Research Interests

My research focuses on tools and techniques for building reliable, efficient, and secure software. To this end, I work on testing and analysis of complex software systems. As part of my research, I have contributed to techniques that detected thousands of bugs and security problems in widely used software.

Positions and Experience

Sep 2019 – now  
**University of Stuttgart, Germany**  
Full Professor

Feb 2024 – Jul 2024  
**University of California, Berkeley, and University of California, Los Angeles, USA**  
Research sabbatical

Feb 2019 – Jul 2019  
**Facebook, Menlo Park, USA**  
Sabbatical/industrial leave

Oct 2014 – Aug 2019  
**TU Darmstadt, Germany**  
Assistant Professor (since April 2017, before: Independent research group leader)

Sep 2013 – Aug 2014  
**University of California, Berkeley, USA**  
Postdoctoral researcher

Jan 2013 – Jun 2013  
**ETH Zurich, Switzerland**  
Postdoctoral researcher and lecturer in the Laboratory for Software Technology lead by Thomas Gross

2008 – 2012  
**ETH Zurich, Switzerland**  
Research assistant in the Laboratory for Software Technology lead by Thomas Gross

Aug 2006 – Sep 2006  
**Fraunhofer Institute for Secure Information Technology SIT, Darmstadt, Germany**  
Internship. Survey of static source code analysis tools. Study on Ajax-related security issues

Jul 2005 – Aug 2005  
**Computer science research center FZI, Karlsruhe, Germany**  
Internship. Developed a Java application to visualize large object-oriented software

2001 – 2002  
**Community service, Jena, Germany**  
Day-care center for disabled children

Education

2008 – 2012  
**ETH Zurich, Switzerland**  
Ph.D. (Dr. sc.) in computer science. Laboratory for Software Technology lead by Thomas Gross.  
Dissertation: *Program Analyses for Automatic and Precise Error Detection*.  
Software Engineering Award of the Ernst-Denert-Foundation (best dissertation)  
Examinors: Thomas Gross, Jonathan Aldrich, Andreas Zeller

Jan 2008 – Jul 2008  
**Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland**  
Diploma thesis in the Programming Methods Laboratory lead by Martin Odersky.  
Best student paper award at ICSOFT’08

2006 – 2008  
**TU Dresden, Germany**  
Diplom (≈ M.S.) in computer science, with distinction. Specialization: software engineering.  
Awarded as one of the best engineering graduates of the year

2004 – 2006  
**Ecole Centrale Paris, France**  
Diplôme d’Ingénieur (≈ M.S.) in engineering

2002 – 2004  
**TU Dresden, Germany**  
Vordiplom (≈ B.S.) in computer science
Peer-reviewed Conference and Journal Publications

ICSE’25 **RepairAgent: An Autonomous, LLM-Based Agent for Program Repair**
Islem Bouzenia, Premkumar Devanbu, Michael Pradel. *International Conference on Software Engineering*

ICSE’25 **Calibration and Correctness of Language Models for Code**
Claudio Spiess, David Gros, Kunal Suresh Pai, Michael Pradel, Md Rafiquil Islam Rabin, Amin Alipour, Sumit Jha, Premkumar Devanbu, Toufique Ahmed. *International Conference on Software Engineering*

OOPSLA’24 **Wasm-R3: Record-Reduce-Replay for Realistic and Standalone WebAssembly Benchmarks**
Doehyun Baek, Jakob Getz, Yusung Sim, Daniel Lehmann, Ben Titzer, Sukyoun Ryu, Michael Pradel. *Proceedings of the ACM on Programming Languages*

FSE’24 **Analyzing Quantum Programs with LintQ: A Static Analysis Framework for Qiskit**
Matteo Paltenghi, Michael Pradel. *Symposium on the Foundations of Software Engineering*

FSE’24 **DyPyBench: A Benchmark of Executable Python Software**
Islem Bouzenia, Bajaj Piyush Krishan, Michael Pradel. *Symposium on the Foundations of Software Engineering*

ICSE’24 **PyTy: Repairing Static Type Errors in Python**
Yiu Wai Chow, Luca Di Grazia, Michael Pradel. *International Conference on Software Engineering*

ICSE’24 **Fuzz4All: Universal Fuzzing with Large Language Models**
Chunqiu Steven Xia, Matteo Paltenghi, Jia Le Tian, Michael Pradel, Lingming Zhang. *International Conference on Software Engineering*

FSE’23 **Resource Usage and Optimization Opportunities in Workflows of GitHub Actions**
Islem Bouzenia, Michael Pradel. *International Conference on Software Engineering*

FSE’23 **LExecutor: Learning-Guided Execution**
Beatriz Souza, Michael Pradel. *Symposium on the Foundations of Software Engineering*

ISSTA’23 **That’s a Tough Call: Studying the Challenges of Call Graph Construction for WebAssembly**
Daniel Lehmann, Michelle Thalakottur, Frank Tip, Michael Pradel. *International Symposium on Software Testing and Analysis*

ISSTA’23 **Beware of the Unexpected: Bimodal Taint Analysis**
Yiu Wai Chow, Max Schäfer, Michael Pradel. *International Symposium on Software Testing and Analysis*

ICSE’23 **MorphQ: Metamorphic Testing of the Qiskit Quantum Computing Platform**
Matteo Paltenghi, Michael Pradel. *International Conference on Software Engineering*

ICSE’23 **When to Say What: Learning to Find Condition-Message Inconsistencies**
Islem Bouzenia, Michael Pradel. *International Conference on Software Engineering*

ICSE’23 **SecBench.js: An Executable Security Benchmark Suite for Server-Side JavaScript**
Masudul Hasan Masud Bhuivan, Adithya Srinivas Parthasarathy, Nikos Vasilakis, Michael Pradel, Cristian-Alexandru Stăicu. *International Conference on Software Engineering*

ICSE’23 **VulGen: Realistic Vulnerability Generation Via Pattern Mining and Deep Learning**
Yu Nong, Yuzhe Ou, Michael Pradel, Feng Chan, Haipeng Cai. *International Conference on Software Engineering*

TSE’22 **DiffSearch: A Scalable and Precise Search Engine for Code Changes**
Luca Di Grazia, Paul Bredl, Michael Pradel. *IEEE Transactions on Software Engineering*

CSUR’22 **Code Search: A Survey of Techniques for Finding Code**
Luca Di Grazia, Michael Pradel. *ACM Computing Surveys*

FSE’22 **Dynapyt: A Dynamic Analysis Framework for Python**
Aryaz Eghbali, Michael Pradel. *Symposium on the Foundations of Software Engineering*

FSE’22 **The Evolution of Type Annotations in Python: An Empirical Study**
Luca Di Grazia, Michael Pradel. *Symposium on the Foundations of Software Engineering*

FSE’22 **Generating Realistic Vulnerabilities via Neural Code Editing: An Empirical Study**
Yu Nong, Yuzhe Ou, Michael Pradel, Feng Chen, Haipeng Cai. *Symposium on the Foundations of Software Engineering*

ASE’22 **CrystalBLEU: Precisely and Efficiently Measuring the Similarity of Code**
Aryaz Eghbali, Michael Pradel. *International Conference on Automated Software Engineering*
OOPSLA’19  Getafix: Learning to Fix Bugs Automatically  
Johannes Bader, Andrew Scott, Michael Pradel, Satish Chandra. Conference on Object-Oriented Programming, Systems, Languages, and Applications

ISSTA’19  Interactive Metamorphic Testing of Debuggers  
Sandro Tolksdorf, Daniel Lehmann, Michael Pradel. International Symposium on Software Testing and Analysis

USENIX Security’19  Small World with High Risks: A Study of Security Threats in the npm Ecosystem  
Markus Zimmermann, Cristian-Alexandru Staicu, Cam Tenny, Michael Pradel. USENIX Security Symposium

USENIX Security’19  Leaky Images: Targeted Privacy Attacks in the Web  
Cristian-Alexandru Staicu, Michael Pradel. USENIX Security Symposium

WWW’19  Anything to Hide? Studying Minified and Obfuscated Code in the Web  
Philippe Skolka, Cristian-Alexandru Staicu, Michael Pradel. The Web Conference (WWW)

ICSE’19  NL2Type: Inferring JavaScript Function Types from Natural Language Information  
Rabee Sohail Malik, Jibesh Patra, Michael Pradel. International Conference on Software Engineering

ASPLOS’19  Wasabi: A Framework for Dynamically Analyzing WebAssembly  
Daniel Lehmann, Michael Pradel. International Conference on Architectural Support for Programming Languages and Operating Systems

CACM’19  Automated Program Repair  
Claire Le Goues, Michael Pradel, Abhik Roychoudhury. Communications of the ACM, 62(12), pages 56–65

CSUR’19  A Survey of Compiler Testing  
Junjie Chen, Jibesh Patra, Michael Pradel, Yingfei Xiong, Hongyu Zhang, Dan Hao, Lu Zhang. ACM Computing Surveys, 53(1), pages 1–36

OOPSLA’18  DeepBugs: A Learning Approach to Name-based Bug Detection  
Michael Pradel, Koushik Sen. Conference on Object-Oriented Programming, Systems, Languages, and Applications

OOPSLA’18  Test Generation for Higher-Order Functions in Dynamic Languages  
Marija Selakovic, Michael Pradel, Rezwana Karim Nawrin, Frank Tip. Conference on Object-Oriented Programming, Systems, Languages, and Applications

ASE’18  How Many of All Bugs Do We Find? A Study of Static Bug Detectors  
Andrew Habib, Michael Pradel. International Conference on Automated Software Engineering

ASE’18  Is This Class Thread-Safe? Inferring Documentation using Graph-based Learning  
Andrew Habib, Michael Pradel. International Conference on Automated Software Engineering

FSE’18  Feedback-Directed Differential Testing of Interactive Debuggers  
Daniel Lehmann, Michael Pradel. European Software Engineering Conference and Symposium on the Foundations of Software Engineering

ICSME’18  Change-aware Dynamic Program Analysis for JavaScript  
Dileep R. K. Murthy, Michael Pradel. International Conference on Software Maintenance and Evolution

USENIX Security’18  Freezing the Web: A Study of ReDoS Vulnerabilities in JavaScript-based Web Servers  
Cristian-Alexandru Staicu, Michael Pradel. USENIX Security Symposium

ICSE’18  ConflictJS: Finding and Understanding Conflicts Between JavaScript Libraries  
Jibesh Patra, Pooja N. Dixit, Michael Pradel. International Conference on Software Engineering

NDSS’18  Synode: Understanding and Automatically Preventing Injection Attacks on Node.js  
Cristian-Alexandru Staicu, Michael Pradel, Ben Livshits. Network and Distributed System Security Symposium

CGO’18  Synthesizing Programs that Expose Performance Bottlenecks  
Luca Della Toffola, Michael Pradel, Thomas R. Gross. International Symposium on Code Generation and Optimization, pages 314–326

ASE’17  Automatically Reducing Tree-Structured Test Inputs  
Satia Herfert, Jibesh Patra, Michael Pradel. International Conference on Automated Software Engineering, pages 861–871

ASE’17  Saying “hi!” Is Not Enough: Mining Inputs for Effective Test Generation  
Luca Della Toffola, Cristian-Alexandru Staicu, Michael Pradel. International Conference on Automated Software Engineering, pages 44–49
OOPSLA’17  Detecting Argument Selection Defects
Andrew Rice, Edward Aftandilian, Ciera Jaspan, Emily Johnston, Michael Pradel, Yulissa Arroyo-Paredes. Conference on Object-Oriented Programming, Systems, Languages, and Applications, pages 104:1–104:22

PLDI’17  Systematic Black-Box Analysis of Collaborative Web Applications
Marina Billes, Anders Møller, Michael Pradel. Conference on Programming Language Design and Implementation, pages 171–184

ISSTA’17  An Actionable Performance Profiler for Optimizing the Order of Evaluations
Marjia Selakovic, Thomas Glaser, Michael Pradel. International Symposium on Software Testing and Analysis, pages 170–180

ICSE’17  Making Malory Behave Maliciously: Targeted Fuzzing of Android Execution Environments
Siegfried Rasthofer, Steven Arzt, Stefan Triller, Michael Pradel. International Conference on Software Engineering, pages 300–311

ICSE’17  Efficient Detection of Thread Safety Violations via Coverage-Guided Generation of Concurrent Tests
Ankit Choudhary, Shan Lu, Michael Pradel. International Conference on Software Engineering, pages 266–277

CSUR’17  A Survey of Dynamic Analysis and Test Generation for JavaScript
Esben Andreasen, Liang Gong, Anders Møller, Michael Pradel, Marjia Selakovic, Koushik Sen, Cristian-Alexandru Staicu. ACM Computing Surveys, 50(5), pages 1–36

EMSE’17  Pinpointing and Repairing Performance Bottlenecks in Concurrent Programs
Tingting Yu, Michael Pradel. Empirical Software Engineering (EMSE), 23(5), pages 3034–3071

ICSE’16  Performance Issues and Optimizations in JavaScript: An Empirical Study
Marjia Selakovic, Michael Pradel. International Conference on Software Engineering, pages 61–72

ICSE’16  Nomen Est Omen: Exploring and Exploiting Similarities between Argument and Parameter Names
Hui Liu, Qiurong Liu, Cristian-Alexandru Staicu, Michael Pradel, Yue Luo. International Conference on Software Engineering, pages 1063–1073

ISSTA’16  Monkey See, Monkey Do: Effective Generation of GUI Tests with Inferred Macro Events
Markus Ermuth, Michael Pradel. International Symposium on Software Testing and Analysis, pages 82–93

ISSTA’16  SyncProf: Detecting, Localizing, and Optimizing Synchronization Bottlenecks
Tingting Yu, Michael Pradel. International Symposium on Software Testing and Analysis, pages 389–400

OOPSLA’15  Performance Problems You Can Fix: A Dynamic Analysis of Memoization Opportunities
Luca Della Toffola, Michael Pradel, Thomas R. Gross. Conference on Object-Oriented Programming, Systems, Languages, and Applications, pages 607–622

FSE’15  JITProf: Pinpointing JIT-Unfriendly JavaScript Code
Liang Gong, Michael Pradel, Koushik Sen. European Software Engineering Conference and Symposium on the Foundations of Software Engineering, pages 357–368

ISSTA’15  DLint: Dynamically Checking Bad Coding Practices in JavaScript
Liang Gong, Michael Pradel, Manu Sridharian, Koushik Sen. International Symposium on Software Testing and Analysis, pages 94–105

ECOOP’15  The Good, the Bad, and the Ugly: An Empirical Study of Implicit Type Conversions in JavaScript
Michael Pradel, Koushik Sen. European Conference on Object-Oriented Programming, pages 519–541

ICSE’15  TypeDevil: Dynamic Type Inconsistency Analysis for JavaScript
Michael Pradel, Parker Schuh, Koushik Sen. International Conference on Software Engineering, pages 314–324

OOPSLA’14  EventBreak: Analyzing the Responsiveness of User Interfaces through Performance-Guided Test Generation
Michael Pradel, Parker Schuh, George Necula, Koushik Sen. Conference on Object-Oriented Programming, Systems, Languages, and Applications, pages 33–47

ISSTA’14  Performance Regression Testing of Concurrent Classes
Michael Pradel, Markus Huggler, Thomas R. Gross. International Symposium on Software Testing and Analysis, pages 13–25
ASE’13  **Bita: Coverage-guided, Automatic Testing of Actor Programs**  
Samira Tasharofi, Michael Pradel, Yu Lin, Ralph Johnson. *International Conference on Automated Software Engineering*, pages 114–224

ICSE’13  **Automatic Testing of Sequential and Concurrent Substitutability**  
Michael Pradel, Thomas R. Gross. *International Conference on Software Engineering*, pages 282–291

TSE’13  **Name-based Analysis of Equally Typed Method Arguments**  
Michael Pradel, Thomas R. Gross. *IEEE Transactions on Software Engineering*, 39(8), pages 1127–1143

PLDI’12  **Fully Automatic and Precise Detection of Thread Safety Violations**  
Michael Pradel, Thomas R. Gross. *Conference on Programming Language Design and Implementation*, pages 521–530

ISSTA’12  **Static Detection of Brittle Parameter Typing**  
Michael Pradel, Severin Heiniger, Thomas R. Gross. *International Symposium on Software Testing and Analysis*, pages 265–275

ICSE’12  **Leveraging Test Generation and Specification Mining for Automated Bug Detection without False Positives**  
Michael Pradel, Thomas R. Gross. *International Conference on Software Engineering*, pages 288–298

ICSE’12  **Statically Checking API Protocol Conformance with Mined Multi-Object Specifications**  
Michael Pradel, Ciera Jaspan, Jonathan Aldrich, Thomas R. Gross. *International Conference on Software Engineering*, pages 925–935

ICSE’12  **Ballerina: Automatic Generation and Clustering of Efficient Random Unit Tests for Multithreaded Code**  
Adrian Nistor, Qingzhou Luo, Michael Pradel, Thomas R. Gross, Darko Marinov. *International Conference on Software Engineering*, pages 727–737

ISSTA’11  **Detecting Anomalies in the Order of Equally-typed Method Arguments**  
Michael Pradel, Thomas R. Gross. *International Symposium on Software Testing and Analysis*, pages 232–242

ICSM’10  **A Framework for the Evaluation of Specification Miners Based on Finite State Machines**  
Michael Pradel, Philipp Bichsel, Thomas R. Gross. *International Conference on Software Maintenance*, pages 1–10

IJEIS’10  **A Good Role Model for Ontologies: Collaborations**  
Michael Pradel, Jakob Henriksson, Uwe Aßmann. *International Journal of Enterprise Information Systems*, 6(1), pages 1–11

ASE’09  **Automatic Generation of Object Usage Specifications from Large Method Traces**  
Michael Pradel, Thomas R. Gross. *International Conference on Automated Software Engineering*, pages 371–382

ICSOFT’08  **Scala Roles - A Lightweight Approach towards Reusable Collaborations**  
Michael Pradel, Martin Odersky. *International Conference on Software and Data Technologies*, pages 13–20. *Best student paper award*

RR’08  **Ontology Design and Reuse with Conceptual Roles**  
Jakob Henriksson, Michael Pradel, Steffen Zschaler, Jeff Z. Pan. *International Conference on Web Reasoning and Rule Systems*, pages 104–118

**Awards and Distinctions**

2023  ACM SIGSOFT Distinguished Paper Award at FSE’23 for *LExecutor: Learning-Guided Execution*

2023  ACM SIGSOFT Distinguished Paper Award at ISSTA’23 for *Beware of the Unexpected: Bimodal Taint Analysis*

2023  ACM SIGSOFT Distinguished Artifact Award at ISSTA’23 for *That’s a Tough Call: Studying the Challenges of Call Graph Construction for WebAssembly*

2022  Distinguished Member of the ACM

2022  ACM SIGSOFT Distinguished Paper Award at FSE’22 for *The Evolution of Type Annotations in Python: An Empirical Study*

2022  ACM SIGSOFT Distinguished Paper Award at ASE’22 for *CrystalBLEU: Precisely and Efficiently Measuring the Similarity of Code*
2021 ACM SIGSOFT Distinguished Paper Award at FSE’21 for *Semantic Bug Seeding: A Learning-Based Approach for Creating Realistic Bugs*

2021 ACM SIGSOFT Distinguished Artifact Award at ISSTA’21 for *Finding Data Compatibility Bugs with JSON Subschema Checking*

Since 2021 Faculty Member in the International Max Planck Research School for Intelligent Systems (IMPRS-IS)

Since 2021 Member of the European Laboratory for Learning and Intelligent Systems (ELLIS)

Since 2019 Member of the IFIP Working Group 2.4 (Software Implementation Technology)

2019 Best Paper Award at ASPLOS’19 for *Wasabi: A Framework for Dynamically Analyzing WebAssembly*

2016 Distinguished Poster Award at ECOOP’16 for *Language-Independent Fuzz Testing with Probabilistic, Generative Models*

2014 Software Engineering Award of the Ernst-Denert-Foundation for the best dissertation (€5,000)

2009 Enno Heidebroek award (best engineering graduates at TU Dresden)

2009 Second winner in the Student Research Competition at OOPSLA’09 for paper *Dynamically Inferring, Refining, and Checking API Usage Protocols*

2008 Best student paper award at the International Conference on Software and Data Technology for paper *Scala Roles - A Lightweight Approach towards Reusable Collaborations*

### Awards Received by Students Under My Supervision

2023 Daniel Lehmann. Best PhD Thesis in Computer Science at the University of Stuttgart. *Program Analysis of WebAssembly Binaries*

2022 Islem Bouzenia. Winner at ACM Student Research Competition at ASE’22. *Detecting Inconsistencies in If-Condition-Raise Statements*

2022 Luca Di Grazia. Second winner at ACM Student Research Competition at ICSE’22. *Efficiently and Precisely Searching for Code Changes with DiffSearch*

2018 Daniel Lehmann. Best Master Thesis in Computer Science at TU Darmstadt (Datenlotsen-Preis). *Automatic Testing of Interactive JavaScript Debuggers*

### External Funding

**January 2024** ERC Proof of Concept Grant. *BugGPT: Practical, Learning-Based Tools for Finding and Fixing Bugs*. Principal investigator.

**November 2023** Individual research project funded by the German Research Foundation (DFG). *LExecution: Learning to Guide and Analyze Program Executions*. Principal investigator.

**August 2023** Individual research project funded by the German Research Foundation (DFG). *QPTest: Automated Testing of Quantum Computing Platforms*. Principal investigator.

**December 2021** Individual research project funded by the German Research Foundation (DFG). *DeMoCo: Developer-Centered, Neural Models of Code*. Principal investigator.

**September 2019** ERC Starting Grant. *LearnBugs: Learning to Find Software Bugs*. Principal investigator.

**October 2017** Individual research project funded by the German Research Foundation (DFG). *Perf4JS: Automatically Fixing Performance Problems in Real-World JavaScript Applications*. Principal investigator.

**July 2017** Collaborative research project funded by the State of Hesse. *Software-Factory 4.0*. Principal investigator.

**May 2017** Collaborative research project funded by the German Federal Ministry of Education and Research (BMBF) and by the State of Hesse. *Center for Research in Security and Privacy (CRISP)*. Principal investigator.

**October 2015** Collaborative research project funded by the German Federal Ministry of Education and Research (BMBF) and by the State of Hesse. *Center for Research in Security and Privacy (CRISP)*. Principal investigator.
October 2014 Collaborative research project funded by the German Federal Ministry of Education and Research (BMBF). European Center for Security and Privacy by Design (EC-SPRIIDE). Principal investigator.

September 2014 Emmy Noether research group funded by DFG. ConcSys: Reliable and Efficient Complex, Concurrent Software Systems. Principal investigator. €1,300,000

Spring 2008 Scholarship of the German Academic Exchange Service DAAD. €4,250

2004 – 2006 Scholarship of the French-German University UFA/DFH. €6,000

Talks

Note: The following does not include regular paper presentations at conferences and workshops

2024 University of California, Berkeley. Host: Koushik Sen
NLBSE at ICSE’24. Keynote
University of California, Davis. Host: Prem Devanbu
Google, Sunnyvale. Host: Satish Chandra
TU Darmstadt. Host: Mira Mezini
TU Munich. Host: Thomas H. Kolbe
Amazon Web Services, Santa Clara. Host: Rajdeep Mukherjee
University of California, Los Angeles. Host: Miryung Kim
University of Southern California. Host: Nenad Medvidovic
University of California, Riverside. Host: Manu Sridharan
Huawei Future Trustworthiness Technology Summit

Dagstuhl seminar on Automated Programming and Program Repair

2023 Microsoft Research, Redmond. Hosts: Sumit Gulwani and Gustavo Soares
LLMs for Code Seminar. Host: Nadav Timor
IBM Research. Host: Saurabh Sinha
AI4Code Meetup London. Host: Konstantina Dritsa
SDD Workshop at FSE’23. Invited talk
MET Workshop at ICSE’23. Keynote
inteNSE Workshop at ICSE’23. Keynote
April meeting of the IFIP Working Group 2.4 (Software Implementation Technology) Uber. Host: Raj Barik

Dagstuhl seminar on Programming Language Processing

2022 International Symposium on Software Testing and Analyses (ISSTA). Keynote
Microsoft Research. Host: Roshanak Zilouchian Moghaddam
PL South-West Workshop, Tübingen
National University of Singapore. Host: Umang Mathur
June meeting of the IFIP Working Group 2.4 (Software Implementation Technology)
ASA Workshop at PLDI’22. Invited talk
New Faculty Symposium at ICSE’22. Invited talk
ETH Zurich. Host: Zhendong Su
University of Lugano (USI). Host: Mauro Pezze
ML4Code@Montreal. Host: Jin Guo

2021 Massachusetts Institute of Technology (MIT). Host: Niko Vasilakis
Northeastern University. Host: Frank Tip
Columbia University. Host: Baishakhi Ray
Stevens Institute of Technology. Host: Michael Greenberg
May meeting of the IFIP Working Group 2.4 (Software Implementation Technology)
New Faculty Symposium at ISSRE’22. Invited talk

November meeting of the IFIP Working Group 2.4 (Software Implementation Technology) Workshop on Product Security at Bosch. Host: Christopher Huth
2020  Belgium-Netherlands Software Evolution Workshop (BENEVOL). Keynote
October meeting of the IFIP Working Group 2.4 (Software Implementation Technology)
January meeting of the IFIP Working Group 2.4 (Software Implementation Technology)

2019  Shonan seminar on *Fuzzing and Symbolic Execution*
University of California, Berkeley. Host: Koushik Sen
Workshop at PLDI’19 program committee meeting

2018  Dagstuhl seminar on *Genetic Improvement of Software*
Dagstuhl event on *Research Methods in Software Engineering*
Paderborn University. Host: Eric Bodden
Saarland University. Host: Holger Hermanns
ML4P Workshop at CAV. Invited talk
SOAP Workshop at ECOOP and ISSTA. Invited talk
Meeting of the IFIP Working Group 2.4 (Software Implementation Technology)
University of Maryland. Host: Michael Hicks
Facebook Big Code Summit. Host: Satish Chandra

2017  Dagstuhl seminar on *Testing and Verification of Compilers*
Imperial College London. Hosts: Ben Livshits and Alastair Donaldson
CREST workshop on *Bimodal Program Analysis* at University College London
University of Edinburgh. Host: Paul Jackson
CISPA, Saarbrücken. Host: Michael Backes
Meeting of the IFIP Working Group 2.4 (Software Implementation Technology)
University of Lugano (USI). Host: Mauro Pezze
Karlsruhe Institute of Technology. Host: Ralf Reussner
Stanford University. Host: Alex Aiken
Google, Mountain View. Host: Omer Tripp
Dagstuhl seminar on *Automated Program Repair*
University of Passau. Host: Christian Lengauer
SE 2017

2016  Meeting of the IFIP Working Group 2.4 (Software Implementation Technology)
IMDEA Software Institute, Madrid. Host: Alessandra Gorla
Massachusetts Institute of Technology (MIT). Host: Martin Rinard
Harvard University. Host: Stephen Chong
Workshop at the ECOOP program committee meeting.
University of Stuttgart. Host: Daniel Weiskopf
TU Dresden. Host: Ivo F. Sbalzarini

2015  ETH Zurich. Host: Thomas R. Gross
Purdue University. Host: Mathias Payer
Aarhus University. Host: Anders Møller
Workshop on Programming Language Evolution. Invited speaker
Advisory Council of University Professors for the German Informatics Society (GIBU), Invited speaker
SE 2015. Two talks
Max Planck Institute for Software Systems, Host: Viktor Vafeiadis

2014  Workshop on Software Engineering for Parallel Systems. Invited speaker
Mozilla Research, San Francisco. Host: Michael Bebenita
University of California, Davis. Host: Zhendong Su
Google, Mountain View. Host: Ciera Jaspan
Samsung Research, San Jose. Host: Satish Chandra
TU Darmstadt. Hosts: Mira Mezini and Eric Bodden
SE 2014, Kiel. Award talk on the occasion of receiving the Software Engineering award of the Ernst-Denert-Foundation for the best dissertation
Meeting of the IFIP Working Group 2.4 (Software Implementation Technology)

2013 University of Lugano (USI). Host: Matthias Hauswirth
TU München. Host: Alexander Pretschner
TU Kaiserslautern. Host: Arnd Poetzsch-Heffter
TU Berlin. Host: Jean-Pierre Seifert
TU Dresden. Host: Uwe Asmann
Saarland University. Host: Andreas Zeller
University of Bern. Host: Oscar Nierstrasz
University of Zurich. Host: Harald Gall
Karlsruhe Institute of Technology. Host: Walter Tichy
TU Darmstadt. Hosts: Mira Mezini and Eric Bodden

2012 Coverity, San Francisco. Host: Murali Krishna Ramanathan
University of California, Berkeley. Host: Koushik Sen
University of Washington. Host: Michael Ernst
Google, Zurich. Host: Andreas Leitner

2011 Google, Zurich. Hosts: Jürgen Allgayer and Andreas Leitner
University of Waterloo. Hosts: Ondrej Lhotak and Patrick Lam
Carnegie Mellon University. Host: Jonathan Aldrich

2010 Dagstuhl seminar on Relationships, Objects, Roles, and Queries in Modern Programming Languages
Saarland University. Hosts: Sebastian Hack and Andreas Zeller

2009 Victoria University of Wellington. Host: David J. Pearce

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**Teaching Experience**

**Lecturer**

**Winter 2024/25**
*Program Analysis*
Lecture and project at University of Stuttgart. About 60 students.

*Programming Paradigms*
Lecture and exercise at University of Stuttgart. About 150 students.

**Winter 2023/24**
*Program Analysis*
Lecture and project at University of Stuttgart. About 60 students.

*Machine Learning for Programming*
Seminar at University of Stuttgart. About 10 students.

**Summer 2023**
*Analyzing Software using Deep Learning*
Lecture and project at University of Stuttgart. About 40 students.

*Programming Paradigms*
Lecture and exercise at University of Stuttgart. About 170 students.

**Winter 2022/23**
*Machine Learning for Programming*
Seminar at University of Stuttgart. About 10 students.

**Summer 2022**
*Analyzing Software using Deep Learning*
Lecture and project at University of Stuttgart. About 40 students.

*Programming Paradigms*
Lecture and exercise at University of Stuttgart. About 200 students.

**Winter 2021/22**
*Program Analysis*
Lecture and project at University of Stuttgart. About 30 students.

*Machine Learning for Programming*
Seminar at University of Stuttgart. About 10 students.

**Summer 2021**
*Analyzing Software using Deep Learning*
Lecture and project at University of Stuttgart. About 50 students.
Programming Paradigms
Lecture and exercise at University of Stuttgart. About 260 students.

Winter 2020/21 Program Analysis
Lecture and project at University of Stuttgart. About 30 students.

Machine Learning for Programming
Seminar at University of Stuttgart. About 10 students.

Summer 2020 Analyzing Software using Deep Learning
Lecture and project at University of Stuttgart. About 60 students.

Programming Paradigms
Lecture and exercise at University of Stuttgart. About 240 students.

Winter 2019/20 Program Analysis
Lecture and project at University of Stuttgart. 20-30 students.

Programming Paradigms
Lecture and exercise at University of Stuttgart. About 200 students. Newly designed course.

Practical Program Analysis
Practical course at University of Stuttgart. About 10 students. Newly designed course.

Machine Learning for Programming
Seminar at University of Stuttgart. 10-15 students.

Winter 2018/19 Machine Learning for Programming
Seminar at TU Darmstadt. About 15 students.

Summer 2018 Analyzing Software using Deep Learning
Integrated course at TU Darmstadt. About 180 students.

Winter Program Testing and Analysis
Integrated course at TU Darmstadt. About 100 students.

Summer 2017 Analyzing Software using Deep Learning
Integrated course at TU Darmstadt. About 300 students. Newly designed course. In addition to a final exam, students work on a larger coding project.

Winter Program Testing and Analysis
Integrated course at TU Darmstadt. About 80 students.

Winter Program Testing and Analysis
Integrated course at TU Darmstadt. About 60 students. Newly designed course (13 lectures of 90 minutes). In addition to a final exam, students work on a larger coding project and write a term paper.

Winter Program Analysis
Seminar at TU Darmstadt. 10-20 students. Newly designed course.

Spring 2013 Software Architecture and Engineering
Core undergraduate course at ETH Zurich. About 100 students. Co-taught with Martin Vechev. Re-designed and extended existing course. Full responsibility for 13 lectures of 90 minutes, exercise sessions, a larger coding project, and for managing a group of teaching assistants.

Fall 2012 Compiler Design
Replacement lecturer for one lecture of 90 minutes, at ETH Zurich.

Teaching Assistant
Teaching assistantships involve preparing and presenting exercises, preparing and grading exams, organizing office hours, and organizing larger coding projects.

Fall 2012 Compiler Design
Fall 2011 Compiler Design
Fall 2009 System Programming and Computer Architecture
Fall 2008 Computer Architecture
Fall 2008 System Programming
Mentor

Spring 2011 Software Engineering seminar
Fall 2008 Software Engineering seminar

Advising and Mentoring
| PhD students | Beatriz Souza. Since April 2023 |
|-------------|--------------------------------|
|             | Huimin Hu. Since October 2022  |
|             | Islem Bouzenia. Since September 2021 |
|             | Matteo Paltenghi. Since December 2020 |
|             | Aryaz Eghbali. Since October 2020 |
|             | Luca Di Grazia. Since September 2019 – February 2024 |
|             | Daniel Lehmann. Since December 2017 – August 2022 |
|             | Andrew Habib. October 2015 – February 2021 |
|             | Jibesh Patra. Since March 2015 – April 2021 |
|             | Cristian-Alexandru Staicu. October 2014 – May 2020 |
|             | Marija Selakovic. Since October 2014 – June 2019 |

| Master theses | Lars Gröninger. *Reasoning about Code Changes via Pairwise Learning-Guided Execution*. 2024 |
|--------------|---------------------------------------------------------------------------------------------------|
|              | Jakob Getz. *Wasm-R3: Creating Executable Benchmarks of WebAssembly Binaries via Record-Reduce-Replay* . 2024. See paper at OOPSLA’24 |
|              | Jan Geistler. *Automatically Detecting Malicious GitHub Actions*. 2023 |
|              | Piyush Krishan Bajaj. *DyPyBench: A Benchmark of Executable Python Software*. 2023. See paper at FSE’24 |
|              | Valentin Knappich. *Tests4J Benchmark: Execution-based Evaluation of Context-Aware Language Models for Test Case Generation*. 2023 |
|              | Felix Burk. *A Dynamic Analysis-Based Linter for Python*. 2023 |
|              | Yiw Wai Chow. *Bimodal Taint Analysis for Detecting Unusual Parameter-Sink Flows*. Co-advised with Max Schäfer. 2022. See paper at ISSTA’23 |
|              | Maximilian Reichel. *Metamorphic Testing of Version Control Systems*. Co-advised with Maria Christakis. 2022 |
|              | Dominik Huber. *Neural Models for Automatic Program Repair vs. Human Developers*. 2022 |
|              | Koushik Ragavendran. *NullnessGraphSeq: Learning-based Java Nullness Inference*. 2022 |
|              | Ya-Jen Hsu. *Learning to Identify Equivalent Code*. Co-advised with Andreas Bulling. 2021 |
|              | Sebastian Harner. *Automated Test Generation for Asynchronous, Higher-Order JavaScript Functions*. Co-advised with Frank Tip. 2020. See paper at ICSE’22 |
|              | Fahad Ghouri. *Learning to Profile: Finding Optimization Opportunities through Machine Learning*. 2020 |
|              | Yaza Wainakh. *A Benchmark for Evaluating and Improving Word Embeddings for Identifier Names*. 2019. See paper at USENIX Security’19 |
|              | Markus Zimmermann. *An Empirical Study of the npm Ecosystem*. 2018. See paper at ICSE’21 |
|              | Sandro Tolksdorf. *Metamorphic Testing of Interactive JavaScript Debuggers*. 2018. See paper at ISSTA’19 |
|              | Giacomo Iadarola. *Graph-based Classification for Detecting Instances of Bug Patterns*. 2018 |
|              | Rabee Sohail Malik. *DeepTypes: a Probabilistic Approach to Inferring JavaScript Function Type Signatures*. 2018. See paper at ICSE’19 |
|              | Prabhjot Singh. *Deep Assist: Contextual Code Assistance using Deep Learning*. 2018 |
|              | Talal Ahmed. *VFix: Fixing Semantic Errors by Deep Learning*. 2018 |
|              | Philippe Skolka. *An Empirical Study of Obfuscation and Minification of Client-Side Web Code*. 2018. See paper at WWW’19 |
|              | Saeed Ehteshamifar. *Chameleon: A Benchmark for Analyzers of Malicious PDF Documents and Anti-Evasion Techniques*. 2017 |
|              | Daniel Lehmann. *Automatic Testing of Interactive JavaScript Debuggers*. 2017. See paper at FSE’18 |
|              | Sebastian Ruhleder. *Automatic Generation of Performance Benchmarks for JavaScript Libraries*. 2017 |
Dileep R. K. Murthy. *Change-aware Dynamic Program Analysis*. 2016. See paper at ICSME’18

Pooja Dixit. *Detecting Unexpected Interferences between Scripts in JavaScript Applications*. 2016. See paper at ICSE’18

Markus Ermuth. *Effective UI-Level Test Generation for Web Applications through Inferred Macro Events*. 2015. See paper at ISSTA’16

Ankit Choudhary. *Coverage-driven Generation of Concurrent Tests*. 2015. See paper at ICSE’17

Michael Fäs. *Automatic and Precise Detection of Deadlocks in Libraries*. 2013

Markus Huggler. *Performance Regression Testing for Thread-safe Classes*. 2013. See paper at ISSTA’14

Jérémie Bresson. *Finding API Usage Bugs with Runtime Monitoring*. 2010

Philipp Bichsel. *Inference of API Usage Documentation*. 2010. See paper at ICSM’10

Sebastian Grüssl. *Finding Implicit Programming Rules and their Violations in Java Programs*. 2009

**Bachelor theses**

Fabian Hick. *androGNN: Graph-based Malware Detection for Android Applications*. 2023

Patrick Bareiß. *Extracting Metamorphic Test Oracles from Natural Language Documentation*. 2021

Paul Bredl. *Improving the Recall of Searching for Code Changes*. 2021. See paper in IEEE TSE, 2022

Lars Gröninger. *Building an Extensible Dataset of Code Reviews*. 2020

Aaron Hilbig. *A Benchmark of WebAssembly Programs*. 2020. See paper at WWW’21

Patrick Mell. *Detecting Parallelization Opportunities in JavaScript Programs*. 2016

Thomas Glaser. *A Dynamic Analysis to Help Refactoring Complex Conditions for Improved Performance*. 2015. See paper at ISSTA’17

Pascal Zimmermann. *Name-based Type Inference*. 2012

Christine Zeller. *Software Anomaly Detection in a Real-world Setting*. Collaboration with Google, Zurich. 2012

Severin Heiniger. *API Usage Anomaly Detection Based on Points-to Analysis*. 2011. See paper at ISSTA’12

Claudio Corrodi. *Detecting Library Usage Anomalies*. 2011

Yiu Wai Chow. 2021–2022. See paper at ICSE’24

Satia Herfert. 2016–2017. See paper at ASE’17

Abhijit Singh. 2015–2016.

Hosam Nima. 2015.

Parker Schuh. 2013–2014. See papers at OOPSLA’14 and ICSE’15

**Reviewing and Service**

Steering Committee

International Symposium on Software Testing and Analysis (ISSTA), 2022–now

Organizer/Chair

Program Committee Chair of International Symposium on Software Testing and Analysis (ISSTA), 2024

Dagstuhl seminar on Code Search, 2024

Dagstuhl seminar on Programming Language Processing, 2023

Chair of Doctoral Symposium at Symposium on the Foundations of Software Engineering (ESEC/FSE), 2022

Chair of Tool Demonstrations at International Symposium on Software Testing and Analysis (ISSTA), 2021

Chair of Artifact Evaluation at International Symposium on Software Testing and Analysis (ISSTA), 2019
Chair of Artifact Evaluation at European Conference on Object-Oriented Programming (ECOOP), 2017

Dagstuhl seminar on Automated Program Repair, 2017

Workshop on Dynamic Analysis (WODA), 2016

Workshop on Tools for JavaScript Analysis (JSTools) at ECOOP, 2016

Workshop on Tools for JavaScript Analysis (JSTools) at ECOOP, 2015

Area chair

International Conference on Software Engineering (ICSE), 2026

Conference on Automated Software Engineering (ASE), 2024

Editor

IEEE Transactions on Software Engineering, 2020–now, Associate editor

IEEE Software, 2020, Guest editor of special issue on “Automatic program repair”

Program committees

International Conference on Software Engineering (ICSE), 2025

LLM4Code workshop at ICSE, 2025

Foundations of Software Engineering (FSE), 2025

Software Engineering (SE), 2025

LLM4Code workshop at ICSE, 2024

International Conference on Software Engineering (ICSE), 2023

Symposium on the Foundations of Software Engineering (ESEC/FSE), 2023

Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOP-SLA), 2023

International Symposium on Software Testing and Analysis (ISSTA), 2023

Conference on Automated Software Engineering (ASE), 2023

Software Engineering (SE), 2023

International Conference on Software Engineering (ICSE), 2022

Symposium on the Foundations of Software Engineering (ESEC/FSE), 2022

International Symposium on Software Testing and Analysis (ISSTA), 2022

Conference on Automated Software Engineering (ASE), 2022

Workshop on Automated Program Repair at ICSE, 2022

Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOP-SLA), Extended review committee, 2021

Conference on Automated Software Engineering (ASE), 2021

Conference on Programming Language Design and Implementation (PLDI), 2021

International Conference on Software Engineering (ICSE), 2021

Symposium on the Foundations of Software Engineering (ESEC/FSE), 2021

International Symposium on Software Testing and Analysis (ISSTA), 2021

European Conference on Object-Oriented Programming (ECOOP), 2021

Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOP-SLA), External review committee, 2020

Conference on Automated Software Engineering (ASE), 2020

IEEE Transactions on Software Engineering, Review board, 2019–2020

TheWebConf (WWW), Security track, 2020

Doctoral Symposium at SPLASH, 2019

Journal First Presentations at Conference on Automated Software Engineering (ASE), 2019

Conference on Programming Language Design and Implementation (PLDI), 2019

International Conference on Software Engineering (ICSE), Program board, 2019

Conference on Automated Software Engineering (ASE), 2018

European Conference on Object-Oriented Programming (ECOOP), 2018

International Symposium on Engineering Secure Software and Systems (ESSoS), 2018

Workshop on API Usage and Evolution (WAPI) at ICSE, 2018

Workshop on Programming Technology for the Future Web (ProWeb), 2018

Software Engineering (SE), 2018
IEEE Transactions on Software Engineering, Review board, 2017–2018
Conference on Programming Language Design and Implementation (PLDI), 2017
International Conference on Software Engineering (ICSE), 2017
International Symposium on Software Testing and Analysis (ISSTA), 2017
Workshops at SPLASH, Program Committee, 2017
ACM Student Research Competition at ESEC/FSE, 2017
ProWeb workshop on programming methodology for the future web, Program Committee, 2017
Conference on Programming Language Design and Implementation (PLDI), External review committee, 2016
European Conference on Object-Oriented Programming (ECOOP), 2016
International Symposium on Software Testing and Analysis (ISSTA), 2016
International Symposium on the Foundations of Software Engineering (FSE), Demonstrations Track, 2016
Student Contest on Software Engineering (SCORE) at ICSE, 2016
Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA), 2015
ACM SIGPLAN Student Research Competition at SPLASH, 2015
Conference on Automated Software Engineering (ASE), Tool Demonstration Track, 2015
Workshop on Software Engineering for Parallel Systems at OOPSLA, 2015
Software Engineering (SE), 2015
Workshop on Software Engineering for Parallel Systems at OOPSLA, 2014
ACM Student Research Competition at International Conference on Software Engineering (ICSE), 2014
International Conference on Software Engineering (ICSE), poster track, 2014

Journal reviewer
IEEE Transactions on Software Engineering, 2014–2022
Journal of Systems and Software, 2019
Journal on Empirical Software Engineering, 2016
ACM Transactions on Software Engineering and Methodology (TOSEM), 2015–2023
IEEE Transactions on Parallel and Distributed Systems, 2014
Science of Computer Programming, 2013, 2014
Information and Software Technology, 2013
IEEE Transactions on Information Forensics and Security, 2012
Journal of Computer Science and Technology (JCST), 2011

External reviewer
International Symposium on Software Testing and Analysis (ISSTA), 2019
Symposium on the Foundations of Software Engineering (FSE), 2016
Symposium on Principles of Programming Languages (POPL), 2016
European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE), 2015
Conference on Computer Aided Verification (CAV), 2014
Conference on Programming Language Design and Implementation (PLDI), 2014
Principles and Practice of Parallel Programming (PPoPP), 2014
European Conference on Object-Oriented Programming (ECOOP), 2013
USENIX Workshop on Hot Topics in Parallelism (HotPar), 2012
Conference on Programming Language Design and Implementation (PLDI), 2011
Workshop on Relationships and Associations in Object-Oriented Languages (RAOOL) at ECOOP 2009

Other committees
IEEE Technical Council on Software Engineering Rising Star Award, 2023
ACM SIGSOFT Research Highlights Committee (2020-2022)

Grant
German Research Foundation (DFG)
reviewing European Research Council (ERC)
Fonds National de la Recherche Luxembourg (FNR)
Austrian Science Fund (FWF)
Research Grants Council, Hong Kong (RGC)
Alexander von Humboldt Foundation
Dutch Research Council (NWO)
National Research Foundation, Singapore (NRF)

PhD thesis committee
Hossein Hajipour (Saarland University, advisor: Mario Fritz), 2024–ongoing
Daniel Fortunato (University of Porto, advisor: Jose Campos), 2024–ongoing
Ellen Arteca (Northeastern University, advisor: Frank Tip), 2022–2023
Muhammad Numair Mansur (TU Kaiserslautern, advisor: Maria Christakis), 2023
Mohammad Bajammal (University of British Columbia, advisor: Ali Mesbah), 2022
Arianna Blasi (USI Lugano, advisor: Mauro Pezzè), 2020–2022
Sven Keidel (Johannes Gutenberg-University Mainz, advisor: Sebastian Erdweg), 2021
Anil Koyuncu (University of Luxembourg, advisor: Yves Le Traon), 2020
Profir-Petru Partachi (University College London, advisor: Earl Barr), 2020
Rafael-Michael Karampatsis (University of Edinburgh, advisor: Charles Sutton), 2020
Luca Della Toffola (ETH Zurich, advisor: Thomas R. Gross), 2018
Francesco Bianchi (USI Lugano, advisor: Mauro Pezzè), 2018
Matthias Keil (University of Freiburg, advisor: Peter Thiemann), 2018

I also served on 15+ Ph.D. examination committees at TU Darmstadt and University of Stuttgart

Last update: November 11, 2024