Paul Krogmeier

202 N Race St, Urbana IL, 61801

+1 765 404 6297 • paulmk2@illinois.edu • paulkrog.github.io

Education

Graduate

University of Illinois at Urbana-Champaign — **Urbana**
PhD Computer Science, GPA: 3.92 — *expected May 2023*

Purdue University — **West Lafayette**
M.Eng. Computer Engineering, GPA: 3.99 — *2016–2018*

Undergraduate

Purdue University — **West Lafayette**
B.S. Computer Engineering, GPA: 4.0 — *2012–2016*

EAFIT University — **Medellín, Colombia**
Study Abroad, Compilers and Operating Systems courses — *Spring 2015*

Publications

- *Synthesizing Axiomatizations using Logic Learning*. Paul Krogmeier, Zhengyao Lin, Adithya Murali, and P. Madhusudan. OOPSLA 2022.
- *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) — **Urbana, IL**
Teaching Assistant — *'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) — **West Lafayette, IN**
Teaching Assistant — *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 — **Urbana, IL**
Research Assistant (advisor: Madhusudan Parthasarathy) — *Aug 2018–present*

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

Purdue Programming Languages Group — **West Lafayette, IN**
Research Assistant (advised by Benjamin Delaware) — *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 — **West Lafayette, IN**
Research Assistant — *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 — **West Lafayette**
Student Programmer — *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 — **Medellín, Colombia**
Programming Internship — *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 **West Lafayette**
Embedded Systems Programmer *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 I^2C.
- Programmed communication between Android app and system-on-chip using Bluetooth Low Energy stack.

Invited

Talk: Learning Formulas in Finite-Variable Logics
Department of Software Engineering, St. Petersburg State University *Mar 2022*

Invited Workshops and Schools

2nd VMCAI Winter School **New Orleans, LA**
Student Participant *Jan 2020*

Dagstuhl Seminar on Logic and Learning **Schloss Dagstuhl, Germany**
Invited Junior Researcher *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 **Atherton, California**
Student Participant *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 **Eugene, Oregon**
Student Participant *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