

# Paul Krogmeier

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## Education

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### Graduate

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

### Undergraduate

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

## Publications

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- *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

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### **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

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### **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 I<sup>2</sup>C.
- Programmed communication between Android app and system-on-chip using Bluetooth Low Energy stack.

## **Invited**

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### **Talk: Learning Formulas in Finite-Variable Logics**

*Department of Software Engineering, St. Petersburg State University*

*Mar 2022*

## **Invited Workshops and Schools**

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### **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

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### 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

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- **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

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- **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