

Michael Hilton

CONTACT INFORMATION	Software and Societal Systems School of Computer Science Carnegie Mellon University	mhilton@cmu.edu http://www.cs.cmu.edu/~mhilton
RESEARCH INTERESTS	My goal is to improve software engineering education. I do this by supporting teachers, doing research, and creating and sharing educational materials. My main research areas are flaky tests, continuous integration, software engineering at startups, and mob programming.	
APPOINTMENTS	Carnegie Mellon University , Pittsburgh, PA USA 2022 - Present Associate Department Head for Education 2020 - Present Associate Teaching Professor, 2017 - 2020 Assistant Teaching Professor Software and Societal Systems (S3D) School of Computer Science (SCS)	
EDUCATION	Oregon State University , Corvallis, OR USA Ph.D., Computer Science, June 2017 <ul style="list-style-type: none">• Advisor: Dr. Danny Dig• Area of Study: Software Engineering• Thesis Topic: <i>Understanding and Improving Agile Development Practices</i> California Polytechnic State University , San Luis Obispo, CA USA M.S., Computer Science, March 2013 <ul style="list-style-type: none">• Advisor: Dr. David Janzen• Area of Study: Software Engineering• Thesis Topic: <i>Improving WebIDE through delightful design and gamification</i> San Diego State University , San Diego, CA USA B.S., Computer Science, May 2002, <i>Cum Laude</i> Grossmont Community College , El Cajon, CA USA A.S., May 1999	
AWARDS AND HONORS	Spira Excellence in Teaching Award 2021 In recognition of major accomplishments and outstanding qualities and strengths in teaching and for excellence in the classroom. Wimmer Faculty Fellows 2020-21 Eberly Center for Teaching Excellence and Educational Innovation Facebook TAV award - 2019 Search-based inducement and repair of latent test flakiness Philip McMinn (University of Sheffield), Gregory M. Kapfhammer (Allegheny College), Michael Hilton (Carnegie Mellon University), and Owain Parry (University of Sheffield) ACM SIGSOFT Distinguished Paper Award Awarded to the top papers at a conference. Received at FSE 2017. ACM SIGSOFT Distinguished Paper Award Awarded to the top papers at a conference. Received at FSE 2016. J.L. Moore Doctoral Fellowship Awarded to Cal Poly CSC graduates who pursue Doctoral Studies in Computer Science. Received 2013,2014,2015	

TEACHING
EXPERIENCE

Carnegie Mellon University, Pittsburgh, PA USA

- Spring '24 - 17-313 Foundations of Software Engineering
- Spring '24 - 17-950 Crafting Software
- Fall '23 - 07-120 Introduction to Software Constructio
- Fall '23 - 15-890 Computer Science Pedagogy
- Summer '23 - 99-519 Collaborative Research through Projects
- Spring '23 - 17-313 Foundations of Software Engineering
- Spring '23 - 17-356 Software Engineering for Startups
- Fall '22 - 17-313 Foundations of Software Engineering
- Fall '22 - 17-623 Quality Assurance
- Spring '22 - 15-890 Computer Science Pedagogy
- Spring '22 - 17-356 Software Engineering for Startups
- Spring '22 - 17-413 Software Engineering Practicum
- Spring '22 - 17-950 Crafting Software
- Fall '21 - 17-313 Foundations of Software Engineering
- Fall '21 - 17-625 Design Patterns & API Design
- Spring '21 - 17-356 Software Engineering for Startups
- Spring '21 - 17-450/17-950 Crafting Software
- Fall '20 - 17-313 Foundations of Software Engineering
- Fall '20 - 17-400/700 Machine Learning and Data Science at Scale
- Spring '20 - 15-890 Computer Science Pedagogy
- Spring '20 - 17-356 Software Engineering for Startups
- Spring '20 - 17-413 Software Engineering Practicum
- Fall '19 - 17-313 Foundations in Software Engineering
- Fall '19 - 17-437 Webapps
- Spring '19 - 17-356 Software Engineering for Startups
- Spring '19 - 17-413 Software Engineering Practicum
- Spring '19 - 17-214: Principles of Software Construction: Objects, Design, and Concurrency
- Fall '18 - 15-890 CS Pedagogy
- Fall '18 - 17-313 Foundations in Software Engineering
- Spring '18 - 17-356 Software Engineering for Startups
- Spring '18 - 17-413 Software Engineering Practicum
- Fall '17 - 15-214: Principles of Software Construction: Objects, Design, and Concurrency

Oregon State University, Corvallis, OR USA

- Winter '16 - CS361: Software Engineering
- Fall '16 - CS/ECE507 - Graduate Seminar (Introduction to Grad School)

California Polytechnic State University, San Luis Obispo, CA USA

- Spring '13 - CSC/CPE 101 Fundamentals of Computer Science I

TALKS

Invited Talk - Jubilee Conference (February 2023) Promoting Human Flourishing with Software and Systems

Invited Talk - Auden (January 2022) Mob Programming: Better Together?

Invited Talk - University of Illinois Urbana-Champaign Champaign (November 2021) Teaching Professorships as a career choice

Invited Talk - University of Victoria (March 2021) Promoting Human Flourishing through Ethical Software Development

Invited Talk - University of Victoria (November 2020) Promoting Human Flourishing through Ethical Software Development

Invited Talk - Grove City College (October 2019) Promoting Human Flourishing through Ethical Software Development

Invited Talk - Dicks Sporting Goods (November 2019) Promoting Human Flourishing through Ethical Software Development

Conference presentation - Abstractions (August 2019) Promoting Human Flourishing through Ethical Software Development

PUBLICATIONS **Conferences and Journals**

1. Barr, E. T., J. Bell, M. Hilton, S. Mechtaev, and C. S. Timperley. Continuously Accelerating Research. In: *45th IEEE/ACM International Conference on Software Engineering: New Ideas and Emerging Results, NIER@ICSE, Melbourne, Australia, May 14-20, 2023*. IEEE, 2023, pp.123–128. doi: 10.1109/ICSE-NIER58687.2023.00028. <https://doi.org/10.1109/ICSE-NIER58687.2023.00028>.
2. Parry, O., G. M. Kapfhammer, M. Hilton, and P. McMinn. Empirically evaluating flaky test detection techniques combining test case rerunning and machine learning models. In: *Empir. Softw. Eng.* **28**(3) (2023), 72. doi: 10.1007/s10664-023-10307-w. <https://doi.org/10.1007/s10664-023-10307-w>.
3. Parry, O., M. Hilton, G. M. Kapfhammer, and P. McMinn. What Do Developer-Repaired Flaky Tests Tell Us About the Effectiveness of Automated Flaky Test Detection? In: *IEEE/ACM International Conference on Automation of Software Test, AST@ICSE 2022, Pittsburgh, PA, USA, May 21-22, 2022*. ACM/IEEE, 2022, pp.160–164. doi: 10.1145/3524481.3527227. <https://doi.org/10.1145/3524481.3527227>.
4. Parry, O., G. M. Kapfhammer, M. Hilton, and P. McMinn. A Survey of Flaky Tests. In: *ACM Trans. Softw. Eng. Methodol.* **31**(1) (2022), 17:1–17:74. doi: 10.1145/3476105. <https://doi.org/10.1145/3476105>.
5. Parry, O., G. M. Kapfhammer, M. Hilton, and P. McMinn. Evaluating Features for Machine Learning Detection of Order- and Non-Order-Dependent Flaky Tests. In: *15th IEEE Conference on Software Testing, Verification and Validation, ICST 2022, Valencia, Spain, April 4-14, 2022*. IEEE, 2022, pp.93–104. doi: 10.1109/ICST53961.2022.00021. <https://doi.org/10.1109/ICST53961.2022.00021>.
6. Parry, O., G. M. Kapfhammer, M. Hilton, and P. McMinn. Surveying the Developer Experience of Flaky Tests. In: *44th IEEE/ACM International Conference on Software Engineering: Software Engineering in Practice, ICSE (SEIP) 2022, Pittsburgh, PA, USA, May 22-24, 2022*. IEEE, 2022, pp.253–262. doi: 10.1109/ICSE-SEIP55303.2022.9793965. <https://doi.org/10.1109/ICSE-SEIP55303.2022.9793965>.
7. Sankaranarayanan, S., S. R. Kandimalla, C. A. Bogart, R. C. Murray, M. Hilton, M. F. Sakr, and C. P. Rosé. Collaborative Programming for Work-Relevant Learning: Comparing Programming Practice With Example-Based Reflection for Student Learning and Transfer Task Performance. In: *IEEE Trans. Learn. Technol.* **15**(5) (2022), 594–604. doi: 10.1109/TLT.2022.3169121. <https://doi.org/10.1109/TLT.2022.3169121>.
8. Winter, S., C. S. Timperley, B. Hermann, J. Cito, J. Bell, M. Hilton, and D. Beyer. A retrospective study of one decade of artifact evaluations. In: *Proceedings of the 30th ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering, ESEC/FSE 2022, Singapore, Singapore, November 14-18, 2022*. Ed. by A. Roychoudhury, C. Cadar, and M. Kim. ACM, 2022, pp.145–156. doi: 10.1145/3540250.3549172. <https://doi.org/10.1145/3540250.3549172>.
9. Alshammari, A., C. Morris, M. Hilton, and J. Bell. FlakeFlagger: Predicting Flakiness Without Rerunning Tests. In: *43rd IEEE/ACM International Conference on Software Engineering, ICSE 2021, Madrid, Spain, 22-30 May 2021*. IEEE, 2021, pp.1572–1584. doi: 10.1109/ICSE43902.2021.00140. <https://doi.org/10.1109/ICSE43902.2021.00140>.
10. Sankaranarayanan, S., S. R. Kandimalla, C. Bogart, R. C. Murray, M. Hilton, M. Sakr, and C. P. Rosé. Combining Collaborative Reflection based on Worked-Out Examples with Problem-Solving Practice: Designing Collaborative Programming Projects for

- Learning at Scale. In: *L@S'21: Eighth ACM Conference on Learning @ Scale, Virtual Event, Germany, June 22-25, 2021*. Ed. by C. Meinel, M. Pérez-Sanagustín, M. Specht, and A. Ogan. ACM, 2021, pp.255–258. doi: [10 . 1145 / 3430895 . 3460152](https://doi.org/10.1145/3430895.3460152). <https://doi.org/10.1145/3430895.3460152>.
11. Timperley, C. S., L. Herckis, C. L. Goues, and M. Hilton. Understanding and improving artifact sharing in software engineering research. In: *Empir. Softw. Eng.* **26**(4) (2021), 67. doi: [10 . 1007/S10664-021-09973-5](https://doi.org/10.1007/S10664-021-09973-5). <https://doi.org/10.1007/s10664-021-09973-5>.
 12. Afzal, A., C. L. Goues, M. Hilton, and C. S. Timperley. A Study on Challenges of Testing Robotic Systems. In: *13th IEEE International Conference on Software Testing, Validation and Verification, ICST 2020, Porto, Portugal, October 24-28, 2020*. IEEE, 2020, pp.96–107. doi: [10 . 1109 / ICST46399 . 2020 . 00020](https://doi.org/10.1109/ICST46399.2020.00020). <https://doi.org/10.1109/ICST46399.2020.00020>.
 13. Durieux, T., C. L. Goues, M. Hilton, and R. Abreu. Empirical Study of Restarted and Flaky Builds on Travis CI. In: *MSR '20: 17th International Conference on Mining Software Repositories, Seoul, Republic of Korea, 29-30 June, 2020*. Ed. by S. Kim, G. Gousios, S. Nadi, and J. Hejderup. ACM, 2020, pp.254–264. doi: [10 . 1145 / 3379597 . 3387460](https://doi.org/10.1145/3379597.3387460). <https://doi.org/10.1145/3379597.3387460>.
 14. Kolak, S., A. Afzal, C. L. Goues, M. Hilton, and C. S. 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 2020, Adelaide, Australia, September 28 - October 2, 2020*. IEEE, 2020, pp.430–440. doi: [10 . 1109 / ICSME46990 . 2020 . 00048](https://doi.org/10.1109/ICSME46990.2020.00048). <https://doi.org/10.1109/ICSME46990.2020.00048>.
 15. Sankaranarayanan, S., S. R. Kandimalla, S. Hasan, H. An, C. Bogart, R. C. Murray, M. Hilton, M. Sakr, and C. P. Rosé. Agent-in-the-Loop: Conversational Agent Support in Service of Reflection for Learning During Collaborative Programming. In: *Artificial Intelligence in Education - 21st International Conference, AIED 2020, Ifrane, Morocco, July 6-10, 2020, Proceedings, Part II*. Ed. by I. I. Bittencourt, M. Cukurova, K. Muldner, R. Luckin, and E. Millán. Vol. 12164. Lecture Notes in Computer Science. Springer, 2020, pp.273–278. doi: [10 . 1007 / 978 - 3 - 030 - 52240 - 7 \ _50](https://doi.org/10.1007/978-3-030-52240-7_50). https://doi.org/10.1007/978-3-030-52240-7_50.
 16. Nguyen, H. A., T. N. Nguyen, D. Dig, S. Nguyen, H. Tran, and M. Hilton. Graph-based mining of in-the-wild, fine-grained, semantic code change patterns. In: *Proceedings of the 41st International Conference on Software Engineering, ICSE 2019, Montreal, QC, Canada, May 25-31, 2019*. Ed. by J. M. Atlee, T. Bultan, and J. Whittle. IEEE / ACM, 2019, pp.819–830. doi: [10 . 1109 / ICSE . 2019 . 00089](https://doi.org/10.1109/ICSE.2019.00089). <https://doi.org/10.1109/ICSE.2019.00089>.
 17. Sankaranarayanan, S., X. Wang, C. Dashti, M. An, C. Ngoh, M. Hilton, M. Sakr, and C. P. Rosé. An Intelligent-Agent Facilitated Scaffold for Fostering Reflection in a Team-Based Project Course. In: *Artificial Intelligence in Education - 20th International Conference, AIED 2019, Chicago, IL, USA, June 25-29, 2019, Proceedings, Part II*. Ed. by S. Isotani, E. Millán, A. Ogan, P. M. Hastings, B. M. McLaren, and R. Luckin. Vol. 11626. Lecture Notes in Computer Science. Springer, 2019, pp.252–256. doi: [10 . 1007 / 978 - 3 - 030 - 23207 - 8 \ _47](https://doi.org/10.1007/978-3-030-23207-8_47). https://doi.org/10.1007/978-3-030-23207-8_47.
 18. Widder, D. G., M. Hilton, C. Kästner, and B. Vasilescu. A conceptual replication of continuous integration pain points in the context of Travis CI. In: *Proceedings of the ACM Joint Meeting on European Software Engineering Conference and Symposium on the Foundations of Software Engineering, ESEC/SIGSOFT FSE 2019, Tallinn, Estonia, August 26-30, 2019*. Ed. by M. Dumas, D. Pfahl, S. Apel, and A. Russo. ACM, 2019, pp.647–658. doi: [10 . 1145 / 3338906 . 3338922](https://doi.org/10.1145/3338906.3338922). <https://doi.org/10.1145/3338906.3338922>.
 19. Bell, J., O. Legunsen, M. Hilton, L. Eloussi, T. Yung, and D. Marinov. DeFlaker: automatically detecting flaky tests. In: *Proceedings of the 40th International Conference on Software Engineering, ICSE 2018, Gothenburg, Sweden, May 27 - June 03, 2018*. Ed. by

- M. Chaudron, I. Crnkovic, M. Chechik, and M. Harman. ACM, 2018, pp.433–444. doi: 10.1145/3180155.3180164. <https://doi.org/10.1145/3180155.3180164>.
20. Hilton, M. and A. Begel. A study of the organizational dynamics of software teams. In: *Proceedings of the 40th International Conference on Software Engineering: Software Engineering in Practice, ICSE (SEIP) 2018, Gothenburg, Sweden, May 27 - June 03, 2018*. Ed. by F. Paulisch and J. Bosch. ACM, 2018, pp.191–200. doi: 10.1145/3183519.3183527. <https://doi.org/10.1145/3183519.3183527>.
 21. Hilton, M., J. Bell, and D. Marinov. A large-scale study of test coverage evolution. In: *Proceedings of the 33rd ACM/IEEE International Conference on Automated Software Engineering, ASE 2018, Montpellier, France, September 3-7, 2018*. 2018. <http://www.cs.cmu.edu/~mhilton/docs/ase18coverage.pdf>.
 22. Widder, D. G., M. Hilton, C. Kästner, and B. Vasilescu. I’m leaving you, Travis: a continuous integration breakup story. In: *Proceedings of the 15th International Conference on Mining Software Repositories, MSR 2018, Gothenburg, Sweden, May 28-29, 2018*. Ed. by A. Zaidman, Y. Kamei, and E. Hill. ACM, 2018, pp.165–169. doi: 10.1145/3196398.3196422. <https://doi.org/10.1145/3196398.3196422>.
 23. Hilton, M., N. Nelson, T. Tunnell, D. Marinov, and D. Dig. Trade-offs in continuous integration: assurance, security, and flexibility. In: *Proceedings of the 2017 11th Joint Meeting on Foundations of Software Engineering, ESEC/FSE 2017, Paderborn, Germany, September 4-8, 2017*. Ed. by E. Bodden, W. Schäfer, A. van Deursen, and A. Zisman. ACM, 2017, pp.197–207. doi: 10.1145/3106237.3106270. <https://doi.org/10.1145/3106237.3106270>.
 24. Omar, C., I. Voysey, M. Hilton, J. Aldrich, and M. A. Hammer. Hazelnut: a bidirectionally typed structure editor calculus. In: *Proceedings of the 44th ACM SIGPLAN Symposium on Principles of Programming Languages, POPL 2017, Paris, France, January 18-20, 2017*. Ed. by G. Castagna and A. D. Gordon. ACM, 2017, pp.86–99. doi: 10.1145/3009837.3009900. <https://doi.org/10.1145/3009837.3009900>.
 25. Hilton, M., N. Nelson, H. McDonald, S. McDonald, R. Metoyer, and D. Dig. TDDViz: Using Software Changes to Understand Conformance to Test Driven Development. In: *Proceedings of Agile Processes, in Software Engineering, and Extreme Programming: 17th International Conference. XP 2016, 2016*. <http://www.cs.cmu.edu/~mhilton/publications/2016/TDDViz.pdf>.
 26. Hilton, M., T. Tunnell, K. Huang, D. Marinov, and D. Dig. Usage, costs, and benefits of continuous integration in open-source projects. In: *Proceedings of the 31st IEEE/ACM International Conference on Automated Software Engineering. ASE 2016. Jan. 2016*. <http://cope.eecs.oregonstate.edu/papers/OpenSourceCIUsage.pdf>.
 27. Nguyen, A. T., M. Hilton, M. Codoban, H. A. Nguyen, L. Mast, E. Rademacher, T. N. Nguyen, and D. Dig. API code recommendation using statistical learning from fine-grained changes. In: *Proceedings of the 2016 24th ACM SIGSOFT International Symposium on Foundations of Software Engineering. FSE 2016. Feb. 2016*. http://www.cs.cmu.edu/~mhilton/publications/2016/APIRec_fse16.pdf.
 28. Hilton, M., A. Christi, D. Dig, M. Moskal, S. Burckhardt, and N. Tillmann. Refactoring local to cloud data types for mobile apps. In: *Proceedings of the 1st International Conference on Mobile Software Engineering and Systems. MOBILESoft 2014. 2014*. <http://cope.eecs.oregonstate.edu/papers/RefactorToCloud.pdf>.
 29. Janzen, D. S., J. Clements, and M. Hilton. An evaluation of interactive test-driven labs with WebIDE in CS0. In: *Proceedings of the 2013 International Conference on Software Engineering. ICSE 2013. 2013*. <http://dl.acm.org/citation.cfm?id=2486788.2486938&co11=DL&dl=GUIDE>.
 30. Hilton, M. and D. S. Janzen. On teaching arrays with test-driven learning in WebIDE. In: *Proceedings of the 17th ACM annual conference on Innovation and technology in computer science education. ITiCSE 2012. 2012*. <http://dl.acm.org/citation.cfm?id=2325296.2325322&co11=DL&dl=GUIDE>.

PROFESSIONAL
EXPERIENCE

Microsoft Research, Redmond, WA USA

Research Intern

May 2017 to August 2017

- Studied how and why developers move between development teams

Steadfast Innovation, San Luis Obispo, CA USA

Mobile HTML5 developer

March 2013 to August 2013

- Developed HTML5 mobile app with real-time shared drawing capabilities

Independent Contractor, San Luis Obispo, CA USA

Software Developer

August 2011 to March 2013

- Worked remotely with Loan-management Software Company
- Developed applications to transition data using ASP.Net applications
- Worked closely with project manager to ensure correct transition

Space and Naval Warfare Systems Center - Pacific, San Diego, CA USA

Software Engineer/Scientist

June 2002 to August 2011

- **Team Lead White House Situation Room Upgrade Project**
 - Team lead for Server portion of White House Situation Room Upgrade Project.
 - Responsible for Server team development effort in ASP.Net using C#. Also responsible for scheduling, resource management, and interfacing with Client team.
 - Responsible for managing and mentoring new hires
- **Lead Software Engineer**
 - Lead Engineer for a Navy Sponsored Web Based Data Aggregation Project consisting of six Government and Contractor Engineers. Responsible for tasking engineering team, monitoring progress, and overseeing new features. Also, meeting with client, and helping them develop requirements for project.
 - Responsible for briefing VIPs, including US Navy Admirals.
 - Member of Cyber-Warfare Strategy Planning meeting, which was comprised of senior leadership and outstanding engineers.
- **Software Engineer**
 - Primary Software Engineer for two projects starting with developing a demo from a concept, lead engineer for lifetime of the development cycle, including transition period once project was finished and delivered
 - Developed Embedded Application running on Windows Mobile in embedded Visual Basic and embedded C++ deployed and used by USN and US Coast Guard.

EXTERNAL
SERVICE

2020 -Present	Computing Research Association - Education Committee Member
2023	SPLASH-E Co-Organizer
2022	ICSE Student Volunteer Co-Chair
2021	CRE-E Outstanding Undergraduate Researcher Award Committee Co-Chair
2020	CRE-E Outstanding Undergraduate Researcher Award Committee Co-Chair
2020	International Conference on Automated Software Engineering Program Committee
2019	Transactions on Software Engineering Journal Reviewer
2019	Empirical Software Engineering Journal Reviewer
2018	Transactions on Software Engineering Journal Reviewer
2018	Empirical Software Engineering Journal Reviewer
2018	2nd Workshop on Innovative Software Engineering Education (ISEE) Program Committee
2018	SIGCSE Reviewer
2018	Member of Program Committee, ISSTA 2018 Tool Demonstrations
2018	Member of Program Committee, Artifact Evaluation Committee for ISSTA 2018 Artifacts
2017, 2018	Member of Program Committee, Mining Software Repositories Challenge
2017	Journal of Systems and Software
2017	ACM Transactions on Software Engineering and Methodology (TOSEM)
2017, 2016 and 2015	Video Chair at ACM's SPLASH (OOPSLA) conference
2016	Student Volunteer at ACM/IEEE ICSE conference
2013	Student Volunteer at ACM's SPLASH (OOPSLA) conference

INTERNAL SERVICE

2022-Present	Associate Department Head for Education
2023-Present	Chair SCS Mark Stehlik Teaching Postdoc committee
2021-Present	SCS Academic Advisor
2018-Present	SE minor/concentration advisor
2018-Present	SCS Undergraduate Review Committee (URC)

STUDENT MENTORING

Sophia Kolak (REU - Summer 2019 - REUSE) Understanding Robotics Testing

Lilly Mast (REU - Summer 2015 - Oregon State University) Code Completion Project

Eli Rademacher (REU - Summer 2015 - Oregon State University) Code Completion Project

Sean McDonald (REU - Summer 2014 - Oregon State University) TDD Visualization Project

Hugh McDonald (REU - Summer 2014 - Oregon State University) TDD Visualization Project

Nicolas Nelson (REU - Summer 2014 - Oregon State University) TDD Visualization Project

Lucas David (REU - Summer 2012 - CalPoly) Improving WebIDE

Vanessa Forney (REU - Summer 2012 - CalPoly) Improving WebIDE