

# Anduo Wang

University of Illinois at Urbana-Champaign, Computer Science

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## Research Interest

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As a networking researcher, I apply database, formal methods and programming languages techniques to create and automate management of flexible, reliable, and provably correct network.

## Education

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University of Pennsylvania, <b>Ph.D.</b> , Computer and Information Science	08/2013
Advisors: Boon Thau Loo, Andre Scedrov	
Thesis: Automated Formal Analysis of Internet Routing Configurations	
University of Pennsylvania, <b>M.S.E.</b> , Computer and Information Science	12/2009
Tsinghua University, <b>research assistant</b> , Computer Science	07/2007
Tianjin University, <b>B.S.</b> , Computer Science	07/2004

## Work and Research Experience

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University of Illinois at Urbana-Champaign – Postdoctoral research associate	12/2013 - Present
SRI International, Menlo Park – International fellow	Summer 2010, 2011, 2012

## Publications

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### Software-defined networking

*Ravel: Orchestrating Software-Defined Networks.* **Anduo Wang**, Brighten Godfrey, Matthew Caesar., Symposium on Software-Defined Networking Research: Demos, June, 2015

*Software-Defined Networks as Databases.* **Anduo Wang**, Wenchao Zhou, Brighten Godfrey, Matthew Caesar., Open networking summit, March, 2014

*Automated Synthesis of Reactive Controllers for Software-Defined Networks.* **Anduo Wang**, Salar Moarref, Ufuk Topcu, Boon Thau Loo, Andre Scedrov., 3rd International Workshop on Rigorous Protocol Engineering (**WRiPE**), October 2013

*On the Feasibility of Automation for Bandwidth Allocation Problems in Data Centers.* Yifei Yuan, **Anduo Wang**, Rajeev Alur, Boon Thau Loo., 13th Conference on the Theory and Applications of Formal Methods in Hardware and System Verification (**FMCAD**), October 2013

### Scale up network analysis

*A Reduction-based Approach Towards Scaling Up Formal Analysis of Internet Configurations.* **Anduo Wang**, Alexander J.T. Gurney, Xianglong Han, Jinyan Cao, Boon Thau Loo, Carolyn Talcott and Andre Scedrov., The

33rd Annual IEEE International Conference on Computer Communications (**INFOCOM**), April 27th - May 2nd, 2014, Canada

*Reduction-based Formal Analysis of BGP Instances.* **Anduo Wang**, Carolyn Talcott, Alexander J.T. Gurney, Boon Thau Loo and Andre Scedrov., 18th International Conference on Tools and Algorithms for the Construction and Analysis of Systems (**TACAS**), Mar 2012

*Reduction-based analysis of BGP systems with BGPVerif* **Anduo Wang**, Alexander J.T. Gurney, Xianglong Han, Jinyan Cao, Carolyn Talcot, Boon Thau Loo, Andre Scedrov., ACM Special Interest Group on Data Communication (**ACM SIGCOMM**) **demonstration**, Helsinki, Finland, Aug, 2012

*Brief announcement: a calculus of policy-based routing systems,* **Anduo Wang**, Carolyn Talcott, Alexander Gurney, Boon Thau Loo, Andre Scedrov., ACM symposium on Principles of distributed computing (**PODC**), 2012

## Analyze real-world routing policies

*Analyzing BGP Instances in Maude* **Anduo Wang**, Carolyn Talcott, Limin Jia, Boon Thau Loo, Andre Scedrov., 13th Formal Methods for Open Object-Based Distributed Systems and 31th Formal Techniques for Networked and Distributed Systems (**FMOODS/FORTE**), 2011

*Partial Specifications of Routing Configurations.* Alexander J. T. Gurney, Limin Jia, **Anduo Wang**, and Boon Thau Loo., 1st International Workshop on Rigorous Protocol Engineering (**WRiPE**), co-located with ICNP 2011, Vancouver, Canada, Oct 2011

## Synthesize declarative routing system

*FSR: Formal Analysis and Implementation Toolkit for Safe Inter-domain Routing.* **Anduo Wang**, Limin Jia, Wenchao Zhou, Yiqing Ren, Boon Thau Loo, Jennifer Rexford, Vivek Nigam, Andre Scedrov, Carolyn L. Talcott., IEEE/ACM Transactions on Networking (**ToN**), 2012

*Recent advances in declarative networking,* Boon Thau Loo, Harjot Gill, Changbin Liu, Yun Mao, William R. Marczak, Micah Sherr, **Anduo Wang**, Wenchao Zhou., 14th international conference on Practical Aspects of Declarative Languages, (**PADL**), 2012

*FSR: Formal Analysis and Implementation Toolkit for Safe Inter-domain Routing.* Yiqing Ren, Wenchao Zhou, **Anduo Wang**, Limin Jia, Alexander J.T. Gurney, Boon Thau Loo, and Jennifer Rexford., ACM Special Interest Group on Data Communication (**ACM SIGCOMM**) **demonstration**, Toronto, Canada, Aug, 2011

*An Operational Semantics for Network Datalog,* Vivek Nigam, Limin Jia, **Anduo Wang**, Boon Thau Loo, and Andre Scedrov., Third International Workshop on Logics, Agents, and Mobility (**LAM**), in conjunction with LICS, July 2010

## Analyze algebraic and declarative routing systems

*FSR: Formal Analysis and Implementation Toolkit for Safe Inter-domain Routing.* **Anduo Wang**, Limin Jia, Wenchao Zhou, Yiqing Ren, Boon Thau Loo, Jennifer Rexford, Vivek Nigam, Andre Scedrov, Carolyn L. Talcott., IEEE/ACM Transactions on Networking (**ToN**), 2012.

*Formally Verifiable Networking,* **Anduo Wang**, Limin Jia, Changbin Liu, Boon Thau Loo, Oleg Sokolsky, and Prithwish Basu., 8th Workshop on Hot Topics in Networks (**ACM SIGCOMM HotNets-VIII**), New York, Oct 2009 (16.0% acceptance)

*A Theorem Proving Approach Towards Declarative Networking,* **Anduo Wang**, Boon Thau Loo, Changbin Liu, Oleg Sokolsky, Prithwish Basu. Theorem Proving in Higher Order Logics (**TPHOLs**) Emerging Trends Section, August, 2009

*Formalizing Metarouting in PVS*, **Anduo Wang**, Boon Thau Loo., *Automated Formal Methods* workshop (**AFM**), co-located with 21st International Conference on Computer Aided Verification, France, 2009

*Declarative Network Verification*, **Anduo Wang**, Prithwish Basu, Boon Thau Loo, Oleg Sokolsky., International Symposium on Practical Aspects of Declarative Languages (**PADL**), 2009

## Other work

*Formalizing a Component Model in PVS*, Kung-Kiu Lau, **Anduo Wang**., preprint 40, Technical Report, School of Computer Science, The University of Manchester, Nov 2006

*A Component Based Approach to Verified Software: What, Why, How And What Next?*, Kung-Kiu Lau, Zheng Wang, **Anduo Wang**, Ming Gu. 1st Asian Working Conference on Verified Software, 2006

*Verifying Java Programs By Theorem Prover HOL*, **Anduo Wang**, Fei He, Ming Gu, Xiaoyu Song., Proceedings of the 30th Annual International Computer Software and Applications Conference, 2006

## Presentations and Demonstrations

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**INFOCOM** *A Reduction-based Approach Towards Scaling Up Formal Analysis of Internet Configurations*. 04/2014, Canada

**Open networking summit** *Software-Defined Networks as Databases*. 03/2014

**PX-exchange meeting, invited talk** *Reduction-based Formal Analysis of BGP Instances*, Baltimore, 10/2012

**SIGCOMM demo** *BGPVerif: A Reduction-based Formal Analysis Toolkit for analyzing BGP Instances*, Finland, 08/2012

**SRI, Menlo Park** *A calculus for policy-based routing systems* 07/2012.

**PODC brief announcement** *A calculus for policy-based routing systems* Portugal, 05/2012

**TACAS** *Analyzing BGP Instances in Maude* TACAS, Estonia, 04/2012

**PX-exchange meeting, invited talk** *Analyzing BGP Instances in Maude*, Baltimore, 10/2011

**SIGCOMM demo** *FSR: Formal Analysis and Implementation Toolkit for Safe Inter-domain Routing*, Canada, 08/2011

**SRI, Menlo Park** *Analyzing BGP Systems with Maude*, 08/2010

**PX-exchange meeting, invited talk** *Formally Verifiable Networking*, Baltimore, 10/2010

**TPHOLs short talk** *A Theorem Proving Approach Towards Declarative Networking*, TPHOLs Emerging Trends Section, Germany, 08/2009

**AFM** *Formalizing Metarouting in PVS*, Automated formal methods workshop, France, 06/2009

**PADL** *Declarative Network Verification*, International Symposium on Practical Aspects of Declarative Languages, Charlotte, NC, 2009

## Teaching

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CS 591 – Acting out Algorithm, University of Illinois at Urbana-Champaign Fall 2013

CIS 121 – Data Structures and Algorithms with Java, University of Pennsylvania Fall 2009

CIS 511 – Introduction to The Theory of Computation, University of Pennsylvania Spring 2009

## Honor & Awards

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**Dean's Fellowship** University of Pennsylvania, 2007 – 2008

**Daiwa first rank fellowship** Tsinghua University, 2006 – 2007

## Academia Service

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**ICNP 2014** Technical Program Committee (Regular Paper Track), 22nd IEEE International Conference on Network Protocols

**NSDI 2014** External reviewer, 11th USENIX Symposium on Networked Systems Design and Implementation

**Journal of the Association for Computing Machinery, 2012** External reviewer

**TOPLAS 2011** External reviewer, ACM Transactions on Programming Languages and Systems

**SECON 2011** External reviewer, 8th Annual IEEE Communications Society Conference on Sensor, Mesh and Ad Hoc Communications and Networks

**SIGMOD 2011** External reviewer, ACM's Special Interest Group on Management Of Data

**TPLP 2010** External reviewer, Theory and Practice of Logic Programming special issue for PADL 2010 (Practical Aspects of Declarative Languages)

**LPAR 2010** External reviewer, Logic for Programming, Artificial Intelligence and Reasoning

**IPTPS 2010** External reviewer, International workshop on Peer-To-Peer Systems

**VLDB 2010** External reviewer, 36th International Conference on Very Large Data Bases

**ACM CoNEXT 2009** External reviewer, The 5th ACM International Conference on emerging Networking EXperiments and Technologies

**ICDE 2008** External reviewer, International Conference on Data Engineering

**POPL 2008** External reviewer, Symposium on Principles of Programming Languages