

## Jonathan Bell

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CONTACT INFORMATION	Department of Computer Science George Mason University 4400 University Drive MSN 4A5 Fairfax, VA 22030 USA	Office: +1-703-993-6089 E-mail: <a href="mailto:bellj@gmu.edu">bellj@gmu.edu</a> WWW: <a href="http://jonbell.net">jonbell.net</a>
RESEARCH INTERESTS	Software engineering: software quality, reliability and security, software testing, fault reproduction and privacy, program analysis, software systems, mobile computing	
EDUCATION	<b>Columbia University</b> , New York, NY USA Ph.D., <b>Computer Science</b> , May 2016 <ul style="list-style-type: none"><li>• Advisor: <b>Professor Gail Kaiser</b></li><li>• Area of Study: Software Engineering and Software Systems</li><li>• Thesis Topic: <i>Making Software More Reliable by Uncovering Hidden Dependencies</i></li></ul> M.Phil., <b>Computer Science</b> , February 2014 M.S., <b>Computer Science</b> , May 2011 B.S., <b>Computer Science</b> , May 2010, <i>Cum Laude</i>	
AWARDS AND HONORS	<b>NSF CAREER Award</b> National Science Foundation Faculty Early Career Development Award. 2019. <b>Computer Science Department Award for Excellence in Teaching</b> George Mason University Department of Computer Science. Awarded for curricular development activities in undergraduate Distributed Systems course and nominations from students. 2019. <b>Distinguished Paper Awards</b> Awarded to the top papers at a conference. Received at ICPC 2016 and ICSE 2014. <b>Distinguished Reviewer Awards</b> Awarded to the top reviewers on a program conference committee. Received at ASE 2018.	
PUBLICATIONS	<b>Conferences</b> <ol style="list-style-type: none"><li>1. Shi, A., <b>Bell, Jonathan</b>, and D. Marinov. Mitigating the Effects of Flaky Tests on Mutation Testing. In: <i>Proceedings of the 2019 ACM SIGSOFT International Symposium on Software Testing and Analysis</i>. ISSTA 2019. Acceptance rate: 22%. 2019. <a href="http://jonbell.net/publications/flakymutants">http://jonbell.net/publications/flakymutants</a>.</li><li>2. Arora, N., <b>Bell, Jonathan</b>, F. Ivancic, G. Kaiser, and B. Ray. Replay without Recording of Production Bugs for Service Oriented Applications. In: <i>33rd IEEE/ACM International Conference on Automated Software Engineering</i>. ASE 2018. Acceptance rate: 20%. 2018. <a href="http://jonbell.net/publications/parikshan">http://jonbell.net/publications/parikshan</a>.</li><li>3. Gambi, A., <b>Bell, Jonathan</b>, and A. Zeller. Practical Test Dependency Detection. In: <i>Proceedings of the 2018 IEEE Conference on Software Testing, Validation and Verification</i>. ICST 2018. Acceptance rate: 25%. 2018. <a href="http://jonbell.net/publications/pradet">http://jonbell.net/publications/pradet</a>.</li><li>4. Hilton, M., <b>Bell, Jonathan</b>, and D. Marinov. A Large-Scale, Longitudinal Study of Test Coverage Evolution. In: <i>33rd IEEE/ACM International Conference on Automated Software Engineering</i>. ASE 2018. Acceptance rate: 20%. 2018. <a href="http://jonbell.net/publications/coverage">http://jonbell.net/publications/coverage</a>.</li><li>5. <b>Bell, Jonathan</b>, O. Legunsen, M. Hilton, L. Eloussi, T. Yung, and D. Marinov. DeFlaker: Automatically Detecting Flaky Tests. In: <i>Proceedings of the 2018 International Conference on Software Engineering</i>. ICSE 2018. Acceptance rate: 21%. 2018. <a href="http://jonbell.net/publications/deflaker">http://jonbell.net/publications/deflaker</a>.</li><li>6. <b>Bell, Jonathan</b> and L. Pina. CROCHET: Checkpoint and Rollback via Lightweight Heap Traversal on Stock JVMs. In: <i>Proceedings of the 2018 European Conference on Object-Oriented Programming</i>. ECOOP 2018. Acceptance rate: 39%. 2018. <a href="http://jonbell.net/publications/crochet">http://jonbell.net/publications/crochet</a>.</li></ol>	

7. Su, F.-H., **Bell, Jonathan**, K. Harvey, G. Kaiser, S. Sethumadhavan, and T. Jebara. Code Relatives: Detecting Similarly Behaving Software. In: *Proceedings of the 2016 ACM SIGSOFT International Symposium on the Foundations of Software Engineering*. FSE 2016. Acceptance rate: 30%. 2016. <http://jonbell.net/publications/dyclink>.
8. Su, F.-H., **Bell, Jonathan**, G. Kaiser, and S. Sethumadhavan. Identifying Functionally Similar Code in Complex Codebases. In: *Proceedings of the 24th IEEE International Conference on Program Comprehension*. ICPC 2016. Acceptance rate: 30%. **Distinguished Paper Award**. 2016. <http://jonbell.net/publications/hitoshiio>.
9. **Bell, Jonathan**, G. Kaiser, E. Melski, and M. Dattatreya. Efficient Dependency Detection for Safe Java Test Acceleration. In: *Proceedings of the 10th Joint Meeting of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering*. ESEC/FSE 2015. Acceptance rate: 25.4%. 2015. <http://jonbell.net/publications/electrictest>.
10. **Bell, Jonathan**, E. Melski, M. Dattatreya, and G. Kaiser. Vroom: Faster Build Processes for Java. In: *IEEE Software*. Vol. Special Issue: Release Engineering, March/April 2015. IEEE Computer Society, 2015.
11. Viennot, N., M. Lecuyer, **Bell, Jonathan**, R. Geambasu, and J. Nieh. Synapse: A Microservices Architecture for Heterogeneous-Database Web Applications. In: *Proceedings of The 2015 European Conference on Computer Systems (EuroSys)*. Acceptance rate: 21%. 2015. <http://jonbell.net/publications/synapse>.
12. Spahn, R., **Bell, Jonathan**, M. Lee, S. Bhamidipati, R. Geambasu, and G. Kaiser. Pebbles: Fine-Grained Data Management Abstractions for Modern Operating Systems. In: *Proceedings of the 11th USENIX Symposium on Operating Systems Design and Implementation*. OSDI 2014. Acceptance rate: 18.4%. 2014. <http://jonbell.net/publications/pebbles>.
13. **Bell, Jonathan** and G. Kaiser. Phosphor: Illuminating Dynamic Data Flow in Off-The Shelf JVMs. In: *Proceeding of the 29th ACM SIGPLAN Conference on Object Oriented Programming Systems Languages and Applications*. OOPSLA 2014. Acceptance rate: 28%. Artifact accepted as meeting reviewer expectations. 2014. <http://jonbell.net/publications/phosphor>.
14. **Bell, Jonathan** and G. Kaiser. Unit Test Virtualization with VMVM. In: *Proceedings of the 2014 International Conference on Software Engineering*. ICSE 2014. Acceptance rate: 20%. **ACM SIGSOFT Distinguished Paper Award**. 2014. <http://jonbell.net/publications/vmvm>.
15. **Bell, Jonathan**, N. Sarda, and G. Kaiser. Chronicler: Lightweight Recording to Reproduce Field Failures. In: *Proceedings of the 2013 International Conference on Software Engineering*. ICSE 2013. Acceptance rate: 18.5%. 2013. <http://jonbell.net/publications/chronicler>.

#### Journals

1. **Bell, Jonathan**, C. Murphy, and G. Kaiser. Metamorphic Runtime Checking of Applications Without Test Oracles. In: *CrossTalk, the Journal of Defense Software Engineering*. Vol. March 2015. 2015. <http://jonbell.net/publications/columbus>.

#### CS Education

1. Sheth, S., **Bell, Jonathan**, and G. Kaiser. A Competitive-Collaborative Approach for Introducing Software Engineering in a CS2 Class. In: *Proceedings of the 2013 Conference on Software Engineering Education and Training*. CSEET 2013. 2013. <http://jonbell.net/publications/cseet2013>.
2. **Bell, Jonathan**, S. Sheth, and G. Kaiser. Secret ninja testing with HALO software engineering. In: *Proceedings of the 4th international workshop on Social software engineering*. SSE '11. 2011. <http://jonbell.net/publications/halo-sse>.
3. Sheth, S., **Bell, Jonathan**, and G. Kaiser. HALO (Highly Addictive, socialLly Optimized) Software Engineering. In: *Proceeding of the 1st international workshop on Games and software engineering*. GAS '11. 2011. <http://jonbell.net/publications/halo>.

### Other Short Papers

1. Su, F.-H., **Bell, Jonathan**, G. Kaiser, and B. Ray. Obfuscation Resilient Search through Executable Classification. In: *Proceedings of the 2nd ACM SIGPLAN International Workshop on Machine Learning and Programming Languages*. MAPL 2018. 2018. <http://jonbell.net/publications/macneto>.
2. **Bell, Jonathan**, T. D. LaToza, F. Baldmitsi, and A. Stavrou. Advancing Open Science with Version Control and Blockchains. In: *Proceedings of the 12th International Workshop on Software Engineering for Science*. SE4Science 2017. 2017. <http://jonbell.net/publications/se4science>.
3. Su, F.-H., **Bell, Jonathan**, and G. Kaiser. Challenges in Behavioral Code Clone Detection. In: *Proceedings of the 10th International Workshop on Software Clones*. IWSC 2016. 2016. <http://jonbell.net/publications/iwsc16>.
4. Su, F.-H., **Bell, Jonathan**, C. Murphy, and G. Kaiser. Dynamic Inference of Likely Metamorphic Properties to Support Differential Testing. In: *Proceedings of the 10th International Workshop on Automation of Software Test*. AST 2015. 2015. <http://jonbell.net/publications/mt-inference>.
5. **Bell, Jonathan** and G. Kaiser. Dynamic Taint Tracking for Java with Phosphor (Demo). In: *Proceedings of the 2015 International Symposium on Software Testing and Analysis*. ISSTA 2015. 2015. <http://jonbell.net/publications/phosphor-demo>.
6. **Bell, Jonathan**. Detecting, Isolating and Enforcing Dependencies Between and Within Test Cases. In: *Proceedings of the 22nd ACM SIGSOFT International Symposium on Foundations of Software Engineering Doctoral Symposium*. SIGSOFT/FSE 2014. 2014. <http://jonbell.net/publications/fse-docsym>.
7. **Bell, Jonathan** and G. Kaiser. VMVM: Unit Test Virtualization for Java (Formal Tool Demonstration). In: *Proceedings of the 2014 International Conference on Software Engineering*. ICSE 2014. Acceptance rate: 36%. 2014. <http://jonbell.net/publications/vmvm-demo>.
8. **Bell, Jonathan**, S. Sheth, and G. Kaiser. A Large-Scale, Longitudinal Study of User Profiles in World of Warcraft. In: *Proceedings of the 5th international workshop on web intelligence and communities*. WiC '13. 2013. <http://jonbell.net/publications/wow>.

### RESEARCH GRANTS

**Total: 6 grants, \$1,179,591 to GMU, my share: \$1,050,924**

1. "NSF Student Travel Grant for 2019 ACM SIGPLAN Conference on Systems, Programming, Languages and Applications: Software for Humanity (SPLASH)," PI: Jonathan Bell. *National Science Foundation* CCF-1940760, \$30,000 to support undergraduate student attendance at the PL/SE mentoring workshop. 8/19-1/20.
2. "CAREER: Amplifying Developer-Written Tests for Code Injection Vulnerability Detection," PI: Jonathan Bell. *National Science Foundation* CNS-1844880, \$500,000. 5/19-4/24.
3. "Enabling Testing and Dynamic Analysis Research at a Very Large Scale," PI: Jonathan Bell. *Amazon Web Services*, \$8,000 to support cloud infrastructure, 12/18.
4. "SHF: Medium: Collaborative Research: Enhancing Continuous Integration Testing for the Open-Source Ecosystem," PI: Jonathan Bell, also non-GMU PIs Darko Marinov (UIUC) and Lingming Zhang (UT Dallas). *National Science Foundation* CCF-1763822, \$1.2 million, GMU Portion: \$399,591. 10/18-9/22.
5. "NSF Student Travel Grant for 2018 ACM SIGPLAN Conference on Systems, Programming, Languages and Applications: Software for Humanity (SPLASH)," PI: Jonathan Bell. *National Science Foundation* CCF-1838986, \$30,000 to support undergraduate student attendance at the PL/SE mentoring workshop. 8/18-1/19.
6. "Science of Security Principles of Trustworthy Systems Design, Modeling and Analysis for Security and Privacy," PI: Jonathan Bell. *National Security Agency*, subcontract from *Carnegie Mellon University*, \$250,000 to GMU, \$83,333 to me. 5/18-5/23.

- INVITED TALKS
- “Testing and Analysis: Better Together,” Northeastern University, October 2019.
  - “DeFlaker: Automatically Detecting Flaky Tests,” Google Journal Club Paper Series, April 2018.
  - “Detecting and Debugging Flaky Tests,” Swedish Association for Software Testing Quarterly Meeting, April 2018.
  - “Practical Dynamic Data Flow Analysis in the JVM,” University of Maryland, May 2017.
  - “Practical Dynamic Data Flow Analysis in the JVM,” Virginia Tech Arlington Campus, March 2017.
  - “Making Software More Reliable by Uncovering Hidden Dependencies,” University of Washington, November 2016.
  - “Making Software More Reliable by Uncovering Hidden Dependencies,” University of Delaware, September 2016.
  - “Making Software More Reliable by Uncovering Hidden Dependencies,” Carnegie Mellon, April 2016.
  - “Making Software More Reliable by Uncovering Hidden Dependencies,” George Mason University, March 2016.
  - “Making Software More Reliable by Uncovering Hidden Dependencies,” Georgia Tech, February 2016.
  - “Making Software More Reliable by Uncovering Hidden Dependencies,” IBM TJ Watson, January 2016.
  - “Faster, More Reliable Builds,” University of Illinois at Urbana-Champaign, December 2015.
  - “Practical Dynamic Taint Tracking in the JVM,” University of Illinois at Urbana-Champaign, December 2015.
  - “Practical Dynamic Taint Tracking in the JVM,” IBM Programming Languages Day, November 2015.
  - “Test Dependencies and the Future of Build Acceleration,” CUNY City Tech Computer Systems Colloquium, September 2015.
  - “Accelerating Software Testing”, Georgia Tech Software Engineering Group Seminar, November 2014.
  - “Accelerating Software Testing”, Electric Cloud, inc. internal all-hands meeting, November 2014.

TEACHING **George Mason University**, Fairfax, VA USA

*“Q15” refers to student evaluation question 15, “My overall rating of the teaching;” “Q16” refers to student evaluation question 16 “My overall rating of this course;” “avg” refers to the overall department average that semester.*

- Fall 2019: Undergrad: “Distributed and Concurrent Systems.” <https://www.jonbell.net/gmu-cs-475-fall-2019/>.
- Spring 2019: Undergrad: “Distributed and Concurrent Systems.” Q15: 4.88/5 (avg. 4.32), Q16: 4.69/5 (avg. 4.07). <http://www.jonbell.net/gmu-cs-475-spring-2019/>.
- Fall 2018: Undergrad: “Web App Development.” Q15: 4.75/5 (avg. 4.29), Q16: 4.67/5 (avg. 4.10). <https://www.jonbell.net/swe-432-fall-2018-web-programming/>.
- Spring 2018: Undergrad: “Distributed and Concurrent Systems.” Q15: 5.00/5 (avg. 4.32), Q16: 4.56/5 (avg. 4.12). <http://www.jonbell.net/gmu-cs-475-spring-2018/>
- Fall 2017: Grad: “Program Analysis for Software Testing.” <http://www.jonbell.net/swe-795-fall-17-program-analysis-for-software-testing/> (Small seminars do not receive course evaluations)
- Spring 2017: Grad: “Distributed Software Engineering.” Q15: 4.38/5 (avg 4.21), Q16: 4.13/5 (avg 4.05). <http://www.jonbell.net/swe-622-spring-2017/>
- Fall 2016: Undergrad: “Design and Implementation of Software for the Web.” Q15: 4.71/5 (avg 4.23), Q16: 4.52/5 (avg 4.08). <http://www.jonbell.net/swe-432-fall-2016/>

PROFESSIONAL AND RESEARCH EXPERIENCE

<b>George Mason University</b> , Fairfax, VA USA <i>Assistant Professor, Department of Computer Science</i>	<b>August 2016 to Present</b>
<b>Electric Cloud, Inc</b> , San Jose, CA USA <i>Consulting Research Scientist</i>	<b>July 2014 to November 2014</b>
<b>Programming Systems Laboratory, Columbia University</b> , New York, NY USA <i>Graduate Research Assistant</i>	<b>January 2011 to August 2016</b>
<b>RentPost, LLC</b> , Atlanta, GA USA <i>Co-Founder and Advisor</i>	<b>May 2010 to Present</b>

SERVICE

**Conference/Workshop Organization**

	2020	
Curry On		General Chair, Curry On Conference
ACM SIGSOFT		Co-Chair, SIGSOFT-wide Open Science Initiative
PLDI AEC		Co-Chair, PLDI Artifact Evaluation Committee
	2019	
ACM SIGSOFT		Co-Chair, SIGSOFT-wide Open Science Initiative
SPLASH		Co-Chair, PL/SE Mentoring Workshop
ICSE		Speaker, Mentoring Workshop; Judge, Student Research Competition
	2018	
SPLASH		Co-Chair, Conference Publicity
		Co-Chair, PL/SE Mentoring Workshop
	2017	
SPLASH		Co-Chair, Posters
		PL/SE Mentoring Workshop Organizing Committee Member
		2015, 2014 and 2013
SPLASH		Co-Chair, Student Volunteers
	2012	
GAS		Workshop co-organizer at the International Workshop on Games and Software Engineering, Co-Located with ICSE 2012

**Conference/Workshop Program Committee Membership**

	2020	
ICSE		International Conference on Software Engineering PC
MSR		Mining Software Repositories PC
MSR/Challenge		Mining Software Repositories Mining Challenge Track PC
ICST/TOOLS		Testing Tools Track at the International Conference on Software Testing PC
	2019	
ASE (RRRR)		Automated Software Engineering PC Reliable Rapid Response Reviewer
ICSME/LBI		International Conference on Software Maintenance and Evolution, Late Breaking Ideas Track PC
ICST		International Conference on Software Testing PC
	2018	
ASE		Automated Software Engineering PC
FSE/NIER		Foundations of Software Engineering NIER Track PC
MSR/Challenge		Mining Software Repositories Mining Challenge Track PC
	2017	
ICSME/Artifacts		Artifacts track at the IEEE ICSME conference
MSR/Challenge		Mining Software Repositories Mining Challenge Track PC
	2016	
RELENG		Release Engineering Workshop co-located with FSE
OOPSLA/Artifacts		Artifacts track at the ACM OOPSLA conference

ICST/Tools	Tool papers track at the IEEE ICST conference 2015
OOPSLA/Artifacts	Artifacts track at the ACM OOPSLA conference
ISSTA/Artifacts	Artifacts track at the ACM ISSTA conference

**Journal Reviewing**

	2019
EMSE	Springer’s Empirical Software Engineering
JSS	Elsevier’s Journal of Systems and Software
	2018
EMSE	Springer’s Empirical Software Engineering Review Board
	2017
EMSE	Springer’s Empirical Software Engineering
JSS	Elsevier’s Journal of Systems and Software
IEEE SW	IEEE Software Magazine
	2016
JSS	Elsevier’s Journal of Systems and Software
EMSE	Springer’s Empirical Software Engineering Review Board

**Other**

	2019
NSF	Panelist
	2018
NSF	Panelist
	2017
NSF	Panelist on two panels

**Within George Mason University CS Department**

	2019-2020
SRCT Student Group Faculty Advisor	
Advisory, computing, PhD, tenure track recruitment, SWE MS admissions committees	
	2018-2019
SRCT Student Group Faculty Advisor	
Advisory, computing, PhD, tenure & teaching track recruitment, SWE MS admissions committees	
	2017-2018
Computing, PhD, teaching track recruitment, SWE MS admissions committees	
	2016-2017
Computing, SWE MS Admissions committees	

THESIS  
COMMITTEES

**Committee Member:**

**Chong Tang** (UVA PhD CS, advisors Kevin Sullivan and Baishakhi Ray), “Improving System Performance via Design and Configuration Space Exploration.”

**David Gonzalez** (GMU PhD IT, advisor Thomas LaToza), “Direct Manipulation of Code through Idiomatic Views”

**Fernando Boccanera** (GMU PhD IT, advisor Alex Brodsky), “Decision Guidance on Software Feature Selection to Maximize the Benefit to Organizational Processes.”

MENTORING &  
ADVISING

**At George Mason:**

**Matthew Coley** (UG), “Improving Maven’s Flaky Test Detection,” Summer 2019.

**Katie Hough** (UG/MS), “Amplifying Developer-Provided Tests to Detect Injection Vulnerabilities,” Spring 2019-Present

**Aaron Massey** (UG/MS), “Amplifying Developer-Provided Tests to Detect Injection Vulnerabilities,” Spring 2019-Present

**James Kukucka** (PhD), “Fuzzing stateful applications in the JVM,” Spring 2019-Present

**Abdulrahman Alshammari** (PhD), “Proactive Detection of Flaky Tests,” Spring 2019-Present

**Sarah Alhozaimy** (PhD), “Quantifying and Visualizing Changes in Code Coverage,” Fall 2018-2019.

**Hayder Al Haddad** (BS), “Detecting and Visualizing Changes in Code Coverage,” Summer 2018.

**Luís Pina** (Postdoctoral Scholar), “JVM Systems for Intrusion Detection and Vulnerability Detection,” Fall 2017-Summer 2019. Now: Assistant Professor at University of Illinois (Chicago).

**Okhaifo Oikeh** (MS), “Exploiting Dynamic Dataflow Information to Improve Software Testing,” Fall 2017-Fall 2018.

**Jeffrey Currence** (BS), with Thomas LaToza, “Mining API invocations in JavaScript,” Summer 2017.

**Monica Jeyasankar** (BS), “Detecting Code Relatives in JavaScript,” Spring 2017. Now at Capital One.

**Sravva Kalva** (BS), “Detecting Code Relatives in JavaScript,” Spring 2017. Now at Geico.

**Pakeezha Arfany** (BS), “Detecting Code Relatives in JavaScript,” Spring 2017. Now at CACI.

**At Columbia:**

**Mandi Wang** (MS), “Extending Test Suite Minimization,” Fall 2014, Spring 2015. Now at Google.

**Emilia Pakulski** (BS), “Automating Test Suite Minimization,” Fall 2014. Now at Segovia.

**Alana Ramjit** (BS), “Optimizing Scala Test Suites,” Fall 2014. Now at UCLA.

**Jennifer Lam** (BS), “Analyzing Regression Testing Practices in OSS,” Spring 2014. Interned at Citi and Bloomberg.

**Xingzhou Derek He** (BS), “Symbolic String Analysis for Java,” Spring 2014, Fall 2014, Spring 2015. Interned at Dropbox and D.E. Shaw.

**Sidharth Shanker** (BS), “Comparing test suite minimization techniques,” Fall 2013. Now at Counsyl.

**Winnie Narang** (MS), “Reproducing Java application field-failures with limited user information,” Fall 2013. Now at Amazon.

**Nikhil Sarda** (MS), “Creating an efficient and robust Java *in-vivo* testing framework,” Summer 2012. Now at Mattermark.

**Miriam Melnick** (BS), “Detecting state-based metamorphic properties with *in-vivo* testing,” Spring 2012. “HALO-SE web portal,” Fall 2011. Now at Google.

**Ethan Hann** (MS), “Visualizing World of Warcraft player data,” Spring 2012. Now at Columbia Medical Center.

**Alison Yang** (BS), “Research notebook for *genSpace*,” Spring 2012.

**Jason Halpern** (MS), “Understanding user retention in *genSpace*,” Fall 2011. Now at SecondMarket.

**Evgeny Fedetov** (MS), “Towards social diversity in tool recommendations with *genSpace*,” Summer 2011. Now at JP Morgan.

**Aditya Bir** (MS), “Managing complex datasets in *genSpace*,” Spring 2011. Now at UBS.