

MAKAI MANN

SUMMARY I am a fourth year Electrical Engineering PhD student at Stanford University working with Dr. Clark Barrett on applying Satisfiability Modulo Theory (SMT) to formal verification of hardware systems. My interests also include optimization, signal processing, machine learning, control systems, and causal inference.

EDUCATION	Electrical Engineering PhD Candidate	Ongoing
	Stanford University	
	MS in Electrical Engineering	June 2018
	Stanford University	
	BS in Systems Science and Engineering with second major in Computer Science	May 2016
	Washington University in St. Louis, graduated Summa Cum Laude	
	<u>Academic Awards and Scholarships</u>	
	National Science Foundation Graduate Research Fellowship (awarded 2018)	
	Stanford EDGE --Enhancing Diversity in Graduate Education-- Fellow (awarded 2016)	
	Washington University Rodriguez Scholar (4 year scholarship program)	
	Washington University McLeod Scholar (4 year scholarship program)	
	Rick Grodsky Electrical & Systems Engineering Award for Technical Achievement (April 2016) for Senior Design Project: Machine Learning Approaches to Solar Output Forecasting	
	Electrical and Systems Engineering Outstanding Junior Award (April 2015)	
	Tau Beta Pi Record Scholar (awarded 2015)	
	Electrical and Systems Engineering Outstanding Sophomore Award (April 2014)	
	AISES Intel Scholar (awarded 2014)	
	<u>Relevant Coursework</u>	
	Introduction to Digital Logic and Computer Design,	Digital Signal Processing
	Introduction to Formal Languages and Automata ,	Automated Reasoning
	Topics in Computer Graphics: Agile Hardware Design,	Convex Optimization

EXPERIENCE	Intern – Apple Silicon Engineering Group Formal Verification Team	Stanford, CA
	<i>June 2018 – September 2018, September 2018 – March 2019 (part time)</i>	
	Researching applications of SMT (Satisfiability Modulo Theory) solvers for formal verification of Apple hardware designs.	
	Intern – Apple Silicon Engineering Group Formal Verification Team	Stanford, CA
	<i>September 2017 – December 2017</i>	
	Researching applications of SMT (Satisfiability Modulo Theory) solvers for formal verification of Apple hardware designs.	

Research Assistant – Barrett Lab**Stanford, CA***January 2017 - present*

Research in SMT-based model checking. I have written preprocessing passes and Python bindings with Cython for the lab's solver, *CVC4*. I am the lead developer of our model checker, *Cosa2*, and our solver-agnostic C++ SMT API, *smt-switch*. I have used a variety of tools to perform formal hardware verification. My main research contributions include symmetry breaking techniques for bounded model checking and an abstraction-refinement technique using prophecy variables for proving properties of array-manipulating transition systems.

Research Assistant – Agile Hardware Center**Stanford, CA***January 2017 - present*

Applying SMT solvers to automate place-and-route for CGRAs. My primary role was building the routing portion of the tool using the graph-aware SMT solver, Monosat.

Ballistic Missile Defense System Integration Intern – MIT Lincoln Laboratory**Lexington, MA***June 2015-August 2015*

Extended Kalman Filtering and multiple model state estimation algorithms development in Matlab.

Software Development Intern – Pacific Disaster Center**Maui, HI***June 2014-August 2014 (304 hours)*

Developed an application to interpret and sort National Weather Service messages from a telnet stream and modified existing company code to process these messages to create "dots on a map."

Software Development Intern – Ardent Management Consulting**Maui, HI***June 2013-August 2013, January 2014 (270+ hours)*

Helped design an internal web communication platform, using mostly HTML5 and some C#, JavaScript, JQuery and SQL.

Teaching Assistant – Matlab (CSE 200), Washington University**St. Louis, MO***January 2014-December 2015*

Hold office hours for students, answer questions, grade assignments.

Grader – Signals and Systems (ESE 351), Washington University**St. Louis, MO***January 2015-May 2015*

Grade quizzes, homework, tests and Matlab assignments.

COMPUTER SKILLS

Proficient in: Python, Matlab

Experienced in: C++, CVC4, Z3, Boolector, Monosat, Yosys, JasperGold

Have used: Haskell, Cython, CMake, Git, Verilog, Tensorflow

LEADERSHIP**EDGE Fellowship Mentor, Stanford University****Stanford, CA***September 2018 - present*

Serve as a point-of-contact and mentor for two new Electrical Engineering PhD students.

Treasurer – Tau Beta Pi Missouri Gamma Chapter, Washington University**St. Louis, MO***August 2015-May 2016*

Coordinated with the national organization and manage the budget.