshop on Synthesis (SYNT) 2017
- 14th International Workshop on Satisfiability Modulo Theories (SMT) 2016
- 7th International Symposium on Games, Automata, Logics and Formal Verification (GANDALF) 2016
- 5th Workshop on Synthesis (SYNT) 2016
- Workshop on Programming based on Actors, Agents, and Decentralized Control (AGERE) 2015
- Scala Symposium 2015
- Annual Scala Workshop (Scala) 2014

Reviewer

- Principles of Programming Languages (POPL) 2013, 2014, external review committee member in 2017
- Conference on Concurrency Theory (CONCUR) 2012 and 2017
- International Joint Conference on Automated Reasoning (IJCAR) 2016
- Fundamental Approaches to Software Engineering (FASE) 2016
- Foundations of Software Science and Computation Structures (FoSSaCS) 2011 and 2016
- Journal of Automated Reasoning, special issue on interpolation 2015
- International Conference on Automated Deduction (CADE) 2015
- Tools and Algorithms for the Construction and Analysis of Systems (TACAS) 2015
- Verification, Model Checking, and Abstract Interpretation (VMCAI) 2015
- International Conference on Current Trends in Theory and Practice of Computer Science (SOFSEM) 2015
- International Workshop on Programming based on Actors, Agents, and Decentralized Control (AGERE!@SPLASH) 2014
- Computer Science Logic - Logic in Computer Science (CSL-LICS) 2014
- Acta Informatica (Volume 52)
- European Software Engineering Conference and Foundations of Software Engineering (ESEC/FSE) 2013
- Theoretical Aspects of Software Engineering (TASE) 2013
- Verified Software: Theories, Tools, Experiments (VSTTE) 2012
- Formal Methods (FM) 2012

Teaching and Supervising

Teaching

- Advanced Automata Theory, university of Kaiserslautern, summer semester 2019 (co-teaching with Daniel Neider)
- Concurrency Theory, university of Kaiserslautern, winter semester 2018-2019 (co-teaching with Daniel Neider)
- Concurrency Theory, university of Kaiserslautern, winter semester 2017-2018

Student Supervision

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- Supervised PhD students at the MPI-SWS
 - Marcus Pirron (2017 –)
 - Aman Shankar Mathur (2017 –) co-supervised with Rupak Majumdar
- Supervised Master student
 - Richard Peifer (2018, Saarland University), master thesis “Domain Specific Language for Specifying and Planning of Industrial Processes” co-supervised with Ortwin Mailahn (ZeMA) and Ivan Gavran (MPI-SWS)
 - Manish Kumar (2018, TU Kaiserslautern), master thesis “Byzantine Fault-Tolerance in the Presence of Partial Synchrony: PSync-BFT”
 - Jennifer Ramseyer (2016, MIT CSAIL), master thesis “Implementing a Verified FTP Client and Server” co-supervised with Martin Rinard

References

Thomas A. Henzinger

Position: President, Institute of Science and Technology Austria.

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Rupak Majumdar

Position: Scientific Director, Max Planck Institute for Software Systems.

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Martin C. Rinard

Position: Professor, Computer Science and Artificial Intelligence Laboratory, MIT.

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Awards

- Excellency Scholarships at the Master level from EPFL.
- Graduated best in class from my Bachelor at EPFL.
- Silver Medal of the ACM - International Collegiate Programming Contest (Regionals, South-Western Europe) in 2007 with EPFL (6th place, Swiss champions, team with Frédéric Dubut and Christian Kauth)
- Bronze Medal of the ACM - International Collegiate Programming Contest (Regionals, South-Western Europe) in 2006 with EPFL (9th place, Swiss champions, team with Frédéric Dubut and Abhishek Garg)

Other

Student representative for the IST Graduate Student Association during the year 2011.

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