

Gregory James Gay

University of South Carolina
Department of Computer Science & Engineering
3A66 Swearingen Engineering Center,
Columbia, SC 29201

E-Mail: greg@greggay.com
Skype: Greg4cr
Phone: (803) 777-9479

Research Interests:

Automated software testing and analysis, search-based software engineering, automated test generation, data analytics, optimization, information retrieval.

Teaching Interests:

Software engineering, software testing, software verification & validation, software design principles, artificial intelligence, data structures, programming languages.

Education:

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

Professional Experience:

- 2015–Present** 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:

For University of South Carolina courses, review scores are out of 5 points.

Fall 2017 Instructor, Software Testing and Quality Assurance (Graduate).

Reviews: TBD

Fall 2017 Instructor, Seminar on Advances in Computing (Graduate).

Reviews: TBD

Fall 2017 Instructor, Software Engineering (Graduate).

Reviews: TBD

Spring 2017 Instructor, Software Testing and Quality Assurance (Graduate).

Reviews: On Clear Presentation - 4.79, On Preparedness - 4.86, On Effective Use of Time - 4.85, On Enthusiasm - 4.79, On Facilitating Understanding - 4.83, On Clear Answering of Questions - 4.69, On Respect - 4.92

Fall 2016 Instructor, Software Engineering (Graduate).

Reviews: On Clear Presentation - 4.29, On Preparedness - 4.40, On Effective Use of Time - 4.14, On Enthusiasm - 4.08, On Facilitating Understanding - 4.40, On Clear Answering of Questions - 4.27, On Respect - 4.47

Spring 2016 Instructor, Seminar on Advances in Computing (Graduate).

Reviews: On Clear Presentation - 4.81, On Preparedness - 4.53, On Effective Use of Time - 4.73, On Enthusiasm - 4.69, On Facilitating Understanding - 4.63, On Clear Answering of Questions - 4.50, On Respect - 4.75

Spring 2016 Instructor, Software Testing and Quality Assurance (Graduate).

Reviews: On Clear Presentation - 4.55, On Preparedness - 4.55, On Effective Use of Time - 4.55, On Enthusiasm - 4.64, On Facilitating Understanding - 4.55, On Clear Answering of Questions - 4.64, On Respect - 4.55

Fall 2015 Instructor, Software Engineering (Graduate).

Reviews: On Clear Presentation - 4.85, On Preparedness - 5.00, On Effective Use of Time - 5.00, On Enthusiasm - 4.92, On Facilitating Understanding - 5.00, On Clear Answering of Questions - 5.00, On Respect - 4.92

For University of Minnesota courses, review scores are out of 6 points.

Spring 2015 Instructor, Software Engineering 1 (Undergraduate/Graduate).

Reviews: On Preparedness - 5.70, On Clear Presentation - 5.22, On Helpful Feedback - 4.97, On Respect - 5.81, On Facilitating Understanding - 4.92, On Stimulating Further Interest in Topic - 4.42

Fall 2014 Teaching Assistant, Software Engineering 1 (Undergraduate/Graduate).

Reviews: On Preparedness - 5.60, On Clear Presentation - 5.60, On Helpful Feedback - 5.70, On Respect - 5.80, On Facilitating Understanding - 5.20, On Stimulating Further Interest in Topic - 5.10

Fall 2013 Teaching Assistant, Software Engineering 1 (Undergraduate/Graduate).

Reviews: On Preparedness - 5.40, On Clear Presentation - 5.14, On Helpful Feedback - 5.38, On Respect - 5.62, On Facilitating Understanding - 5.34, On Stimulating Further Interest in Topic - 5.17

Spring 2013 Teaching Assistant, Software Engineering 2 (Undergraduate/Graduate).

Reviews: On Preparedness - 5.58, On Clear Presentation - 5.58, On Helpful Feedback - 5.67, On Respect - 5.62, On Facilitating Understanding - 5.00, On Stimulating Further Interest in Topic - 4.75

Fall 2012 Teaching Assistant, Software Engineering 1 (Undergraduate/Graduate).

Reviews: On Preparedness - 5.26, On Clear Presentation - 5.23, On Helpful Feedback - 5.23, On Respect - 5.45, On Facilitating Understanding - 5.29, On Stimulating Further Interest in Topic - 4.97

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

Student Supervision:

Ph.D. Advisor

Ongoing Hussein Almulla, Ph.D. in Computer Science, Estimated Graduation: Spring 2019.
Alireza Salahirad, Ph.D. in Computer Science, Estimated Graduation: Spring 2020.

M.S. Advisor

Ongoing Ying Meng, M.S. in Software Engineering, Estimated Graduation: Fall 2017.
Srujana Bollina, M.S. in Computer Science, Estimated Graduation: Fall 2017.

Funding:

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

Awards:

2016 Challenge Award Winner, 8th Symposium on Search-Based Software Engineering (SSBSE'16)
2014 Best Presentation, 7th International Workshop on Search-Based Software Testing (SBST'14)
2010–2013 National Science Foundation Graduate Research Fellowship

Conference Committees and Chairmanships:

2018 Workshop Co-Chair, International Conference on Software Testing, Verification, and Validation (ICST'18).
2018 Program Co-Chair, 5th International Workshop on Requirements Engineering and Testing (RET'18)
2017–Present Steering Committee Deputy Chair, International Workshop on Search-Based Software Testing (SBST).
2017–Present Program Committee, European Conference on the Applications of Evolutionary Computing (EvoSET Track—Nature-inspired algorithms in Software Engineering and Testing).
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).
2017–Present Program Committee, International Workshop on Software Analytics (SWAN).
2016–Present Steering Committee, Symposium on Search-Based Software Engineering (SSBSE).
2016–Present Program Committee, Symposium on Search-Based Software Engineering (SSBSE).
2015–Present Steering Committee, International Workshop on Search-Based Software Testing (SBST).
2017 Co-Chair, 4th International Workshop on Requirements Engineering and Testing (RET'17).
2017 Publicity Co-Chair, Symposium on Search-Based Software Engineering (SSBSE).
2016–2017 Steering Committee Chair, International Workshop on Search-Based Software Testing (SBST).
2016 Co-Chair, 9th International Workshop on Search-Based Software Testing (SBST'16).
2016 Program Co-Chair, 3rd International Workshop on Requirements Engineering and Testing (RET'16).

- 2015** Co-Chair, 8th International Workshop on Search-Based Software Testing (SBST'15).
- 2015** Program Committee, International Workshop on Actionable Analytics for SE (ACTION'15).
- 2011–2012** Program Committee, International Conference on Predictive Models in Software Engineering (PROMISE).
- 2012** North America Publicity Chair, 27th IEEE /ACM International Conference on Automated Software Engineering (ASE'12).
- 2012** Web Chair, 20th IEEE International Conference on Requirements Engineering (RE'12).
- 2008–2010** Web Chair, International Conference on Predictive Models in Software Engineering (PROMISE).

Journal Publications:

Names in *italics* are supervised students.

1. 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 online at <http://greggay.com/pdf/16steering.pdf>.
2. 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. August, 2016. Article 25. Available online at <http://greggay.com/pdf/16mcdc.pdf>.
3. 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 online at <http://greggay.com/pdf/15oracles.pdf>.
4. 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 online at <http://greggay.com/pdf/15covrisks.pdf>.
5. Adam Nelson, Tim Menzies, and Gregory Gay. Sharing Experiments Using Open-Source Software. *Software: Practice and Experience*. Volume 41, Number 3. March, 2011. Pages 283–305.. Available online at <http://greggay.com/pdf/10ourmine.pdf>.
6. 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 from <http://www.greggay.com/pdf/10tar3.pdf>.
7. 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 from <http://www.greggay.com/pdf/10keys.pdf>.

Journal Publications Under Submission or in Revision:

8. Gregory Gay. Choosing The Fitness Function for the Job: Automated Generation of Test Suites that Detect Real Faults. *Under submission to Wiley Software Testing, Verification and Reliability*.

Conference Publications:

9. 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 from <http://greggay.com/pdf/17guava.pdf>. *Acceptance Rate Unknown*.
10. Gregory Gay. Generating Effective Test Suites by Combining Coverage Criteria. *Proceedings of the 9th Symposium on Search-Based Software Engineering (SSBSE'17)*. Paderborn, Germany, September 2017. Available from <http://greggay.com/pdf/17ssbse.pdf>. *Acceptance Rate 23% (31 Submitted, 7 Accepted)*
11. Gregory Gay. The Fitness Function for the Job: Search-Based Generation of Test Suites that Detect Real Faults. *Proceedings of the 10th IEEE International Conference on Software Testing, Verification, and Validation (ICST'17)*. Tokyo, Japan, March 2017. **Best Paper Nominee**. Available from <http://greggay.com/pdf/17fitness.pdf>. *Acceptance Rate 27% (135 Submitted, 36 Accepted)*
12. Gregory Gay. Challenges in Using Search-Based Test Generation to Identify Real Faults in Mockito. *Proceedings of the 8th Symposium on Search-Based Software Engineering, Challenge Track (SSBSE'16)*. Raleigh, NC, USA, October 2016. **Best Paper Winner (Challenge Track)**. Available from <http://greggay.com/pdf/16mockito.pdf>. *Acceptance Rate Unknown*.
13. 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 from <http://greggay.com/pdf/15issre.pdf>. *Acceptance Rate 32% (172 Submitted, 55 Accepted)*
14. 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 from <http://greggay.com/pdf/14ase.pdf>. *Acceptance Rate 20% (276 Submitted, 55 Accepted)*
15. 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 from <http://greggay.com/pdf/14nier.pdf>. *Acceptance Rate 24% (146 Submitted, 35 Accepted)*
16. 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 from <http://greggay.com/pdf/13omcdc.pdf>. *Acceptance Rate 19% (461 Submitted, 85 Accepted)*
17. 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 from <http://greggay.com/pdf/12oracle.pdf>. *Acceptance Rate 21% (408 Submitted, 87 Accepted)*
18. 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 from <http://greggay.com/pdf/12danger.pdf>. *Acceptance Rate 25% (134 Submitted, 33 Accepted)*
19. 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, Belgium, September 2010. Available from <http://greggay.com/pdf/10ccwc.pdf>. *Acceptance Rate 18% (191 Submitted, 34+31 Accepted)*

20. 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 from <http://greggay.com/pdf/10baseline.pdf>. *Acceptance Rate 36% (53 Submitted, 19 Accepted)*
21. 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 from <http://greggay.com/pdf/10profes.pdf>. *Acceptance Rate Unknown.*
22. 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. Available from <http://greggay.com/pdf/09irrf.pdf>. *Acceptance Rate 22% (162 Submitted, 35 Accepted)*
23. Gregory Gay, Tim Menzies, Bojan Cukic, Burak Turhan. How to Build Repeatable Experiments. *Proceedings of the 5th International Conference on Predictive Models in Software Engineering (PROMISE'09)*. Vancouver, Canada, May 2009. Available from <http://greggay.com/pdf/09ourmine.pdf>. *Acceptance Rate 48% (36 Submitted, 17 Accepted)*

Conference Publications Under Submission:

24. Anonymized Submission. *Under submission to the 40th ACM/IEEE International Conference on Software Engineering, NIER Track (ICSE'18-NIER)*.
25. Anonymized Submission 1. *Under submission to the 11th IEEE International Conference on Software Testing, Verification, and Validation (ICST'18)*.
26. Anonymized Submission 2. *Under submission to the 11th IEEE International Conference on Software Testing, Verification, and Validation (ICST'18)*.

Workshop Publications:

27. 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 from <http://greggay.com/pdf/14sbst.pdf>. *Acceptance Rate 53% (19 Submitted, 10 Accepted)*
28. Gregory Gay and Mats P.E. Heimdahl. Towards Community-Assisted Software Engineering Decision Making. *Proceedings of the 2nd International Workshop on Realizing Artificial Intelligence Synergies in Software Engineering (RAISE 2013), "Over the Horizon" track*. San Francisco, California, May 2013. Available from <http://greggay.com/pdf/13raise.pdf>. *Acceptance Rate Unknown.*
29. Tim Menzies, Burak Turhan, Gregory Gay, Ayse Bener, Bojan Cukic and Yue Jiang. Implications of Ceiling Effects in Defect Predictors. *Proceedings of the 4th International Workshop on Predictive Models in Software Engineering (PROMISE'08)*. Leipzig, Germany, May 2008. Available from <http://greggay.com/pdf/08ceiling.pdf>. *Acceptance Rate 81% (16 Submitted, 13 Accepted)*

Other Publications:

30. 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 from <http://greggay.com/pdf/16ret.pdf>.
31. Gregory Gay, Giuliano Antoniol. 8th International Workshop on Search-based Software Testing (SBST 2015). *Proceedings of the 37th International Conference on Software Engineering (ICSE'15)—Workshop Summaries*. Florence, Italy, May 2015. Available from <http://greggay.com/pdf/sbst-summary.pdf>.
32. Gregory Gay. Automated Steering of Model-Based Test Oracles to Admit Real Program Behaviors. *Doctoral Dissertation, University of Minnesota*. Minneapolis, MN, May 2015. Available from <http://greggay.com/pdf/GregoryGayDissertation.pdf>.
33. 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 from <http://greggay.com/pdf/13raise.pdf>.
34. Gregory Gay. The Robust Optimization of Non-Linear Requirements Models. *MS Thesis, West Virginia University*. Morgantown, WV, May 2010. Available from http://greggay.com/pdf/thesis_v1.pdf.

Invited Presentations:

1. South Carolina Law Review 2016 Symposium. February 2016. Columbia, SC.
Panelist: The Science of Cyber Attacks
2. West Virginia University. March 2015. Morgantown, WV.
Invited Talk: Steering Model-Based Oracles to Admit Real Program Behaviors
3. College of William and Mary. March 2015. Williamsburg, VA.
Invited Talk: Steering Model-Based Oracles to Admit Real Program Behaviors
4. University of South Carolina. February 2015. Columbia, SC.
Invited Talk: Steering Model-Based Oracles to Admit Real Program Behaviors
5. Concordia University. January 2015. Montreal, QC, Canada.
Invited Talk: Steering Model-Based Oracles to Admit Real Program Behaviors
6. University of Colorado Denver. March 2014. Denver, CO.
Invited Talk: Connecting the Dots: Improving the Effectiveness of Testing by Leveraging Artifact Relationships
7. Miami University. February 2014. Oxford, OH.
Invited Talk: Connecting the Dots: Improving the Effectiveness of Testing by Leveraging Artifact Relationships
8. University of Kentucky. February 2014. Lexington, KY.
Invited Talk: Connecting the Dots: Improving the Effectiveness of Testing by Leveraging Artifact Relationships
9. California Polytechnic State University. February 2014. San Luis Obispo, CA.
Invited Talk: Connecting the Dots: Improving the Effectiveness of Testing by Leveraging Artifact Relationships
10. Oakland University. January 2014. Oakland, MI.
Invited Talk: Connecting the Dots: Improving the Effectiveness of Testing by Leveraging Artifact Relationships

11. Middle Tennessee State University. January 2014. Murfreesboro, TN.
Invited Talk: Connecting the Dots: Improving the Effectiveness of Testing by Leveraging Artifact Relationships
12. 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
13. Midwest Verification Day 2011. September 2011. Minneapolis, MN.
Invited Talk: Towards Oracle Creation Support
14. Tsinghua University School of Software. March 2010. Beijing, PRC.
Invited Talk: Finding Robust Solutions to Model Optimization Problems
15. Institute of Software, Chinese Academy of Sciences. January 2010. Beijing, PRC.
Invited Talk: OURMINE: A Toolkit for Sharing Experiments
16. NASA Ames Research Center Summer Intern Talks. August 2009. Mountain View, CA.
Invited Talk: Automatically finding the control variables for complex system behavior
17. WVU/NETL/ERA Workshop on Digital Preservation of Complex Engineering Data. April 2009. Morgantown, WV. Poster Presentation: Information Retrieval with HAMLET

Professional Activities:

- 2016–Present** Reviewer, Journal of Systems and Software
- 2016–Present** Reviewer, IEEE Transactions on Evolutionary Computation.
- 2016–Present** Reviewer, Journal of Classification.
- 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.
- 2014–Present** Reviewer, Automated Software Engineering (conference).
- 2014–Present** Reviewer, Software Testing, Verification and Reliability.
- 2013–Present** Reviewer, IEEE Software.
- 2012–Present** Reviewer, Software Quality Journal.
- 2010–Present** Reviewer, Automated Software Engineering (journal).
- 2017** Reviewer, The Computer Journal
- 2017** Reviewer, Formal Methods in System Design
- 2016** Reviewer, 2017 IFAC World Conference
- 2014** Reviewer, Journal of Aerospace Information Systems.
- 2013** Student Volunteer, International Conference on Software Engineering.
- 2012** Reviewer, Formal Methods for Industrial Critical Systems.
- 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.

Affiliate:

- Member of IEEE, ACM, Upsilon Pi Epsilon.