Carnegie Mellon University
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Claire Le Goues

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Appointments

2013–present **Assistant Professor**, *School of Computer Science*, Carnegie Mellon University.
Affiliation Institute for Software Research *Pittsburgh, PA*

Education

2013 **Ph.D.**, *Computer Science*, University of Virginia, Charlottesville, VA.
Adviser Westley Weimer
Thesis Automatic Program Repair Using Genetic Programming

2009 **M.S.**, *Computer Science*, University of Virginia, Charlottesville, VA.
Adviser Westley Weimer
Thesis Specification Mining With Few False Positives

2006 **B.A.**, *Computer Science*, Harvard University, Cambridge, MA.
Adviser Greg Morrisett
Thesis Algebraic Type Isomorphisms

Industrial Employment

2009 **Research Intern**, *Microsoft Research*, Redmond, WA.
Group Research in Software Engineering (RiSE) group
Mentor K. Rustan M. Leino
Developed visualization techniques for formal program verification to enable effective adoption of verification technology. Prototyped a tool for debugging verification failures. The tool and codebase is available through Microsoft's open-source repository. The work resulted in a publication.

2006–2007 **Software Engineer**, *IBM Software*, Cambridge, MA.

Group XML Technologies/Compilation
Supervisor Patrick McManus
Developed and maintained the Datapower SOA appliance, which facilitates rapid and secure XML processing on large networks. Worked with a six-person team on a new internal programming language and a substantial rewrite of portions of the appliance's XML compiler.

2005 **Research Intern**, *IBM Research*, Cambridge, MA.
Group Collaborative User Experience (CUE)
Mentor Steve Rohall
Prototyped a real-time tool to allow users to collaborate in the open-source Open Office application.

2004 **Research Intern**, *IBM Research*, Hawthorne, NY.
Group Architect's Workbench
Mentor Steven Abrams
Worked with a team developing a tool that assists IT architects in the design of large systems. Added a number of features to an extensive existent code base.

Awards and Honors

2013 **Graduate Research Award**, *University of Virginia Department of Computer Science*, Voted by the faculty. Awarded annually to 1 student of approximately 80 with the most outstanding research record.

2012 **Bronze**, *ACM SIGEVO "Humies" for Human-Competitive Results Produced by Genetic and Evolutionary Computation*, $2,000.

Jan/Feb 2012	**Featured Article**, *IEEE Transactions on Software Engineering*.
2009	**Gold**, *ACM SIGEVO "Humies" for Human-Competitive Results Produced by Genetic and Evolutionary Computation*, $10,000.
2009	**IFIP TC2 Manfred Paul Award**, *International Conference on Software Engineering*.
2009	**Best Paper**, *Genetic and Evolutionary Computation Conference*.
2009	**ACM Distinguished Paper**, *International Conference on Software Engineering*.
2009	**Best Short Paper**, *Workshop on Search-Based Software Testing*.
2009–2012	**Graduate Fellowship**, *National Science Foundation*.
2009	**Graduate Teaching Award**, *University of Virginia Department of Computer Science*, Voted by the faculty. Awarded annually to 1 student of approximately 80 with the most outstanding teaching record.

Professional Service and Affiliations

Carnegie Mellon University Service

2014-present	Co-director, Undergraduate Minor in Software Engineering
2013-present	Member, SE PhD Graduate Program Admissions Committee

Conference Service

SPLASH 2015	Local Arrangements Chair
SSBSE 2014-Present	Steering Commitee Member, Symposium on Search Based Software Engineering (SSBSE)
SSBSE 2014	PC co-chair, Symposium on Search Based Software Engineering (SSBSE)
ICST Tools 2015	PC Member, Tools Track, International Conference on Software Testing
ICSME Tools 2015	PC Member, Tools Track, International Conference on Software Maintenance and Evolution
ICSME 2015	PC Member, International Conference on Software Maintenance and Evolution
NasBASE 2015	PC Member, North American Conference on Search-Based Software Engineering
ICSE Tools 2015	PC Member, Demo Track, International Conference on Software Engineering
ICSE NIER 2015	PC Member, New Ideas and Emerging Results, International Conference on Software Engineering
ICSME 2014	PC Member, International Conference on Software Maintenance and Evolution
ICSE NIER 2014	PC Member, New Ideas and Emerging Results, International Conference on Software Engineering

Reviewer

IEEE Software
Journal of Software: Evolution and Process (JSEP)
Transactions on Software Engineering (TSE)
Transactions on Software Engineering and Methodology (TOSEM)
Journal of Systems and Software (JSS)

External Reviewer

OOPSLA/SPLASH 2012	Conference on Systems, Programming, Languages and Applications: Software for Humanity
AUSE 2012	Journal on Automated Software Engineering
TSE 2012	IEEE Transactions on Software Engineering
MSR 2011	Mining Software Repositories
VMCAI 2010	Verification, Model Checking, and Abstract Interpretation
OOPSLA/SPLASH 2010	Conference on Systems, Programming, Languages and Applications: Software for Humanity

Affiliations

Member	IEEE Computer, IEEE Women in Engineering, Association for Computing Machinery (ACM), ACM Special Interest Group on Software Engineering (SIGSOFT)

Publications

Books and Chapters

SSBSE **Claire Le Goues** and Shin Yoo, eds. Search-based Proceedings of the 6th International Symposium on Search-Based Software Engineering. *Lecture Notes in Computer Science 8636*, Springer 2014.

Claire Le Goues, Anh Nguyen-Tuong, Hao Chen, Jack W. Davidson, Stephanie Forrest, Jason D. Hiser, John C. Knight and Matthew Gundy. Moving Target Defenses in the Helix Self-Regenerative Architecture, in *Moving Target Defense II, Advances in Information Security*, vol. 100, pp. 117–149, 2013.

Refereed Journal Articles

SQJO '13 **Invited** **Claire Le Goues**, Stephanie Forrest, Westley Weimer. Current Challenges in Automatic Software Repair, in *Software Quality Journal*, 21(3): 421-443, 2013.

TSE '12 **Featured Article** **Claire Le Goues**, ThanhVu Nguyen, Stephanie Forrest and Westley Weimer. GenProg: A Generic Method for Automatic Software Repair, in *IEEE Transactions on Software Engineering*, vol. 38, no. 1, pp. 54–72, 2012. cvitemTSE '12**Claire Le Goues** and Westley Weimer. Measuring Code Quality to Improve Specification Mining, in *IEEE Transactions on Software Engineering*, vol. 38, no. 1, pp. 175–190, 2012.

CACM '10 **Invited** Westley Weimer, Stephanie Forrest, **Claire Le Goues** and ThanhVu Nguyen. Automatic Repair with Evolutionary Computation, in *Communications of the ACM*, vol. 53, no. 5, pp. 109–116, May 2010.

Refereed Conference Publications

GECCO '12 **Claire Le Goues**, Westley Weimer and Stephanie Forrest. Representation and Operators for Improving Evolutionary Program Repair, *Genetic and Evolutionary Computation Conference*, pp. 959–966, Philadelphia, PA, USA 2012.

ICSE '12 **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, *International Conference on Software Engineering*, pp. 3–13, Zurich, Switzerland 2012.

SEFM '11 **Claire Le Goues**, K. Rustan M. Leino and Michal Moskal. The Boogie Verification Debugger (Tool Paper), *Software Engineering and Formal Methods*, pp. 407–414, Montevideo, Uruguay, 2011.

GECCO '10 Ethan Fast, **Claire Le Goues**, Stephanie Forrest and Westley Weimer. Designing Better Fitness Functions for Automated Program Repair, in *Genetic and Evolutionary Computation Conference*, pp. 965–972, Portland, OR, 2010.

GECCO '09 **Best Paper** Stephanie Forrest, Westley Weimer, ThanhVu Nguyen and **Claire Le Goues**. A Genetic Programming Approach to Automatic Program Repair, in *Genetic and Evolutionary Computation Conference*, pp. 947–954, Montreal, QC, Canada, 2009.

ICSE '09 **Distinguished Paper** **Manfred Paul Award** Westley Weimer, ThanhVu Nguyen, **Claire Le Goues** and Stephanie Forrest. Automatically Finding Patches Using Genetic Programming, in *International Conference on Software Engineering*, pp. 364–374, Vancouver, BC, Canada, 2009.

TACAS '09 **Claire Le Goues** and Westley Weimer. Specification Mining With Few False Positives, in *Tools and Algorithms for the Construction and Analysis of Systems*, pp. 292–306, York, UK, 2009.

Refereed Workshop Publications

SEAMS '15 Zack Coker, David Garlan, and **Claire Le Goues**. SASS: Self-adaption using stochastic search, in *International Syposieum on Software Engineering for Adaptive and Self-Managing Systems (to appear)*, 2015.

FoSER '10 **Claire Le Goues**, Stephanie Forrest and Westley Weimer. The Case for Software Evolution, in *FSE Working Conference on the Future of Software Engineering*, pp. 205–210, Santa Fe, NM, USA, 2010.

SBST '09
Best Short Paper
ThanhVu Nguyen, Westley Weimer, **Claire Le Goues** and Stephanie Forrest. Extended Abstract: Using Execution Paths to Evolve Software Patches, in *Search-Based Software Testing*, pp. 152–153, Denver, CO, USA, 2009.

Tutorials

GECCO '12
Stephanie Forrest and **Claire Le Goues**. Evolutionary software repair, in *GECCO (Companion)*, pp. 1345–1348, Philadelphia, PA, USA, 2012.

Under submission or revision

TSE '15
Claire Le Goues, Neal Holtschulte, Edward K. Smith, Yuriy Brun, Premkumar Devanbu, Stephanie Forrest, and Westley Weimer. The ManyBugs and IntroClass Benchmarks for Automated Repair of C Programs, currently undergoing a *minor revision* to appear in *IEEE Transactions on Software Engineering*

FSE '15
Zack Coker, Michael Maass, Tianyuan Ding, **Claire Le Goues**, and Joshua Sunshine. Evaluating the Flexibility of the Java Sandbox. Under submission to *Foundations of Software Engineering*

FSE '15
Edward K. Smith, Earl T. Barr, **Claire Le Goues**, and Yuriy Brun. Is the Cure Worse than the Disease? A Large-Scale Analysis of Overfitting in Automated Program Repair. Under submission to *Foundations of Software Engineering*

Teaching and Advising

Instructor of Record

Spring 2015 **Carnegie Mellon**, *17-654*, Analysis of Software Artifacts.
Fall 2014 **Carnegie Mellon**, *15-313*, Foundations of Software Engineering.
Fall 2014 **Carnegie Mellon**, *17-808*, Software Engeering Research.
Spring 2014 **Carnegie Mellon**, *17-654*, Analysis of Software Artifacts.
Fall 2013 **Carnegie Mellon**, *17-808*, Software Engeering Research.
Spring 2013 **University of Virginia**, *CS444/6444*, High Performance and Parallel Computation.

Adviser

2013–present **Carnegie Mellon**, *Zack Coker*, Ph.D., CS, expected 2018.
2014–present **Carnegie Mellon**, *Deby Katz*, Ph.D., CS, expected 2017.
2014–present **Carnegie Mellon**, *Mauricio Soto*, Ph.D., CS, expected 2019.
2009–2011 **University of Virginia**, *Gu Lin*, M.S., ECE, 2011.

Research Funding

2014-2017 **Cooperative, Trusted Repair for Cyber Physical System Resiliency**.
Co-PIs Claire Le Goues (CMU), Westley Weimer (UVA), Stephanie Forrest (UNM), Miryung Kim (UCLA)
Agency Air Force Research Lab
Duration Jan 15–Sept 17
Amount $215,972

2014 **Demonstrating the Feasibility of Automatic Program Repair Guided by Semantic Code Search**.
Co-PIs Claire Le Goues (CMU), Yuriy Brun (UMass-Amherst), Kathryn Stolee (Iowa State)
Agency National Science Foundation
Duration 2014-2015
Amount $80,000

2014 **Human-friendly automatic bug repair via source code and repository mining**.
PI Claire Le Goues
Company Google

Duration 2014–2015
Amount $81,924

Formal presentations

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

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

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

Automatic Program Repair Using Genetic Programming.
Apr 2014 Carnegie Mellon University *Pittsburgh, PA*
Apr 2014 Washington University in St Louis *St Louis, MO*
Mar 2014 George Mason University *Fairfax, VA*
Feb 2014 University of Waterloo *Waterloo, ON*
Feb 2014 University of Illinois - Urbana Champaign *Champaign, IL*
Jan 2014 North Carolina State University *Raleigh, NC*
Jan 2014 Georgia Institute of Technology *Atlanta, GA*
Jan 2014 University of New Mexico *Albuquerque, NM*
Nov 2013 MIT Lincoln Laboratory *Lexington, MA*

2009 **Specification Mining with few false positives**, *King's College London.*

ICSE 2012 **A Systematic Study of Automated Program Repair: Fixing 55 out of 105 bugs for $8 Each**, *Zurich, Switzerland*, International Conference on Software Engineering.

GECCO 2012 **Representation and Operators for Improving Evolutionary Program Repair**, *Philadelphia, PA*, Genetic and Evolutionary Computation Conference.

FUSE 2010 **The Case for Software Evolution**, *Santa Fe, NM*, FSE Working Conference on the Future of Software Engineering.

TACAS 2009 **Specification Mining with few false positives**, *York, UK*, Tools and Algorithms for the Construction and Analysis of Systems.

Artifacts

Benchmarks **ManyBugs and IntroClass**, *principle contributor*, http://repairbenchmarks.cs.umass.edu.
GenProg *principle contributor* http://genprog.cs.virginia.edu
BVD *contributor* http://boogie.codeplex.com/