Paul Krogmeier

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Pursuing a PhD in computer science from the University of Illinois at Urbana-Champaign.

Education

Graduate

University of Illinois at Urbana-Champaign — **Urbana**
PhD Computer Science — *2018–present*

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

Decidable Synthesis of Programs with Uninterpreted Functions. Paul Krogmeier, P. Madhusudan, Umang Mathur, Adithya Murali, Mahesh Viswanathan. Under submission. Preprint.

Deciding Memory Safety for Single-Pass Heap-Manipulating Programs. Umang Mathur, Adithya Murali, Paul Krogmeier, P. Madhusudan, Mahesh Viswanathan. Conditionally accepted at POPL 2020. Preprint.

Krogmeier, P. M. and Kidd, S. and Delaware, B. Towards Context-Aware Data Refinement. Fourth International Workshop on Coq for Programming Languages, January 2018.

Experience

Illinois Programming Languages and Formal Methods — **Urbana, IL**
Research Assistant (advised by Mahesh Viswanathan) — *Aug 2018–present*

- Exploring synthesis and verification problems for entirely uninterpreted programs over infinite data domains
- Learning algorithms for first-order logic concepts: seeking tractable classes of formulae for which online learning has a polynomial mistake bound

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 ECE Department — **West Lafayette, IN**
Discrete Math Teaching Assistant–ECE 369 — *Aug 2017–Dec 2017*

- Verified reference exam solutions and graded student exams.
- Organized weekly office hours and help sessions.

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 Workshops

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.

Summer Schools

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: Ocaml, C/C++, Python
  Medium proficiency: Haskell, 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 and Honors

- **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