

YAN PENG

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ABSTRACT

Fourth-year **PhD** candidate looking for job opportunities in applying formal methods including **theorem proving** and **SAT/SMT** solving to *machine learning* problems, *concurrent systems* and *hardware verification* problems.

EDUCATION

<i>Doctor of Philosophy</i> , Computer Science University of British Columbia, Vancouver, BC	GPA 92.5 % Expected Nov. 2019
<i>Master of Science</i> , Computer Science University of British Columbia, Vancouver, BC THESIS - Combining SMT with Theorem Proving for AMS Verification	GPA 92.5 % Sept. 2015
<i>Bachelor of Engineering</i> , Computer Science and Technology Zhejiang University, Hangzhou, Zhejiang THESIS - Research on Technology of Large-Scale Web Video Topic Discovery	Major GPA 3.9/4.0 June 2012
<i>Chu Kochen Honors College</i> , Foreign Languages & Engineering platform Zhejiang University, Hangzhou, Zhejiang	English Minor June 2012

RESEARCH EXPERIENCE

Research Assistant (Ph.D. Candidate)
Integrated System Design Lab, University of British Columbia Aug. 2012 - Now

- **Smtlink:** Combining Theorem Proving with SMT to verify properties of Analog/Mixed-Signal circuits, asynchronous circuits and machine learning algorithms ([project link](#))
 - Built an extensible and sound architecture for integrating Z3 into the ACL2 theorem prover
 - Verified global convergence for a digital PLL using Smtlink
 - Verify safety, liveness and functional correctness properties of asynchronous circuits (ongoing)
- **Automatic differentiation:** Using automatic differentiation to calculate small signal response and parameter sensitivities of circuits
- **Tool optimization:** Optimizing the internal circuit representation of the Coho reachability analysis tool to improve its simulation performance

Student Intern (Multiple)
Oracle Labs, Redwood Shores, CA, US

- Formally defined synthesis-generated glitch and prototyping showed feasibility of solving the problem using ACL2 and SAT Aug. 2014 (Full-time)
- Built **Glitch Hunter** using theorem prover ACL2 and SAT solvers for defining and detecting glitch errors in Clock Domain Crossing circuitry Nov. 2014 - Dec. 2014
May 2015 - Jan. 2017 (Part-time)
- Built a **Parallel Glitch Hunter** that runs over clusters of machines to solve large industrial designs Jan. 2017 - March 2017 (Full-time)
- Conducted experiments on real design modules, successfully found glitch errors in industrial designs May 2017 - April 2018 (Part-time)

Student Research Training Plan (SRTP)

- Digital media Computing & Design Lab (DCD), Zhejiang University June 2010 - June 2012
- Web Video Data Mining Algorithms and the Applications
 - Multi-model integration, K-partite graph clustering

PUBLICATIONS

Verifying Timed, Asynchronous Circuits using ACL2 [Full paper]

Y. Peng, M. Greenstreet, 25th IEEE International Symposium on Asynchronous Circuits and Systems (ASYNC-2019).

Smtlink 2.0 [Full paper]

Y. Peng, M. Greenstreet, 15th International Workshop on the ACL2 Theorem Prover and Its Applications (ACL2-2018).

Defining and Detecting Synthesis-generated Glitches [Poster]

Y. Peng, M. Greenstreet, I. Jones, the 56th Design Automation Conference (DAC-2018).

Finding Glitches Using Formal Methods [Short paper]

Y. Peng, I. Jones, M. Greenstreet, the 22nd IEEE International Symposium on Asynchronous Circuits and Systems (ASYNC-2016).

Extending ACL2 with SMT Solvers [Full paper]

Y. Peng, M. Greenstreet, the 13th International Workshop on the ACL2 Theorem Prover and Its Applications (ACL2-2015).

Integrating SMT with Theorem Proving for Analog/Mixed-Signal Circuit Verification [Full paper]

Y. Peng, M. Greenstreet, the 7th International NASA Formal Methods Symposium (NFM-2015).

Combining SMT with Theorem Proving for AMS Verification: Analytically Verifying Global Convergence of a Digital PLL [Thesis]

Master of Science, Computer Science program, University of British Columbia, Vancouver, BC, Canada, April 28th 2015.

AMS Verification with Theorem Proving and SMT [Abstract]

Y. Peng, M. Greenstreet, the International Workshop on Frontiers in Analog CAD (FAC-2014).

Verifying Global Convergence for a Digital Phase-Locked Loop [Full paper]

J. Wei, Y. Peng, G. Yu, M. Greenstreet, the 13th Conference on Formal Methods in Computer Aided Design (FMCAD-2013).

Verifying Global Convergence of a Digital Phase-Locked Loop with Z3 [Poster]

Y. Peng, M. Greenstreet, the International Workshop on Design Automation for Analog and Mixed-Signal Circuits (2013).

TALK

Hardware Verification Using Theorem Proving and SMT/SAT Solving Nov. 2018
IBM, Austin, Texas, US.

Verifying Global Convergence of a Digital Phase-Locked Loop with Z3 Sept. 2013
Microsoft, Redmond, WA, US.

PEER REVIEWING SERVICE

Reviewer of International Conference on Computer-Aided Verification (CAV-2018)

TEACHING EXPERIENCE

CPSC418 - Parallel Computing Sept. 2018 - Now
Course description: Parallel computing algorithms and architecture (Erlang and CUDA)

CPSC311 - Definition of Programming Languages Sept. 2015 - Dec. 2015
Course description: Programming language theory

CPSC312 - Functional and Logic Programming Sept. 2013 - Dec. 2013
Course description: Functional and logic programming (Haskell and Prolog)

APSC160 - Introduction to Computation in Engineering Design Sept. 2012 - Dec. 2012
Course description: C and hardware IO programming

SELECTED COURSE PROJECTS

Automate Convergence Rate Proof for Gradient Descent on Quadratic Functions
Course: CPSC540 - Machine Learning 2014, Winter, 1st Term

Automatic Differentiation and Continuous System Formal Verification
Course: CPSC513 - Formal Verification 2013, Winter, 2nd Term

SKILLS

Research-related Languages/Tools: ACL2, Z3

Experienced: Python, Common Lisp, Erlang, Racket, Haskell, Prolog, CUDA, C, C++, C#, Java, MATLAB, bash, SQL, assembly language, Verilog, and SPICE.

Others: Emacs, Git, L^AT_EX

EXTRACURRICULAR ACTIVITIES

Girls Learning Code Intro to Python for Teen Girls (ages 12-17), volunteer June 2016

Microsoft Technology Club, Operation Group, Group leader Sept. 2008 - June 2012

- Microsoft Asia Research Institute Campus Tour, Assistant March 2010
- The Fourth C Language Competition, Project Manager Dec. 2009
- MSTC Academic Lecture Series, Project Manager March 2009