Philip Guo

Associate Professor
Department of Cognitive Science
University of California, San Diego (UCSD)

RESEARCH INTERESTS

Human-computer interaction, computing education, online learning at scale, tools for programmers and data scientists, research programming, end-user programming

ACADEMIC POSITIONS

07/2020 – PRESENT **University of California, San Diego (UCSD)**, La Jolla, CA
Associate Professor of Cognitive Science
Affiliate Associate Professor of Computer Science and Engineering
Faculty Affiliate: Design Lab, Computational Social Science

07/2016 – 06/2020 **University of California, San Diego (UCSD)**, La Jolla, CA
Assistant Professor of Cognitive Science
Affiliate Assistant Professor of Computer Science and Engineering

07/2014 – 06/2016 **University of Rochester**, Rochester, NY
Assistant Professor of Computer Science

06/2013 – 06/2014 **Massachusetts Institute of Technology**, Cambridge, MA
Visiting Research Scientist – edX (summer 2013)
Postdoctoral Researcher – CSAIL User Interface Design Group – Host: Rob Miller

EDUCATION

09/2006 – 06/2012 **Stanford University**, Stanford, CA
Ph.D. in Computer Science
Dissertation: *Software Tools to Facilitate Research Programming*
Advisor: Dawson Engler

06/2005 – 06/2006 **Massachusetts Institute of Technology**, Cambridge, MA
Master of Engineering in Electrical Engineering and Computer Science
Master's Thesis: *A Scalable Mixed-Level Approach to Dynamic Analysis of C and C++ Programs*, Advisor: Michael D. Ernst

09/2001 – 06/2005 **Massachusetts Institute of Technology**, Cambridge, MA
Bachelor of Science in Electrical Engineering and Computer Science

AWARDS AND HONORS

10/2021 UIST Best Paper Award [C.54]

10/2021 VL/HCC Honorable Mention Paper Award [C.53]

03/2021 SIGCSE Best Paper Award [C.52]

04/2020 CHI Best Paper Award [C.50]

10/2019 VL/HCC Best Paper Award [C.47]

07/2019	ISSTA 10-Year Impact Paper Award [C.6]
05/2019	CHI Honorable Mention Paper Award [C.44]
04/2019	NSF CAREER Award
04/2019	Google Faculty Research Award
10/2018	UIST Best Paper Award [C.42]
04/2018	CHI Honorable Mention Paper Award [C.38]
10/2017	UIST Honorable Mention Paper Award [C.36]
05/2017	CHI Honorable Mention Paper Award [C.31]
08/2015	Google Faculty Research Award
04/2014	CHI Honorable Mention Paper Award [C.18]
06/2012	ICSE Software Engineering In Practice Best Paper Award [C.13]
07/2009	ACM SIGSOFT Distinguished Paper Award (ISSTA) [C.6]
04/2009	CHI Honorable Mention Paper Award [C.3]
09/2009 – 06/2011	National Science Foundation (NSF) Graduate Fellowship
09/2006 – 09/2009	National Defense Science and Engineering (NDSEG) Graduate Fellowship
05/2006	MIT Charles and Jennifer Johnson Thesis Award for Outstanding Computer Science Master of Engineering Thesis

FUNDING

Microsoft Research. Beyond just programming: using an LLM's knowledge about the human world to improve human-AI collaboration for data science. $50,000 (2023)

Google exploreCSR program. Uncovering the Hidden Curriculum of HCI, AI, and Data Science Careers. $32,000 (2023)

Alfred P. Sloan Foundation. Investigating How Domain Scientists and Computational Scientists Work Together in Software-driven Research Labs $49,681 (2021–2022)

National Science Foundation. CAREER: Interactive Systems for Learning Programming at Scale. $479,860 + $64,000 REU supplement (2019–2025)

Google Faculty Research Award. Automated IDE Activity Tracing for Creating, Testing, and Updating Developer Tutorials. $65,609 (2019)

National Science Foundation. NRT-IGE: Augmenting, Piloting, and Scaling Computational Notebooks to Train New Graduate Researchers in Data-Centric Programming. $498,751 (2017–2020), PI: James Hollan, co-PI: Philip Guo, co-PI: Scott Klemmer, co-PI: Bradley Voytek

National Science Foundation. CRII: CHS: Scaling Up Online Peer Tutoring of Computer Programming. $175,000 + $32,000 REU supplement (2015–2018)

Google Faculty Research Award. Enabling Learners to Create Hierarchical Tutorials from How-To Videos on YouTube. $64,295 (2015)

University of Rochester. University Research Award: Enabling Fast and Scalable Feedback on Writing. $50,000 (2015)

Microsoft Research. Online Python Tutor for Office Mix. $61,308 (2014)

PEER-REVIEWED PUBLICATIONS

Note that in many areas within computer science and human-computer interaction, *conferences* (not journals) are the primary publication venues.

To see the full PDFs of all publications, visit https://pg.ucsd.edu/

CONFERENCE PAPERS

C.63 Devamardeep Hayatpur, Brian Hempel, Kathy Chen, William Duan, Philip J. Guo, Haijun Xia. Taking ASCII Drawings Seriously: How Programmers Diagram Code. In Proceedings of CHI 2024: ACM Conference on Human Factors in Computing Systems, May 2024.

C.62 Sam Lau and Philip J. Guo. From "Ban It Till We Understand It" to "Resistance is Futile": How University Programming Instructors Plan to Adapt as More Students Use AI Code Generation and Explanation Tools such as ChatGPT and GitHub Copilot. In Proceedings of ICER 2023: ACM Conference on International Computing Education Research, Aug 2023.

C.61 Kendall Nakai and Philip J. Guo. Uncovering the Hidden Curriculum of University Computing Majors via Undergraduate-Written Mentoring Guides: A Learner-Centered Design Workflow. In Proceedings of ICER 2023: ACM Conference on International Computing Education Research, Aug 2023.

C.60 Georgios Sakkas, Madeline Endres, Philip J. Guo, Westley Weimer, Ranjit Jhala. Seq2Parse: Neurosymbolic Parse Error Repair. In Proceedings of OOPSLA 2022: *Object-oriented Programming, Systems, Languages, and Applications*, Oct 2022.

C.59 Rimika Chaudhury, Philip J. Guo, Parmit K. Chilana. "There's no way to keep up!": Diverse Motivations and Challenges Faced by Informal Learners of ML. In Proceedings of VL/HCC 2022: *IEEE Symposium on Visual Languages and Human-Centric Computing*, Sep 2022.

C.58 Ian Drosos and Philip J. Guo. The Design Space of Livestreaming Equipment Setups: Tradeoffs, Challenges, and Opportunities. In Proceedings of DIS 2022: ACM SIGCHI Conference on Designing Interactive Systems, June 2022.

C.57 Sam Lau, Justin Eldridge, Shannon Ellis, Aaron Fraenkel, Marina Langlois, Suraj Rampure, Janine Tiefenbruck, Philip J. Guo. The Challenges of Evolving Technical Courses at Scale: Four Case Studies of Updating Large Data Science Courses. In Proceedings of L@S 2022: ACM Conference on Learning at Scale, June 2022.

C.56 Sam Lau, Deborah Nolan, Joseph Gonzalez, Philip J. Guo. How Computer Science and Statistics Instructors Approach Data Science Pedagogy Differently: Three Case Studies. In Proceedings of SIGCSE 2022: *ACM Technical Symposium on Computer Science Education*, March 2022.

C.55 Sean Kross and Philip J. Guo. Five Pedagogical Principles of a User-Centered Design Course that Prepares Computing Undergraduates for Industry Jobs. In Proceedings of SIGCSE 2022: *ACM Technical Symposium on Computer Science Education*, March 2022.

C.54 Philip J. Guo. Ten Million Users and Ten Years Later: Python Tutor's Design Guidelines for Building Scalable and Sustainable Research Software in Academia. In Proceedings of UIST 2021: ACM Symposium on User Interface Software and Technology, Oct 2021.
Best Paper Award

C.53 Ian Drosos and Philip J. Guo. Streamers Teaching Programming, Art, and Gaming: Cognitive Apprenticeship, Serendipitous Teachable Moments, and Tacit Expert Knowledge. Short paper in Proceedings of VL/HCC 2021: *IEEE Symposium on Visual Languages and Human-Centric Computing*, Oct 2021.
Honorable Mention Paper Award

C.52 Julia M. Markel and Philip J. Guo. Inside the Mind of a CS Undergraduate TA: A Firsthand Account of Undergraduate Peer Tutoring in Computer Labs. In Proceedings of SIGCSE 2021: *ACM Technical Symposium on Computer Science Education*, March 2021.
Best Paper Award

C.51 Sam Lau, Ian Drosos, Julia M. Markel, Philip J. Guo. The Design Space of Computational Notebooks: An Analysis of 60 Systems in Academia and Industry. In Proceedings of VL/HCC 2020: IEEE Symposium on Visual Languages and Human-Centric Computing, Aug 2020.

C.50 Ian Drosos, Titus Barik, Philip J. Guo, Robert DeLine, Sumit Gulwani. Wrex: A Unified Programming-by-Example Interaction for Synthesizing Readable Code for Data Scientists. In Proceedings of CHI 2020: ACM Conference on Human Factors in Computing Systems, April 2020.
Best Paper Award

C.49 Priyan Vaithilingam and Philip J. Guo. Bespoke: Interactively Synthesizing Custom GUIs from Command-Line Applications By Demonstration. In Proceedings of UIST 2019: ACM Symposium on User Interface Software and Technology, Oct 2019.

C.48 Xiong Zhang and Philip J. Guo. Mallard: Turn the Web into a Contextualized Prototyping Environment for Machine Learning. In Proceedings of UIST 2019: ACM Symposium on User Interface Software and Technology, Oct 2019.

C.47 Carrie J. Cai and Philip J. Guo. Software Developers Learning Machine Learning: Motivations, Hurdles, and Desires. In Proceedings of VL/HCC 2019: IEEE Symposium on Visual Languages and Human-Centric Computing, Oct 2019.
Best Paper Award

C.46 Sean Kross and Philip J. Guo. End-User Programmers Repurposing End-User Programming Tools to Foster Diversity in Adult End-User Programming Education. In Proceedings of VL/HCC 2019: IEEE Symposium on Visual Languages and Human-Centric Computing, Oct 2019.

C.45 Charles Chen and Philip J. Guo. Improv: Teaching Programming at Scale via Live Coding. In Proceedings of L@S 2019: ACM Conference on Learning at Scale, June 2019.

C.44 Sean Kross and Philip J. Guo. Practitioners Teaching Data Science in Industry and Academia: Expectations, Workflows, and Challenges. In Proceedings of CHI 2019: ACM Conference on Human Factors in Computing Systems, May 2019.
Honorable Mention Paper Award

C.43 Xiong Zhang and Philip J. Guo. Fusion: Opportunistic Web Prototyping with UI Mashups. In Proceedings of UIST 2018: ACM Symposium on User Interface Software and Technology, Oct 2018.

C.42 Alok Mysore and Philip J. Guo. Porta: Profiling Software Tutorials Using Operating-System-Wide Activity Tracing. In Proceedings of UIST 2018: ACM Symposium on User Interface Software and Technology, Oct 2018.
(**Best Paper Award**)

C.41 Kyle Thayer, Philip J. Guo, Katharina Reinecke. The Impact of Culture on Learner Behavior in Visual Debuggers. In Proceedings of VL/HCC 2018: IEEE Symposium on Visual Languages and Human-Centric Computing, Oct 2018.

C.40 Kandarp Khandwala and Philip J. Guo. Codemotion: Expanding the Design Space of Learner Interactions with Computer Programming Tutorial Videos. In Proceedings of L@S 2018: ACM Conference on Learning at Scale, June 2018.

C.39 Sean Kross and Philip J. Guo. Students, Systems, and Interactions: Synthesizing the First Four Years of Learning@Scale and Charting the Future. In Proceedings of L@S 2018: ACM Conference on Learning at Scale, June 2018.

C.38 April Y. Wang, Ryan Mitts, Philip J. Guo, Parmit K. Chilana. Mismatch of Expectations: How Modern Learning Resources Fail Conversational Programmers. In Proceedings of CHI 2018: ACM Conference on Human Factors in Computing Systems, April 2018.
Honorable Mention Paper Award

C.37 Philip J. Guo. Non-Native English Speakers Learning Computer Programming: Barriers, Desires, and Design Opportunities. In Proceedings of CHI 2018: ACM Conference on Human Factors in Computing Systems, April 2018.

C.36 Xiong Zhang and Philip J. Guo. DS.js: Turn Any Webpage into an Example-Centric Live Programming Environment for Learning Data Science. In Proceedings of UIST 2017: ACM Symposium on User Interface Software and Technology, Oct 2017.
Honorable Mention Paper Award

C.35 Hyeonsu Kang and Philip J. Guo. Omnicode: A Novice-Oriented Live Programming Environment with Always-On Run-Time Value Visualizations. In Proceedings of UIST 2017: ACM Symposium on User Interface Software and Technology, Oct 2017.

C.34 Alok Mysore and Philip J. Guo. Torta: Generating Mixed-Media GUI and Command-Line App Tutorials Using Operating-System-Wide Activity Tracing. In Proceedings of UIST 2017: ACM Symposium on User Interface Software and Technology, Oct 2017.

C.33 Ian Drosos, Philip J. Guo, Chris Parnin. HappyFace: Identifying and Predicting Frustrating Obstacles for Learning Programming at Scale. In Proceedings of VL/HCC 2017: IEEE Symposium on Visual Languages and Human-Centric Computing, Oct 2017.

C.32 Jeremy Warner and Philip J. Guo. Hack.edu: Examining How College Hackathons Are Perceived By Student Attendees and Non-Attendees. In Proceedings of ICER 2017: ACM International Computing Education Research conference, Aug 2017.

C.31 Philip J. Guo. Older Adults Learning Computer Programming: Motivations, Frustrations, and Design Opportunities. In Proceedings of CHI 2017: ACM Conference on Human Factors in Computing Systems, May 2017.
Honorable Mention Paper Award

C.30 Jeremy Warner and Philip J. Guo. CodePilot: Scaffolding End-to-End Collaborative Software Development for Novice Programmers. In Proceedings of CHI 2017: ACM Conference on Human Factors in Computing Systems, May 2017.

C.29 Denae Ford, Justin Smith, Philip J. Guo, Chris Parnin. Paradise Unplugged: Identifying Barriers for Female Participation on Stack Overflow. In Proceedings of FSE 2016: ACM SIGSOFT International Symposium on the Foundations of Software Engineering, Nov 2016.

C.28 Parmit K. Chilana, Rishabh Singh, Philip J. Guo. Understanding Conversational Programmers: A Perspective from the Software Industry. In Proceedings of CHI: ACM Conference on Human Factors in Computing Systems, May 2016.

C.27 Philip J. Guo. Codeopticon: Real-Time, One-To-Many Human Tutoring for Computer Programming. In Proceedings of UIST 2015: ACM Symposium on User Interface Software and Technology, Nov 2015.

C.26 Philip J. Guo, Jeffery White, Renan Zanelatto. Codechella: Multi-User Program Visualizations for Real-Time Tutoring and Collaborative Learning. In Proceedings of VL/HCC 2015: IEEE Symposium on Visual Languages and Human-Centric Computing, Oct 2015.

C.25 Mitchell Gordon and Philip J. Guo. Codepourri: Creating Visual Coding Tutorials Using A Volunteer Crowd Of Learners. In Proceedings of VL/HCC: IEEE Symposium on Visual Languages and Human-Centric Computing, Oct 2015.

C.24 Joyce Zhu, Jeremy Warner, Mitchell Gordon, Jeffery White, Renan Zanelatto, Philip J. Guo. Toward a Domain-Specific Visual Discussion Forum for Learning Computer Programming: An Empirical Study of a Popular MOOC Forum. In Proceedings of VL/HCC 2015: IEEE Symposium on Visual Languages and Human-Centric Computing, Oct 2015.

C.23 Parmit K. Chilana, Celena Alcock, Shruti Dembla, Anson Ho, Ada Hurst, Brett Armstrong, Philip J. Guo. Perceptions of Non-CS Majors in Intro Programming: The Rise of the Conversational Programmer. In Proceedings of VL/HCC 2015: IEEE Symposium on Visual Languages and Human-Centric Computing, Oct 2015.

C.22 Jeremy Warner, John Doorenbos, Bradley N. Miller, Philip J. Guo. How High School, College, and Online Students Differentially Engage with an Interactive Digital Textbook. Short paper in Proceedings of EDM 2015: International Conference on Educational Data Mining, June 2015.

C.21 Carrie J. Cai, Philip J. Guo, James Glass, Robert C. Miller. Wait-Learning: Leveraging Wait Time for Second Language Education. In Proceedings of CHI 2015: *ACM Conference on Human Factors in Computing Systems*, April 2015.

C.20 Juho Kim, Philip J. Guo, Carrie J. Cai, Shang-Wen (Daniel) Li, Krzysztof Z. Gajos, Robert C. Miller. Data-Driven Interaction Techniques for Improving Navigation of Educational Videos. In Proceedings of UIST 2014: *ACM Symposium on User Interface Software and Technology*, October 2014.

C.19 Jeremy Scott, Philip J. Guo, Randall Davis. A Direct Manipulation Language for Explaining Algorithms. Short paper in Proceedings of VL/HCC 2014: *IEEE Symposium on Visual Languages and Human-Centric Computing*, Jul 2014.

C.18 Juho Kim, Phu Nguyen, Sarah Weir, Philip J. Guo, Robert C. Miller, Krzysztof Z. Gajos. Crowdsourcing Step-by-Step Information Extraction to Enhance Existing How-to Videos. In Proceedings of CHI 2014: *ACM Conference on Human Factors in Computing Systems*, April 2014.
Honorable Mention Paper Award

C.17 Philip J. Guo and Katharina Reinecke. Demographic Differences in How Students Navigate Through MOOCs. In Proceedings of L@S 2014: *ACM Conference on Learning at Scale*, March 2014.

C.16 Philip J. Guo, Juho Kim, Rob Rubin. How Video Production Affects Student Engagement: An Empirical Study of MOOC Videos. In Proceedings of L@S 2014: *ACM Conference on Learning at Scale*, March 2014.

C.15 Juho Kim, Philip J. Guo, Daniel T. Seaton, Piotr Mitros, Krzysztof Z. Gajos, Robert C. Miller. Understanding In-Video Dropouts and Interaction Peaks in Online Lecture Videos. In Proceedings of L@S 2014: *ACM Conference on Learning at Scale*, March 2014.

C.14 Philip J. Guo. Online Python Tutor: Embeddable Web-Based Program Visualization for CS Education. In Proceedings of SIGCSE 2013: *ACM Technical Symposium on Computer Science Education*, March 2013.

C.13 Thomas Zimmermann, Nachiappan Nagappan, Philip J. Guo, Brendan Murphy. Characterizing and Predicting Which Bugs Get Reopened. In Proceedings of ICSE 2012: *ACM/IEEE International Conference on Software Engineering*, Software Engineering In Practice track, June 2012.
Best Paper Award

C.12 Philip J. Guo. CDE: Run Any Linux Application On-Demand Without Installation. In Proceedings of LISA 2011: *USENIX Large Installation System Administration Conference*, December 2011.

C.11 Philip J. Guo, Sean Kandel, Joseph M. Hellerstein, Jeffrey Heer. Proactive Wrangling: Mixed-Initiative End-User Programming of Data Transformation Scripts. In Proceedings of UIST 2011: *ACM Symposium on User Interface Software and Technology*, October 2011.

C.10 Philip J. Guo and Dawson Engler. Using Automatic Persistent Memoization to Facilitate Data Analysis Scripting. In Proceedings of ISSTA 2011: *ACM International Symposium on Software Testing and Analysis*, July 2011.

C.9 Philip J. Guo and Dawson Engler. CDE: Using System Call Interposition to Automatically Create Portable Software Packages. Short paper in Proceedings of USENIX 2011: *USENIX Annual Technical Conference*, June 2011.

C.8 Philip J. Guo, Thomas Zimmermann, Nachiappan Nagappan, Brendan Murphy. "Not My Bug!" and Other Reasons for Software Bug Report Reassignments. In Proceedings of CSCW 2011: *ACM Conference on Computer Supported Cooperative Work*, March 2011.

C.7 Philip J. Guo, Thomas Zimmermann, Nachiappan Nagappan, Brendan Murphy. Characterizing and Predicting Which Bugs Get Fixed: An Empirical Study of Microsoft Windows. In Proceedings of ICSE 2010: *ACM/IEEE International Conference on Software Engineering*, May 2010.

C.6 Adam Kiezun, Vijay Ganesh, Philip J. Guo, Pieter Hooimeijer, Michael D. Ernst. HAMPI: A Solver for String Constraints. In Proceedings of ISSTA: *ACM International Symposium on Software Testing and Analysis*, July 2009.
ACM SIGSOFT Distinguished Paper Award
ISSTA 10-Year Impact Paper Award

C.5 Philip J. Guo and Dawson Engler. Linux Kernel Developer Responses to Static Analysis Bug Reports. Short paper in Proceedings of USENIX 2009: *USENIX Annual Technical Conference*, June 2009.

C.4 Adam Kiezun, Philip J. Guo, Karthick Jayaraman, Michael D. Ernst. Automatic Creation of SQL Injection and Cross-site Scripting Attacks. In Proceedings of ICSE 2009: *ACM/IEEE International Conference on Software Engineering*, May 2009.

C.3 Joel Brandt, Philip J. Guo, Joel Lewenstein, Mira Dontcheva, Scott R. Klemmer. Two Studies of Opportunistic Programming: Interleaving Web Foraging, Learning, and Writing Code. In Proceedings of CHI 2009: *ACM Conference on Human Factors in Computing Systems*, April 2009.
Honorable Mention Paper Award

C.2 Philip J. Guo, Jeff H. Perkins, Stephen McCamant, Michael D. Ernst. Dynamic Inference of Abstract Types. In Proceedings of ISSTA 2006: *ACM International Symposium on Software Testing and Analysis*, July 2006.

C.1 Brian Demsky, Michael D. Ernst, Philip J. Guo, Stephen McCamant, Jeff H. Perkins, Martin Rinard. Automatic Inference and Enforcement of Data Structure Consistency Specifications. In Proceedings of ISSTA 2006: *ACM International Symposium on Software Testing and Analysis*, July 2006.

JOURNAL ARTICLES

J.4 Sean Kross and Philip J. Guo. Orienting, Framing, Bridging, Magic, and Counseling: How Data Scientists Navigate the Outer Loop of Client Collaborations in Industry and Academia. Published in *Proceedings of the ACM: Human Computer Interaction (PACM HCI) journal*, presented at the ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW), 2021.

J.3 Elena L. Glassman, Jeremy Scott, Rishabh Singh, Philip J. Guo, Robert C. Miller. OverCode: Visualizing Variation in Student Solutions to Programming Problems at Scale. In TOCHI: *ACM Transactions on Computer-Human Interaction*, 2015.

J.2 Adam Kiezun, Vijay Ganesh, Shay Artzi, Philip J. Guo, Pieter Hooimeijer, Michael D. Ernst. Hampi: A Solver for Word Equations over Strings, Regular Expressions and Context-free Grammars. In TOSEM: *ACM Transactions on Software Engineering Methodology*, 2012.

J.1 Michael D. Ernst, Jeff H. Perkins, Philip J. Guo, Stephen McCamant, Carlos Pacheco, Matthew S. Tschantz, Chen Xiao. The Daikon system for dynamic detection of likely invariants. In *Science of Computer Programming*, 2007.

WORKSHOP PAPERS

W.11 Ruanqianqian (Lisa) Huang, Philip J. Guo, Sorin Lerner. Unfolding State Changes via Live State-First Debugging. *Workshop on Live Programming (LIVE)*, Oct 2023.

W.10 Sam Lau*, Sean Kross*, Eugene Wu, Philip J. Guo (*equal contribution). Teaching Data Science by Visualizing Data Table Transformations: Pandas Tutor for Python, Tidy Data Tutor for R, and SQL Tutor. *International Workshop on Data Systems Education (DataEd)*, 2023.

W.9 Sam Lau and Philip J. Guo. Codehound: Helping Instructors Track Pedagogical Code Dependencies in Course Materials. *ACM SIGPLAN SPLASH-E Symposium (SPLASH-E)*, 2022.

W.8 Josh Pollock, Grace Oh, Eunice Jun, Philip J. Guo, Zachary Tatlock. The Essence of Program Semantics Visualizers: A Three-Axis Model. *Workshop on Evaluation and Usability of Programming Languages and Tools (PLATEAU)*, Nov 2020.

W.7 Sam Lau and Philip J. Guo. Data Theater: A Live Programming Environment for Prototyping Data-Driven Explorable Explanations. *Workshop on Live Programming (LIVE)*, Nov 2020.

W.6 Julia M. Markel and Philip J. Guo. Designing the Future of Experiential Learning Environments for a Post-COVID World: A Preliminary Case Study. *Symposium on the New Future of Work*, Aug 2020.

W.5 Amy Rae Fox, Philip Guo, Clemens Nylandsted Klokmose, Peter Dalsgaard, Arvind Satyanarayan, Haijun Xia, James D. Hollan. Towards a Dynamic Multiscale Personalized Information Space. *Convivial Computing Salon (workshop at the <Programming> conference)*, Mar 2020.

W.4 Philip J. Guo and Margo Seltzer. Burrito: Wrapping Your Lab Notebook in Computational Infrastructure. In Proceedings of TaPP 2012: *USENIX Workshop on the Theory and Practice of Provenance*, June 2012.

W.3 Philip J. Guo. Sloppy Python: Using Dynamic Analysis to Automatically Add Error Tolerance to Ad-Hoc Data Processing Scripts. In Proceedings of WODA 2011: *ACM International Workshop on Dynamic Analysis*, July 2011.

W.2 Philip J. Guo and Dawson Engler. Towards Practical Incremental Recomputation for Scientists: An Implementation for the Python Language. In Proceedings of TaPP 2010: *USENIX Workshop on the Theory and Practice of Provenance*, February 2010.

W.1 Joel Brandt, Philip J. Guo, Joel Lewenstein, Scott R. Klemmer. Opportunistic Programming: How Rapid Ideation and Prototyping Occur in Practice. In WEUSE 2008: *ACM Workshop on End-User Software Engineering*, May 2008.

POSTERS AND WORKS-IN-PROGRESS

P.6 Kendall Nakai and Philip J. Guo. Scaling Up Access to the Hidden Curriculum: A Design Methodology for Creating Undergraduate Mentoring Guides. Work-in-progress in Proceedings of L@S 2022: *ACM Conference on Learning at Scale*, June 2022.

P.5 Priyan Vaithilingam, Julia M. Markel, Philip J. Guo. Papercode: Generating Paper-Based User Interfaces for Code Review, Annotation, and Teaching. Poster in Proceedings of UIST 2020: *ACM Symposium on User Interface Software and Technology*, October 2020.

P.4 Philip J. Guo, Julia M. Markel, Xiong Zhang. Learnersourcing at Scale to Overcome Expert Blind Spots for Introductory Programming: A Three-Year Deployment Study on the Python Tutor Website. Work-in-progress in Proceedings of L@S 2020: *ACM Conference on Learning at Scale*, Aug 2020.

P.3 Elena L. Glassman, Jeremy Scott, Rishabh Singh, Philip J. Guo, Robert C. Miller. OverCode: Visualizing Variation in Student Solutions to Programming Problems at Scale. Poster in Proceedings of UIST 2014: *ACM Symposium on User Interface Software and Technology*, October 2014.

P.2 Carrie J. Cai, Philip J. Guo, James Glass, Robert C. Miller. Wait-Learning: Leveraging Conversational Dead Time for Second Language Education. Work-in-progress in Proceedings of CHI 2014: *ACM Conference on Human Factors in Computing Systems*, April 2014.

P.1 Anvisha Pai, Philip J. Guo, Robert C. Miller. Modeling Programming Knowledge for Mentoring at Scale. Work-in-progress in Proceedings of L@S 2014: *ACM Conference on Learning at Scale*, March 2014.

INVITED PUBLICATIONS

<small>MAGAZINE ARTICLES</small>

M.16 Philip J. Guo. Expanding Career Pipelines by Unhiding the Hidden Curriculum of University Computing Majors. In *Computing Research News, a publication of the Computing Research Association*, Feb 2024.

M.15 Philip J. Guo. I Actually Chatted with ChatGPT: Assessing the Usability of Voice Interfaces to Large Language Models. In *O'Reilly Radar, AI and Machine Learning*, Jan 2024.

M.14 Philip J. Guo. Six Opportunities for Scientists and Engineers to Learn Programming Using AI Tools such as ChatGPT. In *Computing in Science and Engineering*, Nov 2023.

M.13 Philip J. Guo. Real-Real-World Programming with ChatGPT: Taking AI Far Beyond Small Self-Contained Coding Tasks. In *O'Reilly Radar, AI and Machine Learning*, July 2023.

M.12 Philip J. Guo. Building Tools to Help Students Learn to Program. In *Communications of the ACM*, Vol. 60, No. 12, Dec 2017.

M.11 Philip J. Guo. How adults ages 60+ are learning to code. In *Communications of the ACM*, Vol. 60, No. 8, Aug 2017.

M.10 Philip J. Guo. Learning Programming at Scale. In *O'Reilly Radar*, Aug 2015.

M.9 Philip J. Guo. Refining Students' Coding and Reviewing Skills. In *Communications of the ACM*, Vol. 57, No. 9, Sep 2014.

M.8 Philip J. Guo. The Difficulty of Teaching Programming Languages, and the Benefits of Hands-on Learning. In *Communications of the ACM*, Vol. 57, No. 7, Jul 2014. (appeared alongside unrelated articles by Mark Guzdial et al.)

M.7 Philip J. Guo. Clarifying Human-Computer Interaction. In *Communications of the ACM*, Vol. 57, No. 2, Feb 2014.

M.6 Philip J. Guo. Silent Technical Privilege. In *Slate*, Jan 2014.

M.5 Philip J. Guo. Helping scientists, engineers to work up to 100 times faster. In *Communications of the ACM*, Vol. 56, No. 10, Oct 2013.

M.4 Philip J. Guo. Teaching Programming the Way It Works Outside the Classroom. In *Communications of the ACM*, Vol. 56, No. 8, Aug 2013.

M.3 Philip J. Guo. Lessons from the Grind: How unglamorous grunt work can lead to creative innovation. In *MIT Technology Review*, Jan 2013.

M.2 Philip J. Guo. CDE: A Tool For Creating Portable Experimental Software Packages. In *Computing in Science and Engineering: Special Issue on Software for Reproducible Computational Science*, Jul/Aug 2012.

M.1 Joel Brandt, Philip J. Guo, Joel Lewenstein, Mira Dontcheva, Scott R. Klemmer. Opportunistic Programming: Writing Code to Prototype, Ideate, and Discover. In *IEEE Software: Special Issue on End-User Software Engineering*, Sep/Oct 2009.

BOOK CHAPTERS

B.3 Philip J. Guo. Parse that data! Practical Tips for preparing your raw data for analysis. Book chapter in *Perspectives on Data Science for Software Engineering*, T. Menzies, L. Williams, T. Zimmermann, eds. Morgan Kaufmann, 2016.

B.2 Philip J. Guo. CDE: Automatically Package and Reproduce Computational Experiments. Book chapter in *Implementing Reproducible Research*, V. Stodden, F. Leisch, R. Peng, eds. Taylor & Francis Group, 2013.

B.1 Joel Brandt, Philip J. Guo, Joel Lewenstein, Mira Dontcheva, Scott R. Klemmer. How the Web Helps People Turn Ideas Into Code. Book chapter in *No Code Required: Giving Users Tools to Transform the Web*, A. Cypher, M. Dontcheva, T. Lau, J. Nichols, eds. Morgan Kaufmann, 2010.

INVITED TALKS

- Learning programming in the era of LLMs, fireside chat at Google, Jan 2024

- How might AI code generation and explanation tools (e.g., GitHub Copilot, Chat-GPT) affect computer science education? Invited talk at San Francisco State University, Apr 2023.

- The challenges of integrating PL and HCI research as a Ph.D. student. Invited talk at the PL+HCI "Swimmer" School, Aug 2022.

- Ten Million Users and Ten Years Later: Python Tutor's Design Guidelines for Building Scalable and Sustainable Research Software in Academia. Invited talk at Microsoft Research, Mar 2022; fireside chat at Google, Apr 2022; SIGGRAPH conference, Aug 2023.

- Invited panelist at VL/HCC 2021 Graduate Symposium (Ph.D. student mentoring event), Oct 2021.

- Invited panelist at CHIMe: *CHI Mentoring Workshop for underrepresented students, industry scientists, and faculty in HCI*, May 2021.

- Learning Programming at Scale: Code, Data, and Environment. *University of Iowa*, CS Colloquium Series, Mar 2021; *University of Virginia*, CS Distinguished Speaker Colloquium Series, Oct 2020; *MIT CSAIL HCI seminar*, Sep 2019; *UC Irvine, University of Washington, Stanford University, University of Michigan*, Jan–Mar 2019; *Carnegie Mellon University (Human-Computer Interaction Institute)*, Oct 2018.

- Learning Programming at Scale. *Coursera, Berkeley Institute for Data Science, South Park Commons, Google*, May 2018; *Caltech CMS Department*, April 2018.

- The Design Space of Tools for Learning Programming at Scale.
  UCSD Design at Large Seminar, October 2016.

- Interactive Systems for Learning Programming at Scale (faculty candidate job talk). *Northwestern University EECS + School of Education & Social Policy, UCSD Cognitive Science, CU Boulder CS, Yale University CS, UCLA CS, UC Berkeley School of Information, UCSD CSE*, Jan–Apr 2016.

- Interactive Systems for Learning Programming at Scale. *Stanford Human-Computer Interaction Seminar*, Stanford, CA, Feb 2016; *Recurse Center (née Hacker School)*, New York, NY, Jan 2016; *University of Maryland*, College Park, MD, Dec 2015.

- Invited panelist on tools for personalized education, *CCC visioning workshop on Computer-Aided Personalized Education*, Washington, D.C., Nov 2015.

- Learning Programming at Scale. *University of Rochester Laboratory for Laser Energetics*, Rochester, NY, Sep 2015; *Microsoft Research*, Redmond, WA, Aug 2015; *University of Washington DUB seminar*, Seattle, WA, July 2015.

- Online Python Tutor: A 5-Year Retrospective.
  Union College, Rensselaer Polytechnic Institute (RPI), New York, Oct 2014.

- How to effectively ask for help as a junior employee.
  MIT 6.UAT guest lecture, Cambridge, MA, Nov 2013.

- Hacking the Ph.D.: Three Serendipitous Projects.
  Hacker School, New York, NY, Nov 2013.

- Why Pursue A Ph.D.? Three Practical Reasons. *Amherst College, UMass Amherst, Brown, MIT, Harvard, Tufts*. Oct–Nov 2013.

- Challenges in Teaching Python Programming: Vocabulary, Meaning, and Idioms.
  MIT Lincoln Laboratory, Lexington, MA, Oct 2013.

- Twenty Lessons From The Ph.D. Grind.
  Keynote at the MIT CSAIL Student Workshop, Oct 2013.

- Software Tools for Research Programming. *Boston University*, MA, Sep 2013.

- Programming On Demand: Wrangling, Iterating, and Opportunistic Learning.
  (faculty candidate job talk, all in CS or EECS departments)
  University of Utah, North Carolina State University, Dartmouth College, University of San Francisco, Oregon State University, Northeastern University, University of Rochester, Washington University in St. Louis, Feb–Mar 2013.

- Online Python Tutor: Web-Based Program Visualization for CS Education. *Sonoma State University – Computer Science Colloquium*, Rohnert Park, CA, Nov 2012; *Hacker School*, New York, NY, Oct 2012.

- The Ph.D. Grind: Candid Discussions About Ph.D. Life. *UC Riverside – Computer Science Colloquium*, Riverside, CA, Oct 2012; *Google Tech Talk*, Mountain View, CA, Aug 2012.

- CDE: automatically creating reproducible experimental software packages. *Reproducible Research: Tools and Strategies for Scientific Computing* interdisciplinary meeting, Vancouver, Canada, July 2011; *NASA JPL*, Pasadena, CA, May 2011.

- CDE: Using System Call Interposition to Automatically Create Portable Software Packages. *Google Tech Talk*, Mountain View, CA, Feb 2011.

- The potentials and challenges of implementing automatic test generation using combined concrete and symbolic execution. *Fujitsu*, Sunnyvale, CA, Oct 2009.

- Automatic Creation of SQL Injection and Cross-site Scripting Attacks. *Samsung R&D Center*, San Jose, CA, May 2009.

SERVICE

PROGRAM COMMITTEE CO-CHAIR

- L@S 2023 (ACM Conference on Learning at Scale)
- VL/HCC 2023 (Symposium on Visual Languages & Human-Centric Computing)

PROGRAM COMMITTEE MEMBER

- ICER 2024 (International Computing Education Research Conference)
- UIST 2023 (ACM Symposium on User Interface Software and Technology)
- ICER 2023 (International Computing Education Research Conference)
- PX 2023 (Programming Experience Workshop)
- SPLASH-E 2022 (SIGPLAN SPLASH-E Symposium)
- L@S 2021 (ACM Conference on Learning at Scale)
- NFW 2020 (Virtual symposium on the New Future of Work)
- EDM 2020 (International Conference on Educational Data Mining)
- Blocks and Beyond Workshop 2019 (located at VL/HCC 2019)
- UIST 2019 (ACM Symposium on User Interface Software and Technology) + Best Paper Committee co-chair
- L@S 2019 (ACM Conference on Learning at Scale)
- CHI 2019 (ACM Conference on Human Factors in Computing Systems)
- UIST 2018 (ACM Symposium on User Interface Software and Technology)
- VL/HCC 2018 (Symposium on Visual Languages & Human-Centric Computing)
- L@S 2018 (ACM Conference on Learning at Scale)
- EDM 2018 (International Conference on Educational Data Mining)
- LIVE 2018 (Workshop on Live Programming, located at SPLASH 2018)
- ICER 2017 review committee (International Computing Education Research Conference)
- LIVE 2017 (Workshop on Live Programming, located at SPLASH 2017)
- EDM 2017 (International Conference on Educational Data Mining)
- VISSOFT 2016 (IEEE Working Conference on Software Visualization)
- EDM 2016 (International Conference on Educational Data Mining)
- L@S 2016 (ACM Conference on Learning at Scale)
- L@S 2015 (ACM Conference on Learning at Scale)
- PLOOC 2015 (Workshop on Programming Languages Technology for MOOCs)
- CHESE 2015 (Int'l Code Hunt Workshop on Educational Software Engineering)
- SPLASH-E 2015 (Systems, Programming, Languages and Applications: Software for Humanity – Education Symposium)
- PLATEAU 2012 (Workshop on Evaluation and Usability of Programming Languages and Tools)
- TaPP 2012 (Workshop on the Theory and Practice of Provenance)

EXTERNAL PAPER REVIEWER

CHI (2014–2018, 2020–2021, 2023), UIST (2013–2017, 2020–2021), CSCW (2014–2018), TOCE (2017–2019, 2022), DIS (2020), VIS (2021), SIGGRAPH (2020), Computer Science Education (2017), JSME (2017), JVLC (2016), VLSS (2016), IEEE Software (2016), TOCHI (2015–2016,2018,2021), IUI (2015), MobileHCI (2015–2016), UbiComp (2015), JAIED (2015,2017), TSE (2014–2015,2017) PLDI (2013), EuroSys (2012), POPL (2011), ECOOP (2006, 2009)

STEERING COMMITTEE

VL/HCC (Symposium on Visual Languages & Human-Centric Computing), elected to a four-year term (2019–2023)

VL/HCC Most Influential Paper award committee co-chair (2021, 2022)

L@S (ACM Conference on Learning at Scale), elected to a two-year term (2023–2025)

Grant Proposal Reviewer	Sloan Foundation (2012, 2019, 2021)
	National Science Foundation (2016, 2017, 2019, 2021, 2023)
Artifact Eval. Committee	ESEC/FSE 2011 (Symposium on the Foundations of Software Engineering)

TEACHING

Instructor

- UCSD COGS 120/CSE 170: Human-Computer Interaction Design
  (Fall 2016–2018)
- UCSD COGS 124: Human-Computer Interaction Technical Systems Research
  (Fall 2017–2020, Winter 2023, Fall 2023)
- UCSD COGS 127: Data-Driven UX/Product Design
  (Fall 2019–2020, Winter 2023)
- UCSD CSE 219/COGS 229/DSGN 119: Design at Large seminar series
  (Fall 2017)
- UCSD COGS 121: Human-Computer Interaction Programming Studio (Spring 2017–2019) / Portfolio Design Studio (Spring 2020, 2021, 2023)
- UCSD COGS 231: Graduate Seminar on Human-Centered Programming
  (Spring 2017–2021 + 2023, Fall 2023)
- University of Rochester CSC 210: Principles of Web Application Development
  (Fall 2014, 2015)
- University of Rochester CSC 253: Dynamic Languages and Software Development
  (Fall 2014)
- MIT 6.813: User Interface Design & Implementation, co-taught as a postdoc with PI Rob Miller and others (Spring 2014)

Graduate Teaching Assistant

- Stanford CS343 – Advanced Topics in Compilers (Spring 2012)
- Stanford CS242 – Programming Languages (Autumn 2009)
- Stanford CS243 – Advanced Compiling Techniques (Winter 2008)
- MIT 6.170 – Laboratory in Software Engineering (Spring 2006)

Undergraduate Laboratory Assistant

- MIT 6.170 – Laboratory in Software Engineering (Fall 2004)
- MIT 6.111 – Introductory Digital Systems Laboratory (Fall 2004)
- MIT 6.001 – Structure and Interpretation of Computer Programs (Spring 2002)

RESEARCH STUDENTS SUPERVISED

Ph.D.

- Xiong Zhang [C.36,C.43,C.48,P.4] – first position: research scientist at Facebook
- Ian Drosos [C.33,C.50,C.51,C.53,C.58] – first position: postdoctoral researcher at Microsoft Research
- Sean Kross [C.39,C.44,C.46,C.55,J.4,W.10] – first position: data staff scientist at the Fred Hutch Data Science Lab
- Sam Lau [C.51,C.56,C.57,C.62,W.7,W.9,W.10] – first position: assistant teaching professor at UC San Diego
- Alice Chung
- Rachel Lim

Masters

- Davide Berdin (visiting student from Uppsala University, Sweden)
- Charles (Hsien-che) Chen [C.45] – undergrad+masters, first position: NVIDIA
- Logan Gittelson
- Hyeonsu Kang [C.35] – first position: research engineer at MIT, then Ph.D. student at CMU Human-Computer Interaction Institute
- Kandarp Khandwala [C.40] – first position: MathWorks

- Jaime Montoya – first position: Kodak Alaris
- Alok Mysore [C.34,C.42] – 2017 UCSD CSE masters student research award winner, first position: Yelp
- Dan Scarafoni – undergrad+masters, first position: MIT Lincoln Laboratory, then Ph.D. student in Machine Learning at Georgia Tech
- Priyan Vaithilingam [C.49,P.5] – first position: Ph.D. student at Harvard CS Dept.
- Jeremy Warner [C.22,C.24,C.30,C.32] – undergrad+masters, first position: Ph.D. student at UC Berkeley EECS Department
- April Wang [C.38] – masters at Simon Fraser University, member of thesis committee, first position: Ph.D. student at University of Michigan School of Information
- Jeffery White [C.24,C.26]
- Renan Zanelatto [C.24,C.26]

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<td><small>UNDERGRADUATE</small></td>
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- Karina Banda
- Lenny Brown
- Irene Chen – first position: Google
- Megan Dinh – first position: Amazon
- Jennifer (Kate) Godzicki
- Mitchell Gordon [C.24,C.25] – 2015 CRA Outstanding Undergraduate Researcher Award winner, first position: Ph.D. student at Stanford Computer Science Dept.
- Dan Hassin
- Sara Lickers
- Finn Lin – first position: Intel
- Neharika Makam – first position: MS student at CMU Human-Computer Interaction Institute
- Julia Markel [C.51,C.52,P.4,P.5,W.6] – first position: Ph.D. student at Stanford Computer Science Dept.
- Douglas Miller – first position: Jump Trading
- Kendall Nakai [P.6,C.61] – first position: Microsoft, then Ph.D. student at MIT CSAIL (with an NSF CSGrad4US fellowship)
- Anvisha Pai [P.1] – first position: Dropbox
- Annie Zhang – first position: Bank of America
- Joyce Zhu [C.24] – 2015 CRA Outstanding Undergraduate Researcher Award honorable mention, first position: Quip

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<small>PH.D. COMMITTEE MEMBER</small> Erin Brady, Anna Loparev, Phyo Thiha, Eric Seidel, Tricia Ngoon, Adam Rule, Ailie Fraser, Benjamin Cosman, Mario Alvarez, Amy Rae Fox, Yan Chen, Toby (Jia-Jun) Li, Sander Valstar, Vraj Shah, Jeongmin Byun, Cora Coleman, Michael James, Ruanqianqian (Lisa) Huang, Kasra Ferdowsi, Georgios Sakkas, Matin Yarmand, Rachel Lim (masters committee), April Wang (masters committee)

OTHER EMPLOYMENT

07/2018 – 09/2018   **Google**, Mountain View, CA (worked remotely)
Visiting Researcher, People + AI Research (PAIR) group, Host: Carrie Cai

07/2015 – 08/2015   **Microsoft Research**, Redmond, WA
Visiting Researcher, Research in Software Engineering (RiSE) group, Host: Rishabh Singh

07/2012 – 02/2013   **Google**, Mountain View, CA
Software Engineer – online education group – Google Research

09/2006 – 06/2012   **Stanford University**, Stanford, CA
Ph.D. Student – Department of Computer Science

09/2011 – 01/2012   **Harvard University**, Cambridge, MA
Visiting Research Fellow, Computer Systems Group, Host: Margo Seltzer

06/2011 – 09/2011   **Google**, Mountain View, CA
Software Engineering Intern – refined and deployed CDE

06/2009 – 09/2009   **Microsoft Research**, Redmond, WA
Research Intern, Research in Software Engineering (RiSE) group, Host: Thomas Zimmermann

06/2007 – 09/2007   **Google**, Mountain View, CA
Software Engineering Intern – prototyped memory allocators for C and C++ programs

01/2004 – 06/2006   **Massachusetts Institute of Technology**, Cambridge, MA
Research Assistant – Program Analysis Group – Advisor: Michael D. Ernst
Undergraduate and master's research on tools for analyzing C and C++ programs

09/2003 – 01/2004   **Massachusetts Institute of Technology**, Cambridge, MA
Research Assistant – Computer Graphics Group – Advisor: Fredo Durand
Developed an HDR (high dynamic range) image editing tool for photographers

06/2004 – 08/2004,   **Teradyne**, Agoura Hills, CA
06/2003 – 08/2003   Software Engineering Intern – wrote simulators for semiconductor test hardware

09/2002 – 06/2003   **Massachusetts Institute of Technology**, Cambridge, MA
Research Assistant – Teacher Education Program – Advisor: Eric Klopfer
Developed a suite of 5 educational games for Palm OS devices

06/2002 – 08/2002   **Codehost**, Culver City, CA
Software Engineering and QA Intern – wrote embedded Linux tablet PC software, tested printer drivers across many Linux distributions