# Paul Krogmeier

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https://paulkrog.github.io

## EDUCATION

**University of Illinois Urbana-Champaign** — Expected Fall 2024
*Ph.D. in Computer Science (advisor: Madhusudan Parthasarathy).*
Ph.D. Thesis: Theory and Algorithms for Symbolic Learning.

**Purdue University**
*M.S. in Computer Engineering (advisor: Benjamin Delaware).* — 2016–2018
M.S. Thesis: A Core Calculus for Data Refinement.
*B.S. in Computer Engineering (with highest distinction).* — 2012–2016

## RESEARCH INTERESTS

My interests are in the foundations of **symbolic learning and reasoning**, with a focus on the problem of learning symbolic concepts that describe **structured data** like sequences, trees, graphs, or states of computer programs. This encompasses program synthesis from examples as well as learning classifiers expressed in logic. Recently, I have been exploring how to **synthesize domain-specific languages** to support efficient few-shot symbolic learning.

## AWARDS

ACM SIGPLAN Distinguished Paper Award at OOPSLA — 2023
ACM SIGPLAN Distinguished Paper Award at POPL — 2022
Illinois Wing Kai Cheng Fellowship — 2018
Purdue Ross Fellowship — 2016

## REFEREED CONFERENCE PUBLICATIONS

Paul Krogmeier and P. Madhusudan. 2023. Languages with Decidable Learning: A Meta-theorem. Proc. ACM Program. Lang. 7, OOPSLA1, Article 80 (April 2023), 29 pages. https://doi.org/10.1145/3586032
**ACM SIGPLAN Distinguished Paper Award.**

Paul Krogmeier*, Zhengyao Lin*, Adithya Murali*, and P. Madhusudan. 2022. Synthesizing axiomatizations using logic learning. Proc. ACM Program. Lang. 6, OOPSLA2, Article 185 (October 2022), 29 pages. https://doi.org/10.1145/3563348

Adithya Murali, Atharva Sehgal, Paul Krogmeier, P. Madhusudan. Composing Neural Learning and Symbolic Reasoning with an Application to Visual Discrimination. Proceedings of the Thirty-First International Joint Conference on Artificial Intelligence Main Track (IJCAI). Pages 3358-3365. https://doi.org/10.24963/ijcai.2022/466

Paul Krogmeier and P. Madhusudan. 2022. Learning formulas in finite variable logics. Proc. ACM Program. Lang. 6, POPL, Article 10 (January 2022), 28 pages. https://doi.org/10.1145/3498671
**ACM SIGPLAN Distinguished Paper Award.**

Gilles Barthe, Rohit Chadha, Paul Krogmeier, A. Prasad Sistla, and Mahesh Viswanathan. 2021. Deciding accuracy of differential privacy schemes. Proc. ACM Program. Lang. 5, POPL, Article 8 (January 2021), 30 pages. https://doi.org/10.1145/3434289

Krogmeier, P., Mathur, U., Murali, A., Madhusudan, P., Viswanathan, M. (2020). Decidable Synthesis of Programs with Uninterpreted Functions. In: Lahiri, S., Wang, C. (eds) Computer Aided Verification. CAV 2020. Lecture Notes in Computer Science, vol 12225. Springer, Cham. https://doi.org/10.1007/978-3-030-53291-8_32

Umang Mathur, Adithya Murali, Paul Krogmeier, P. Madhusudan, and Mahesh Viswanathan. 2019. Deciding memory safety for single-pass heap-manipulating programs. Proc. ACM Program. Lang. 4, POPL, Article 35 (January 2020), 29 pages. https://doi.org/10.1145/3371103

## WORKSHOP PUBLICATIONS

Paul Krogmeier, Steven Kidd, Benjamin Delaware.
Towards Context-Aware Data Refinement.
CoqPL 2018

## WORK IN PROGRESS

Paul Krogmeier and P. Madhusudan.
Synthesizing DSLs for Few-Shot Learning.
Algorithms for synthesizing domain-specific languages that can be learned efficiently from few examples.
*In preparation.*

Paul Krogmeier.
Computing with Abstractions.
A new model of computation to study how abstractions emerge in an evolving computation.
*In preparation.*

## INVITED TALKS

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|---|---|
| Learning Symbolic Concepts and Domain-specific Languages | George Mason CS, Oct 24<br>Santa Fe Institute, Jun 24<br>MIT EECS, Apr 24<br>Houston CS, Apr 24<br>Purdue ECE/CS, Mar 24 |
| Languages with Decidable Learning: a Meta-theorem | Boston U. CS, Mar 23 |
| Learning Formulas in Finite-Variable Logics | St. Petersburg State University, Mar 22 |

## INVITED WORKSHOPS

**Dagstuhl seminar** Fall 2019
Logic and Learning

## TEACHING

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|---|---|
| CS 421: Programming Languages and Compilers | **University of Illinois**<br>Fall 2019, Fall 2020,<br>Spring 2021, Fall 2021<br>Spring 2022, Fall 2022,<br>Spring 2023, Fall 2023,<br>Fall 2024 |
| ECE 369: Discrete Mathematics for Computer Engineering | **Purdue University**<br>Fall 2017 |

## SERVICE

### Conference Reviewer

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| International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS) | 2025 |
| International Colloquium on Automata, Languages and Programming (ICALP) | 2023 |
| Logic in Computer Science (LICS) | 2022 |

### Journal Reviewer

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| Formal Methods in System Design (FMSD) | 2023 |

## MENTORING

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| SIGPLAN-M Graduate Student Mentor | 2023 – Present |

## STUDENT WORKSHOPS

VMCAI Formal Methods Winter School — New Orleans, LA, Jan 2020

SRI Formal Methods Summer School — Atherton, CA, May 2019

Oregon Programming Languages Summer School — Eugene, OR, Jun 2017

## MISCELLANY

Native English speaker, fluent in Spanish, conversational in German.
Jazz alto saxophonist with substantial performance and teaching experience.
Lover of snow, mountains, and skiing.