# Gregory Gay

Chalmers and the University of Gothenburg
Department of Computer Science & Engineering
Jupiter Building 481
Hörselgången 5
417 56 Göteborg, Sweden

E-Mail: greg@greggay.com
Phone: +46 0736964446

## Research Interests:

Software engineering, automated software testing and analysis, AI4SE, SE4AI/AI Engineering, search-based software engineering, automated test generation, requirements engineering, data analytics, optimization, information retrieval.

## Teaching Interests:

Software engineering, software testing, software verification & validation, software architecture, software design principles, artificial intelligence, optimization.

## Education:

- Docent, University of Gothenburg, Gothenburg, Sweden, 2021.
- Ph.D. Computer Science, University of Minnesota, Minneapolis, Minnesota, 2015.
  Advisor: Mats Heimdahl.
  Thesis title: *Steering Model-Based Oracles to Admit Real Program Behaviors.*
- M.Sc. Computer Science, West Virginia University, Morgantown, West Virginia, 2010.
  Advisor: Tim Menzies.
  Thesis title: *Robust Optimization of Non-Linear Requirements Models.*
- B.Sc. Computer Science, West Virginia University, Morgantown, West Virginia, 2008.

## Professional Experience:

**2023–Present** Program Manager for Software Engineering and Technology M.Sc., Chalmers University of Technology, Gothenburg, Sweden.

**2023–Present** Program Manager for Software Engineering and Management M.Sc., University of Gothenburg, Gothenburg, Sweden.

**2021–Present** Associate Professor, Chalmers and the University of Gothenburg, Gothenburg, Sweden.
Interaction Design and Software Engineering Division,
Department of Computer Science & Engineering

**2022** Program Manager (Temporary) for Software Engineering and Management B.Sc., University of Gothenburg, Gothenburg, Sweden.

**2019–2021** Assistant Professor, Chalmers and the University of Gothenburg, Gothenburg, Sweden.
Interaction Design and Software Engineering Division,
Department of Computer Science & Engineering

**2015–2019** Assistant Professor, University of South Carolina, Columbia, SC.
Department of Computer Science & Engineering

**2010–2015** Research Assistant, University of Minnesota, Minneapolis, MN.
Critical Systems Group (under Mats Heimdahl)

**2010** Visiting Researcher, Chinese Academy of Sciences, Beijing, PRC.
Lab for Internet Software Technologies, Institute of Software

**2009** Intern, National Aeronautics and Space Administration (NASA), Mountain View, CA.
Robust Software Engineering Group, Ames Research Center

**2007–2010** Research Assistant, West Virginia University, Morgantown, WV.
Modeling Intelligence Lab (under Tim Menzies)

**2006–2007** Research Assistant, West Virginia University, Morgantown, WV.
Virtual Environments Lab (under Francis Van Scoy)

**2005** SEAP Intern, National Aeronautics and Space Administration (NASA), Fairmont, WV.
Independent Verification & Validation Center

## Teaching Experience:

**2020–2024** Course Responsible, Software Quality and Testing (Bachelor, Chalmers and University of Gothenburg).
Course Materials (Newest): `https://greg4cr.github.io/courses/spring23dit635/index.html`

**2023–2024** Course Responsible, Industrial Practice Project in Software Engineering (Master, Chalmers and University of Gothenburg).

**2024** Course Responsible, Research Project in Software Engineering (Master, Chalmers and University of Gothenburg).

**2020-2022** Course Responsible, Software Engineering Principles for Complex Systems (Bachelor/Master, Chalmers and University of Gothenburg).
Course Materials (Newest): `https://greg4cr.github.io/courses/fall22tda594/index.html`

**2019** Co-Teacher, Miniproject: Team Programming (Bachelor, University of Gothenburg).
Course Materials: `https://greg4cr.github.io/courses/misc/index.html`

**2019** Co-Teacher, Mobile and Web Development (Bachelor, University of Gothenburg).
Course Materials: `https://greg4cr.github.io/courses/misc/index.html`

**2019** Course Responsible, Software Engineering (Bachelor, University of South Carolina).
Course Materials: `https://greg4cr.github.io/courses/spring19csce247/index.html`

**2018** Course Responsible, Software Architecture (Masters, University of South Carolina).
Course Materials: `https://greg4cr.github.io/courses/fall18csce742/index.html`

**2016–2018** Course Responsible, Software Testing and Quality Assurance (Masters, University of South Carolina).
Course Materials (Newest): `https://greg4cr.github.io/courses/spring18csce747/index.html`

**2016–2017** Course Responsible, Seminar on Advances in Computing (Masters, University of South Carolina).
Course Materials (Newest): `https://greg4cr.github.io/courses/fall17csce791/index.html`

**2015–2017** Course Responsible, Software Engineering (Masters, University of South Carolina).
Course Materials (Newest): `https://greg4cr.github.io/courses/fall17csce740/index.html`

**2015** Course Responsible, Software Engineering 1 (Bachelor/Master, University of Minnesota).

**2012–2014** Teaching Assistant, Software Engineering 1 (Bachelor/Master, University of Minnesota).

**2013** Teaching Assistant, Software Engineering 2 (Bachelor/Master, University of Minnesota).

**2012** Participant, University of Minnesota Preparing Future Faculty Program.

## Student Supervision:

### Ph.D. Supervisor

**2020–Ongoing** Afonso Fontes, University of Gothenburg (estimated graduation: 2025).

**2016–2022** Alireza Salahirad, University of South Carolina.

**2016–2020** Hussein Almulla, University of South Carolina.

**2018–2019** Ying Meng, University of South Carolina (transferred to new supervisor).

**2018–2019** Peter Mourfield, University of South Carolina (transferred to new supervisor).

**2018–2019** Alaleh Torkjazi, University of South Carolina (transferred to new supervisor).

### Ph.D. Co-Supervision

**2020–Ongoing** Khan Mohammad Habibullah, co-supervised with Jennifer Horkoff, University of Gothenburg (estimated graduation: 2025).

### M.Sc. Supervisor

**2024** Linnea Wahlgren and Ludvig Lemner, Chalmers University of Technology.

**2023** Viktor Tu and Albin Lönnfalt, Chalmers University of Technology.

**2022–2023** Haozhao Lyu, Chalmers University of Technology.

**2022** Rohini Bisht and Selomie Kindu Ejigu, Chalmers University of Technology and University of Gothenburg.

**2022** Teklit Berihu Gereziher and Selam Gebrekrstos, Chalmers University of Technology.

**2020** Ashish Husain and Martin Tran, Chalmers University of Technology.

**2020** Rasmus Jenth, Chalmers University of Technology.

**2018–2019** Burl Kenner III, University of South Carolina.

**2017–2018** Srujana Bollina, University of South Carolina.

**2016–2017** Ying Meng, University of South Carolina.

### M.Sc. Co-Supervision

**2024** Avito Alexandre Costa da Silva, co-supervised with José Campos, University of Porto.

**2024** Stefan Alexander van Heijningen and Theo Wiik, co-supervised with Francisco Gomes de Oliveira Neto, Chalmers University of Technology.

**2024** Henrik Johansson and Erik Blomberg, co-supervised with Afonso Fontes, Chalmers University of Technology.

**2022** Jonathan Örgård, co-supervised with Francisco Gomes de Oliveira Neto, University of Gothenburg.

**2022** Lukas Berglund and Tim Grube, co-supervised with Francisco Gomes de Oliveira Neto, Chalmers University of Technology and University of Gothenburg.

**2017–2018** George Akhvlediani, co-supervised with Duncan Buell, University of South Carolina.

### B.Sc. Supervisor

**2024** Arash Amiry, Nils Bengtsson Svanstedt, Anton Börås, Julia Giaro, and Elin Ruud, Chalmers University of Technology

**2023** Gregory Sastrawidjaya and Edvin Danielsson, University of Gothenburg.

**2023** Zubeen Maruf, University of Gothenburg.

**2022** Shonaigh Douglas, University of Gothenburg.

**2022** Dia Istanbuly and Max Zimmer, University of Gothenburg.

**2020** Fabian Daneshmand-Mehr and Daniel Salomons, University of Gothenburg.

**2020** Sarkis George Sarkisian, University of Gothenburg.

### B.Sc. Co-Supervision

**2023** Karl Stahre and Malte Götharsson, co-supervised with Francisco Gomes de Oliveira Neto, University of Gothenburg.

### Independent Study, Research Project, or Research Internship Supervisor[1]

**2024** Nicole Andrea Quinstedt, University of Gothenburg (Research Assistant).

**2024** Juan Garcia Diaz, University of Gothenburg (Research Assistant, Co-supervised with Jennifer Horkoff).

**2023** Albin Landgren, Chalmers University of Technology (Industrial Practice Project).

**2018** Hayley Lichtenfels, University of South Carolina (Independent Study).

**2016** Allen Kanapala, University of South Carolina (Independent Study).

**2016** Narasimha Chilukuri, University of South Carolina (Independent Study).

**2016** Craig Sharp, University of South Carolina (Independent Study).

### Ph.D. Examination/Opponent

**Expected in 2025** Stephan Lukasczyk, External Ph.D. Examiner, University of Passau.

**Expected in 2025** Alaleh Torkjazi, Ph.D. Examination Committee, University of South Carolina.

**2024** Stefan Karlsson, Ph.D. Examination Committee, Mälardalen University.

**2024** Mitchell Olsthoorn, Ph.D. Opponent and Examination Committee, TU Delft.

**2023** Milos Ojdanic, Ph.D. Examination Committee, University of Luxembourg.

**2022** William Hoskins, Ph.D. Examination Committee, University of South Carolina.

**2022** Anjana Perera, External Ph.D. Examiner, Monash University.

**2021** Khouloud Gaaloul, Ph.D. Examination Committee, University of Luxembourg.

### Licentiate Examination/Opponent

**2023** Andreas Bauer, Licentiate Opponent, Blekinge Institute of Technology.

**2022** Qunying Song, Licentiate Opponent, Lund University.

**2020** Mahshid Helali, Licentiate Opponent, Mälardalen University.

### M.Sc. Examination

**2020–Present** Examined 22 theses, Chalmers and University of Gothenburg.

### B.Sc. Examination

**2020–Present** Examined 7 theses, University of Gothenburg.

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[1]An "Independent Study" or an "Industrial Practice/Research Project" is similar to a Bachelor's Thesis in scope.

## Funding:

**2020–Present** Software Center, Aspects of Automated Testing (15–20% of research hours funded on an ongoing basis).

**2020–2025** Vetenskapsrådet (Swedish Research Council) Award 2019-05275, Context-Infused Automated Software Test Generation (Sole PI, 3,900,000 SEK).

**2019–2020** South Carolina NASA EPSCoR, Robust Software Testing of Autonomous Aerospace Robotic Systems Using Transfer Learning (Co-PI, $25,000.00).

**2018–2019** University of South Carolina ASPIRE-1, Investigating the Relationship between Real and Synthetic Software Faults (Sole PI, $14,959.00).

**2017–2019** National Science Foundation Award CCF-1657299, CRII: SHF: Understanding The Role of Software Test Adequacy Criteria in Search-Based Test Generation (Sole PI, $173,528.00).

## Awards:

**2024** Distinguished Reviewer, ACM Transactions on Software Engineering and Methodology.

**2023** Best Paper Award, $35^{th}$ International Conference on Testing Software and Systems (ICTSS'23), *Understanding Problem Solving in Software Testing: An Exploration of Tester Routines and Behavior.*

**2023** Distinguished Reviewer, $27^{th}$ International Conference on Evaluation and Assessment in Software Engineering (EASE'23).

**2023** Distinguished Paper Award, $16^{th}$ International Conference on Software Testing, Verification, and Validation (ICST'23), *How Closely are Common Mutation Operators Coupled to Real Faults?.*

**2020** Distinguished Reviewer, $35^{th}$ International Conference on Automated Software Engineering (ASE'20).

**2019** 2009-2019 Most Influential Paper Award, $35^{th}$ International Conference on Software Maintenance and Evolution (ICSME'19), *On the Use of Relevance Feedback in IR-based Concept Location.*

**2019** Best Reviewer, Journal of Systems and Software.

**2018** Graduate Teaching Award, University of South Carolina (Department of Computer Science & Engineering).

**2018** Challenge Award Winner, $10^{th}$ Symposium on Search-Based Software Engineering (SSBSE'18), *Detecting Real Faults in the Gson Library Through Search-Based Unit Test Generation.*

**2018** Best Presentation, $11^{th}$ International Workshop on Search-Based Software Testing (SBST'18), *Multifaceted Test Suite Generation Using Primary and Supporting Fitness Functions.*

**2016** Challenge Award Winner, $8^{th}$ Symposium on Search-Based Software Engineering (SSBSE'16), *Challenges in Using Search-Based Test Generation to Identify Real Faults in Mockito.*

**2014** Best Presentation, $7^{th}$ International Workshop on Search-Based Software Testing (SBST'14), *Moving the Goalposts: Coverage Satisfaction is Not Enough.*

**2010–2013** National Science Foundation Graduate Research Fellowship.

## Conference Steering Committees and Chairmanships:

**2023–Present** Steering Committee, International Conference on Software Testing, Verification, and Validation (ICST)

**2024** Program Co-Chair, $17^{th}$ International Conference on Software Testing, Verification, and Validation (ICST'24)

**2023–2024** Co-Chair, International Workshop on Artificial Intelligence in Software Testing (AIST)

**2023** New Ideas and Emerging Results/Replications and Negative Results (NIER/RENE) Track Co-Chair, $15^{th}$ Symposium on Search-Based Software Engineering (SSBSE'23).

**2023** Testing Tools/Tool Demonstrations Co-Chair, $16^{th}$ International Conference on Software Testing, Verification, and Validation (ICST'23)

**2016–2022** Steering Committee, Symposium on Search-Based Software Engineering (SSBSE).

**2022** Publicity and Social Media Co-Chair, $38^{th}$ International Conference on Software Maintenance and Evolution (ICSME'22)

**2021** Artifact Evaluation Co-Chair, $37^{th}$ International Conference on Software Maintenance and Evolution (ICSME'21)

**2021** Challenge Track Co-Chair, $13^{th}$ Symposium on Search-Based Software Engineering (SSBSE'21).

**2020** New Ideas and Emerging Results (NIER) Track Co-Chair, $12^{th}$ Symposium on Search-Based Software Engineering (SSBSE'20).

**2015–2020** Steering Committee, International Workshop on Search-Based Software Testing (SBST).

**2019** Program Co-Chair, $11^{th}$ Symposium on Search-Based Software Engineering (SSBSE'19).

**2019** Co-Chair, $3^{rd}$ ROSE Festival (Recognizing and Rewarding Open Science in Software Engineering, ESEC/FSE Special Track).

**2019** General Chair, $6^{th}$ International Workshop on Requirements Engineering and Testing (RET'19)

**2018** Workshop Co-Chair, $11^{th}$ International Conference on Software Testing, Verification, and Validation (ICST'18).

**2018** Program Co-Chair, $5^{th}$ International Workshop on Requirements Engineering and Testing (RET'18)

**2017–2018** Steering Committee Deputy Chair, International Workshop on Search-Based Software Testing (SBST).

**2017** Publicity Co-Chair, $9^{th}$ Symposium on Search-Based Software Engineering (SSBSE'17).

**2017** Co-Chair, $4^{th}$ International Workshop on Requirements Engineering and Testing (RET'17).

**2016–2017** Steering Committee Chair, International Workshop on Search-Based Software Testing (SBST).

**2016** Co-Chair, $9^{th}$ International Workshop on Search-Based Software Testing (SBST'16).

**2016** Program Co-Chair, $3^{rd}$ International Workshop on Requirements Engineering and Testing (RET'16).

**2015** Co-Chair, $8^{th}$ International Workshop on Search-Based Software Testing (SBST'15).

**2012** North America Publicity Chair, $27^{th}$ IEEE /ACM International Conference on Automated Software Engineering (ASE'12).

**2012** Web Chair, $20^{th}$ IEEE International Conference on Requirements Engineering (RE'12).

**2008–2010** Web Chair, International Conference on Predictive Models in Software Engineering (PROMISE).

## Conference Program Committees and Journal Reviewing:

**2023–Present** Program Committee, International Conference on Evaluation and Assessment in Software Engineering (EASE).

**2020, 2022–Present** Program Committee, Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE) (Tool Demonstrations)

**2020–Present** Program Committee, Symposium on Search-Based Software Engineering (SSBSE) (Replications and Negative Results Track)

**2019, 2022–Present** Program Committee, International Symposium on Software Testing and Analysis (ISSTA) (Tool Demonstrations)

**2018–Present** Program Committee, Genetic and Evolutionary Computation Conference (GECCO)

**2018–Present** Reviewer, Information and Software Technology

**2017–Present** Program Committee, International Conference on Advances in System Testing and Validation Lifecycle (VALID).

**2017–Present** Program Committee, International Workshop on Search-Based Software Testing (SBST).

**2016–Present** Reviewer, Journal of Systems and Software

**2015–Present** Reviewer, Empirical Software Engineering Journal

**2015–Present** Reviewer, ACM Transactions on Software Engineering and Methodology

**2014–Present** Reviewer, IEEE Transactions on Software Engineering

**2016–2018, 2023** Program Committee, Symposium on Search-Based Software Engineering (SSBSE).

**2024** Program Committee, ACM/IEEE International Conference on Automation of Software Test (AST)

**2023** Program Committee, Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE) (Student Research Competition)

**2020–2022** Program Committee, International Conference on Automated Software Engineering (ASE)

**2020, 2022** Program Committee, Symposium on Search-Based Software Engineering (SSBSE) (Challenge Track)

**2019–2022** Program Committee, International Conference on Automated Software Engineering (ASE) (Tool Demonstrations)

**2023** Program Committee, Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE) (Student Research Competition)

**2022** Program Committee, International Conference on Software Engineering (ICSE).

**2022** Program Committee, International Workshop on Artificial Intelligence in Software Testing (AIST).

**2010, 2021** Reviewer, Automated Software Engineering (journal)

**2021** Program Committee, International Conference on the Applications of Evolutionary Computing (EvoApplications)

**2021** Program Committee, International Conference on Software Analysis, Evolution and Reengineering (SANER) (Tool Track)

**2021** Program Committee, International Workshop on Test Oracles (TORACLE)

**2019–2020** Reviewer, IEEE Access

**2017–2020** Reviewer, IET Software

**2014, 2018, 2020** Reviewer, Software Testing, Verification and Reliability

**2020** Program Committee, International Conference on Software Engineering (ICSE) (Poster Track).

**2020** Reviewer, Software and Systems Modeling

**2018–2019** Program Committee, International Conference on Software Testing, Verification, and Validation (ICST)

**2018–2019** Program Committee, International Conference on Software Engineering (ICSE) (Demonstrations Track).

**2017–2019** Program Committee, European Conference on the Applications of Evolutionary Computing (EvoSET Track—Nature-inspired algorithms in Software Engineering and Testing).

**2019** Program Committee, International Workshop on Software Engineering Intelligence (SEI)

**2019** Reviewer, Software Practice and Experience

**2019** Reviewer, Systems Engineering

**2017–2018** Program Committee, International Workshop on Software Analytics (SWAN).

**2012, 2018** Reviewer, Software Quality Journal

**2018** Reviewer, Journal of Software: Evolution and Process

**2018** Reviewer, IEEE Transactions on Reliability

**2018** Reviewer, Applied Soft Computing Journal

**2018** Reviewer, Traffic Injury Prevention

**2016–2017** Reviewer, IEEE Transactions on Evolutionary Computation

**2017** Reviewer, The Computer Journal

**2017** Reviewer, Formal Methods in System Design

**2016** Reviewer, Journal of Classification

**2016** Reviewer, 2017 IFAC World Conference

**2015** Program Committee, International Workshop on Actionable Analytics for SE (ACTION).

**2014** Reviewer, Journal of Aerospace Information Systems

**2013** Reviewer, IEEE Software

**2012** Reviewer, Formal Methods for Industrial Critical System

**2011–2012** Program Committee, International Conference on Predictive Models in Software Engineering (PROMISE).

## Additional Professional Activities:

**2024–Present** Deputy Editor-in-Chief, Automated Software Engineering Journal

**2024–Present** Cluster Co-Chair (Software Engineering and Technology), Wallenberg Autonomous Systems and Software Program (WASP)

**2023–Present** Member, ACM TOSEM Replicated Computational Results Distinguished Reviewers Board

**2019–Present** Member, ACM TOSEM Board of Distinguished Reviewers

**2017–Present** Member, Empirical Software Engineering Journal Review Board

**2024** Award Committee, ACM SIGSOFT

**2023** Reviewer, CHIST-ERA Funding Call Open & Re-usable Research Data & Software

**2023** Panelist, ICST 2023 Doctoral Symposium

**2023** Invited Participant, Dagstuhl Seminar 23103: Testing and Debugging of Data Analysis Workflows

**2020** Panelist, ICSE Student Mentoring Workshop

**2019** Invited Participant, Shonan Seminar 160: Fuzzing and Symbolic Execution: Reflections, Challenges, and Opportunities

**2018** Panelist, NSF Panel P181594 (CRI-SW)

**2013** Student Volunteer, International Conference on Software Engineering

**2012** Student Volunteer, 2012 International Symposium on Software Testing and Analysis

**2008–2009** President, ACM West Virginia University Student Chapter

**2007–2008** Vice-President, ACM West Virginia University Student Chapter

**2007–2010** Member, West Virginia University Engineering Student Advisory Council

## Published Books and Book Chapters:

Names in **bold** are supervised students.

1. **Afonso Fontes**, Gregory Gay, Francisco Gomes de Oliveria Neto, Robert Feldt. Automated Support for Unit Test Generation. Book chapter, *Optimising the Software Development Process with Artificial Intelligence.* Springer, 2023. ISBN: 978-981-19-9948-2. Available at `http://greg4cr.github.io/pdf/21ai4se.pdf`.

2. Shiva Nejati and Gregory Gay, editors. Proceedings of the 11th International Symposium on Search-Based Software Engineering, SSBSE 2019, Talinn, Estonia, August 31-September 1, 2019. Vol. 11664. Lecture Notes in Computer Science. Springer, 2019. ISBN: 978-3-030-27455-9.

## Journal Publications:

3. **Khan Mohammad Habibullah**, Hans-Martin Heyn, Gregory Gay, Jennifer Horkoff, Eric Knauss, Markus Borg, Alessia Knauss, Håkan Sivencrona, Polly Jing Li. Requirements and Software Engineering for Automotive Perception Systems: An Interview Study. *Requirements Engineering Journal.* To appear, 2024. Available at `http://greg4cr.github.io/pdf/24aps.pdf`.

4. **Afonso Fontes**, Gregory Gay. The Integration of Machine Learning into Automated Test Generation: A Systematic Mapping Study. *Wiley Software Testing, Verification and Reliability.* Volume 33, Issue 4. 2023. Available at `http://greg4cr.github.io/pdf/23mapping.pdf`.

5. **Khan Mohammad Habibullah**, Gregory Gay, Jennifer Horkoff. Non-Functional Requirements for Machine Learning: Understanding Current Use and Challenges Among Practitioners. *Requirements Engineering Journal.* Volume 28, Number 2. June 2023. Available at `http://greg4cr.github.io/pdf/23nfrsurvey.pdf`.

6. **Alireza Salahirad**, Gregory Gay, Ehsan Mohammadi. Mapping the Structure and Evolution of Software Testing Research Over the Past Three Decades. *Journal of Systems and Software.* Volume 195. 2023. Available at `http://greg4cr.github.io/pdf/22topics.pdf`.

7. **Hussein Almulla**, Gregory Gay. Learning How to Search: Generating Effective Test Cases Through Adaptive Fitness Function Selection. *Empirical Software Engineering Journal.* Volume 27, Article 38. 2022. Available at `http://greg4cr.github.io/pdf/21affs.pdf`.

8. **Alireza Salahirad**, **Hussein Almulla**, Gregory Gay. Choosing The Fitness Function for the Job: Automated Generation of Test Suites that Detect Real Faults. *Wiley Software Testing, Verification and Reliability.* Volume 29, Issue 4-5. June–August 2019. Available at `http://greg4cr.github.io/pdf/19fitness.pdf`.

9. **Ying Meng**, Gregory Gay, Michael Whalen. Ensuring the Observability of Structural Test Obligations. *IEEE Transactions on Software Engineering.* Volume 46, Issue 7, September 2018. Available at `http://greg4cr.github.io/pdf/18omcdc.pdf`.

10. Amanda Schwartz, Daniel Puckett, **Ying Meng**, Gregory Gay. Investigating Faults Missed by Test Suites Achieving High Code Coverage. *Journal of Systems and Software.* Volume 144. October 2018. Pages 106-120. Available at `http://greg4cr.github.io/pdf/18mutation.pdf`.

11. Gregory Gay, Sanjai Rayadurgam, Mats P.E. Heimdahl. Automated Steering of Model-Based Test Oracles to Admit Real Program Behaviors. *IEEE Transactions on Software Engineering.* Volume 43, Number 6. June 2017. Pages 531-555. Available at `http://greg4cr.github.io/pdf/16steering.pdf`.

12. Gregory Gay, Ajitha Rajan, Matt Staats, Michael Whalen, Mats P.E. Heimdahl. The Effect of Program and Model Structure on the Effectiveness of MC/DC Test Adequacy Coverage. *ACM Transactions on Software Engineering and Methodology.* Volume 25, Number 3, Article 25. August 2016. Available at `http://greg4cr.github.io/pdf/16mcdc.pdf`.

13. Gregory Gay, Matt Staats, Michael Whalen, Mats P.E. Heimdahl. Automated Oracle Data Selection Support. *IEEE Transactions on Software Engineering*. Volume 41, Number 11. November 2015. Pages 1119-1137. Available at `http://greg4cr.github.io/pdf/15oracles.pdf`.

14. Gregory Gay, Matt Staats, Michael Whalen, Mats P.E. Heimdahl. The Risks of Coverage-Directed Test Case Generation. *IEEE Transactions on Software Engineering*. Volume 41, Number 8. August 2015. Pages 803-819. Available at `http://greg4cr.github.io/pdf/15covrisks.pdf`.

15. Adam Nelson, Tim Menzies, Gregory Gay. Sharing Experiments Using Open-Source Software. *Software: Practice and Experience*. Volume 41, Number 3. March 2011. Pages 283–305. Available at `http://greg4cr.github.io/pdf/10ourmine.pdf`.

16. Gregory Gay, Tim Menzies, Misty Davies, and Karen Gundy-Burlet. Automatically Finding the Control Variables for Complex System Behavior. *Automated Software Engineering*. Volume 17, Number 4. December 2010. Pages 1–30. Available at `http://www.greg4cr.github.io/pdf/10tar3.pdf`.

17. Gregory Gay, Tim Menzies, Omid Jalali, Gregory Mundy, Beau Gilkerson, Martin Feather, and James Kiper. Finding Robust Solutions in Requirements Models. *Automated Software Engineering*. Volume 17, Number 1. March 2010. Pages 87–116. Available at `http://www.greg4cr.github.io/pdf/10keys.pdf`.

## Conference Publications:

18. **Khan Mohammad Habibullah**, Gregory Gay, Jennifer Horkoff. A Framework for Managing Quality Requirements for Machine Learning-Based Software Systems. *Proceedings of the 17$^{th}$ International Conference on the Quality of Information and Communications Technology (QUATIC'24)*. Pisa, Italy, September 2024. Available at `http://greg4cr.github.io/pdf/24quatic.pdf`.

19. **Khan Mohammad Habibullah, Juan Garcia Diaz**, Gregory Gay, Jennifer Horkoff. Scoping of Non-Functional Requirements for Machine Learning Systems. *Proceedings of the 32$^{nd}$ IEEE International Requirements Engineering, Posters Track (RE'24)*. Reykjavik, Iceland, June 2024. Available at `http://greg4cr.github.io/pdf/24poster.pdf`.

20. **Malte Götharsson, Karl Stahre**, Gregory Gay, Francisco Gomes de Oliveira Neto. Exploring the Role of Automation in Duplicate Bug Report Detection: An Industrial Case Study. *Proceedings of the 5$^{th}$ ACM/IEEE International Conference on Automation of Software Test (AST'24)*. Lisbon, Portugal, April 2024. Available at `http://greg4cr.github.io/pdf/24duplicates.pdf`.

21. Gregory Gay. Improving the Readability of Generated Tests Using GPT-4 and ChatGPT Code Interpreter. *Proceedings of 15$^{th}$ Symposium on Search-Based Software Engineering, Challenge Track (SSBSE'23)*. San Francisco, USA, December 2023. Available at `http://greg4cr.github.io/pdf/23readability.pdf`.

22. **Haozhou Lyu**, Gregory Gay, Maiko Sakamoto. Developer Views on Software Carbon Footprint and its Potential for Automated Reduction. *Proceedings of 15$^{th}$ Symposium on Search-Based Software Engineering (SSBSE'23)*. San Francisco, USA, December 2023. Available at `http://greg4cr.github.io/pdf/23cfreq.pdf`.

23. **Haozhou Lyu**, Gregory Gay, Maiko Sakamoto. Exploring Genetic Improvement of the Carbon Footprint of Web Pages. *Proceedings of 15$^{th}$ Symposium on Search-Based Software Engineering (SSBSE'23)*. San Francisco, USA, December 2023. Available at `http://greg4cr.github.io/pdf/23cfgi.pdf`.

24. Eduard Paul Enoiu, Gregory Gay, Jameel Esber, Robert Feldt. Understanding Problem Solving in Software Testing: An Exploration of Tester Routines and Behavior. *Proceedings of the 35$^{th}$ International Conference on Testing Software and Systems (IFIP-ICTSS'23)*. Bergamo, Italy, September 2023. **Best Paper Award Winner**. Available at `http://greg4cr.github.io/pdf/23problemmodel.pdf`.

25. **Dia Istanbuly**, **Max Zimmer**, Gregory Gay. How Do Different Types of Testing Goals Affect Test Case Design? *Proceedings of the 35<sup>th</sup> International Conference on Testing Software and Systems (IFIP-ICTSS'23).* Bergamo, Italy, September 2023. Available at `http://greg4cr.github.io/pdf/23goals.pdf`.

26. **Teklit Berihu Gereziher**, **Selam Welu Gebrekrstos**, Gregory Gay. Search-Based Test Generation Targeting Non-Functional Quality Attributes of Android Apps. *Proceedings of the 24<sup>th</sup> ACM Genetic and Evolutionary Computation Conference (GECCO'23).* Lisbon, Portugal, July 2023. Available at `http://greg4cr.github.io/pdf/23searchnonfunc.pdf`.

27. **Khan Mohammad Habibullah**, Hans-Martin Heyn, Gregory Gay, Jennifer Horkoff, Eric Knauss, Markus Borg, Alessia Knauss, Håkan Sivencrona, Polly Jing Li. Requirements Engineering for Automotive Perception Systems: an Interview Study. *Proceedings of the 29<sup>th</sup> International Working Conference on Requirement Engineering: Foundation for Software Quality (REFSQ'23).* Barcelona, Spain, April 2023. Available at `http://greg4cr.github.io/pdf/23perception.pdf`.

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29. **Lukas Berglund, Tim Grube**, Gregory Gay, Francisco Gomes de Oliveira Neto, Dimitrios Platis. Test Maintenance for Machine Learning Systems: A Case Study in the Automotive Industry. *Proceedings of the 16<sup>th</sup> IEEE International Conference on Software Testing, Verification, and Validation, Industry Track (ICST'23).* Dublin, Ireland, April 2023. Available at `http://greg4cr.github.io/pdf/23maintenance.pdf`.

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33. **Srujana Bollina**, Gregory Gay. Bytecode-based Multiple Condition Coverage: An Initial Investigation. *Proceedings of 12<sup>th</sup> Symposium on Search-Based Software Engineering, Replications and Negative Results Track (SSBSE'20).* Bari, Italy, September 2020. Available at `http://greg4cr.github.io/pdf/20bmcc.pdf`.

34. **Ying Meng**, Gregory Gay. Understanding The Impact of Solver Choice in Model-Based Test Generation. *Proceedings of the ACM/IEEE International Symposium on Empirical Software Engineering and Measurement (ESEM'20).* Bari, Italy, September 2020. Available at `http://greg4cr.github.io/pdf/20solvers.pdf`.

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36. **Allen Kanapala**, Gregory Gay. Mapping Class Dependencies for Fun and Profit. *Proceedings of the 10<sup>th</sup> Symposium on Search-Based Software Engineering, Hot Off the Press Track (SSBSE'18).*

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38. **Hussein Almulla**, **Alireza Salahirad**, Gregory Gay. Using Search-Based Test Generation to Discover Real Faults in Guava. *Proceedings of the 9th Symposium on Search-Based Software Engineering, Challenge Track (SSBSE'17)*. Paderborn, Germany, September 2017. Available at `http://greg4cr.github.io/pdf/17guava.pdf`.

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42. Dongjiang You, Sanjai Rayadurgam, Michael Whalen, Mats P.E. Heimdahl, Gregory Gay. Efficient Observability-based Test Generation by Dynamic Symbolic Execution. *Proceedings of the 26th IEEE International Symposium on Software Reliability Engineering (ISSRE'15)*. Gaithersburg, MD, USA, November 2015. Available at `http://greg4cr.github.io/pdf/15issre.pdf`.

43. Gregory Gay, Sanjai Rayadurgam, Mats P.E. Heimdahl. Improving the Accuracy of Oracle Verdicts Through Automated Model Steering. *Proceedings of the 29th ACM/IEEE International Conference on Automated Software Engineering (ASE'14)*. Vasteras, Sweden, September 2014. Available at `http://greg4cr.github.io/pdf/14ase.pdf`.

44. Gregory Gay, Sanjai Rayadurgam, Mats P.E. Heimdahl. Steering Model-Based Oracles to Admit Real Program Behaviors. *Proceedings of the 36th ACM/IEEE International Conference on Software Engineering, NIER Track (ICSE'14-NIER)*. Hyderabad, India, June 2014. Available at `\newlinehttp://greg4cr.github.io/pdf/14nier.pdf`.

45. Michael Whalen, Gregory Gay, Dongjiang You, and Mats P.E. Heimdahl. Observable Modified Condition/Decision Coverage. *Proceedings of the 35th ACM/IEEE International Conference on Software Engineering (ICSE'13)*. San Francisco, United States, May 2013. Available at `http://greg4cr.github.io/pdf/13omcdc.pdf`.

46. Matt Staats, Gregory Gay, and Mats P.E. Heimdahl. Automated Oracle Creation Support, or: How I Learned to Stop Worrying About Fault Propagation and Love Mutation Testing. *Proceedings of the 34th ACM/IEEE International Conference on Software Engineering (ICSE'12)*. Zurich, Switzerland, May 2012. Available at `http://greg4cr.github.io/pdf/12oracle.pdf`.

47. Matt Staats, Gregory Gay, Michael Whalen, and Mats P.E. Heimdahl. On the Danger of Coverage Directed Test Case Generation. *Proceedings of the 15th International Conference on Fundamental Approaches to Software Engineering (FASE'12)*. Talinn, Estonia, March 2012. Available at `http://greg4cr.github.io/pdf/12danger.pdf`.

48. Ekrem Kocaguneli, Gregory Gay, Tim Menzies, Ye Yang, and Jacky Keung. When to Use Data from Other Projects for Effort Estimation. Short Paper, *Proceedings of the 25th ACM/IEEE International Conference on Automated Software Engineering (ASE'10)*. Antwerp, Belguim, September 2010. Available at `http://greg4cr.github.io/pdf/10ccwc.pdf`.

49. Gregory Gay. A Baseline Method For Search-Based Software Engineering. *Proceedings of the 6th International Conference on Predictive Models in Software Engineering (PROMISE'10)*. Banff, Canada, September 2010. Available at `http://greg4cr.github.io/pdf/10baseline.pdf`.

50. Jia Chen, Ye Yang, Wen Zhang, Gregory Gay. Measuring the Heterogeneity of Crosscompany Datasets. *Proceedings of the 11th International Conference on Product Focused Software Development and Process Improvement (PROFES'10)*. Limerick, Ireland, June 2010. Available at `http://greg4cr.github.io/pdf/10profes.pdf`.

51. Gregory Gay, Sonia Haiduc, Andrian Marcus, Tim Menzies. On the Use of Relevance Feedback in IR-based Concept Location. *Proceedings of the 25th IEEE International Conference on Software Maintenance (ICSM'09)*. Alberta, Canada, September 2009. **2009–2019 Most Influential Paper Award**. Available at `http://greg4cr.github.io/pdf/09irrf.pdf`.

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## Workshop Publications:

53. **Rohini Bisht, Selomie Kindu Ejigu**, Gregory Gay, Predrag Filipovikj. Identifying Redundancies and Gaps Across Testing Levels During Verification of Automotive Software. *Proceedings of the 6th International Workshop on User Interface Test Automation and Testing Techniques for Event Based Software (INTUITESTBEDS'23)*. Dublin, Ireland, April 2023. Available at `http://greg4cr.github.io/pdf/23vmodel.pdf`.

54. **Jonathan Örgård**, Gregory Gay, Francisco Gomes de Oliveira Neto, Kim Viggedal. Mutation Testing in Continuous Integration: An Exploratory Industrial Case Study. *Proceedings of the 18th International Workshop on Mutation Analysis (MUTATION'23)*. Dublin, Ireland, April 2023. Available at `http://greg4cr.github.io/pdf/23mutationci.pdf`.

55. **Khan Mohammad Habibullah**, Gregory Gay, Jennifer Horkoff. Non-Functional Requirements for Machine Learning: An Exploration of System Scope and Interest. *Proceedings of the 1st Workshop on Software Engineering for Responsible AI (SE4RAI'22)*. Pittsburgh, USA, May 2022. Available at `http://greg4cr.github.io/pdf/22nfrexplore.pdf`.

56. **Afonso Fontes**, Gregory Gay. Using Machine Learning to Generate Test Oracles: A Systematic Literature Review. *Proceedings of the 1st International Workshop on Test Oracles (TORACLE'21)*. Athens, Greece, August 2021. Available at `http://greg4cr.github.io/pdf/21oracleslr.pdf`.

57. Gregory Gay. One-Size-Fits-None? Improving Test Generation Using Context-Optimized Fitness Functions. *Proceedings of the 12th International Workshop on Search-Based Software Testing (SBST'19)*. Montreal, Canada, May 2018. Available at `http://greg4cr.github.io/pdf/19sbst.pdf`.

58. Gregory Gay. To Call, or Not to Call: Contrasting Direct and Indirect Branch Coverage in Test Generation. *Proceedings of the 11th International Workshop on Search-Based Software Testing (SBST'18)*. Gothenburg, Sweden, May 2018. Available at `http://greg4cr.github.io/pdf/18sbstdbc.pdf`.

59. Gregory Gay. Multifaceted Test Suite Generation Using Primary and Supporting Fitness Functions. *Proceedings of the 11th International Workshop on Search-Based Software Testing (SBST'18)*. Gothenburg, Sweden, May 2018. Available at `http://greg4cr.github.io/pdf/18sbstposition.pdf`.

60. Gregory Gay, Matt Staats, Michael Whalen, and Mats P.E. Heimdahl. Moving the Goalposts: Coverage Satisfaction is Not Enough. *Proceedings of the 7th International Workshop on Search-Based Software Testing (SBST'14)*. Hyderabad, India, June 2014. Available at `http://greg4cr.github.io/pdf/14sbst.pdf`.

61. Gregory Gay and Mats P.E. Heimdahl. Towards Community-Assisted Software Engineering Decision Making. *Proceedings of the $2^{nd}$ International Workshop on Realizing Artificial Intelligence Synergies in Software Engineering (RAISE 2013)*. San Francisco, California, May 2013. Available at `http://greg4cr.github.io/pdf/13raise.pdf`.

62. Tim Menzies, Burak Turhan, Gregory Gay, Ayse Bener, Bojan Cukic and Yue Jiang. Implications of Ceiling Effects in Defect Predictors. *Proceedings of the $4^{th}$ International Workshop on Predictive Models in Software Engineering (PROMISE'08)*. Leipzig, Germany, May 2008. Available at `http://greg4cr.github.io/pdf/08ceiling.pdf`.

## Other Publications:

63. Miroslaw Staron, Silvia Abrahao, Gregory Gay, Alexander Serebrenik. Testing, Debugging, and Log Analysis With Modern AI Tools. *IEEE Software (Practitioners' Digest)*. Volume 41, Issue 2. 2024. Available at `http://greg4cr.github.io/pdf/24digest.pdf`.

64. Paul Ralph, Nauman bin Ali, Sebastian Baltes, Domenico Bianculli, Jessica Diaz, Yvonne Dittrich, Neil Ernst, Michael Felderer, Robert Feldt, Antonio Filieri, Breno Bernard Nicolau de Frana, Carlo Alberto Furia, Gregory Gay, Nicolas Gold, Daniel Graziotin, Pinjia He, Rashina Hoda, Natalia Juristo, Barbara Kitchenham, Valentina Lenarduzzi, Jorge Martnez, Jorge Melegati, Daniel Mendez, Tim Menzies, Jefferson Molleri, Dietmar Pfahl, Romain Robbes, Daniel Russo, Nyyti Saarimki, Federica Sarro, Davide Taibi, Janet Siegmund, Diomidis Spinellis, Miroslaw Staron, Klaas Stol, Margaret-Anne Storey, Davide Taibi, Damian Tamburri, Marco Torchiano, Christoph Treude, Burak Turhan, Xiaofeng Wang, Sira Vegas. ACM SIGSOFT Empirical Standards for Software Engineering Research. *arXiv preprint arXiv:2010.03525*. March, 2021.

65. Michael Unterkalmsteiner, Tingting Yu, Gregory Gay, Elizabeth Bjarnason, Markus Borg, Michael Felderer. Summary of the 5th International Workshop on Requirements Engineering and Testing (RET 2018). *ACM SIGSOFT Software Engineering Notes*. Volume 44, Number 1, March, 2019. Pages 31–34..

66. Markus Borg, Elizabeth Bjarnason, Michael Unterkalmsteiner, Tingting Yu, Gregory Gay, Michael Felderer. Summary of the 4th International Workshop on Requirements Engineering and Testing (RET 2017). *ACM SIGSOFT Software Engineering Notes*. Volume 42, Number 4. January, 2018. Pages 28-31. Available at `http://greg4cr.github.io/pdf/18ret.pdf`.

67. Michael Unterkalmsteiner, Gregory Gay, Michael Felderer, Elizabeth Bjarnason, Markus Borg, Mirko Morandini. Summary of the 3rd International Workshop on Requirements Engineering and Testing (RET 2016). *ACM SIGSOFT Software Engineering Notes*. Volume 41, Number 3. May, 2016. Pages 31-33. Available at `http://greg4cr.github.io/pdf/16ret.pdf`.

68. Gregory Gay, Giuliano Antoniol. 8th International Workshop on Search-based Software Testing (SBST 2015). *Proceedings of the $37^{th}$ International Conference on Software Engineering (ICSE'15)— Workshop Summaries*. Florence, Italy, May 2015. Available at http://greg4cr.github.io/pdf/sbst-summary.pdf.

69. Gregory Gay. Automated Steering of Model-Based Test Oracles to Admit Real Program Behaviors. *Doctoral Dissertation, University of Minnesota*. Minneapolis, MN, May 2015. Available at `http://greg4cr.github.io/pdf/GregoryGayDissertation.pdf`.

70. Gregory Gay and Mats P.E. Heimdahl. Towards Community-Assisted Software Engineering Decision Making. *University of Minnesota Tech Report 13-015*. Minneapolis, MN, April 2013. Available at `http://greg4cr.github.io/pdf/13raise.pdf`.

71. Gregory Gay. The Robust Optimization of Non-Linear Requirements Models.*MS Thesis, West Virginia University*. Morgantown, WV, May 2010. Available at `http://greg4cr.github.io/pdf/thesis_v1.pdf`.

## Invited Presentations:

1. AI in Healthcare Seminar. January 2024. Gothenburg, Sweden.
   Testing Models and ML-Based Software

2. International Conference on Software Testing (ICST). April 2023. Dublin, Ireland.
   Invited Panelist: Doctoral Symposium

3. Dagstuhl Seminar 23103: Testing and Debugging of Data Analysis Workflows. March 2023. Wadern, Germany. Invited Participant

4. International Workshop on Artificial Intelligence in Software Testing (AIST). April 2021. Online.
   Keynote: Learning How to Test - Generating Context-Infused Test Cases

5. International Conference on Software Engineering (ICSE). July 2020. Seoul, South Korea.
   Invited Panelist: Student Mentoring Workshop

6. Chalmers University of Technology (Machine Learning Seminar). March 2020. Gothenburg, Sweden.
   Invited Talk: Learning How to Search: Generating Exception-Triggering Tests Through Adaptive Fitness Function Selection

7. Jeppesen Systems AB. December 2019. Gothenburg, Sweden.
   Invited Talk: An Introduction to Search-Based Test Generation

8. SAST Vst. October 2019. Gothenburg, Sweden.
   Invited Talk: A Brief Introduction to Search-Based Test Generation

9. Shonan Seminar 160: Fuzzing and Symbolic Execution: Reflections, Challenges, and Opportunities. September 2019. Kanagawa, Japan.
   Invited Talk: A Brief Introduction to (Metaheuristic) Search-Based Test Generation

10. South Carolina Law Review 2016 Symposium. February 2016. Columbia, SC.
    Panelist: The Science of Cyber Attacks

11. University of Minnesota Graduate Student Colloquium. October 2011. Minneapolis, MN.
    Invited Talk: Software Test Oracles: How I Learned to Stop Worrying and Love Mutation Testing

12. Midwest Verification Day 2011. September 2011. Minneapolis, MN.
    Invited Talk: Towards Oracle Creation Support

13. Tsinghua University School of Software. March 2010. Beijing, PRC.
    Invited Talk: Finding Robust Solutions to Model Optimization Problems

14. Institute of Software, Chinese Academy of Sciences. January 2010. Beijing, PRC.
    Invited Talk: OURMINE: A Toolkit for Sharing Experiments

15. NASA Ames Research Center. August 2009. Mountain View, CA.
    Invited Talk: Automatically finding the control variables for complex system behavior

16. WVU/NETL/ERA Workshop on Digital Preservation of Complex Engineering Data. April 2009. Morgantown, WV. Poster Presentation: Information Retreival with HAMLET

## Affiliate:

- Senior Member, IEEE.
- Member, ACM, Upsilon Pi Epsilon.