

## 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 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, 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

**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

**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, 8<sup>th</sup> Symposium on Search-Based Software Engineering (SSBSE'16)

**2014** Best Presentation, 7<sup>th</sup> 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).

**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, 4<sup>th</sup> 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, 9<sup>th</sup> International Workshop on Search-Based Software Testing (SBST'16).

**2016** Program Co-Chair, 3<sup>rd</sup> International Workshop on Requirements Engineering and Testing (RET'16).

**2015** Co-Chair, 8<sup>th</sup> 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, 27<sup>th</sup> IEEE /ACM International Conference on Automated Software Engineering (ASE'12).
- 2012** Web Chair, 20<sup>th</sup> 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 XX, Number XX. October, 2016. Pages 1-24.. 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>.

## Conference Publications:

8. Hussein Almulla, Alireza Salahirad, Gregory Gay. Using Search-Based Test Generation to Discover Real Faults in Guava. *To appear, proceedings of the 9<sup>th</sup> 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*.
9. Gregory Gay. Generating Effective Test Suites by Combining Coverage Criteria. *To appear, proceedings of the 9<sup>th</sup> Symposium on Search-Based Software Engineering (SSBSE'17)*. Paderborn, Germany, September 2017. Available from <http://greggay.com/pdf/17sbse.pdf>. *Acceptance Rate 23% (31 Submitted, 7 Accepted)*

10. Gregory Gay. The Fitness Function for the Job: Search-Based Generation of Test Suites that Detect Real Faults. *Proceedings of the 10<sup>th</sup> 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)*
11. Gregory Gay. Challenges in Using Search-Based Test Generation to Identify Real Faults in Mockito. *Proceedings of the 8<sup>th</sup> Symposium on Search-Based Software Engineering, Challenge Track (SS-BSE'16)*. Raleigh, NC, USA, October 2016. **Best Paper Winner (Challenge Track)**. Available from <http://greggay.com/pdf/16mockito.pdf>. *Acceptance Rate Unknown*.
12. Dongjiang You, Sanjai Rayadurgam, Michael Whalen, Mats P.E. Heimdahl, Gregory Gay. Efficient Observability-based Test Generation by Dynamic Symbolic Execution. *Proceedings of the 26<sup>th</sup> 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)*
13. Gregory Gay, Sanjai Rayadurgam, Mats P.E. Heimdahl. Improving the Accuracy of Oracle Verdicts Through Automated Model Steering. *Proceedings of the 29<sup>th</sup> 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)*
14. Gregory Gay, Sanjai Rayadurgam, Mats P.E. Heimdahl. Steering Model-Based Oracles to Admit Real Program Behaviors. *Proceedings of the 36<sup>th</sup> 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)*
15. Michael Whalen, Gregory Gay, Dongjiang You, and Mats P.E. Heimdahl. Observable Modified Condition/Decision Coverage. *Proceedings of the 35<sup>th</sup> 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)*
16. 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 34<sup>th</sup> 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)*
17. Matt Staats, Gregory Gay, Michael Whalen, and Mats P.E. Heimdahl. On the Danger of Coverage Directed Test Case Generation. *Proceedings of the 15<sup>th</sup> 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)*
18. 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 25<sup>th</sup> 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)*
19. Gregory Gay. A Baseline Method For Search-Based Software Engineering. *Proceedings of the 6<sup>th</sup> 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)*
20. Jia Chen, Ye Yang, Wen Zhang, Gregory Gay. Measuring the Heterogeneity of Crosscompany Datasets. *Proceedings of the 11<sup>th</sup> 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*.
21. Gregory Gay, Sonia Haiduc, Andrian Marcus, Tim Menzies. On the Use of Relevance Feedback in IR-based Concept Location. *Proceedings of the 25<sup>th</sup> 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)*

22. Gregory Gay, Tim Menzies, Bojan Cukic, Burak Turhan. How to Build Repeatable Experiments. *Proceedings of the 5<sup>th</sup> 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)*

## Workshop Publications:

23. 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)*
24. Gregory Gay and Mats P.E. Heimdahl. Towards Community-Assisted Software Engineering Decision Making. *Proceedings of the 2<sup>nd</sup> 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*.
25. Tim Menzies, Burak Turhan, Gregory Gay, Ayse Bener, Bojan Cukic and Yue Jiang. Implications of Ceiling Effects in Defect Predictors. *Proceedings of the 4<sup>th</sup> 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:

26. 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>.
27. Gregory Gay, Giuliano Antoniol. 8th International Workshop on Search-based Software Testing (SBST 2015). *Proceedings of the 37<sup>th</sup> International Conference on Software Engineering (ICSE'15)—Workshop Summaries*. Florence, Italy, May 2015. Available from <http://greggay.com/pdf/sbst-summary.pdf>.
28. 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>.
29. 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>.
30. 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](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, 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.