Eric Bodden, Ph.D.

Lauteschlägerstraße 30
64289 Darmstadt
Germany

Phone: +49 (6151) 165478
Email: eric@bodden.de
URL: http://bodden.de/

Date of birth: Feb. 20th, 1980

Academic Work Experience

08/2009–present **Post-doctoral research fellow:** Software Technology Group (Professor Mira Mezini), Technische Universität Darmstadt, Germany.

Coordinator of the Graduate School: Center for Advanced Security Research Darmstadt (CASED). Responsible for hiring of scholars, for organizing workshops on transferable skills and the annual retreat, for controlling and reporting. Promoting new Master of IT-Security.

01/2006–07/2009 **Research Assistant:** Sable Research Group, School of Computer Science, McGill University, Montréal, Québec, Canada. Designer and maintainer of the **Clara** system for **hybrid verification** (dynamic and static) of typestate properties using runtime monitors and data-flow analysis. In runtime monitoring, a compiler instruments a program under test with safety checks that are evaluated at runtime. The static analyses that Clara provides evaluate most of these checks ahead-of-time. This allows programmers to find programming errors already at compile time, and to evaluate runtime monitors with less overhead at runtime. I am also the chief maintainer of the **Soot** framework for the analysis and transformation of Java programs, and a committer to the **AspectBench Compiler** project, an open research compiler for AspectJ.

02/2004–12/2005 **Student Assistant:** Chair I2 for Programming languages and Program anaysis, RWTH Aachen University, Germany. I supported Ph.D. student Michael Weber in the design and development of an explicit-state model checker for SDL, the Specification and Description Language.

04/2001–07/2002 **Student Assistant:** Detection of sub-components of gestures using hierarchical clustering as part of project "Wireless Information System for Deaf People On The Move". Supervisor: Britta Bauer of Institute of Man-Machine Interaction, RWTH Aachen University.

Education

01/2006–06/2009 **McGill University, Montréal, Québec, Canada**
Ph.D. in Computer Science
Thesis: Verifying finite-state properties of large-scale programs
Advisor: Professor Laurie J. Hendren

10/2003–12/2005 **RWTH Aachen University, Aachen, Germany**
Diploma in Computer Science, graduated with distinction
Thesis: J-LO—A tool for runtime-checking temporal assertions
Advisor: Professor Klaus Indermark

09/2002–06/2003 **University of Kent at Canterbury, UK**
exchange year, Diploma in Computer Science, graduated with distinction

10/2000–08/2002 **RWTH Aachen University, Aachen, Germany**
Intermediate Diploma (Vordiplom) in Computer Science

Workshops on transferable skills

10/2009–12/2009 **Achieving professional goals:** Attended workshop *Achieving professional goals* offered by the Center for Advanced Security Research Darmstadt (CASED).

March 2008 **Learn to teach:** Attended workshop by McGill's Teaching and Learning Services. Topics: Engaging Students through Interactive Strategies, Communicating with students, Language and culture for asking and answering questions.

10/2006–12/2006 **Writing Science Articles:** Successfully completed course *Writing Science Articles 1* offered by McGill University. Topic: How to structure and edit scientific articles to make them easily accessible to a broad audience.

Awards, Distinctions and Patents

March 2010 **CAGS/UMI and ADESAQ Dissertation awards**
McGill University nominated my dissertation "Verifying finite-state properties of large-scale programs" for the Canada-wide CAGS/UMI Distinguished Dissertation Awards and for the Québec-wide Prix d'excellence de l'Association des doyens des études supérieures au Québec (ADESAQ). There is one nomination per faculty.

July 2008 **SIGSOFT Distinguished Paper Award**
"Racer: Effective Race Detection Using AspectJ" at the 2008 International Symposium on Software Testing and Analysis (ISSTA)

June 2005 **Winner: Grand Finals of the ACM Student Research Competition**
"Efficient and Expressive Runtime Verification for Java"

Others **Distinction:** Diplomas awarded with distinction by both the University of Kent at Canterbury and RWTH Aachen University (see above)

Patent: pending for "Method and system for performance profiling of software", claimed by IBM, US patent no. US20060101421, filed on 19/10/2005.

Other awards: I have been awarded multiple merit-based travel awards by ACM SIGPLAN and SIGSOFT, the DFG, AOSD-Europe and McGill University. McGill University further supported me through multiple merit-based departmental funding and tuition-fee waivers.

Research Topics

I am interested in developing tools that answer interesting questions about **realistic programs**, i.e., programs of substantial size that use features like dynamic class loading, dynamic class generation, reflection, and native calls. My current tool chain focuses on Java programs and on determining safety and security properties of such programs. With my work, I am building on research from and contributing to the following research areas:

Incremental analyses: how to incrementalize analyses, how to persist analysis results, how to analyze program components in isolation

Runtime verification: efficient implementations, specification languages, precise and scalable data structures and abstractions

Static verification: compilation and optimization techniques, data-flow and pointer analysis, incremental program analysis, abstract interpretation, theorem proving

Aspect-oriented programming: modularity, use for runtime verification

Programming languages: managed-code languages like Java, AspectJ and C#: verifiability, language extensions for verification, functional languages, proof-carrying code

Teaching Experience

04/2010–07/2010 **Automated Software Engineering:** Course Lecturer at Technische Universität Darmstadt, in collaboration with Dr. Martin Monperrus. Had official teaching assignment ("Lehrauftrag") for this course: designed course structure and contents from scratch, taught lectures, designed and supervised assignments, developed final exam and assigned all grades. Supervised a teaching assistant.

10/2008–12/2008 **Compiler Design:** Course Lecturer at McGill University. Had overall responsibility for this course: taught lectures, designed and supervised course project and assignments, developed midterm and final exam and assigned final grades. Supervised a teaching assistant.

01/2008–04/2008 **Optimizing Compilers:** Teaching Assistant at McGill University. Graded assignments and held multiple guest lectures, in particular on the Soot program analysis and transformation framework which the students used in class and which I maintain. Discussed possible Soot-based solution strategies for assignments with the students.

10/2003–02/2004 **Programmierung:** Teaching Assistant at RWTH Aachen University. Graded assignments and final exam.

Supervisions

03/2010–present **An empirical evaluation of uses of reflection and dynamic class loading** by Hela Oueslati. End-of study project for the Institut Supérieur d'Informatique et de Multimédia (ISIM) de Sfax, Tunesia, conducted at the Technische Universität Darmstadt.

03/2010–present **A holistic approach for specifying and enforcing non-functional safety properties** by Slim Kallel. Ph.D. thesis at Technische Universität Darmstadt. (co-supervised with Prof. Mira Mezini)

12/2009–03/2010 **Visualizing finite-state runtime monitors in Eclipse** by Thomas Pilot. Bachelor's thesis at Technische Universität Darmstadt.

01/2007–04/2007 **Implementing relational aspects using tracematches** by Reehan Shaikh (M.Sc. student). Course project for Optimizing Compilers at McGill University. This work was published at the AOSD 2008 conference.

Service

Communications chair: International Symposium on Software Testing and Analysis (ISSTA) 2011.

Since 08/2009 **Coordinator of the Software-Engineering Project:** Technische Universität Darmstadt. In this project, groups of four to six students develop an industrial-strength piece of software from scratch, for actual industrial partners. I acquired project proposals and 27.000 EUR of funding from industrial partners such as Deutsche Börse Group, Deutsche Flugsicherung, REA Electronics and Lynx Technik AG. Further, I supervised the overall project during the entire academic year.

Since 11/2009 **Coordinator of the Graduate School:** Center for Advanced Security Research Darmstadt (CASED): hiring of scholars, organization of workshops on transferable skills, organization of annual retreat, controlling and reporting. Promoting new Master of IT-Security.

06/2006–06/2009 **Representative for Canada:** Association of Alumni, Friends, and Supporters of the RWTH Aachen University in North America: connecting with and supporting RWTH Alumni living in Canada, organization of the annual meeting of all North-American Alumni in Montréal, May 15th-17th, 2009. (www.rwth-naaa.de)

Others **Hiring Committees:** In 2009/2010: Member of a hiring committee for a full professorship in Software Engineering at the Technische Universität Darmstadt.

Program Committees: International Conference on Aspect-Oriented Programming (AOSD) 2011, International Conference on Runtime Verification (RV) 2010, Workshop on Foundations of Aspect-Oriented Languages (FOAL) 2010, Workshop on Runtime Verification (RV) 2007 and 2009, Workshop on Virtual Machines and Intermediate Languages for emerging modularization mechanisms (VMIL) 2008 and 2009 and the ECOOP Doctoral Symposium 2008.

Reviewer: ACM Transactions on Software Engineering and Methodology (TOSEM), IEEE Transactions on Software Engineering (TSE), International Journal of Image and Graphics (IJIG), ECOOP 2010, OOPSLA 2008, PEPM 2008, PLDI 2006, AOSD 2006, 2007 and 2010, SEFM 2005 and 2008, and ATVA 2008.

Other Related Community Involvement: From 01/2006–04/2006: Member of the Expert group for Design by Contract for Java in the Java Community Process (JCP). Also committer to the ajlib development group; goal: to develop a standard library of reusable AspectJ aspects. Member of the Association for Computing Machinery (ACM), ACM SIGSOFT, and the Gesellschaft für Informatik (GI).

Relevant Non-academic Employment

06/2004–11/2005 **Microsoft Student Partner** at Microsoft Germany GmbH, Aachen, Germany. Established academic relationships between Microsoft and students. Built community web portal.

06/2003–06/2004 **Software Architect at Q2Web** GmbH, Pulheim, Germany. Designed and implemented a caching system for PDAs, allowing both offline reading and posting of webpages.

06/2003–09/2003 **Summer internship at IBM** e-business Integration Technologies, Hursley, UK. Developed performance-test framework for J9 Java VM from scratch.

04/2002–06/2002 **Lab on Java High-Performance Programming** at the Institute for Scientific Computing, RWTH Aachen University, Aachen, Germany. Developed distributed algorithms in Java using MPI and other technologies.

10/1996–09/2001 **Programmer at Hitec Zang** GmbH, Herzogenrath, Germany. Developed software components in Delphi. Conducted ISO 9000 compliance testing.

Publications

Theses

[1] Eric Bodden. *Verifying finite-state properties of large-scale programs.* Ph.D. thesis, McGill University, June 2009. Available through ProQuest.

[2] Eric Bodden. *J-LO - A tool for runtime-checking temporal assertions.* Diploma thesis, RWTH Aachen University, November 2005.

Journal Articles

[1] Eric Bodden and Klaus Havelund. "Aspect-oriented Race Detection in Java." *IEEE Transactions on Software Engineering (TSE)*, 2010. To appear. Pre-print at: `http://doi.ieeecomputersociety.org/10.1109/TSE.2010.25`.

[2] Eric Bodden, Laurie Hendren, Patrick Lam, Ondřej Lhoták and Nomair A. Naeem. "Collaborative Runtime Verification with Tracematches." *Oxford Journal of Logics and Computation*, November 2008. Document available online at: `http://doi.ieeecomputersociety.org/10.1093/logcom/exn077`.

Refereed Conference Publications

[1] Eric Bodden. "Efficient Hybrid Typestate Analysis by Determining Continuation-Equivalent States." In *ICSE '10: International Conference on Software Engineering*. May 2010. To appear.

[2] Eric Bodden, Feng Chen and Grigore Roşu. "Dependent advice: A general approach to optimizing history-based aspects." In *AOSD '09: Proceedings of the 8th international conference on Aspect-oriented software development*, pages 3–14. March 2009.

[3] Eric Bodden, Patrick Lam and Laurie Hendren. "Object representatives: a uniform abstraction for pointer information." In *Visions of Computer Science - International Academic Conference of the British Computer Society (BCS 2008), London, United Kingdom*. September 2008.

[4] Eric Bodden, Patrick Lam and Laurie Hendren. "Finding programming errors earlier by evaluating runtime monitors ahead-of-time." In *16th ACM SIGSOFT International Symposium on Foundations of Software Engineering (SIGSOFT'08/FSE-16)*, pages 36–47. 2008.

[5] Eric Bodden and Klaus Havelund. "Racer: Effective Race Detection Using AspectJ." In *International Symposium on Software Testing and Analysis (ISSTA), Seattle, WA*, pages 155–165. July 2008.

[6] Eric Bodden, Reehan Shaikh and Laurie Hendren. "Relational aspects as tracematches." In *AOSD '08: Proceedings of the 7th international conference on Aspect-oriented software development*, pages 84–95. March 2008.

[7] Eric Bodden and Hans Vangheluwe. "Transforming Timeline specifications into automata for runtime monitoring." In *3rd International Symposium on Applications of Graph Transformations with Industrial Relevance (AGTIVE)*, volume 5088 of *Lecture Notes of Computer Science*, pages 249–265. October 2007.

[8] Eric Bodden, Laurie Hendren and Ondřej Lhoták. "A Staged Static Program Analysis to Improve the Performance of Runtime Monitoring." In Erik Ernst (editor), *ECOOP*, volume 4609 of *Lecture Notes in Computer Science*, pages 525–549. July 2007.

[9] Eric Bodden, Florian Forster and Friedrich Steimann. "Avoiding Infinite Recursion with Stratified Aspects." In Robert Hirschfeld, Andreas Polze and Ryszard Kowalczyk (editors), *GI-Edition Lecture Notes in Informatics "NODe 2006 GSEM 2006"*, volume P-88, pages 49 – 64. Gesellschaft für Informatik, September 2006.

Refereed Workshop Publications

[1] Eric Bodden. "Specifying and Exploiting Advice-Execution Ordering using Dependency State Machines." In *International Workshop on the Foundations of Aspect-Oriented Languages (FOAL)*. March 2010. To appear.

[2] Eric Bodden. "The design and implementation of formal monitoring techniques." In *OOPSLA '07: Companion of the 22nd annual ACM SIGPLAN conference on Object-oriented programming, systems, languages, and applications*. October 2007. Doctoral Symposium.

[3] Eric Bodden. "The design and implementation of formal monitoring techniques." In *Doctoral Symposium at the 21st European Conference on Object-Oriented Programming, Berlin, Germany*. July 2007.

[4] Hans Vangheluwe, Ximeng Sun and Eric Bodden. "Domain-Specific Modelling with AToM^3." In *Second International Conference on Software and Data Technologies (ICSOFT). Special Session on Metamodelling – Utilization in Software Engineering (MUSE)*, pages 305 – 314. July 2007.

[5] Eric Bodden, Laurie Hendren, Patrick Lam, Ondřej Lhoták and Nomair A. Naeem. "Collaborative runtime verification with tracematches." In *7th workshop on Runtime Verification at the 6th International Conference on Aspect-Oriented Software Development, Vancouver, Canada*, volume 4839, pages 22–37. March 2007.

[6] Eric Bodden and Volker Stolz. "Tracechecks: Defining Semantic Interfaces with Temporal Logic." In Welf Löwe and Mario Südholt (editors), *Software Composition*, volume 4089 of *Lecture Notes in Computer Science*, pages 147–162. March 2006.

[7] Eric Bodden and Volker Stolz. "Efficient temporal pointcuts through dynamic advice deployment." In *Workshop on Open Aspect Languages, Bonn, Germany.* March 2006.

[8] Volker Stolz and Eric Bodden. "Temporal Assertions using AspectJ." In *5th Workshop on Runtime Verification*, volume 144 of *Electronic Notes in Theoretical Computer Science*, pages 109–124. July 2005.

[9] Eric Bodden. "Concern specific languages and their implementation with abc." In *3rd Workshop on Software-engineering Properties of Languages and Aspect Technologies (SPLAT) at the 4th International Conference on Aspect-oriented Software Development, March 15th 2005, Chicago, USA*. March 2005.

Other Publications

[1] Torsten Weber and Eric Bodden. "Zweigstelle, Hauptstelle, Dienstleister: Aspektorientierte Programmierung mit .NET." *ObjektSPEKTRUM*, June 2006.

[2] Eric Bodden. "A lightweight LTL runtime verification tool for Java." In *Companion to the 19th Annual ACM SIGPLAN Conference on Object-Oriented Programming, Systems, Languages, and Applications, OOPSLA 2004, October 24-28, 2004, Vancouver, BC, Canada*, pages 306–307. October 2004. Student Research Competition.

[3] Eric Bodden. "A high-level view of Java applications." In *OOPSLA '03: Companion of the 18th annual ACM SIGPLAN conference on Object-oriented programming, systems, languages, and applications*, pages 384–385. October 2003. Student Research Competition.

Presentations

Invited talks

[1] "Efficient and Precise Typestate Analysis by Determining Continuation-Equivalent States." Seminar talk at Universität des Saarlandes, hosted by Andreas Zeller, Saarbrücken, Germany, December 2009.

[2] "Finding Programming Errors Earlier by Evaluating Runtime Monitors Ahead-of-Time." Hiring Talk at Center for Advanced Security Research Darmstadt (CASED), hosted by Max Mühlhäuser, Darmstadt, Germany, January 2009.

[3] "Finding Programming Errors Earlier by Evaluating Runtime Monitors Ahead-of-Time." Seminar talk at Universität des Saarlandes, hosted by Andreas Zeller, Saarbrücken, Germany, January 2009.

[4] "Finding Programming Errors Earlier by Evaluating Runtime Monitors Ahead-of-Time." Seminar talk at *Microsoft Research*, hosted by Manuel Fähndrich, Redmond, WA, July 2008.

[5] "Detecting non-local API violations of API contracts in large software systems." Seminar talk at *Vrije Universiteit Brussels*, Brussels, Belgium, April 2008.

[6] "Detecting non-local API violations of API contracts in large software systems." Seminar talk at *RWTH Aachen University*, Aachen, Germany, April 2008.

[7] "A staged static program analysis to improve the performance of runtime monitoring." Invited talk at the *University of Urbana Champaign*, Urbana, IL, May 2007.

[8] "A staged static program analysis to improve the performance of runtime monitoring." Invited talk at the *Dagstuhl Seminar on Runtime Verification*, Dagstuhl, Germany, January 2007.

Tutorials

[1] Pavel Avgustinov, Eric Bodden, Elnar Hajiyev, Ondřej Lhoták, Oege de Moor, Neil Ongkingco and Julian Tibble. "abc: How to implement your own tools for AOP research." Tutorial at the 5th International Conference on Aspect-oriented Software Development, Bonn, Germany, March 2006.

Citizenship

German

Languages

German native

English full professional proficiency (written and spoken)

French elementary proficiency (written and spoken)

References

Professor Laurie J. Hendren
ACM Fellow
E-mail: `hendren@cs.mcgill.ca`
Telephone: +1 (514) 398-7391
McGill University, School of Computer Science
McConnell Engineering Building, Room 318
3480 University Street
Montréal, Québec H3A 2A7, Canada

Professor Oege de Moor
E-mail: `oege@comlab.ox.ac.uk`
Telephone: +44 (1865) 273 878
University of Oxford, Computing Labroratory
Room 005, Wolfson Building, Parks Road
Oxford OX1 3QD, United Kingdom

Professor Matthew Dwyer, Henson Chair of Software Engineering
ACM Fellow
E-mail: `dwyer@cse.unl.edu`
Telephone: +1 (402) 472-2186
University of Nebraska, Department of Computer Science and Engineering
256 Avery Hall
Lincoln, NE 68588-0115

Professor Grigore Roşu
E-mail: `grosu@cs.uiuc.edu`
Telephone: +1 (217) 244-7431
University of Illinois at Urbana-Champaign, Department of Computer Science
201 N. Goodwin
Urbana, IL 61801

Dr. Klaus Havelund
E-mail: `Klaus.Havelund@jpl.nasa.gov`
Telephone: +1 (818) 354-5418
Laboratory for Reliable Software (LARS)
NASA's Jet Propulsion Laboratory
4800 Oak Grove Drive, M/S 301-285
Pasadena/Los Angeles, CA 91109, USA