Claire Le Goues

Software and Societal Systems Department
School of Computer Science
Carnegie Mellon University

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Research Interests and Approach

My research interests span software engineering and programming languages, and especially in how to construct, maintain, evolve, improve/debug, and assure high-quality software systems.

Employment

Carnegie Mellon University . . . . . Pittsburgh, PA, USA
School of Computer Science (SCS)
Software and Societal Systems Department (S3D)

2024 – present	Professor
2022 – present	Associate Department Head for Faculty, S3D
2021 – 2024	Associate Professor, with indefinite tenure
2019 – 2021	Associate Professor, without indefinite tenure
2013 – 2019	Assistant Professor

Microsoft Research . . . . . Redmond, WA, USA

2009	Research Intern, Research in Software Engineering (RiSE) group

IBM . . . . . *(various)*

2006–2007	Software Engineer, XML Technologies/Compilation	Cambridge, MA, USA
2005	Research Intern, Collaborative User Experience (CUE)	Cambridge, MA, USA
2004	Research Intern, Architect's Workbench	Hawthorne, NY, USA

Education

University of Virginia . . . . . Charlottesville, VA, USA

2013	Doctor of Philosophy in Computer Science Thesis: Automatic Program Repair Using Genetic Programming, advised by Westley Weimer
2009	Master of Science in Computer Science Thesis: Specification Mining With Few False Positives, advised by Westley Weimer

Harvard University . . . . . Cambridge, MA, USA

2006	Bachelor of Arts in Computer Science Thesis: Algebraic Type Isomorphisms, advised by Gregory Morrisett

Honors and Major Leadership

Leadership and Impact

2020–2026	SCS Faculty Fellowship Recognizing Diversity and Inclusion
2020	ACM SIGSOFT Early Career Researcher Award
2019	ICSE Most Influential Paper (N-10)
2019	SIGEVO Impact Award

Research Quality

2022	Best Paper, USENIX Security
2018	ACM Distinguished Paper, Intl. Conference on Software Engineering
2018	Facebook Testing and Verification Research Award
2015	Featured Article, IEEE Transactions on Software Engineering

2013 Google Faculty Research Award
2012 Featured Article, IEEE Transactions on Software Engineering
2012 Bronze, ACM SIGEVO "Humies" for Human-Competitive Results Produced by Genetic and Evolutionary Computation
2009 Gold, ACM SIGEVO "Humies" for Human-Competitive Results Produced by Genetic and Evolutionary Computation
2009 IFIP TC2 Manfred Paul Award, Intl. Conference on Software Engineering
2009 ACM Distinguished Paper, Intl. Conference on Software Engineering
2009 Best Paper, Genetic and Evolutionary Computation Conference
2009 Best Short Paper, Workshop on Search-Based Software Testing

Other honors

2022 Distinguished Reviewer, Intl. Conference on Automated Software Engineering (ASE)
2018 Reliable Rapid Response Reviewer, Intl. Conference on Software Engineering
2018 National Science Foundation CAREER Award
2016 Best Reviewer Award, Intl. Symposium on Search-Based Software Engineering
2015 Distinguished Reviewer, Intl. Conference on Automated Software Engineering (ASE)
2009–2012 Graduate Research Fellowship, National Science Foundation

Professional Service and Affiliations

Local Service at Carnegie Mellon University

Leadership and University-level service

Associate Dept. Head for Faculty, S3D 2022–present
Member, University Committee on Faculty Appointments (Non tenure) 2021–2023
Chair, ISR Tenure Track Hiring Committee 2019–2022
Co-Director, REUSE@CMU 2016–present
Director, Undergraduate Minor in Software Engineering 2014–2018

Other service

Member, SCS Dean Search Committee 2018–2019
Member, Cylab Director Search Committee 2018
Member, SCS Undergraduate Review Committee 2016–2019
Member, ISR Teaching/Tenure Track Faculty Hiring Committees 2015–2019
Member, SE PhD Graduate Admissions Committee 2013–present

International Service

Organization and Chairs

- Area Co-Chair, Intl. Conference on Automated Software Engineering (ASE), 2024
- Area Co-Chair, Intl. Conference on Software Engineering (ICSE), 2024
- Newcomers Co-Chair, Intl. Conference on Software Engineering (ICSE), 2022
- PC Co-Chair, Intl. Conference on Automated Software Engineering (ASE), 2020
- PC Co-Chair, Tool Demonstration Track, Intl. Conference on Automated Software Engineering (ASE Demo), 2019
- PC Co-chair, Foundations of Software Engineering, New Ideas and Emerging Results Track (FSE-NIER), 2018
- Co-organizer, Dagstuhl Seminar 18052, Genetic Improvement of Software, 2018
- Co-organizer, Dagstuhl Seminar 17022, Automated Program Repair, 2017
- PC Chair, Graduate Track, Symposium on Search Based Software Engineering (SSBSE), 2017
- Review Process Co-Chair, Intl. Conference on Automated Software Engineering (ASE), 2016
- Local Arrangements Chair, Systems, Programming, Languages and Applications: Software for Humanity (SPLASH), 2015
- PC Co-chair, Symposium on Search Based Software Engineering (SSBSE), 2014

Memberships

- Steering Committee Member, Intl. Conference on Automated Software Engineering (ASE), 2020–present
- Member, ASE Most Influential Paper (MIP) Award Committee, Intl. Conference on Automated Software Engineering (ASE), 2020, 2021
- Member, Test of Time Award Selection Committee, European Software Engineering Conference/Foundations of Software Engineering (ESEC/FSE), 2019
- Member, IEEE Transactions on Software Engineering (TSE) Review Board, 2017–2020
- Member, DARPA ISAT study group, 2017–2020
- Steering Committee Member, Symposium on Search Based Software Engineering (SSBSE), 2014–2017

Journal Editorships

- Associate Editor, Harvard Data Science Review (HDSR), 2022–present
- Guest editor for special issue of IEEE Software on Automatic Program Repair, 2021
- Associate Editor, Genetic Programming and Evolvable Machines (Area Editor for Software Engineering) (GPEM), 2019–present

Program Committee (conference)

- Intl. Conference on Software Engineering (ICSE) 2016, 2017, 2018 (Rapid Response Reviewer), 2019 (Program Board), 2022, 2023, 2024 (Area Chair, AI&SE, Auto-coding)
- IEEE/ACM Intl. Automated Software Engineering (ASE), 2015, 2018, 2019, 2022
- European Software Engineering Conference/Foundations of Software Engineering (ESEC/FSE), 2017, 2025
- Symposium on Search Based Software Engineering (SSBSE), 2015, 2016, 2018
- Working Conference on Mining Software Repositories (MSR), 2016
- Intl. Symposium on Software Testing and Analysis (ISSTA), 2016
- North American Conference on Search-Based Software Engineering (NasBASE), 2015
- Intl. Conference on Software Maintenance and Evolution (ICSME), 2014, 2015

Program Committee (special tracks, workshops)

- Intl. Workshop on Dependability of Safety-Critical Systems with Machine Learned Components (D-SyMLe), 2023
- Intl. Workshop on Automatic Program Repair (ICSE) (APR), 2022
- Intl. Workshop on Genetic Improvement (ICSE) (GI), 2018
- Intl. Workshop on Software Fairness (FairWare), 2018
- Demonstrations Track, Intl. Symposium on Software Testing and Analysis (ISSTA-Demos), 2017
- Intl. Workshop on Genetic Improvement (GECCO) (GECCO-GI), 2015, 2016
- Tools Track, Intl. Conference on Software Testing (ICST-Tools), 2015
- Tools Track, Intl. Conference on Software Maintenance and Evolution (ICSME/Tools), 2015
- Tools Track, Intl. Conference on Software Engineering (ICSE/Tools), 2015
- Onward! Essays (Onward!), 2015
- New Ideas and Emerging Results, Intl. Conference on Software Engineering (ICSE NIER), 2014

Journal Referee

- IEEE TSE (2015–present)
- ACM TOSEM (2014, 2015, 2020–present)
- Harvard Data Science Review, 2022–present
- Empirical Software Engineering (EMSE) (2016–present)
- IEEE Software (2014, 2020)
- Journal of Automated Reasoning (JARS) (2016, 2017)
- Journal of Software: Evolution and Process (JSEP) (2014, 2015)
- Journal of Computing (2015)
- Journal of Systems and Software (JSS) (2014)

Publications

Books, Chapters, and Proceedings

[B3] John Grundy, Claire Le Goues, and David Lo, eds. *35th IEEE/ACM International Conference on Automated Software Engineering Workshops, ASE Workshops 2020, Melbourne, Australia, September 21-25, 2020*. ACM, 2020. ISBN: 978-1-4503-8128-4. DOI: 10.1145/3417113. URL: https://doi.org/10.1145/3417113.

[B2] Claire Le Goues and Shin Yoo, eds. *Proceedings of the 6th International Symposium on Search-Based Software Engineering, SSBSE 2014, Fortaleza, Brazil, August 26-29, 2014*. Vol. 8636. Lecture Notes in Computer Science. Springer, 2014. ISBN: 978-3-319-09939-2. DOI: 10.1007/978-3-319-09940-8.

[B1] Claire Le Goues, Anh Nguyen-Tuong, Hao Chen, Jack W. Davidson, Stephanie Forrest, Jason Hiser, John C. Knight, and Matthew Van Gundy. "Moving Target Defenses in the Helix Self-Regenerative Architecture". In: *Moving Target Defense II - Application of Game Theory and Adversarial Modeling*. Springer, 2013, pp. 117–149. DOI: 10.1007/978-1-4614-5416-8_7.

Refereed Journal Articles

[J19] Luke Dramko, Jeremy Lacomis, Pengcheng Yin, Edward J. Schwartz, Miltiadis Allamanis, Graham Neubig, Bodan Vasilescu, and Claire Le Goues. "DIRE and its Data: Neural Decompiled Variable Renamings with respect to Software Class". In: *ACM Trans. Softw. Eng. Methodol.* 32.2 (2022), 39:1–39:34. DOI: 10.1145/3546946.

[J18] Juan Alfredo Cruz-Carlon, Mahsa Varshosaz, Claire Le Goues, and Andrzej Wąsowski. "Patching Locking Bugs Statically with Crayons". In: *ACM Trans. Softw. Eng. Methodol.* (June 2022). Just Accepted. ISSN: 1049-331X. DOI: 10.1145/3548684.

[J17] Afsoon Afzal, Claire Le Goues, and Christopher Steven Timperley. "Mithra: Anomaly Detection as an Oracle for Cyberphysical Systems". In: *IEEE Trans. Software Eng.* 48.11 (2022), pp. 4535–4552. DOI: 10.1109/TSE.2021.3120680.

[J16] Claire Le Goues, Michael Pradel, Abhik Roychoudhury, and Satish Chandra. "Automatic Program Repair". In: *IEEE Softw.* 38.4 (2021), pp. 22–27. DOI: 10.1109/MS.2021.3072577.

[J15] Christopher Steven Timperley, Lauren Herckis, Claire Le Goues, and Michael Hilton. "Understanding and improving artifact sharing in software engineering research". In: *Empir. Softw. Eng.* 26.4 (2021), p. 67. DOI: 10.1007/s10664-021-09973-5.

[J14] Cody Kinneer, David Garlan, and Claire Le Goues. "Information Reuse and Stochastic Search: Managing Uncertainty in Self-* Systems". In: *ACM Trans. Auton. Adapt. Syst.* 15.1 (2021), 3:1–3:36. DOI: 10.1145/3440119.

[J13] Manish Motwani, Mauricio Soto, Yuriy Brun, René Just, and Claire Le Goues. "Quality of Automated Program Repair on Real-World Defects". In: *IEEE Transactions on Software Engineering (TSE)* 48.2 (2022), pp. 637–661. ISSN: 0098-5589. DOI: 10.1109/TSE.2020.2998785.

[J12] Afsoon Afzal, Manish Motwani, Kathryn T. Stolee, Yuriy Brun, and Claire Le Goues. "SOSRepair: Expressive Semantic Search for Real-World Program Repair". In: *IEEE Transactions on Software Engineering (TSE)* 47.10 (2021), pp. 2162–2181. ISSN: 0098-5589. DOI: 10.1109/TSE.2019.2944914.

[J11] Claire Le Goues, Michael Pradel, and Abhik Roychoudhury. "Automated Program Repair". In: *Commun. ACM* 62.12 (Nov. 2019), pp. 56–65. ISSN: 0001-0782. DOI: 10.1145/3318162.

[J10] Jonathan Aldrich, David Garlan, Christian Kästner, Claire Le Goues, Anahita Mohseni-Kabir, Ivan Ruchkin, Selva Samuel, Bradley R. Schmerl, Christopher Steven Timperley, Manuela Veloso, Ian Voysey, Joydeep Biswas, Arjun Guha, Jarrett Holtz, Javier Cámara, and Pooyan Jamshidi. "Model-Based Adaptation for Robotics Software". In: *IEEE Software* 36.2 (2019), pp. 83–90. DOI: 10.1109/MS.2018.2885058.

[J9] Claire Le Goues, Ciera Jaspan, Ipek Ozkaya, Mary Shaw, and Kathryn T. Stolee. "Bridging the Gap: From Research to Practical Advice". In: *IEEE Software* 35.5 (2018), pp. 50–57. DOI: 10.1109/MS.2018.3571235.

[J8] Claire Le Goues, Yuriy Brun, Sven Apel, Emery Berger, Sarfraz Khurshid, and Yannis Smaragdakis. "Effectiveness of Anonymization in Double-Blind Review". In: *Commun. ACM* 61.6 (June 2018), pp. 30–33. DOI: 10.1145/3208157.

[J7] Xuan-Bach D. Le, Ferdian Thung, David Lo, and Claire Le Goues. "Overfitting in semantics-based automated program repair". In: *Empirical Software Engineering* 23.5 (2018), pp. 3007–3033. DOI: 10.1007/s10664-017-9577-2.

[J6] Vinicius Paulo L. Oliveira, Eduardo F. Souza, Claire Le Goues, and Celso G. Camilo-Junior. "Improved representation and genetic operators for linear genetic programming for automated program repair". In: *Empirical Software Engineering* 23.5 (2018), pp. 2980–3006. DOI: 10.1007/s10664-017-9562-9.

[J5] Claire Le Goues, Neal Holtschulte, Edward K. Smith, Yuriy Brun, Premkumar T. Devanbu, Stephanie Forrest, and Westley Weimer. "The ManyBugs and IntroClass Benchmarks for Automated Repair of C Programs". In: *IEEE Trans. Software Eng.* 41.12 (2015), pp. 1236–1256. DOI: 10.1109/TSE.2015.2454513.

[J4] Claire Le Goues, Stephanie Forrest, and Westley Weimer. "Current challenges in automatic software repair". In: *Software Quality Journal* 21.3 (2013), pp. 421–443. DOI: 10.1007/s11219-013-9208-0.

[J3] Claire Le Goues, ThanhVu Nguyen, Stephanie Forrest, and Westley Weimer. "GenProg: A Generic Method for Automatic Software Repair". In: *IEEE Trans. Software Eng.* 38.1 (2012), pp. 54–72. DOI: 10.1109/TSE.2011.104.

[J2] Claire Le Goues and Westley Weimer. "Measuring Code Quality to Improve Specification Mining". In: *IEEE Trans. Software Eng.* 38.1 (2012), pp. 175–190. DOI: 10.1109/TSE.2011.5.

[J1] Westley Weimer, Stephanie Forrest, Claire Le Goues, and ThanhVu Nguyen. "Automatic program repair with evolutionary computation". In: *Communications of the ACM Research Highlight* 53.5 (May 2010), pp. 109–116. DOI: 10.1145/1735223.1735249.

Refereed Conference Publications

[C53] Aidan Z. H. Yang, Claire Le Goues, Ruben Martins, and Vincent Hellendoorn. "Large Language Models for Test-Free Fault Localization". In: *Proceedings of the IEEE/ACM 46th International Conference on Software Engineering*. ICSE '24. New York, NY, USA: Association for Computing Machinery, 2024. ISBN: 9798400702174. DOI: 10.1145/3597503.3623342.

[C52] Hadeel Eladawy, Claire Le Goues, and Yuriy Brun. "Automated Program Repair, What Is It Good For? Not Absolutely Nothing!" In: *Proceedings of the IEEE/ACM 46th International Conference on Software Engineering*. ICSE '24. New York, NY, USA: Association for Computing Machinery, 2024. ISBN: 9798400702174. DOI: 10.1145/3597503.3639095.

[C51] Tobias Dürschmid, Christopher Steven Timperley, David Garlan, and Claire Le Goues. "ROSInfer: Statically Inferring Behavioral Component Models for ROS-based Robotics Systems". In: *Proceedings of the IEEE/ACM 46th International Conference on Software Engineering*. ICSE '24. New York, NY, USA: Association for Computing Machinery, 2024. ISBN: 9798400702174. DOI: 10.1145/3597503.3639206.

[C50] Kush Jain, Uri Alon, Alex Groce, and Claire Le Goues. "Contextual Predictive Mutation Testing". In: *Proceedings of the 31st ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering*. ESEC/FSE 2023. New York, NY, USA: Association for Computing Machinery, 2023, pp. 250–261. ISBN: 9798400703270. DOI: 10.1145/3611643.3616289. URL: https://doi.org/10.1145/3611643.3616289.

[C49] Kush Jain, Goutamkumar Tulajappa Kalburgi, Claire Le Goues, and Alex Groce. "Mind the Gap: The Difference Between Coverage and Mutation Score Can Guide Testing Efforts". In: *2023 IEEE 34th International Symposium on Software Reliability Engineering (ISSRE)*. 2023, pp. 102–113. DOI: 10.1109/ISSRE59848.2023.00036.

[C48] Daniel Ramos, Hailie Mitchell, Inês Lynce, Vasco Manquinho, Ruben Martins, and Claire Le Goues. "MELT: Mining Effective Lightweight Transformations from Pull Requests". In: *2023 38th IEEE/ACM International Conference on Automated Software Engineering (ASE)*. 2023, pp. 1516–1528. DOI: 10.1109/ASE56229.2023.00117.

[C47] Nikitha Rao, Kush Jain, Uri Alon, Claire Le Goues, and Vincent J. Hellendoorn. "CAT-LM Training Language Models on Aligned Code And Tests". In: *2023 38th IEEE/ACM International Conference on Automated Software Engineering (ASE)*. 2023, pp. 409–420. DOI: 10.1109/ASE56229.2023.00193.

[C46] Alex Groce, Rijnard van Tonder, Goutamkumar Tulajappa Kalburgi, and Claire Le Goues. "Making no-fuss compiler fuzzing effective". In: *31st ACM SIGPLAN International Conference on Compiler Construction (CC)*. ACM, 2022, pp. 194–204. DOI: 10.1145/3497776.3517765.

[C45] Kevin Leach, Christopher Steven Timperley, Kevin Angstadt, Anh Nguyen-Tuong, Jason Hiser, Aaron Paulos, Partha P. Pal, Patrick Hurley, Carl Thomas, Jack W. Davidson, Stephanie Forrest, Claire Le Goues, and Westley Weimer. "START: A Framework for Trusted and Resilient Autonomous Vehicles (Practical Experience Report)". In: *IEEE 33rd International Symposium on Software Reliability Engineering, ISSRE*. IEEE, 2022, pp. 73–84. DOI: 10.1109/ISSRE55969.2022.00018.

[C44] Christopher S. Timperley, Tobias Dürschmid, Bradley Schmerl, David Garlan, and Claire Le Goues. "ROSDiscover: Statically Detecting Run-Time Architecture Misconfigurations in Robotics Systems". In: *19th IEEE International Conference on Software Architecture (ICSA)*. ICSA '22. IEEE, 2022, pp. 112–123.

[C43] Qibin Chen, Jeremy Lacomis, Edward J. Schwartz, Claire Le Goues, Graham Neubig, and Bogdan Vasilescu. "Augmenting Decompiler Output with Learned Variable Names and Types". In: *31st USENIX Security Symposium*. 2022. DOI: 10.48550/arXiv.2108.06363.

[C42] Qibin Chen, Jeremy Lacomis, Edward J. Schwartz, Graham Neubig, Bogdan Vasilescu, and Claire Le Goues. "VarCLR: Variable Semantic Representation Pre-training via Contrastive Learning". In: *44th IEEE/ACM International Conference on Software Engineering (ICSE)*. 2022, pp. 2327–2339. DOI: 10.1145/3510003.3510162.

[C41] Chu-Pan Wong, Priscila Santiesteban, Christian Kästner, and Claire Le Goues. "VarFix: balancing edit expressiveness and search effectiveness in automated program repair". In: *Proceedings of the 29th ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering*. Athens, Greece: ACM, Aug. 2021, pp. 354–366. DOI: 10.1145/3468264.3468600.

[C40] Zhen Yu Ding and Claire Le Goues. "An Empirical Study of OSS-Fuzz Bugs". In: *2021 IEEE/ACM 18th International Conference on Mining Software Repositories*. MSR'21. Madrid, Spain: IEEE Computer Society, May 2021, pp. 131–142. DOI: 10.1109/MSR52588.2021.00026.

[C39] Ansong Ni, Daniel Ramos, Aidan Z. H. Yang, Inês Lynce, Vasco M. Manquinho, Ruben Martins, and Claire Le Goues. "SOAR: A Synthesis Approach for Data Science API Refactoring". In: *43rd IEEE/ACM International Conference on Software Engineering (ICSE)*. IEEE, 2021, pp. 112–124. DOI: 10.1109/ICSE43902.2021.00023.

[C38] Afsoon Afzal, Deborah S. Katz, Claire Le Goues, and Christopher Steven Timperley. "Simulation for Robotics Test Automation: Developer Perspectives". In: *14th IEEE Conference on Software Testing, Verification and Validation (ICST)*. Porto de Galinhas, Brazil: IEEE, Apr. 2021, pp. 263–274. DOI: 10.1109/ICST49551.2021.00036.

[C37] Zack Coker, Joshua Sunshine, and Claire Le Goues. "FrameFix: Automatically Repairing Statically-Detected Directive Violations in Framework Applications". In: *28th IEEE International Conference on Software Analysis, Evolution and Reengineering (SANER)*. Honolulu, HI: IEEE, Mar. 2021, pp. 201–212. DOI: 10.1109/SANER50967.2021.00027.

[C36] Cody Kinneer, Rijnard van Tonder, David Garlan, and Claire Le Goues. "Building Reusable Repertoires for Stochastic Self-* Planners". In: *IEEE International Conference on Autonomic Computing and Self-Organizing Systems (ACSOS)*. Washington, DC: IEEE, Aug. 2020, pp. 222–231. DOI: 10.1109/ACSOS49614.2020.00045.

[C35] Sophia Kolak, Afsoon Afzal, Claire Le Goues, Michael Hilton, and Christopher Steven Timperley. "It Takes a Village to Build a Robot: An Empirical Study of The ROS Ecosystem". In: *IEEE International Conference on Software Maintenance and Evolution (ICSME)*. Adelaide, Australia: IEEE, Sept. 2020, pp. 430–440. DOI: 10.1109/ICSME46990.2020.00048.

[C34] Thomas Durieux, Claire Le Goues, Michael Hilton, and Rui Abreu. "Empirical Study of Restarted and Flaky Builds on Travis CI". In: *IEEE/ACM 17th International Conference on Mining Software Repositories (MSR)*. Seoul, Republic of Korea: ACM, June 2020, pp. 254–264. DOI: 10.1145/3379597.3387460.

[C33] Deborah S. Katz, Casidhe Hutchison, Milda Zizyte, and Claire Le Goues. "Detecting Execution Anomalies as an Oracle for Autonomy Software Robustness". In: *Proceedings of the 2020 International Conference on Robotics and Automation (ICRA)*. Paris, France: IEEE, May 2020, pp. 9366–9373. DOI: 10.1109/ICRA40945.2020.9197060.

[C32] Rijnard van Tonder and Claire Le Goues. "Tailoring Programs for Static Analysis via Program Transformation". In: *Proceedings of the 42nd IEEE/ACM International Conference on Software Engineering (ICSE)*. ACM, 2020. DOI: 10.1145/3377811.3380343.

[C31] Afsoon Afzal, Claire Le Goues, Michael Hilton, and Christopher Steven Timperley. "A Study on Challenges of Testing Robotic Systems". In: *2020 IEEE International Conference on Software Testing, Verification and Validation (ICST)*. IEEE, 2020, pp. 96–107. DOI: 10.1109/ICST46399.2020.00020. URL: https://doi.org/10.1109/ICST46399.2020.00020.

[C30] Cody Kinneer, Ryan Wagner, Fei Fang, Claire Le Goues, and David Garlan. "Modeling Observability in Adaptive Systems to Defend against Advanced Persistent Threats". In: *Proceedings of the 17th ACM-IEEE International Conference on Formal Methods and Models for System Design (MEMOCODE)*. New York, NY, USA: Association for Computing Machinery, 2019. ISBN: 9781450369978. DOI: 10.1145/3359986.3361208.

[C29] Zack Coker, David G. Widder, Claire Le Goues, Christopher Bogart, and Joshua Sunshine. "A Qualitative Study on Framework Debugging". In: *2019 IEEE International Conference on Software Maintenance and Evolution (ICSME)*. Cleveland, OH, Sept. 2019, pp. 568–579. DOI: 10.1109/ICSME.2019.00091.

[C28] Jeremy Lacomis, Pengcheng Yin, Edward Schwarts, Miltiadis Allamanis, Claire Le Goues, Graham Neubig, and Bogdan Vasilescu. "DIRE: A Neural Approach to Decompiled Identifier Naming". In: *Proceedings of the 34th IEEE/ACM International Conference on Automated Software Engineering (ASE)*. 2019, pp. 628–639. DOI: 10.1109/ASE.2019.00064.

[C27] Rijnard van Tonder and Claire Le Goues. "Lightweight Multi-language Syntax Transformation with Parser Parser Combinators". In: *Proceedings of the 40th ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI)*. 2019, pp. 363–378. DOI: 10.1145/3314221.3314589.

[C26] Rijnard van Tonder, John Kotheimer, and Claire Le Goues. "Semantic crash bucketing". In: *Proceedings of the 33rd ACM/IEEE International Conference on Automated Software Engineering (ASE)*. Montpellier, France, 2018, pp. 612–622. DOI: 10.1145/3238147.3238200.

[C25] Rijnard van Tonder and Claire Le Goues. "Cross-Architecture Lifter Synthesis". In: *Proceedings of the 16th International Conference on Software Engineering and Formal Methods (SEFM) Held as part of STAF 2018*. Vol. 10886. Lecture Notes in Computer Science. Springer, 2018, pp. 155–170. DOI: 10.1007/978-3-319-92970-5_10.

[C24] Eduardo Faria de Souza, Claire Le Goues, and Celso Goncalves Camilo-Junior. "A Novel Fitness Function for Automated Program Repair Based on Source Code Checkpoints". In: *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO)*. Kyoto, Japan: ACM, July 2018, pp. 1443–1450. DOI: 10.1145/3205455.3205566.

[C23] Alan Jaffe, Jeremy Lacomis, Edward Schwartz, Claire Le Goues, and Bogdan Vasilescu. "Meaningful Variable Names for Decompiled Code: A Machine Translation Approach". In: *Proceedings of the 26th IEEE International Conference on Program Comprehension (ICPC)*. Gothenburg, Sweden: ACM, May 2018, pp. 20–30. DOI: 10.1145/3196321.3196330.

[C22] Rijnard van Tonder and Claire Le Goues. "Static Automated Program Repair for Heap Properties". In: *Proceedings of the 40th IEEE/ACM International Conference on Software Engineering (ICSE)*. Gothenburg, Sweden: ACM, May 2018, pp. 151–162. DOI: 10.1145/3180155.3180250.

[C21] Casidhe Hutchison, Milda Zizyte, Patrick E. Lanigan, David Guttendorf, Michael Wagner, Claire Le Goues, and Philip Koopman. "Robustness Testing of Autonomy Software". In: *Proceedings of the 40th International Conference on Software Engineering: Software Engineering in Practice (ICSE SEIP)*. Gothenburg, Sweden: ACM, May 2018, pp. 276–285. DOI: 10.1145/3183519.3183534.

[C20] Cody Kinneer, Zack Coker, Jiacheng Wang, David Garlan, and Claire Le Goues. "Managing Uncertainty in Self-Adaptive Systems with Plan Reuse and Stochastic Search". In: *Proceedings of the 12th IEEE/ACM International Symposium on Software Engineering for Adaptive and Self-Managing Systems (SEAMS)*. Gothenburg, Sweden: ACM, May 2018, pp. 40–50. DOI: 10.1145/3194133.3194145.

[C19] Mauricio Soto and Claire Le Goues. "Using a probabilistic model to predict bug fixes". In: *Proceedings of the 25th IEEE International Conference on Software Analysis, Evolution, and Reengineering (SANER)*. Campobasso, Italy, Mar. 2018, pp. 221–231. DOI: 10.1109/SANER.2018.8330211.

[C18] Christopher Steven Timperley, Afsoon Afzal, Deborah Katz, Jam Marcos Hernandez, and Claire Le Goues. "Crashing simulated planes is cheap: Can simulation detect robotics bugs early?" In: *Proceedings of the 11th IEEE Conference on Software Testing, Validation and Verification (ICST)*. Västerås, Sweden, Apr. 2018, pp. 331–342. DOI: 10.1109/ICST.2018.00040.

[C17] Zack Coker, Kostadin Damevski, Claire Le Goues, Nicholas A. Kraft, David Shepherd, and Lori Pollock. "Behavior Metrics for Prioritizing Investigations of Exceptions". In: *Proceedings of the 2017 IEEE International Conference on Software Maintenance and Evolution (ICSME, Industry Track)*. Shanghai, China: IEEE Computer Society, Sept. 2017, pp. 554–563. DOI: 10.1109/ICSME.2017.62.

[C16] Christopher Steven Timperley, Susan Stepney, and Claire Le Goues. "An investigation into the use of mutation analysis for automated program repair". In: *Proceedings of the 9th International Symposium on Search Based Software Engineering (SSBSE)*. Vol. 10452. Lecture Notes in Computer Science. Paderborn, Germany: Springer, Sept. 2017, pp. 99–114. DOI: 10.1007/978-3-319-66299-2_7.

[C15] Xuan-Bach D. Le, Duc Hiep Chu, David Lo, Claire Le Goues, and Willem Visser. "S3: Syntax- and Semantic-Guided Repair Synthesis via Programming by Examples". In: *Proceedings of the 11th Joint Meeting on Foundations of Software Engineering (ESEC/FSE)*. ACM, 2017, pp. 593–604. DOI: 10.1145/3106237.3106309.

[C14] Cyrus Omar, Ian Voysey, Michael Hilton, Joshua Sunshine, Claire Le Goues, Jonathan Aldrich, and Matthew Hammer. "Toward Semantic Foundations for Program Editors". In: *Proceedings of the 2nd Summit on Advances in Programming Languages (SNAPL)*. Asilomar, CA, USA: Schloss Dagstuhl - Leibniz-Zentrum fuer Informatik, May 2017, 11:1–11:12. DOI: 10.4230/LIPIcs.SNAPL.2017.11.

[C13] Vinicius Paulo L. Oliveira, Eduardo F. D. Souza, Claire Le Goues, and Celso G. Camilo-Junior. "Improved Crossover Operators for Genetic Programming for Program Repair". In: *Proceedings of the 8th International Symposium on Search Based Software Engineering (SSBSE)*. Vol. 9962. Lecture Notes in Computer Science. Raleigh, NC, USA, Oct. 2016, pp. 112–127. DOI: 10.1007/978-3-319-47106-8_8.

[C12] Tien-Duy B. Le, David Lo, Claire Le Goues, and Lars Grunske. "A Learning-to-rank Based Fault Localization Approach Using Likely Invariants". In: *Proceedings of the 25th International Symposium on Software Testing and Analysis (ISSTA)*. Saarbrücken, Germany: ACM, July 2016, pp. 177–188. DOI: 10.1145/2931037.2931049.

[C11] Yuan Tian, Dinusha Wijedasa, David Lo, and Claire Le Goues. "Learning to rank for bug report assignee recommendation". In: *Proceedings of the 24th IEEE International Conference on Program Comprehension (ICPC)*. Austin, TX, USA: IEEE Computer Society, May 2016, pp. 1–10. DOI: 10.1109/ICPC.2016.7503715.

[C10] Xuan-Bach D. Le, David Lo, and Claire Le Goues. "History Driven Program Repair". In: *Proceedings of the 23rd IEEE International Conference on Software Analysis, Evolution, and Reengineering (SANER)*. Vol. 1. Osaka, Japan: IEEE Computer Society, Mar. 2016, pp. 213–224. DOI: 10.1109/SANER.2016.76.

[C9] Zack Coker, Michael Maass, Tianyuan Ding, Claire Le Goues, and Joshua Sunshine. "Evaluating the Flexibility of the Java Sandbox". In: *Proceedings of the 31st Annual Computer Security Applications Conference (ACSAC)*. Los Angeles, CA, USA: ACM, Dec. 2015, pp. 1–10. DOI: 10.1145/2818000.2818003.

[C8] Yalin Ke, Kathryn T. Stolee, Claire Le Goues, and Yuriy Brun. "Repairing Programs with Semantic Code Search". In: *Proceedings of the 30th IEEE/ACM International Conference on Automated Software Engineering (ASE)*. Lincoln, NE, USA: IEEE Computer Society, Nov. 2015, pp. 295–306. DOI: 10.1109/ASE.2015.60.

[C7] Edward K. Smith, Earl Barr, Claire Le Goues, and Yuriy Brun. "Is the Cure Worse than the Disease? Overfitting in Automated Program Repair". In: *Proceedings of the 10th Joint Meeting of the European Software Engineering Conference and ACM SIGSOFT Symposium on the Foundations of Software Engineering (ESEC/FSE)*. Bergamo, Italy: ACM, Sept. 2015, pp. 532–543. DOI: 10.1145/2786805.2786825.

[C6] Claire Le Goues, Stephanie Forrest, and Westley Weimer. "Representations and Operators for Improving Evolutionary Software Repair". In: *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO)*. Philadelphia, PA, USA: ACM, July 2012, pp. 959–966. DOI: 10.1145/2330163.2330296.

[C5] Claire Le Goues, Michael Dewey-Vogt, Stephanie Forrest, and Westley Weimer. "A Systematic Study of Automated Program Repair: Fixing 55 out of 105 bugs for $8 Each". In: *Proceedings of the 34th International Conference on Software Engineering (ICSE)*. Zurich, Switzerland: IEEE Computer Society, June 2012, pp. 3–13. DOI: 10.1109/ICSE.2012.6227211.

[C4] Ethan Fast, Claire Le Goues, Stephanie Forrest, and Westley Weimer. "Designing better fitness functions for automated program repair". In: *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO)*. Portland, OR, USA: ACM, July 2010, pp. 965–972. DOI: 10.1145/1830483.1830654.

[C3] Stephanie Forrest, Westley Weimer, ThanhVu Nguyen, and Claire Le Goues. "A genetic programming approach to automated software repair". In: *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO)*. Montreal, Québec, Canada: ACM, July 2009, pp. 947–954. DOI: 10.1145/1569901.1570031.

[C2] Westley Weimer, ThanhVu Nguyen, Claire Le Goues, and Stephanie Forrest. "Automatically Finding Patches Using Genetic Programming". In: *Proceedings of the 31st International Conference on Software Engineering (ICSE)*. Vancouver, Canada: IEEE, May 2009, pp. 364–374. DOI: 10.1109/ICSE.2009.5070536.

[C1] Claire Le Goues and Westley Weimer. "Specification Mining with Few False Positives." In: *Proceedings of the 15th Annual Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS), Held as Part of the Joint European Conferences on Theory and Practice of Software (ETAPS)*. Vol. 5505. Lecture Notes in Computer Science. York, UK: Springer, Mar. 2009, pp. 292–306. DOI: 10.1007/978-3-642-00768-2_26.

Refereed Short Publications

[S18] Ye He, Zimin Chen, and Claire Le Goues. "PreciseBugCollector: Extensible, Executable and Precise Bug-Fix Collection: Solution for Challenge 8: Automating Precise Data Collection for Code Snippets with Bugs, Fixes, Locations, and Types". In: *2023 38th IEEE/ACM International Conference on Automated Software Engineering (ASE)*. 2023, pp. 1899–1910. DOI: 10.1109/ASE56229.2023.00163.

[S17] Alex Groce, Kush Jain, Rijnard van Tonder, Goutamkumar Tulajappa Kalburgi, and Claire Le Goues. "Looking for Lacunae in Bitcoin Core's Fuzzing Efforts". In: *44th IEEE/ACM International Conference on Software Engineering: Software Engineering in Practice, ICSE (SEIP)*. IEEE, 2022, pp. 185–186. DOI: 10.1109/ICSE-SEIP55303.2022.9794086.

[S16] Milda Zizyte, Casidhe Hutchison, Raewyn Duvall, Claire Le Goues, and Philip Koopman. "The Importance of Safety Invariants in Robustness Testing Autonomy Systems". In: *Proceedings of the 51st Annual IEEE/IFIP International Conference on Dependable Systems and Networks - Supplemental Volume*. Taipei, Taiwan: IEEE, June 2021, pp. 41–44. DOI: 10.1109/DSN-S52858.2021.00028.

[S15] Deborah Katz, Milda Zizyte, Casidhe Hutchison, David Guttendorf, Patrick Lanigan, Eric Sample, Philip Koopman, Michael Wagner, and Claire Le Goues. "Robustness Inside Out Testing". In: *Proceedings of the 50th IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2020) – Industry Track*. DSN-Industry'20. Valencia, Spain: IEEE, June 2020, pp. 1–4. DOI: 10.1109/DSN-S50200.2020.00013.

[S14] Rijnard van Tonder, Asher Trockman, and Claire Le Goues. "A Panel Data Set of Cryptocurrency Development Activity on GitHub". In: *2019 IEEE/ACM 16th International Conference on Mining Software Repositories (MSR)*. Montreal, Canada: IEEE/ACM, May 2019, pp. 186–190. DOI: 10.1109/MSR.2019.00037. URL: https://doi.org/10.1109/MSR.2019.00037.

[S13] Christopher Steven Timperley, Susan Stepney, and Claire Le Goues. "Poster: BugZoo: A Platform for Studying Software Bugs". In: *Proceedings of the 40th International Conference on Software Engineering: Companion Proceedings (ICSE Poster)*. Gothenburg, Sweden: ACM, May 2018, pp. 446–447. DOI: 10.1145/3183440.3195050.

[S12] Mauricio Soto and Claire Le Goues. "Common Statement Kind Changes to Inform Automatic Program Repair". In: *Proceedings of the 15th International Conference on Mining Software Repositories (MSR Challenge)*. Gothenburg, Sweden, May 2018, pp. 102–105. DOI: 10.1145/3196398.3196472.

[S11] Afsoon Afzal and Claire Le Goues. "A Study on the Use of IDE Features for Debugging". In: *Proceedings of the 15th International Conference on Mining Software Repositories (MSR Challenge)*. Gothenburg, Sweden, May 2018, pp. 114–117. DOI: 10.1145/3196398.3196468.

[S10] Claire Le Goues, Yuriy Brun, Stephanie Forrest, and Westley Weimer. "Clarifications on the Construction and Use of the ManyBugs Benchmark (Comment Paper)". In: *IEEE Trans. Software Eng.* 43.11 (2017), pp. 1089–1090. DOI: 10.1109/TSE.2017.2755651.

[S9] Xuan-Bach D. Le, Duc Hiep Chu, David Lo, Claire Le Goues, and Willem Visser. "JFix: Semantics-based repair of Java programs via Symbolic PathFinder". In: *Proceedings of the 26th ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA Tools)*. Santa Barbara, CA, USA: ACM, July 2017, pp. 376–379. DOI: 10.1145/3092703.3098225.

[S8] Mauricio Soto, Zack Coker, and Claire Le Goues. "Analyzing the Impact of Social Attributes on Commit Integration Success". In: *Proceedings of the 14th International Conference on Mining Software Repositories (MSR Challenge)*. Buenos Aires, Argentina: IEEE Computer Society, May 2017, pp. 483–486. DOI: 10.1109/MSR.2017.34.

[S7] Xuan-Bach D. Le, David Lo, and Claire Le Goues. "Empirical Study on Synthesis Engines for Semantics-based Program Repair". In: *Proceedings of the 32nd IEEE International Conference on Software Maintenance and Evolution (ICSME ERA)*. Raleigh, NC, USA: IEEE Computer Society, Oct. 2016, pp. 423–427. DOI: 10.1109/ICSME.2016.68.

[S6] Xuan-Bach D. Le, Quang Loc Le, David Lo, and Claire Le Goues. "Enhancing Automated Program Repair with Deductive Verification". In: *Proceedings of the 32nd IEEE International Conference on Software Maintenance and Evolution (ICSME ERA)*. Raleigh, NC, USA: IEEE Computer Society, Oct. 2016, pp. 428–432. DOI: 10.1109/ICSME.2016.66.

[S5] Rijnard van Tonder and Claire Le Goues. "Defending against the attack of the micro-clones". In: *Proceedings of the 24th IEEE International Conference on Program Comprehension (ICPC Short)*. Austin, TX, USA: IEEE Computer Society, May 2016, pp. 1–4. DOI: 10.1109/ICPC.2016.7503736.

[S4] Mary Beth Kery, Claire Le Goues, and Brad A. Myers. "Examining Programmer Practices for Locally Handling Exceptions". In: *Proceedings of the 13th International Conference on Mining Software Repositories (MSR Challenge)*. Austin, TX, USA: ACM, May 2016, pp. 484–487. DOI: 10.1145/2901739.2903497.

[S3] Mauricio Soto, Ferdian Thung, Chu-Pan Wong, Claire Le Goues, and David Lo. "A Deeper Look into Bug Fixes: Patterns, Replacements, Deletions, and Additions". In: *Proceedings of the 13th International Conference on Mining Software Repositories (MSR Challenge)*. Austin, TX, USA: ACM, May 2016, pp. 512–515. DOI: 10.1145/2901739.2903495.

[S2] Zack Coker, David Garlan, and Claire Le Goues. "SASS: Self-Adaptation Using Stochastic Search". In: *Proceedings of the 10th IEEE/ACM International Symposium on Software Engineering for Adaptive and Self-Managing Systems (SEAMS)*. Florence, Italy: IEEE Computer Society, May 2015, pp. 168–174. DOI: 10.1109/SEAMS.2015.16.

[S1] Claire Le Goues, K. Rustan M. Leino, and Michal Moskal. "The Boogie Verification Debugger (Tool Paper)". In: *Proceedings of the 9th International Conference on Software Engineering and Formal Methods (SEFM)*. Vol. 7041. Lecture Notes in Computer Science. Montevideo, Uruguay: Springer, Nov. 2011, pp. 407–414. DOI: 10.1007/978-3-642-24690-6_28.

Refereed Workshop Publications

[W7] Alexander G. Shypula, Pengcheng Yin, Jeremy Lacomis, Claire Le Goues, Edward J. Schwartz, and Graham Neubig. "Learning to Superoptimize Real-World Programs". In: *Deep Learning for Code Workshop*. DL4C '22. 2022.

[W6] Zhen Yu Ding, Yiwei Lyu, Christopher Timperley, and Claire Le Goues. "Leveraging Program Invariants to Promote Population Diversity in Search-Based Automatic Program Repair". In: *2019 IEEE/ACM International Workshop on Genetic Improvement (GI)*. May 2019, pp. 2–9. DOI: 10.1109/GI.2019.00011.

[W5] Rijnard van Tonder and Claire Le Goues. "Towards s/engineer/bot: Principles for Program Repair Bots". In: *2019 IEEE/ACM 1st International Workshop on Bots in Software Engineering (BotSE)*. May 2019, pp. 43–47. DOI: 10.1109/BotSE.2019.00019.

[W4] Afsoon Afzal, Jeremy Lacomis, Claire Le Goues, and Christopher S. Timperley. "A Turing Test for Genetic Improvement (Position Paper)". In: *Proceedings of the 4th International Genetic Improvement Workshop*. GI '18. Gothenburg, Sweden: ACM, 2018, pp. 17–18. DOI: 10.1145/3194810.3194817.

[W3] Westley Weimer, Stephanie Forrest, Miryung Kim, Claire Le Goues, and Patrick Hurley. "Trusted Software Repair for System Resiliency". In: *Proceedings of the 46th Annual IEEE/IFIP International Conference on Dependable Systems and Networks Workshops (DSN Workshops)*. Toulouse, France: IEEE Computer Society, July 2016, pp. 238–241. DOI: 10.1109/DSN-W.2016.64.

[W2] Claire Le Goues, Stephanie Forrest, and Westley Weimer. "The case for software evolution". In: *Proceedings of the Workshop on Future of Software Engineering Research (FoSER), at the 18th ACM SIGSOFT International Symposium on Foundations of Software Engineering*. Santa Fe, NM, USA: ACM, Nov. 2010, pp. 205–210. DOI: 10.1145/1882362.1882406.

[W1] ThanhVu Nguyen, Westley Weimer, Claire Le Goues, and Stephanie Forrest. "Using Execution Paths to Evolve Software Patches". In: *Second International Conference on Software Testing Verification and Validation, Workshops Proceedings*. Denver, CO, USA: IEEE Computer Society, Apr. 2009, pp. 152–153. DOI: 10.1109/ICSTW.2009.35.

Non-Refereed Publications

[N5] Deborah S. Katz, Christopher Steven Timperley, and Claire Le Goues. "Using Dynamic Binary Instrumentation to Detect Failures in Robotics Software". In: *CoRR* abs/2201.12464 (2022). arXiv: 2201.12464. URL: https://arxiv.org/abs/2201.12464.

[N4] Justyna Petke, Claire Le Goues, Stephanie Forrest, and William B. Langdon. "Genetic Improvement of Software (Dagstuhl Seminar 18052)". In: *Dagstuhl Reports* 8.1 (2018). Ed. by Justyna Petke, Claire Le Goues, Stephanie Forrest, and William B. Langdon, pp. 158–182. ISSN: 2192-5283. DOI: 10.4230/DagRep.8.1.158.

[N3] Xuan-Bach D. Le, Ferdian Thung, David Lo, and Claire Le Goues. "Overfitting in semantics-based automated program repair". In: *Proceedings of the 40th International Conference on Software Engineering (Journal First)*. ICSE (Journal First) 2018. Gothenburg, Sweden: ACM, May 2018, p. 163. DOI: 10.1145/3180155.3182536.

[N2] Claire Le Goues and Shin Yoo. "Guest editorial for special section on research in search-based software engineering". In: *Empirical Software Engineering* 22.2 (2017), pp. 849–851. DOI: 10.1007/s10664-017-9504-6.

[N1] Sunghun Kim, Claire Le Goues, Michael Pradel, and Abhik Roychoudhury. "Automated Program Repair (Dagstuhl Seminar 17022)". In: *Dagstuhl Reports* 7.1 (2017). Ed. by Sunghun Kim, Claire Le Goues, Michael Pradel, and Abhik Roychoudhury, pp. 19–31. ISSN: 2192-5283. DOI: 10.4230/DagRep.7.1.19.

Invited Tutorials

[T1] Stephanie Forrest and Claire Le Goues. "Evolutionary software repair (Invited Tutorial)". In: *Genetic and Evolutionary Computation Conference (GECCO): Companion Material Proceedings*. Philadelpha, PA, USA: ACM, July 2012, pp. 1345–1348. DOI: 10.1145/2330784.2330943.

Formal and Invited Presentations

Everything is program repair: Automated Transformation
– High Confidence Software and Systems Conference (HCSS)
Ann Arbor, MD, USA, May 2024

What is a bug? Implications for the future of automatic Repair
– International Workshop on Automatic Program Repair (co-located, ICSE)
Lisbon, Portugal, April 2024

Building your research vision: From existential crisis to useful tool
– ICSE New Faculty Symposium
Lisbon, Portugal, April 2024

Everything is APR: Automatic repair of client code in light of evolving APIs
– 65th Crest Open Workshop, Automatic Program Repair and Genetic Improvement
University College London, *London, UK*, October 2023

AI and Software Quality: Future directions in automatic program
– U.S. Leadership in Software Engineering & AI Engineering: Critical Needs & Priorities
– Joint workshop, SEI/NITRD/NSF SPSQ working group
Washington, DC, June 2023

Program repair: life at the intersection of heuristic and semantic analyses
– IFIP Working Group 2.4 Meeting
York Harbor, ME, USA, April 2023

Correctness Matters: Program repair at the intersection of heuristic and semantic analyses
– SnT Center, University of Luxembourg
Luxembourg City, Luxembourg, January 2023

Let me fix that for you: An Overview of Automated Program Repair
–Summer School, 30th ACM International Symposium on Software Testing and Analysis (ISSTA, co-located with ECOOP)
Virtual, Covid-19, July 2021

Challenges and Opportunities in Automatic Program Repair
– Volkswagen AG
Virtual, Covid-19, November 2020

Do What I Mean, Not What I Say: An Introduction to Automatic Program Repair for Early-Career Researchers
–Doctoral Symposium/Summer School, 29th ACM International Symposium on Software Testing and Analysis (ISSTA)
Virtual, Covid-19, July 2020

It Does What You Say, Not What You Mean: Lessons from 10 Years of Program Repair
–Plenary Session, N-10 Award, 41st ACM/IEEE International Conference on Software Engineering (ICSE)
Montreal, Canada, May 2019
–University of Virginia, *Charlottesville, VA*, Sep 2019

Fault Localization and Program Repair
–Lorentz Center Workshop, In-Vivo Analytics for Big Software Quality
Leiden, Netherlands, Sept 2018

Fixed That For You: Scalable Semantic Code Search for High-Quality Program Repair
–Williams College, *Williamstown, MA*, Sept 2018

Evolving Software Quality (keynote)
–4th Intl. Genetic Improvement Workshop (GI), co-located with ICSE 2018
Gothenburg, Sweden, June 2018

From PhD Candidate to Early-Career Researcher: Reflections on Science and Other Useful Stuff (keynote)
–Doctoral Symposium, 32nd IEEE/ACM Symposium on Automated Software Engineering (ASE)
Urbana Champaign, IL, USA, Nov 2017

Advances in automated software repair
–FaceTAV 2017 Symposium, Facebook, *London, UK*, Nov 2017
Video available: `https://facetavlondon2017.splashthat.com/`

FTFY: Research Advances in Automatic Bug Repair (keynote)
–O'Reilly Velocity NY, *NYC, NY*, Sep 2017

Research Advances in Automatic Program Repair
–Amazon, *Seattle, WA*, Sep 2017

Scalable Semantic Code Search for High-Quality Program Repair
–University of Washington, *Seattle, WA*, Jan 2017
–Microsoft Research, *Redmond, WA*, Jan 2017
–Dagstuhl Seminar 17022, Automated Program Repair, *Wadern, Germany*, Jan 2017

Overview on Search-based Program Patching
–Dagstuhl Seminar 17022, Automated Program Repair, *Wadern, Germany*, Jan 2017

Automatic patch generation (keynote)
–PWLConf, co-located with StrangeLoop 2016
St. Louis, MO, Sep 2016
Video available: `https://www.youtube.com/watch?v=sRkfMe0_5cA`

Passing tests is easy: when full coverage isn't enough (keynote)
–9th Intl. Workshop on Search Based Software Testing (SBST), co-located with ICSE 2016
Austin, TX, May 2016

Automatic Program Repair Using Genetic Programming
–University of Massachusetts, Amherst, *Amherst, MA*, Jan 2014
–Virginia Polytechnic Institute and State University (Virginia Tech), *Blacksburg, VA*, Sep 2012

Bloat vs. overfitting in test-driven GP for program repair
–28th Crest Open Workshop, Genetic Programming for Software Engineering
University College London, *London, UK*, Oct 2013

Question your assumptions: the bleeding edge of search-based program repair
–Lille 1 University/INRIA Lille Norde-Europe, *Lille, France*, Oct 2013

Specification Mining with few false positives
–King's College London, Nov 2009

Invited Panels

AI for Software Productivity, Sustainability, and Quality
– U.S. Leadership in Software Engineering & AI Engineering: Critical Needs & Priorities
– Joint workshop, SEI/NITRD/NSF SPSQ working group
Washington, DC , June 2023

Will AI Render Programming Obsolete?
–CEO Innovation Network
New York, New York , April 2023

New Faculty Symposium
–40th Intl. Conference on Software Engineering (ICSE)
Gothenburg, Sweden, May 2018

Thirty Years of Automated Software Engineering (ASE)
–30th IEEE/ACM Intl. Conference on Automated Software Engineering (ASE)
Lincoln, NE, USA, Nov 2015

Educational Contributions

Leadership

CMU SCS Faculty Fellowship Recognizing Diversity and Inclusion 2020–2026
Co-Director, REUSE@CMU 2016–present
Director, Undergraduate Minor in Software Engineering 2014–2018
Member, SCS Undergraduate Review Committee 2016–2019

REUSE@CMU. I am co-director and co-founder of REUSE@CMU, `reuse.cs.cmu.edu`, which provides summer undergraduate research opportunities in Interdisciplinary Software Engineering. REUSE trains students in all elements of research. We specifically seek out students early in their undergraduate educations and those who do not have access to traditional research at their home institutions.

Since 2016, approximately 55% of the 198 students who have passed through the program identify as non-male, and approximately 20% as members of other under-represented minority groups in computing (groups overlap). Of the students who have graduated, more than 60% are pursuing research as a career, either in a PhD program (the vast majority) or other lab or research environment. (One way to understand these numbers is to consult the CRA Taulbee survey, which as of 2018 indicated that women made up 22.3% of the CS PhD population, and members of other URM groups, about 4%.)

Program analysis. With Jonathan Aldrich and Rohan Padhye, I have designed an upper-division elective course in Program Analysis and written an associated set of course notes that we use as a textbook. The most recent version of the course and its book are available at `https://cmu-program-analysis.github.io/`.

Teaching

Instructor of Record *Carnegie Mellon University*

I also co-teach/have co-taught 17-808, Software Engineering Research (Ph.D. level), Fall 2013–present.

17-355	Program Analysis (cross-listed, 17-655, 17-819) (undergraduate, graduate)	Spring 2023
17-214/514	Principles of Software Construction (undergraduate, masters)	Fall 2022
17-214/514	Principles of Software Construction (undergraduate, masters)	Spring 2022
17-313	Foundations of Software Engineering (undergraduate)	Fall 2020
17-355	Program Analysis (cross-listed, 17-655, 17-819) (undergraduate, graduate)	Spring 2020
17-313	Foundations of Software Engineering (undergraduate)	Fall 2019
17-355	Program Analysis (cross-listed, 17-655, 17-819) (undergraduate, graduate)	Spring 2018
17-356	Software Engineering for Startups (undergraduate)	Spring 2018
15-313	Foundations of Software Engineering (undergraduate)	Fall 2017
17-654	Analysis of Software Systems (Masters)	Spring 2017
15-313	Foundations of Software Engineering (undergraduate)	Fall 2016
15-819O	Special Topics in Programming Languages: Program Analysis (Ph.D.)	Spring 2016
15-313	Foundations of Software Engineering (undergraduate)	Fall 2015
17-654	Analysis of Software Systems (Masters)	Spring 2015
15-313	Foundations of Software Engineering (undergraduate)	Fall 2014
17-654	Analysis of Software Systems (Masters)	Spring 2014

University of Virginia

CS4444/6444	High Performance and Parallel Computation (undergraduate/graduate)	Spring 2013

Supervision

Listings include first position post-PhD/PostDoc.

Postdoctoral Advisor

- He Ye (2023–present)
- Milda Zizyte (2020–2021), Lecturer in Computer Science at Brown University
- Christopher Timperley (2016–2017), Systems Scientist at Carnegie Mellon University

PhD Advisor

- Harrison Green, (2024–present), joint with Fraser Brown
- Claudia Mamede, (2023–present), joint with Rui Abreu
- Nikitha Rao, (2023–present), joint with Vincent Hellendoorn
- Kush Jain (2021–present)

- Tobias Dürschmid (2022–present), joint with David Garlan
- Aidan Yang (2021–present), joint with Ruben Martins
- Luke Dramko (2020–present)
- Trenton Tabor (2020–present)
- Daniel Ramos (2020–present), joint with Ruben Martins and Vasco Manquinho
- Jeremy Lacomis, PhD in Software Engineering, 2023. "Automatically Annotating Decompiled Code with Meaningful Names and Types". Joint with Bogdan Vasilescu. Mark Stehlik Postdoctoral Teaching Fellow
- Afsoon Afzal, PhD in Software Engineering, 2021. "Automated Testing of Robotic and Cyberphysical Systems". Software Engineer, Nuro
- Cody Kinneer. PhD in Software Engineering, 2021. "Search-based Plan Reuse in Self-* Systems". Joint with David Garlan. Trader, IMC Trading
- Mauricio Soto. PhD in Software Engineering, 2021. "Improving Patch Quality by Enhancing Key Components of Automatic Program Repair". Research Scientist, ABB/Hitachi
- Deborah Katz. PhD in Computer Science, 2020. "Identification of Software Failures in Complex Systems Using Low-Level Execution Data". Research Engineer, Seegrid Corp
- Zack Coker. PhD in Computer Science, 2020. "Automatic repair of framework applications". Research Scientist, Sandia National Labs
- Rijnard van Tonder. PhD in Software Engineering, 2019. "Automated Program Transformation for Improving Software Quality". Research Scientist, Sourcegraph

PhD Thesis Committees

- CMU, School of Computer Science
  - Christopher Meiklejohn, completed 2024 (advisor Heather Miller)
  - Paulo Casanova, completed 2023 (advisor David Garlan)
  - Miguel Velez, completed 2021 (advisor Christian Kästner)
  - Chu-Pan Wong, completed 2021 (advisor Christian Kästner)
  - Gabriel Moreno, completed 2017 (advisor David Garlan)
  - Jason Tsay, completed 2017 (advisors Jim Herbsleb and Laura Dabbish)
- CMU, College of Engineering
  - Milda Zizyte, completed 2020 (advisor Philip Koopman)
  - Xuechen (Jerry) Lei, completed 2019 (advisor Burcu Akinci)
- External PhD Committees
  - Haoye Tian, University of Luxembourg, LU, completed 2023 (advisor Tegawendé Bissyande)
  - Manish Motwani, University of Massachusetts - Amherst, completed 2022 (advisor Yuriy Brun)
  - Mozhan Soltani, Leiden University, NL, completed 2020 (advisor Felienne Hermans)
  - David Kelk, University of Ontario Institute of Technology, completed 2014 (advisor Jeremy Bradbury)

Masters Advisor

- Qibin Chen, completed 2022. Language Technologies Institute, MLT, CMU, joint with Bogdan Vasilescu
- Alexander Shypula, completed 2021. Language Technologies Institute, MSAII, CMU, joint with Bogdan Vasilescu and Graham Neubig
- Jon Kotheimer, completed 2017. Heinz College of Public Policy, CMU
- Edward (Ted) Smith, completed 2016. University of Massachusetts - Amherst, joint with Yuriy Brun

Research Funding

Listed amounts denote the CMU portion of multi-institutional awards.

HPSTA: Hardware in the loop Perception Safety Testing for Autonomy
US Army Research Office/US Army Futures Command, 2022-2023, $730,000 (solo PI, via NREC)

RINGS: Language-Agnostic Resilience Engineering at the Edge with WebAssembly

National Science Foundation, 2022–2025, with Heather Miller and Benjamin Titzer (both at CMU), $929,959, and REU supplements totaling $16,000

BAST: Build-in Adaptive System Testing
Naval Air Warfare Center Aircraft Division, 2021–2025, solo PI (via NREC), $3.1M

CMU REU Site in Interdisciplinary Software Engineering (REUSE)
National Science Foundation, 2016–2025 (renewed twice), with Joshua Sunshine (at CMU), award amounts of $360,000, $375,402, and $416,347

SHF: Small: Feedback-Driven Mutation Testing for Any Language
National Science Foundation, 2021–2024, with Alex Groce (at NAU), $255,457

SHF: Small: Idiomatic Decompilation
National Science Foundation, 2019–2023, with Graham Neubig (at CMU), $425,000, and REU supplement of $8,000

Improving Search-Based and Semantic Automated Program Repair
Air Force Research Lab, 2018–2023, with Stephanie Forest (ASU) and Westley Weimer (UMich), $330,000

Improving analysis via automated program transformation
Facebook Testing and Verification Research Award, 2018–2019, solo PI, $50,000

Modeling Observability in Adaptive Systems to Improve their Security
Cylab Seed Funding, 2018–2019, with Fei Fang and David Garlan (both at CMU), $110,000

CAREER: Quality Matters: Dynamic, Static and Proactive Analyses for Automated Program Repair
National Science Foundation, 2018–2023, Solo PI, $525,000 and REU Supplements totaling $81,352

SHF: Small: Evolution of Self-adaptive Systems using Stochastic Search
National Science Foundation, 2016–2020, with David Garlan (CMU), $499,948 and REU Supplements totaling $52,575

Trusted and Resilient Mission Operation
Air Force Research Lab, 2017–2019, with Stephanie Forrest (ASU), Westley Weimer (UMich), and Jack Davidson (UVA), $447,252

SHF: Medium: Semi and fully automated program repair and synthesis via semantic code search
National Science Foundation, 2016–2021, with Yuriy Brun (UMass-Amherst) and Kathryn Stolee (NCSU), $411,996 and REU Supplements totaling $19,050

Robust Inside Out Testing (RIOT)
Army Test Resource Management Center, 2016–2019, with Philip Koopman and Michael Wagner (CMU/NREC), $617,798

Intelligent Model-Based Adaptation for Mobile Robotics
Defense Advanced Research Projects Agency, 2015 – 2019, with Jonathan Aldrich (lead PI), David Garlan, Christian Kaestner, Manuela Velosa (all at CMU), and Joydeep Biswas (UMass-Amherst), $7.8M

Cooperative, Trusted Repair for Cyber Physical System Resiliency
Air Force Research Lab, 2015–2017, with Stephanie Forrest (UNM), Miryung Kim (UCLA), and Westley Weimer (UVA), $185,202

Automated Code Repair
Software Engineering Institute, 2015–2016, with Christian Kaestner (CMU) and William Klieber (SEI), $50,000

EAGER: Demonstrating the Feasibility of Automatic Program Repair Guided by Semantic Code Search
National Science Foundation, 2014–2016, with Yuriy Brun (UMass-Amherst) and Kathryn Stolee (Iowa State), $111,864

Human-friendly automatic bug repair via source code and repository mining
Google Faculty Research Award, 2014–2015, Solo PI, $81,924

Selected Software Artifacts

Other code and data can be found at `https://github.com/squaresLab` and `http://squareslab.github.io`.

Comby: Parser parser combinators for language-agnostic code transformation.
`https://comby.dev`
JarFly: Heuristic repair for Java programs.
`https://github.com/squaresLab/genprog4java`
JFix: Semantics-based repair for Java programs. Implements S3.
`https://xuanbachle.github.io/semanticsrepair/`
BugZoo: A framework for performing empirical studies on automated repair of C programs.
`https://github.com/squaresLab/BugZoo`
SearchRepair: A semantic-search-based automated program repair technique.
`https://github.com/ProgramRepair/SearchRepair`
ManyBugs and IntroClass: benchmarks for research in automated repair of C programs.
`http://repairbenchmarks.cs.umass.edu`
GenProg: framework for search-and evolutionary-computation-based repair of C programs.
`https://squareslab.github.io/genprog-code/`
Boogie Verification Debugger (BVD): tool to assist in debugging failed program verification activities.
`http://boogie.codeplex.com/`

Professional Associations

ACM	Association for Computing Machinery, Senior Member
ACM SIGSOFT	ACM Special Interest Group on Software Engineering
IEEE	The Institute of Electrical and Electronics Engineers, Senior Member
IEEE TCSE	IEEE Technical Community on Software Engineering

Miscellaneous

Selected media:

- "10 challenges of using simulators for testing robots", The Robot Report (https://www.therobotreport.com/10-challenges-simulators-robotics-testing/), 2020
- Software Engineering Radio, Episode 379: Automatic Program Repair (https://www.se-radio.net/2019/09/episode-379-claire-le-goues-on-automated-program-repair/), 2019
- Interview, People of PLDI, (http://abstract.ece.cmu.edu/peopleOfPLDI/claire.html), 2019
- Times Higher Ed, "Objections to double-blind peer review 'unfounded"' (https://www.timeshighereducation.com/news/objections-double-blind-peer-review-unfounded), 2018

I was on maternity leave the Spring 2019 and Spring 2021 semesters. I am a Dual US-French citizen.