

Christopher Steven Timperley
Systems Scientist at Institute for Software Research
School of Computer Science, Carnegie Mellon University

March 13, 2021
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Research Experience

Carnegie Mellon University
Systems Scientist

Pittsburgh, PA, USA
August, 2018 – present

Carnegie Mellon University
Postdoctoral Researcher

Pittsburgh, PA, USA
October, 2016 – August, 2018

Carnegie Mellon University
Visiting Research Student

Pittsburgh, PA, USA
July, 2015 – October, 2015

Education

University of York, UK
Ph.D. Computer Science

2013–2017

Advisor: Susan Stepney

Thesis: Advanced methods for search-based program repair

University of York, UK
M.Eng. Computer Science with Artificial Intelligence

2009–2013

First Class Honours

Advisor: Susan Stepney

Thesis: Reflective method matching for object-oriented programs

Industry Experience

Analytica Informatics
Co-Founder, Technical Director

London, UK
February, 2012 – August, 2013

The Guild of Dark Knights (TGODK.com)
Founder

Heysham, UK
April, 2004 – February, 2007

Awards, Grants & Honors

EPSRC Doctoral Training Grant	2013–2016
William Gibbs Award (£3,000)	2015
K.M. Stott Prize for Best Qualifying Disseration	2015
British Informatics Olympiad (Merit)	2009

Press Coverage

- [RACER-SIM] “Broad Agency Announcement: Robotic Autonomy in Complex Environments with Resiliency — Simulation (Racer-Sim)”. In: *DARPA Tactical Technology Office* (Nov. 30, 2020). URL: <https://www.grants.gov/web/grants/view-opportunity.html?oppId=330584>.
- [Cro20] Steve Crowe. “10 challenges of using simulators for testing robots”. In: *The Robot Report* (May 25, 2020). URL: <https://www.therobotreport.com/10-challenges-simulators-robotics-testing/>.
- [Wig20] Kyle Wiggers. “The challenges of developing autonomous vehicles during a pandemic”. In: *Venture Beat* (Apr. 28, 2020). URL: <https://venturebeat.com/2020/04/28/challenges-of-developing-autonomous-vehicles-during-coronavirus-covid-19-pandemic>.
- [Rob19] Open Robotics. “ROSCon Macau 2019”. In: (Nov. 5, 2019). URL: <https://www.openrobotics.org/blog/2019/11/4/roscon-macau-2019>.

Publications

Refereed Journal Publications

- [Soft’19] J. Aldrich, D. Garlan, C. Kaestner, C. Le Goues, A. Mohseni-Kabir, I. Ruchkin, S. Samuel, B. Schmerl, C. S. Timperley, M. Veloso, I. Voysey, J. Biswas, A. Guha, J. Holtz, J. Camara, and P. Jamshidi. “Model-Based Adaptation for Robotics Software”. In: *IEEE Software* 36.2 (2019), pp. 83–90.
- [ALIFE’16] Tim Taylor et al. “Open-Ended Evolution: Perspectives from the OEE Workshop in York”. In: *Artificial Life* 22.3 (2016), pp. 408–423.

Refereed Conference and Workshop Publications

- [ICST’21] Afsoon Afzal, Deborah S. Katz, Claire Le Goues, and Christopher Steven Timperley. “Simulation for Robotics Test Automation: Developer Perspectives”. In: *International Conference on Software Testing*. ICST ’21. **(To appear.)** 2021.
- [SBST’21] Paulo Santos, José Campos, Christopher S. Timperley, and Alcides Fonseca. “Augmenting Search-based Techniques with Static Synthesis-based Input Generation”. In: *International Workshop on Search-Based Software Testing*. SBST ’21. **(To appear.)** 2021.
- [ICST’20] Afsoon Afzal, Claire Le Goues, Michael Hilton, and Christopher Steven Timperley. “A Study on Challenges of Testing Robotic Systems”. In: *International Conference on Software Testing*. ICST ’20. 2020, pp. 96–107.
- [ICSME’20] Sophia Kolak, Afsoon Afzal, Michael Hilton, Claire Le Goues, and Christopher Steven Timperley. “It Takes a Village To Build a Robot: An Empirical Study of the ROS Ecosystem”. In: *International Conference on Software Maintenance and Evolution*. ICSME ’20. 2020, pp. 430–440.

- [GI'19] Zhen Yu Ding, Yiwei Lyu, Christopher S. Timperley, and Claire Le Goues. "Leveraging Program Invariants to Promote Population Diversity in Search-Based Automatic Program Repair". In: *Genetic Improvement Workshop*. GI '19. 2019, pp. 2–9.
- [GI'18b] Afsoon Afzal and Jeremy Lacomis and Claire Le Goues and Christopher S. Timperley. "A Turing Test for Genetic Improvement". In: *International Workshop on Genetic Improvement*. GI '18. 2018, pp. 17–18.
- [GI'18a] Benoit Baudry and Nicholas Harrand and Eric Schulte and Chris Timperley and Shin Hwei Tan and Marija Selkavoic and Emamurho Ugherughe. "A spoonful of DevOps helps the GI go down". In: *Genetic Improvement Workshop*. GI '18. 2018, pp. 35–36.
- [ICST'18] Christopher Steven Timperley and Afsoon Afzal and Deborah S. Katz and Jam Marcos Hernandez and Claire Le Goues. "Crashing simulated planes is cheap: Can simulation detect robotics bugs early?" In: *International Conference on Software Testing*. ICST '18. 2018, pp. 331–342.
- [ICSE'18] Christopher Steven Timperley and Susan Stepney and Claire Le Goues. "Poster: BugZoo – A Platform for Studying Software Bugs". In: *International Conference on Software Engineering*. ICSE '18. 2018, pp. 446–447.
- [SSBSE'17] Christopher Steven Timperley, Susan Stepney, and Claire Le Goues. "An Investigation into the Use of Mutation Analysis for Automated Program Repair". In: *Search Based Software Engineering*. SSBSE '17. 2017, pp. 99–114.
- [ECAL'15] Christopher Steven Timperley and Susan Stepney. "Wallace: An efficient generic evolutionary framework". In: *European Conference on Artificial Life*. ECAL '15. 2015, pp. 365–372.
- [ALIFE'14] Christopher Steven Timperley and Susan Stepney. "Reflective Grammatical Evolution". In: *ALife XIV*. MIT Press. 2014, pp. 71–78.

Unconventional and Non-Refereed Publications

- [arXiv:2004.07368] Afsoon Afzal, Deborah S. Katz, Claire Le Goues, and Christopher Steven Timperley. "A Study on the Challenges of Using Robotics Simulators for Testing". In: 2020. arXiv: 2004.07368 [cs-ro].
- [arXiv:2008.01046] Christopher Steven Timperley, Lauren Herckis, Claire Le Goues, and Michael Hilton. "Understanding and Improving Artifact Sharing in Software Engineering Research". In: 2020. arXiv: 2008.01046 [cs.SE].
- [SEN'19] William B Langdon, Westley Weimer, Christopher Timperley, Oliver Krauss, Zhen Yu Ding, Yiwei Lyu, Nicolas Chausseau, Eric Schulte, Shin Hwei Tan, Kevin Leach, et al. "The State and Future of Genetic Improvement". In: *Software Engineering Notes* 44.3 (2019), pp. 25–29.
- [PhD] Christopher Steven Timperley. "Advanced Methods for Search-Based Program Repair". PhD thesis. York, England: University of York, 2017.
- [MEng] Christopher Steven Timperley. "Reflective Method Matching for Object-Oriented Programs". MEng thesis. York, England: University of York, 2013.

Selected Open Source Projects

BugZoo: <https://github.com/squaresLab/BugZoo>

An open platform for studying and reproducing historical software bugs.

Darjeeling: <https://github.com/squaresLab/Darjeeling>

A framework for language-agnostic automated program repair.

ROSWire: <https://github.com/ChrisTimperley/ROSWire>

A library for performing static and dynamic analysis of containerised ROS applications.

ROBUST: <https://github.com/robust-robin/robust>

A curation of over 200 historical bugs in Robot Operating System packages.

The Robot Cooperative: <https://github.com/TheRobotCooperative/TheRobotCooperative>

A growing set of guides and interactive Docker images for new researchers studying ROS.

Teaching and Demonstrating

Carnegie Mellon University

Spring 2021	17413	Software Engineering Practicum	Instructor of Record
Fall 2020	17623	Quality Assurance	Instructor of Record
Spring 2020	17413	Software Engineering Practicum	Instructor of Record
Fall 2019	17214	Principles of Software Construction	Instructor of Record
Spring 2019	17355	Program Analysis	Guest Lecturer
Spring 2019	17413	Software Engineering Practicum	Instructor of Record

University of York

2016	SMAT	Software Measurement and Testing	Teaching Assistant, Guest Lecturer
2016	TPOP	Theory and Practice of Programming	Teaching Assistant
2015	EVCO	Evolutionary Computation	Teaching Assistant, Guest Lecturer
2015	CIDCATS	Introduction to Complex Systems	Teaching Assistant
2015	TPOP	Theory and Practice of Programming	Teaching Assistant
2014	TPOP	Theory and Practice of Programming	Teaching Assistant

Invited Talks

A Reflection on Program Repair for Robots

National University of Singapore, *Singapore, Dec 2019.*

188 ROS bugs later: Where do we go from here?

ROS Quality Assurance Group, *Dec 2019.*

188 ROS bugs later: Where do we go from here?

ROSCon 2019, *Macau, China, Nov 2019.*

Crashing simulated planes is cheap: Can simulation detect robotics bugs early?

Swedish Association for Software Testing Quarterly Meeting Q2, *Västerås, Sweden, Apr 2018.*

Automated Program Repair: Opportunities, Challenges, Advances.

58th CREST Open Workshop, Automating Programmers' Programming Experiments for Analytic Result Reporting in Code Review and Continuous Integration, *London, England, Feb 2018*.

BugZoo: A Platform for Studying Historical Bugs. Dagstuhl Seminar 18052, Genetic Improvement of Software, *Wadern, Germany, Jan 2018*.

Professional Activities

Local Service at Carnegie Mellon University

- 2021 Member, MSE Scalable Systems and Embedded Systems Admissions Committee
- 2017 Member, REUSE@CMU Admissions Committee

Program Committee Membership

- 2021 International Workshop on the Repair and Optimisation of Software using Computational Search
- 2020 International Workshop on the Repair and Optimisation of Software using Computational Search
- 2019 International Conference on Automated Software Engineering, Tools Track
International Workshop on the Repair and Optimisation of Software using Computational Search
International Conference on Software Engineering, Demo Track
- 2017 International Symposium on Search-Based Software Engineering, Student and Short Papers Track
Complex Systems Modelling and Simulation Workshop
- 2014 York Doctoral Symposium

Guest Reviewing and Refereeing

- 2021 IEEE Software
IEEE Transactions on Software Engineering
Journal of Field Robotics
IEEE Robotics and Automation Letters
- 2019 Empirical Software Engineering
Journal of Software and Systems
- 2015 Artificial Life Journal

Student Service

Ph.D. Student Mentoring

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| current | Afsoon Afzal | Institute for Software Research, CMU |
| 2018–2020 | Deborah Katz | Computer Science Department, CMU |

Undergraduate Student Mentoring

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| current | Mehal Kayshapp | Carnegie Mellon University |
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Research Experience for Undergraduates (REU) Mentoring

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| 2020 | Victoria Jordan | Embry-Riddle Aeronautical University |
| 2019 | Sophia Kolak | Columbia University |
| 2017 | Jam Marcos Hernandez | State University of New York |

CMU Portugal Exchange Program Mentoring

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| current | Paulo Santos | University of Lisbon |
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