Christopher A. Bogart

Systems Scientist, Computer Science Department

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Research Interests:

My research currently centers on developing techniques and technology for computer science education. My focus is on developing ways to collect and interpret data describing student activity in online learning platforms. This data allows us to identify students' unique strengths, strategies, and misconceptions; this will help us better engage and include students with a diversity of learning styles, backgrounds, and situations. Information about students' differences is important for research into better instructional techniques. Understanding student differences can inform both improvement of static courses and platforms, and dynamic adaptation of instruction to students' needs. A better understanding of students' needs will help us provide for those needs at scale, and thus grow and diversify the workforce of CS and IT professionals. My methods in this research range from cloud-based data engineering for delivering timely data to instructor dashboards, to data warehouse design and maintenance, to data mining and analysis of student activity traces, to qualitative methods like surveys and interviews.

Education:

Oregon State University, 2013, Ph.D. Computer Science
Colorado State University, 1992, M.S. Computer Science
Colorado State University, 1988, B.S. Computer Science, Honors
Minors in Mathematics and Psychology

Employment (non Teaching):

Oct 2016-Present	System Scientist, Carnegie Mellon University
2013-2016	Postdoctoral Researcher, Carnegie Mellon University
2008-2013	Graduate Research Assistant, Oregon State University
Summers 2009-12	Intern, Air Force Research Laboratory, Mesa AZ & Dayton OH
Summer 2008	User experience intern, Microsoft, Seattle WA
2003-2007	Software Engineer and Consultant, SKLD, Denver CO
2001-2003	Software Engineer and Consultant, Avaya, Thornton CO
1990-2001	Various software engineering contracts

Teaching:

Summer 2013	CS381 Programming Language Fundamentals, Oregon State University
Summer 2011	CS352 Intro to Usability Engineering, Oregon State University
Sept. 2007-Dec. 2008	Graduate Teaching Assistant, Oregon State University
1999	Basic computer skills course (English/Spanish), Boulder, CO
1989-1990	Assistant English Teacher, Iruma, Japan

Service:

Program committee member, 2016 Domain-Specific Language Design and Implementation (DSLDI)
Program co-chair, 2019 Visual Languages and Human-Centric Computing (VL/HCC)

Mentorship:

Supervised RAs doing data analysis and software engineering in support of research (Ketan Ramaneti, Ruth Peter, Yifan Song, Chenglin Alan Zhang, Surya Lakshminarasimhan, Abel Tessema, Ying-Jui Ben Tseng, David Galbreath, Devanshi Gupta, Akshit Bhalla, Rohil Vijaywargiya, Padmil Khandelwal, Huy Nguyen, Shenhao Wang, Jyot Mehta, Ishank Lakhmani, Pawanjeet Singh, Vamsidhar Parasurampuram, Kishore Perumalsamhy, Nikhil Kashyap, Akshit Bhalla, Ankush Babbar, Mingxiao An)

Mentored research assistants supervised by others (Samridi Choudhary, Yuya Asano)

Mentored capstone students (Austin Murphy, Yizhou Cheng, Frank He, Shicheng Huang, Jeahong Hwang, Abhishek Parikh, Jay Patel, Anup Kumar Prakashan, Arjun Manjunatha Rao, Sarthak Tandon, Abby Vorhaus, Yuchen Wang, Xiaoyu Zhang, Tom Zhu, Xiangyu Bob Bao, Xuye He)

Mentored independent study students (Sheng-Yu Tsai, Pallav Soni, Vignesh Kumar, Kanishka Bandaru)

Grants:

Social and Interactive Learning at Community Colleges: Investigating Data-driven Feedback for Improving Student Outcomes with Project Based Learning (SAIL-CC). Role: Co-PI; Grantor: NSF; Dates: 8/2021-8/2025; Amount: $1,998,096.

Data Pipeline Benchmarking Framework. (3 years as separate grants). Role: Co-PI, years 1 and 2, PI in year 3; Grantor: Honda; Dates: 3/2021-3/2024; Amount: $300,000/year.

The State of Cloud-Edge Modeling for Architectural Assessment and Optimization. Role: PI; Grantor: Honda; Dates: 5/2024-12/2024; Amount: $165,000

Training:

ACT-R Summer school, July 2010, Carnegie Mellon University

Awards and Honors:

Oregon State University Graduate Laurels Scholarship, 2012
Oregon Lottery Graduate Scholarship, 2012
Phi Beta Kappa, 1988
Patricia Mohilner Memorial Scholarship, 1987

Languages:

English (native); Spanish (written and conversational)

Invited Talks:

"How Do People Debug F#?", Microsoft, Seattle, WA, December 15, 2008

PhD Thesis:

C. Bogart, "Eliciting informal specifications from scientific modelers for evaluation and debugging", Oregon State University, 2013.

Journal Articles:

S. Sankaranarayanan, S. R. Kandimalla, C. Bogart, R. C. Murray, M. Hilton, M. Sakr, C. P. Rosé , "Collaborative Programming for Work-Relevant Learning: Comparing Programming Practice With Example-Based Reflection for Student Learning and Transfer Task Performance", *IEEE Transactions on Learning Technologies*, vol 15, no. 5, pp. 594-604, 2022.

C. Bogart, C. Kästner, J. Herbsleb, F. Thung, "When and how to make breaking changes: Policies and pratices in 18 open source software ecosystems," *Transactions on Softare Engineering and Methodology,* vol. 30, issue 4, article no. 42, pp. 1-56, 2021.

Y. Ma, T. Dey, C. Bogart, S. Amreen, M. Valiev, A. Tutko, D. Kennard, R. Zaretzki, A. Mockus, "World of Code: enabling a research workflow for mining and analyzing the universe of open source VCS data", *Empirical Software Engineering,* vol 26, Article No. 22, 2021.

S. Amreen, A. Mockus, R. Zaretzki, C. Bogart, Y. Zhang. "ALFAA: Active Learning Fingerprint based Anti-Aliasing for correcting developer identity errors in version control systems. *Empirical Software Engineering* (2020).

J. Herbsleb, C. Kästner, and C. Bogart, "Intelligently transparent software ecosystems," *IEEE Software*, vol. 33, no. 1, pp. 89–96, 2016.

C. Scaffidi, C. Bogart, M. Burnett, A. Cypher, B. Myers, and M. Shaw, "Using traits of web macro scripts to predict reuse," *Journal of Visual Languages and Computing* 21(5), December 2010.

J. Lawrance, C. Bogart, M. Burnett, R. Bellamy, K. Rector, and S. D. Fleming, "How programmers debug, revisited: an information foraging theory perspective," *IEEE Transactions on Software Engineering* 39(2), 2013, 197-215.

D. Whitley, T. Starkweather, and C. Bogart, "Genetic algorithms and neural networks: Optimizing connections and connectivity," *Parallel Computing*, vol. 14, 1990, pp. 347-361.

Conference Papers:

C. Bogart, M. An, E. Keylor, P. Singh, J. Savelka, and M. Sakr, "What Factors Influence Persistence in Project-Based Programming Courses at Community Colleges?" Proc. Technical Symposium on Comp. Sci. Education (SIGCSE 2024), vol. 1, pp 116-122.

J. Savelka, A. Agarwal, C. Bogart, and M. Sakr, "Large language models (gpt) struggle to answer multiple-choice questions about code," Proc. Conf. Computer Supported Education (CSEDU), vol. 2, pp. 47–58, 2023.

J. Savelka, A. Agarwal, C. Bogart, and M. Sakr, "From GPT-3 to GPT-4: On the Evolving Efficacy of LLMs to Answer Multiple-choice Questions for Programming Classes in Higher Education," arXiv preprint arXiv:2311.09518, 2023.

J. Savelka, A. Agarwal, C. Bogart, Y. Song, and M. Sakr, "Can Generative Pre-trained Transformers (GPT) Pass Assessments in Higher Education Programming Courses?," Proc. Conf. Innovation and Technology in Computer Science Education (ITICSE), vol. 1, pp. 117–123, 2023.

J. Savelka, A. Agarwal, M. An, C. Bogart, and M. Sakr, "Thrilled by Your Progress! Large Language Models (GPT-4) No Longer Struggle to Pass Assessments in Higher Education Programming Courses," Proc. Conf. International Computing Education Research, vol. 1, 2023.

S. Sankaranarayanan et al., "Collaborative Programming for Work-Relevant Learning: Comparing Programming Practice With Example-Based Reflection for Student Learning and Transfer Task Performance," IEEE Transactions on Learning Technologies, vol. 15, no. 5, pp. 594–604, 2022.

J. Du, Y. Song, M. An, M. An, C. Bogart, and M. Sakr, "Cheating Detection in Online Assessments via Timeline Analysis," in Proceedings of the 53rd ACM Technical Symposium on Computer Science Education-Volume 1, 2022, pp. 98–104.

J. Doughty et al., "A Comparative Study of AI-Generated (GPT-4) and Human-crafted MCQs in Programming Education," in Proceedings of the 26th Australasian Computing Education Conference (ACE), 2024, pp. 114–123.

S. Sankaranarayanan, L. Ma, S. R. Kandimalla, I. Markevych, H. Nguyen, R. C. Murray, C. Bogart, M. Hilton, M. Sakr, C. P. Rosé, "Collaborative Reflection "in the flow" of Programming: Designing Effective Collaborative Learning Activities in Advanced Computer Science Contexts", Proc. Conf. Computer Supported Collaborative Learning (CSCL) 2022.

J. Du, Y. Song, M. An, M. An, C. Bogart and M. Sakr, "Cheating detection in online assessments via timeline analysis", *Special Interest Group on Computer Science Education Conference (SIGCSE).* (2022, to appear).

S. Sankaranarayanan, S.R. Kandimalla, C. Bogart, R.C. Murray, M. Hilton, M. Sakr, C. Rosé, "Combining Collaborative Reflection based on Worked-Out Examples with Problem-Solving Practice: Designing Collaborative Programming Projects for Learning at Scale". *Proc. Conf. Learning@Scale*, pp. 255-258. (2021)

Y. Asano, S. Sankaranarayanan, M. Sakr, C. Bogart, "A Thematic Summarization Dashboard for Navigating Student Reflections at Scale*", International Conference on Computers in Education (ICCE)***,** 2021 (to appear).

M. An, H. Zhang, J. Šavelka, S. Zhu, C. Bogart, M. Sakr, "Are Working Habits Different Between Well-Performing and at-Risk Students in Online Project-Based Courses? "Conference on Innovation and Technology in Computer Science Education (ITiCSE) (2021).

S. Sankaranarayanan, S. R. Kandimalla, C. Bogart, R.C. Murray, H. An, M. Hilton, M. Sakr, and C. Rosé. "Comparing Example-Based Collaborative Reflection to Problem-Solving Practice for Learning during Team-Based Software Engineering Projects." International Society for the Learning Sciences. (2021).

D. Klug, C. Bogart, J. Herbsleb, "'They Can Only Ever Guide.': How an Open-Source Software Community uses Roadmaps to Coordinate Effort," *Conference* on *Computer-Supported Cooperative Work and Social Computing (CSCW)* (2021, to appear)

S. Sankaranarayanan, S. Kandimalla, S. Hasan, H. An, C. Bogart, R. C. Murray, M. Hilton, M. Sakr, C.P. Rosé, "Agent-in-the-loop: conversational agent support in service of reflection for learning during collaborative learning," *International conference on artificial intelligence in education* (2020).

S. Sankaranarayanan, S. Kandimalla, S. Hasan, H. An, C. Bogart, R. C. Murray, M. Hilton, M. Sakr, C.P. Rosé, "Creating opportunities for transactive exchange for learning in Performance-Oriented team projects," *International Society of the Learning Sciences* (2020).

S. Sankaranarayanan, S. Kandimalla, M. Cao, I. Maronna, H. An, C. Bogart, R. C. Murray, M. Hilton, M. Sakr, C.P. Rosé, "Designing for learning during collaborative projects online: tools and takeaways," *Information and Learning Sciences* (2020).

S. Choudhary, C. Bogart, C. Rose, J. Herbsleb, "Using productive collaboration bursts to analyze open source collaboration effectiveness." *Software Analysis, Evolution and Reengineering* (2020).

Z. Coker, D.G. Widder, C. Le Goues, C. Bogart, J. Sunshine, "A qualitative study on framework debugging," *Conf, on Software Maintenance and Evolution (ICSME),* pp. 569-579 *(2019).*

Y. Ma, C. Bogart, S. Amreen, R. Zaretzki, A. Mockus. "World of Code: An Infrastructure for Mining the Universe of Open Source Vcs Data." *Mining Software Repositories* (2019).

S. Sankaranarayanan, C. Dashti, C. Bogart, M. Sakr. "Transactivity-Based Team-Formation as a Choice: Evaluation in a Large Online Project Course." *International Collective Intelligence Conference* (2019).

S. Sankaranarayanan, C. Dashti, C. Bogart, X. Wang, M. Sakr, and C. P. Rosé. "When Optimal Team Formation is a Choice - Self-Selection versus Intelligent Team Formation Strategies in a Large Online Project-Based Course". 19th International Conference on Artificial Intelligence in Education, 2018.

A. Naik, C. Bogart, C. Rosé, "Extracting Personal Medical Events for User Timeline Construction using Minimal Supervision". *BioNLP* Workshop, 2017, pp. 356-364.

C. Bogart, C. Kästner, J. Herbsleb, F. Thung, "How to break an API: cost negotiation and community values in three software ecosystems", ACM Foundations of Software Engineering (FSE), 2016, pp. 109-120.

K. Abbott, C. Bogart, E. Walkingshaw, "Programs for people: What we can learn from lab protocols". Visual Languages and Human-Centric Computing (VL/HCC), 2015, pp. 203-211.

C. Bogart, M. Burnett, S. Douglass, H. Adams, R. White, "Designing a debugging interaction language for cognitive modelers: an initial case study in Natural Programming Plus". *ACM CHI*, *2012, pp. 2469-2478.*

D. Piorkowski, S. Fleming, C. Scaffidi, C. Bogart, M. Burnett, B. John, R. Bellamy, C. Swart, "Reactive Information Foraging: An empirical investigation of theory-based recommender systems for programmers". *ACM CHI,* 2012, pp. 1471-1480.

D. Piorkowski, S. D. Fleming, C. Scaffidi, L. John, C. Bogart, B. E. John, M. Burnett, and R. Bellamy, "Modeling Programmer Navigation: A head-to-head empirical evaluation of predictive models," *IEEE Symposium on Visual Languages and Human-Centric Computing*, 2011, pp. 109-116.

C. Bogart, M. Burnett, S. Douglass, D. Piorkowski, and A. Shinsel, "Does my model work? Evaluation abstractions of cognitive modelers," *IEEE Symposium on Visual Languages and Human-Centric Computing,* 2010, pp. 49-58.

J. Lawrance, M. Burnett, R. Bellamy, C. Bogart, and C. Swart, "Reactive Information Foraging for Evolving Goals," *ACM CHI*, 2010, pp. 25-34.

C. Scaffidi, C. Bogart, M. Burnett, A. Cypher, B. Myers, and M. Shaw, "Predicting Reuse of End-User Web Macro Scripts," *IEEE Symposium on Visual Languages and Human-Centric Computing*, 2009, pp. 93-100.

N. Subrahmaniyan, M. Burnett, and C. Bogart, "Software visualization for end-user programmers: trial period obstacles," *ACM Symposium on Software Visualization*, 2008, pp. 135-144.

V. Grigoreanu, J. Cao, T. Kulesza, C. Bogart, K. Rector, M. Burnett, and S. Wiedenbeck, "Can feature design reduce the gender gap in end-user software development environments," *IEEE Symposium on Visual Languages and Human-Centric Computing*, 2008, pp. 149-156.

C. Bogart, M. Burnett, A. Cypher, and C. Scaffidi, "End-user programming in the wild: A field study of CoScripter scripts," *IEEE Symposium on Visual Languages and Human-Centric Computing*, 2008, pp. 39-46.

Other Papers:

P. Sridhar, A. Doyle, A. Agarwal, C. Bogart, J. Savelka, and M. Sakr, "Harnessing LLMs in curricular design: Using GPT-4 to support authoring of learning objectives," Proceedings of the Workshop on Empowering Education with LLMs—the Next-Gen Interface and Content Generation held at AIED, Tokyo, Japan, 2023.

P. Agarwal et al., "SocioEconomicMag Meets a Platform for SES-Diverse College Students: A Case Study," arXiv preprint arXiv:2304.04873, 2023.

M. Burnett, M. Erwig, A. Fallatah, C. Bogart, A. Sarma, "Intersectionality Goes Analytical: Taming Combinatorial Explosion Through Type Abstraction", arXiv preprint arXiv:2201.10643, 2022.

D. Tsovaltzi (and 19 others), “Group formation in the digital age: Relevant characteristics, their diagnosis, and combination for productive collaboration” Symposium at International Society of the Learning Sciences (ISIL) 2019.

S. Prabhumoye, S. Choudhary, E. Spiliopoulou, C. Bogart, C. Rosé, A. W. Black, “Linguistic Markers of Influence in Informal Interactions”, NLP and Computational Social Science Workshop at ACL, 2017.

J. Herbsleb, C. Kästner, C. Bogart, “Intelligently Transparent Software Ecosystems”. IEEE Software 33 (1), 2016, pp. 89-96.

C. Bogart, C. Kästner, J. Herbsleb, "When it breaks, it breaks: How ecosystem developers reason about the stability of dependencies". Proc. of the Workshop on Software Support for Collaborative and Global Software Engineering (SCGSE), 2015.

M. Burnett, C. Bogart, J. Cao, V. Grigoreanu, T. Kulesza, and J. Lawrance, “End-user software engineering and distributed cognition,” *ICSE Workshop on Software Engineering for End-User Programmers*, Vancouver, BC, 2009.

C. Scaffidi, C. Bogart, M. Burnett, A. Cypher, B. Myers, and M. Shaw, “Characterizing reusability of end-user web macro scripts,” *International Workshop on Recommendation Systems for Software Engineering*, ACM, 2008.

C. Bogart, “Rhetorical end-user programming,” *IEEE Symposium on Visual Languages and Human-Centric Computing*, Graduate Consortium Paper, 2008, pp. 260-261.