Yang Zhao

CONTACT INFORMATION

Department of Computer Science and Engineering
University of California, Riverside
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CITIZENSHIP

China

RESEARCH INTEREST

Formal methods on software/hardware verification

Logic and probabilistic model checking

Performance and dependability analysis

QUALIFICATIONS

Formal verification of software/hardware systems
Over 6 years research experiences and hand-on experiences on verifying real safety-critical systems (See "Work Experience"). Expertise on model checking.

C++/C, object-oriented programming
Over 8 years experiences on developing and debugging C++/C programs on Linux platform. Working as the main maintainer of the tool SMART.

Algorithm design and analysis
Published several papers proposing new symbolic algorithms to reduce the memory and runtime consumption in model checking and Markov Chain analysis (See "Academic Experience" and "Selected Publications").

RTL design and verification
Over 2 years experiences of integrated circuit design and verification.

EDUCATION

University of California, Riverside, CA

Ph.D. student, Computer Science, **expected graduation in July, 2013**

- Advisor: Professor Gianfranco Ciardo
- Area of study: Software Engineering, Formal Verification

Institute of Computing Technology, **CAS**, Beijing, China

M.S., Computer Science, July 2008

- Advisor: Professor Xiaowei Li
- Thesis: Formal Verification Techniques Based on Satisfiability

Peking University, Beijing, China

B.S., Electrical Engineering, July 2005, minor in Mathematics

ACADEMIC EXPERIENCE

University of California, Riverside

Graduate Student Researcher **June 2009 to Now**

Maintainer of the decision diagram library and verification tool SMART, designed and implemented new algorithms for:

- Probabilistic model checking
- Steady-state solution for large continuous-time Markov Chain [QEST12]
- Shortest counterexample generation [TASE11]

- Strongly connected component enumeration [NFM10][ISSE11]
- CTL model checking [ATVA09]

Teaching Assistant **September 2009 to December 2011**

- CS 008: Introduction to Computing
- CS 179K: Project in Computer Science: Software Engineering

Institute of Computing Technology, **CAS**, Beijing, China

Research Assistant **September 2005 to July 2008**

- Digital integrated circuit design and simulation-based verification

Work Experience

NASA Ames Research Center, Moffett Field, CA

Intern Student **June 2012 to August 2012**
Advisor: Kristin Yvonne Rozier

- Analyzed the dependability of NASA's next generation airspace control system using PRISM
- Produced quantitative results to guide the design decision
- Research paper in preparation

Intern Student **June 2011 to August 2011**
Advisor: Kristin Yvonne Rozier

- Verified NASA's next generation airspace control system using model checker NuSMV
- Found logic flaws in the original system designs that may lead to hazard
- Research paper presented in AVoCS 2012

National Institute of Aerospace, Hampton, VA

Visiting Graduate Student **June 2010 to September 2010**
Advisor: Radu Siminiceanu

- Integrated an MDD library written in C to the open-source model checker SAL, which is written in Scheme

Ningbo IC Center, Ningbo, China

Development Assistant **January 2008 to May 2008**

Design and verification of an embedded processor Low Power Processor (LPP)

Awards

UCR Dissertation Year Program Fellowship	**Fall 2012**
QEST 2010 Student Travel Grant	**September 2010**
UCR Dean's Distinguished University Fellowship	**September 2008– June 2009**

Technical Skills

Verification tools	SMART, NuSMV, PRISM, VIS, zChaff
Language	C++/C, Python, Java, Matlab, LISP, HTML/CSS, Verilog, SystemVerilog, E verification language
Tool	GNU make, autotools, Bison, gdb, gprof, Valgrind, SVN
IDE	Eclipse, Visual Studio
Operating Systems	Linux, Microsoft Windows, Apple OS X

PUBLICATIONS

Yang Zhao and Kristin Rozier, *Formal Specification and Verification of a Coordination Protocol for an Automated Air Traffic Control System*, International Workshop on Automated Verification of Critical Systems (AVoCS), 2012.

Yang Zhao and Gianfranco Ciardo, *A Two-Phase Gauss-Seidel Algorithm for Steady-state Solution of Structured CTMCs Encoded with EVMDDs*, International Conference on Quantitative Evaluation of SysTems (QEST), 2012.

Gianfranco Ciardo, **Yang Zhao** and Xiaoqing Jin, *Ten Years of Saturation: A Petri Net Perspective*, Transactions on Petri Nets and Other Models of Concurrency V, pages 51-95, vol.6900, 2012.

Xiaoqing Jin, Gianfranco Ciardo, Tae-Hyong Kim and **Yang Zhao**, *Symbolic Verification and Test Generation for a Network of Communicating FSMs*, Automated Technology for Verification and Analysis (ATVA), 2011.

Yang Zhao, Xiaoqing Jin and Gianfranco Ciardo, *A Symbolic Algorithm for Shortest EG Witness Generation*, IEEE International Conference on Theoretical Aspects of Software Engineering (TASE), 2011.

Yang Zhao and Gianfranco Ciardo, *Symbolic Computation of Strongly Connected Components and Fair Cycles Using Saturation*, Innovations in Systems and Software Engineering, Volume 7, Number 2, Page 141-150, 2011.

Yang Zhao and Gianfranco Ciardo, *Symbolic Computation of Strongly Connected Components Using Saturation*, Second NASA Formal Methods Symposium (NFM), 2010.

Gianfranco Ciardo, **Yang Zhao** and Xiaoqing Jin, *Parallel symbolic state-space exploration is difficult, but what is the alternative?*, International Workshop on Parallel and Distributed Methods in Verification (PDMC), 2009.

Yang Zhao and Gianfranco Ciardo, *Symbolic CTL Model Checking of Asynchronous Systems Using Constrained Saturation*, Automated Technology for Verification and Analysis (ATVA), 2009.

Yang Zhao, Ling-yi Liu, Tao LV, Hua-wei Li and Xiao-wei Li, *Novel Circuit-Oriented SAT Engine and Its Application to Unbounded Model Checking* (poster in informal diguest), European Test Symposium (ETS), 2007.

Tao Lv, Tong Xu, **Yang Zhao**, Hua-wei Li and Xiao-wei Li, *Bug Analysis and Corresponding Error Models in Real Designs*, IEEE International High Level Design Validation and Test Workshop (HLDVT), 2007.

Tao Lv, Ling-yi Liu, **Yang Zhao**, Hua-wei Li and Xiao-wei Li, *An Observability Branch Coverage Metric Based on Dynamic Factored Use-Define Chains*, Asian Test Symposium (ATS), 2006.