

Shaohui Wang

CONTACT INFORMATION	Department of Computer and Information Science, University of Pennsylvania Levine 514 3330 Walnut Street Philadelphia, PA 19104, USA	<i>Phone:</i> (215) 301-4922 <i>E-mail:</i> shaohui@seas.upenn.edu <i>WWW:</i> www.seas.upenn.edu/~shaohui
RESEARCH INTERESTS	Software engineering, formal modeling and verification, software testing, code generation, and programming languages.	
EDUCATION	University of Pennsylvania , Philadelphia, PA, USA Ph.D., Department of Computer and Information Science (expected graduation: July 2018) <ul style="list-style-type: none">• Specialization: runtime verification, medical device interoperability• Advisors: Professor Insup Lee and Professor Oleg Sokolsky M.S., Department of Computer and Information Science, May 2015 <ul style="list-style-type: none">• Specialization: software engineering, formal modeling Peking University , Beijing, P.R.China M.Phil., Department of Philosophy, July 2008 <ul style="list-style-type: none">• Major: Mathematical Logic• Specialization: applications of logic into computer science• Thesis Topic: <i>Model Checking: Its Theory and Applications</i> Tsinghua University , Beijing, P.R.China B.S., Department of Mathematical Sciences, July 2005 <ul style="list-style-type: none">• Major: Information and Computing Science• Thesis Topic: <i>On the SAT Problems Based on Quantum Computation</i>	
RESEARCH EXPERIENCE AND PROJECTS	Research Assistant, University of Pennsylvania <i>Causality Analysis for Medical Device Interoperability</i> May 2011–present <ul style="list-style-type: none">• Defined notion of causality in presence of multiple medical devices working in an interoperable manner.• Developed algorithms to decide the minimal causes when adverse events to patients happen.• Conducted case studies in laser-scalpel interoperability scenarios as well as cases involving patient infusion pumps. <i>Medical Device Data Loggers</i> February 2012–May 2015 <ul style="list-style-type: none">• Developed prototypes for data loggers for medical device interoperability settings.• Designed techniques for determining optimal configurations for medical device data loggers. <i>Assurance Cases for Computer Software</i> September 2010–April 2011 <ul style="list-style-type: none">• Developed formal semantics for assurance case arguments.• Applied the assurance case techniques in a whole product cycle of an in-house pacemaker system.	

The Ahlta-Mobile Project

September 2008–November 2010

- Developed state machine models of user interaction of a handheld medical device to represent user mental model of device operation.
- Developed a general-purpose C# source code analyzer for constructing state machine models of screen transitions.
- Compared mental models and extracted models and identified potential mode confusion errors.

The Pacemaker Challenge

April 2009–May 2010

- Designed a Uppaal model of the pacemaker system in the DDD mode.
- Verified safety properties with regard to the operation of the model.
- Constructed assurance case arguments of the safe operation of the designed pacemaker system.

Student Associate, Computer Science Lab at SRI International

Networked Cyber Physical Systems

May 2010–August 2010

- Modeled and verified correctness of motion planning systems using Petri Nets.
- Transformed models into applications on the NCPS framework simulator.

Research Assistant, Peking University

IEEE 1394 Leader Election Protocol

November 2007–April 2008

- Modeled the IEEE 1394 leader election protocol using Petri Nets.
- Verified correctness of the IEEE 1394 protocol.
- Programmed a simulator for the leader election protocol in Matlab.

PUBLICATIONS

In reverse chronological order.

- [1] Shaohui Wang, Yoann Geoffroy, Gregor Goessler, Oleg Sokolsky, and Insup Lee. *A Hybrid Approach to Causality Analysis*. In RV'15, the 6th International Conference on Runtime Verification.
- [2] Shaohui Wang, Anaheed Ayoub, BaekGyu Kim, Gregor Goessler, Oleg Sokolsky, and Insup Lee. *A Causality Analysis Framework for Component-based Real-time Systems*. In RV'13, the 4th International Conference on Runtime Verification.
- [3] Shaohui Wang, Anaheed Ayoub, Radoslav Ivanov, Oleg Sokolsky, and Insup Lee. *Contract-based Blame Assignment by Trace Analysis*. In Proceedings of HiCoNS'13, the 2nd International Conference on High Confidence Networked System.
- [4] Shaohui Wang, Srinivasan Dwarakanathan, Oleg Sokolsky, and Insup Lee. *High-level Model Extraction Via Symbolic Execution*. Technical Report MS-CIS-12-04, University of Pennsylvania, 2012.
- [5] Shaohui Wang, Anaheed Ayoub, Oleg Sokolsky, and Insup Lee. *Runtime Verification of Traces Under Recording Uncertainty*. In Proceedings of RV'11, the 2nd International Conference on Runtime Verification.
- [6] Eunkyong Jee, Shaohui Wang, Jeong Ki Kim, Jaewoo Lee, Oleg Sokolsky, and Insup Lee. *A Safety-assured Development Approach for Real-time Software*. In 16th International Conference on Embedded and Real-Time Computing Systems and Applications (RTCSA), pages 133-142.
- [7] Vivien Chinnapongse, Insup Lee, Oleg Sokolsky, Shaohui Wang, Paul L. Jones. *Model-Based Testing of GUI-Driven Applications*. Software Technologies for Embedded and Ubiquitous Systems, volume 5860 of LNCS, pages 203-214. Springer, 2009.

PROFESSIONAL
SERVICES

External peer reviewer.

- FMSD: Formal Methods in System Design (journal)
- MPE: Mathematical Problems in Engineering (journal)
- SMC: IEEE Transactions on Systems, Man, and Cybernetics (journal)
- STTT: International Journal on Software Tools for Technology Transfer (journal)
- TECS'09: ACM Transactions on Embedded Computing Systems (journal)
- TOSEM'11: ACM Transactions on Software Engineering and Methodology (journal)
- ASSURE'13: 1st International Workshop on Assurance Cases for Software-Intensive Systems
- ATVA'09, ATVA'10, ATVA'11, ATVA'12, ATVA'13: International Symposium on Automated Technology for Verification and Analysis
- BSN'10: International Conference on Wearable and Implantable Body Sensor Networks
- DATE'12: Design, Automation, Test & Test in Europe
- ECRS'10: Euromicro Conference on Real-Time Systems
- EMSOFT'12, EMSOFT'14, EMSOFT'15: International Conference on Embedded Software
- FM'09: 16th International Symposium on Formal Methods
- FORMATS'09: 7th International Conference on Formal Modeling and Analysis of Timed Systems
- HEALTHTECH'13: 2013 USENIX Workshop on Health Information Technologies
- ICCAD'11: The International Conference on Computer-Aided Design
- ICCPS'10, ICCPS'12: International Conference on Cyber-Physical Systems
- ICFEM'12: International Conference on Formal Engineering Methods
- ICHI'13: The IEEE International Conference on Healthcare Informatics
- IHI'12: ACM SIGHIT International Health Informatics Symposium
- ISORC'10, ISORC'12: International Symposium on Object/Component/Service-Oriented Real-Time Distributed Computing
- LCTES'09: ACM SIGPLAN/SIGBED Conference on Languages, Compilers, and Tools for Embedded Systems
- NFM'12: The 4th NASA Formal Methods Symposium
- RTAS'11, RTAS'15: The 17th IEEE Real-Time and Embedded Technology and Applications Symposium
- RTCSA'10, RTCSA'11: IEEE International Conference on Embedded and Real-Time Computing Systems and Applications
- RTSS'09, RTSS'10, RTSS'11, RTSS'12, RTSS'13: IEEE Real-Time Systems Symposium
- RV'09, RV'11, RV'12, RV'13: International Conference on Runtime Verification
- SEHC'12: 4th International Workshop on Software Engineering in Health Care
- SPIN'13: The International SPIN Symposium on Model Checking of Software
- SRDS'12: 31st IEEE International Symposium on Reliable Distributed Systems

Conference organization volunteers.

- CPSWEEK'13: Cyber-Physical Systems Week
- ICHI'13: The IEEE International Conference on Healthcare Informatics

TEACHING
EXPERIENCE

University of Pennsylvania

Fall 2012. Teaching Assistant for CIS 441/541: *Embedded Software for Life-Critical Applications*

Fall 2011. Teaching Assistant for CIS 441/541: *Embedded Software for Life-Critical Applications*

Fall 2010. Teaching Assistant for CIS 441: *Embedded Software for Life-Critical Applications*.

- Co-designed a course project for students to implement a pacemaker controller on AVR Butterfly board.
- Project reused for over three offerings of the course; fulfilled by more than 100 students in groups of three or four.

Spring 2010. Teaching Assistant for CIS 541: *Embedded and Cyber Physical Systems*

Fall 2009. Teaching Assistant for CIS 140: *Introduction to Cognitive Science*

Peking University

Fall 2005. Teaching Assistant for *Mathematical Logic*, Peking University,

SELECTED
COURSEWORK

University of Pennsylvania

- CIS 500: Software Foundations
- CIS 502: Analysis of Algorithms
- CIS 505: Software Systems (Distributed Systems)
- CIS 520: Machine Learning
- CIS 540: Principles of Embedded Systems
- CIS 673: Computer-Aided Verification
- CIS 682: Friendly Logics
- CIS 800: Rigorous Internet Protocol Engineering
- CIS 899: Embedded and Cyber Physical Systems

Peking University

- First Order Logic and First Order Theories
- Modal Logic
- Set Theory
- Model Theory
- Recursion Theory

Tsinghua University

- Mathematical Analysis I, II, III
- Linear Algebra I, II
- Number Theory
- Analytic Geometry
- Abstract Algebra I, II
- Real Analysis
- Complex Analysis
- Numerical Analysis
- Ordinary Differential Equations
- Probability and Stochastic Process
- Artificial Intelligence

AWARDS

University of Pennsylvania

- Doctoral Fellowship, 2008–2015

Peking University

- Guanghai Scholarship, 2006

TECHNICAL SKILLS Operating Systems: Microsoft Windows, GNU Linux, Mac OSX, FreeRTOS.

Programming Skills: Java, Python, Perl, C, C++, C#, Visual Basic, PHP, Ruby, Lisp, Subversion, Git.

Specialized Tools: Matlab, Uppaal, NuSMV, Spin, Z3, Coq, OSate.

Applications: L^AT_EX, Emacs, and other common productivity software suites.

REFERENCE Available upon request.