Claire Le Goues

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Appointments

2013–present **Assistant Professor**, *School of Computer Science*, Carnegie Mellon University.
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.

Publications

Book Chapters (1 total)

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 (4 total, 2 invited, 1 featured article)

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. *Impact Factor: 2.46*

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. *Impact Factor: 5.45*

TSE '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. *Impact Factor: 5.45*

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. *Impact Factor: 2.94*

Refereed Conference Publications (7 total, 2 best papers)

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. *Acceptance Rate: 36%*

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. *Acceptance Rate: 21%*

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. *Acceptance Rate: 29%*

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. *Acceptance Rate: 43%*

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. *Acceptance Rate: 32%*

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. *Acceptance Rate: 12%*

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. *Acceptance Rate: 20%*

Refereed Workshop Publications (2 total, 1 best paper)

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 (1 total)

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

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.

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.

Professional Service and Affiliations

Program Committee co-chair

SSBSE 2014 Sixth annual Symposium on Search Based Software Engineering

Program Committee Member

ICSE NIER 2015 New Ideas and Emerging Results Track, International Conference on Software Engineering
ICSME 2014 International Conference on Software Maintenance and Evolution
ICSE NIER 2014 New Ideas and Emerging Results Track, International Conference on Software Engineering

Reviewer

TOSEM 2014 Transactions on Software Engineering and Methodology
JSS 2014 Journals of Systems and Software

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)

Research Funding

2014 **Human-friendly automatic bug repair via source code and repository mining**.
PI Claire Le Goues
Company Google
Duration 2014–2015 (12 months)
Amount $81,924

Teaching and Advising

Instructor of record

Spring 2014 **Carnegie Mellon**, *17-654*, Analysis of Software Artifacts.
Spring 2013 **University of Virginia**, *CS444/6444*, High Performance and Parallel Computation.

Principle Teaching Assistant

2007–2008 **University of Virginia**, *CS210*, Software Development Methods.
2008 **University of Virginia**, *CS415*, Programming Languages.

Guest lecturer

2012 **CS1120**, *University of Virginia*, From Ada and Euclid to Quantum Computing and the World Wide Web, Objects and Python Interpreters.
2011 **CS4610**, *University of Virginia*, Programming Languages, Introduction to Static Semantics.
2011 **CS6610**, *University of Virginia*, Graduate Programming Languages, Dependent types and data abstraction.

2010 **CS1120**, *University of Virginia*, From Ada and Euclid to Quantum Computing and the World Wide Web, Implementing Interpreters and Charme.

2008 **CS210**, *University of Virginia*, Software Development Methods, Data Structures: Trees and Grammars.

Adviser

2013–present **Carnegie Mellon**, *Zack Coker*, Ph.D., CS, expected 2018.

2009–2011 **University of Virginia**, *Gu Lin*, M.S., ECE, 2011.

Artifacts

GenProg principle contributor; http://genprog.cs.virginia.edu

BVD contributor; http://boogie.codeplex.com/