

Theophilos Giannakopoulos

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Professional Profile

Solution-oriented researcher and software engineer with extensive knowledge of formal methods, applied logic and language design. Proficient at applying mathematical techniques and leadership experience to create high-quality deliverables.

Technical Skills

- › Haskell, Scala, C, Bash, Coq, Java, C#, SQL, Racket, Perl, Rust, OCaml, SML
- › CVC4, Emacs, Vim, Git, GitLab, LaTeX, Linux, Docker
- › Formal methods, compiler construction, probabilistic programming
- › Mathematical background:
 - › Applied logic, measure theory, abstract algebra, category theory, graph theory

Business Skills

- › Experience as Principal Investigator for DARPA projects
- › Experience leading local and remote teams
- › Experience authoring white papers and DARPA project proposals
- › Experience with agile software development
- › Experience with back office business processes in the financial industry
- › Experience integrating with domestic and international payment providers

Experience

Systems & Technology Research

June 2018-Present

Lead Researcher

- › Research and technical lead for MASON project on the DARPA [ConSec program](#)
 - › Designed algorithms based on model checking, SMT solvers, and Prolog engines for synthesizing and verifying secure configurations based on high-level system models
 - › Led team of three software engineers implementing and evaluating algorithms
- › Computational Research/Formal Methods team lead, managing two software engineers
- › Research and technical lead for MITCHELL project on the DARPA [SDH program](#)
 - › Created an automatically parallelizable language based on the Standard ML [MLton](#) compiler targeting [Intel's PIUMA architecture](#)

BAE Systems

February 2014–June 2018

Principal Scientist

- › Software Engineering Lead for the RINGS project on the DARPA [BRASS program](#)
 - › Developed prototype software for automatic detection of and adaptation to changes in runtime environment and available system resources
 - › Managed collaboration with researchers at MIT and University of Pennsylvania
- › Principal Investigator for the OP3 project on the DARPA [PPAML program](#)
 - › Managed a team of five researchers, including professors at Northeastern University
 - › Developed semantics for probabilistic programming languages (see [publications](#) below)
 - › Implemented [a notebook IDE](#) for the [Gamble probabilistic programming language](#)
 - › Created [machine checked proofs](#) for [publications](#) on probabilistic programming semantics
- › Software Engineering Lead for the [SAFE project](#) on the DARPA [CRASH program](#)
 - › Maintained and extended a compiler for Tempest, a C-like programming language
 - › Designed and analyzed instruction set security polices on novel SAFE hardware
 - › Implemented operating system components for the SAFE system

Experience

Other experience

- **Vistaprint, Senior Software Engineer** **April 2012–January 2014**
 - Developed and maintain a high availability payment system with an international team
- **Worcester Polytechnic Institute, Research Assistant** **2008–2010, 2011–2012**
 - See [publications](#) below
- **Worcester Polytechnic Institute, Teaching Assistant** **2008–2010, 2011–2012**
- **Galatea Associates** **2010–2011**
 - Created, maintained and provided support for back-office financial software
- **Milliman Global** **2004–2007**
 - Developed insurance valuation system automation tools and quality assurance software

Selected Publications

[Synthesizing Mutable Configurations: Setting up Systems for Success](#)

Nelson, Danas, Giannakopoulos, and Krishnamurthi

Automated Software Engineering Workshop 2019 (ASE2019)

Designed and proved correctness of an algorithm for deriving the root cause for linear temporal logic requirements violations in a state machine and using those root causes in a counterexample-guided process to synthesize a configuration that satisfies the requirements.

[Contextual Equivalence for a Probabilistic Language with Continuous Random Variables and Recursion](#)

Wand, Culpepper, Giannakopoulos, and Cobb

International Conference on Functional Programming 2018 (ICFP18)

Defined a logical relation for proving contextual equivalence in a probabilistic programming language with continuous random variables and recursion. The logical relation is useful for proving the correctness of compiler optimizations and other program transformations.

[Finite-depth HOAS trees for reasoning about probabilistic programs](#)

Giannakopoulos, Wand, and Cobb

Probabilistic Programming Semantics Workshop 2016 (PPS16)

Designed a core calculus for the purpose of investigating reasoning principles of probabilistic programming languages. The calculus captures the semantics of a stochastic language with observation while being agnostic to the details of its deterministic portions.

[Multi-Decision Policy and Policy Combinator Specifications](#)

Master's Thesis (Worcester Polytechnic Institute)

Designed semantics for a core language for policies and policy combinators, with a specific focus on multi-decision access control policies and the [Margrave policy language](#).

See my [publications page](#) for additional publications.

Education

Worcester Polytechnic Institute

- M.S. Computer Science, May 2012, GPA 4.0
- B.S. Computer Science, May 2009, GPA 4.0
 - Minor in Mathematics
 - Graduation with High Distinction