

Paul Krogmeier

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Education

Graduate

University of Illinois at Urbana-Champaign <i>PhD Computer Science, GPA: 3.92</i>	Urbana 2018-
Purdue University <i>M.Eng. Computer Engineering, GPA: 3.99</i>	West Lafayette 2016–2018

Undergraduate

Purdue University <i>B.S. Computer Engineering, GPA: 4.0</i>	West Lafayette 2012–2016
EAFIT University <i>Study Abroad, Compilers and Operating Systems courses</i>	Medellín, Colombia Spring 2015

Publications

- *Languages with Decidable Learning: a Meta-theorem*. Paul Krogmeier and P. Madhusudan. OOPSLA 2023. [preprint](#)
- *Synthesizing Axiomatizations using Logic Learning*. Paul Krogmeier, Zhengyao Lin, Adithya Murali, and P. Madhusudan. OOPSLA 2022. [paper](#)
- *Composing Neural Learning and Symbolic Reasoning with an Application to Visual Discrimination*. Adithya Murali, Atharva Sehgal, Paul Krogmeier, and P. Madhusudan. IJCAI 2022. [paper](#)
- *Learning Formulas in Finite Variable Logics*. Paul Krogmeier and P. Madhusudan. **Distinguished paper** at POPL 2022. [paper](#)
- *Deciding Accuracy of Differential Privacy Schemes*. Gilles Barthe, Rohit Chadha, Paul Krogmeier, Aravinda Sistla, Mahesh Viswanathan. POPL 2021. [paper](#)
- *Decidable Synthesis of Programs with Uninterpreted Functions*. Paul Krogmeier, P. Madhusudan, Umang Mathur, Adithya Murali, Mahesh Viswanathan. CAV 2020. [paper](#)
- *Deciding Memory Safety for Single-pass Heap-manipulating Programs*. Umang Mathur, Adithya Murali, Paul Krogmeier, P. Madhusudan, and Mahesh Viswanathan. POPL 2019. [paper](#)
- *Towards Context-Aware Data Refinement*. Paul Krogmeier, Steven Kidd, Benjamin Delaware. Fourth International Workshop on Coq for Programming Languages, January 2018. [paper](#)

Teaching

Programming Languages and Compilers (CS 421)

Teaching Assistant

Urbana, IL
'23, '22, '21, '20, '19

Duties:

- Debugging student code in biweekly office hours
- Answering piazza questions
- Maintaining and releasing Ocaml/Haskell assignments

Discrete Math (ECE 369)

Teaching Assistant

West Lafayette, IN
Fall 2015

Duties:

- Answering questions in biweekly office hours
- Manage preparation and release of written math assignments
- Grading written exams

Research Positions

Illinois Programming Languages and Formal Methods

Research Assistant (advisor: Madhusudan Parthasarathy)

Urbana, IL
Aug 2018–present

- Thesis: Algorithms for learning first-order logic formulae from data

Purdue Programming Languages Group

Research Assistant (advised by Benjamin Delaware)

West Lafayette, IN
Aug 2017–Jul 2018

- Modeled the syntax and semantics of the Fiat specification language with a deep embedding in the Coq proof assistant.
- Developed a mechanized proof of Fiat's type safety.
- Formalized a logical relations proof strategy for validity of refinement from Fiat specifications to implementations.

Purdue University – Machine Learning for SAT

Research Assistant

West Lafayette, IN
Jan 2017–May 2017

- Studied the source code for the MiniSat SAT solver.
- Implemented online thompson sampling algorithm to learn reward function over SAT variables.
- Tested usefulness of the extension against plain MiniSat.

Purdue University – E-Lab

Student Programmer

West Lafayette
Sep 2016–Dec 2016

- Programmed Torch7 CNNs to solve image classification problems.
- Experimented with RNNs to study problems in speech recognition.

APOLO Scientific Computing Center

Programming Internship

Medellín, Colombia
May 2016–Jul 2016

- Developed software to produce client usage reports for a Linux Rocks cluster administrative team.
- Wrote and debugged Python scripts to generate reports on cluster load and usage characteristics. This involved learning the APIs for the TORQUE and SLURM resource management tools.
- Met weekly with development team to discuss progress.

Purdue University – Open Ag Data Alliance

Embedded Systems Programmer

West Lafayette

May 2014–Jul 2014

- Developed C code for a wireless, embedded semi-truck weight sensing application.
- Interfaced Nordic system-on-chip to air pressure sensor over I²C.
- Programmed communication between Android app and system-on-chip using Bluetooth Low Energy stack.

Invited Talks

Languages with Decidable Learning: a Meta-theorem

Boston University

Mar 2023

Learning Formulas in Finite-Variable Logics

Department of Software Engineering, St. Petersburg State University

Mar 2022

Service

External Reviewer

ICALP 2023, LICS 2022

Invited Workshops and Schools

2nd VMCAI Winter School

Student Participant

New Orleans, LA

Jan 2020

Dagstuhl Seminar on Logic and Learning

Invited Junior Researcher

Schloss Dagstuhl, Germany

Sep 2019

The goal of this seminar was to explore ways of combining logical knowledge with learning systems like neural networks.

SRI Formal Methods Summer School

Student Participant

Atherton, California

May 2019

- Experimented with EasyCrypt for Coq proofs security for cryptographic protocols.
- Experimented with the Viper verification language for proving properties of heap-manipulating programs.

Oregon Programming Languages Summer School

Student Participant

Eugene, Oregon

Jun 2017

- Experimented with dependently-typed Idris and with programming language semantics modelling in PLT Redex.
- Attended research lectures from experts in programming languages and formal methods.

Coursework

Graduate

CS 598 – Algorithmic Game Theory
MA 570 – Mathematical Logic
MA 511 – Linear Algebra with Applications
CS 477 – Formal Software Development
CE 642 – Information Theory and Source Coding
CE 573 – Compilers and Translator Systems
CE 608 – Computational Models and Methods
CE 600 – Probabilities and Random Processes
CS 565 – Programming Languages
CS 590 – Artificial Intelligence and Causal Inference
CS 584 – Theory of Computation and Complexity
CS 573 – Data Mining

Undergraduate

CE 368 – Algorithms and Data Structures
CE 369 – Discrete Math
CE 364 – Python and Bash Scripting Lab
CE 337 – ASIC Design Laboratory
CE 437 – Computer Architecture
CE 477 – Digital Systems Senior Design

Skills

- **Programming Languages and Tools:**

High proficiency: Haskell, Ocaml, C/C++, Python

Medium proficiency: Prolog, Java, Matlab, Verilog, Emacs

Familiarity: Coq, Racket, Rosette, Idris, Lisp, x86, MIPS, Jekyll/HTML/CSS

- **Natural Languages:** Fluent in Spanish, German, and English (native)

Awards, Honors, Grants

- **ACM SIGPLAN PAC Travel Grant:** January 2020
- **UIUC Wing Kai Cheng Fellowship:** August 2018
- **Purdue Ross Fellowship:** May 2016
- **Phi Beta Kappa:** May 2016
- **Graduated “with highest distinction” (top in class, Purdue ECE):** May 2016
- **100K Strong in the Americas Scholarship:** August 2014