# Chen Chen

University of Pennsylvania
Room 575, Levine Hall
3330 Walnut Street
Philadelphia, PA 19104-6309

Email: chenche@seas.upenn.edu
Web: `http://www.cis.upenn.edu/~chenche/`
Phone: (215) 290-9716

## Education

- **Ph.D. Candidate**, Computer and Information Science — Sep 2011 - Present
  Thesis research: Unified Static and Runtime Analysis of Declarative Distributed Systems.
  Thesis research webpage: `http://netdb.cis.upenn.edu/strands`
  University of Pennsylvania, Philadelphia, PA
  Advisors: Boon Thau Loo and Limin Jia (co-advisor, CMU)

- **Bachelor of Science**, Information Security — Sep 2007 - Sep 2011
  School of Computer Science, Fudan University, Shanghai, China
  GPA: 3.56/4.00; Major GPA: 3.90/4.00; Rank: 3/32

## Publications

- **Distributed Provenance Compression**
  Chen Chen, Harshal Tushar Lehri, Lay Kuan Loh, Anupam Alur, Limin Jia, Wenchao Zhou and Boon Thau Loo
  In SIGMOD, May 2017

- **A Program Logic for Verifying Secure Routing Protocols**
  Chen Chen, Limin Jia, Hao Xu, Cheng Luo, Wenchao Zhou and Boon Thau Loo
  In Logical Methods in Computer Science (LMCS), Volume 11, Issue 4, August 2016

- **Automated Verification of Safety Properties in Declarative Networking Programs**
  Chen Chen, Lay Kuan Loh, Limin Jia, Wenchao Zhou and Boon Thau Loo
  In the 17th International Symposium on Principles and Practice of Declarative Programming (PPDP), July 2015

- **A Scalable Multi-Datacenter Layer-2 Network Architecture**
  Chen Chen, Changbin Liu, Pingkai Liu, Boon Thau Loo and Ling Ding
  In ACM Sigcomm Symposium on SDN Research (SOSR), June 2015

- **A Program Logic for Secure Routing Protocols**
  Chen Chen, Limin Jia, Hao Xu, Cheng Luo, Wenchao Zhou and Boon Thau Loo
  In the 34th IFIP International Conference on Formal Techniques for Distributed Objects, Components and Systems (FORTE), June 2014

- **Proof-based Verification of Software Defined Networks**
  Chen Chen, Limin Jia, Wenchao Zhou, and Boon Thau Loo
  In the Open Networking Summit (ONS), March 2014

- **Reduction-based Security Analysis of Internet Routing Protocols**
  Chen Chen, Limin Jia, Wenchao Zhou, and Boon Thau Loo
  In the 2nd International Workshop on Rigorous Protocol Engineering (WRiPE), Oct 2012

- **Datacast: A Scalable and Efficient Reliable Group Data Delivery Service for Data Centers**
  Jiaxin Cao, Chuanxiong Guo, Guohan Lu, Yongqiang Xiong, Yixin Zheng, Yongguang Zhang, Yibo Zhu, and Chen Chen
  In the 8th International Conference on emerging Networking EXperiments and Technologies (CoNEXT)

- **Towards a Secure and Verifiable Future Internet**
  Limin Jia, Chen Chen, Sangeetha A.Jyothi, Wenchao Zhou, Suyog Mapara and Boon Thau Loo
  In the Off the Beaten Track: Underrepresented Problems for Programming Language Researchers(OBT)

## Professional Experience

**University of Pennsylvania, Research Assistant, Sep 2011 - Present**

- **Distributed Provenance Compression** Sep 2015 – Jun 2016
  Designed and implemented a framework for compressing network provenance in a distributed fashion. The framework places provenance trees into different equivalence classes, and stores only one concrete copy for provenance trees in the same equivalence class. To efficiently identify the equivalence class to which each provenance tree belongs, we performed static analysis on provenance maintenance sourcecode, and used the analysis results to compress provenance trees at runtime.
  (in collaboration with Prof. Boon Thau Loo, Prof. Limin Jia and Prof. Wenchao Zhou)
- **Verification of Declarative Networking Programs** Jun 2014 – May 2015
  Designed and implemented a framework for verifying safety properties of networking programs specified in declarative programming languages (e.g. NDLog). The declarative specification of networking applications is parsed and converted into dependency graph – a data structure capturing the tuple-level dependency between relations in NDLog – that are used to verify safety properties. We developed a prototype to verify properties of SDN applications, and found several bugs in the applications.
  (in collaboration with Prof. Boon Thau Loo, Prof. Limin Jia and Prof. Wenchao Zhou)
- **Program Logic for Secure Routing Protocols** Sep 2011 – May 2014
  Developed a program logic for verifying security properties of secure routing protocols (e.g., Secure BGP). The logic is built on SANDlog, a variant specification language of Network Datalog (i.e., NDLog) with extension of security primitives. We used the logic to prove classical properties, such as path authenticity, of secure routing protocols. Our logic is proved to be sound with regards to the semantics of SANDlog.
  (in collaboration with Prof. Boon Thau Loo, Prof. Limin Jia and Prof. Wenchao Zhou)

**NEC Labs America, Research Assistant, Jun 2015 - Aug 2015**

- **Data Analytics for Networked System Logs** Jun 2015 - Aug 2015
  Developed a knowledge management framework for log analytics in networked systems. The framework allows the user to specify desired network behaviors (e.g., TCP setup), and identifies the sequence of log entries that match the specified behavior. The framework also supports partial matching when the log information is incomplete.
  (in collaboration with Dr. Hui Zhang, Dr. Qiang Xu, and Dr. Biplob Debnath)

**AT&T Labs Research, Research Assistant, Jun 2013 - Aug 2013**

- **Scalable Software-defined Networking** Jun 2013 - Aug 2013
  Built infrastructure supporting multi-datacenter Layer-2 Network. SDN controllers are used to achieve

scalability by replacing broadcast traffic, such as ARP requests and DHCP requests/replies, with unicast traffic to the controller. Live migration can be supported naturally by our system.

(in collaboration with Dr. Changbin Liu (Senior Member of Technical Staff, AT&T) and Prof. Boon Thau Loo)

**Microsoft Research Asia, Research Assistant, Apr 2010 - Oct 2010**

- **Multicast in Data Center Network** Apr 2010 - Oct 2010
  Developed algorithms for multicast in data center network. Constructed optimal multicast trees for different large-scale architectures in seconds, including Bcube, FatTree and Torus. Compared algorithms with BitTorrent protocols for optimization evaluation.

  (in collaboration with Dr. Jiaxin Cao, Dr. Chuanxiong Guo, Dr. Haitao Wu, Dr. Yongqiang Xiong)

**Fudan University, Research Assistant, Sep 2009 - Feb 2010**

- **Network Coding for Highly Reliable P2P Network** Sep 2009 - Feb 2010
  Implemented hierarchical P2P network based on network coding with C#. Reduced file sharing time in distributed file transmission with network coding. Compared the performance of network coding with traditional file sharing protocol: BitTorrent and showed that network coding is quicker and effective in distributing scarce information.

  (in collaboration with Prof. Xin Wang, Prof. Jin Zhao)

## Honors

- **National Scholarship 1st Prize** 2009 - 2010
  Top 1% student in Fudan University(i.e. Top 1 student in the major) is awarded for excellent academic performance. One student every two years for the same major
- **Tung OOCL Scholarship 1st Prize** 2008 - 2009
  Top 1% student in the major is awarded for excellent academic performance

## Teaching Experience

- **Teaching Assistant** for CIS 511: Theory of Computation Spring 2013
- **Teaching Assistant** for CIS 262: Automata, Computability and Complexity Fall 2012

## References

- **Boon Thau Loo**, Associate Professor
  CIS Masters program chair
  Department of Computer and Information Science, University of Pennsylvania
  Contact: boonloo@seas.upenn.edu
- **Limin Jia**, Assistant Research Professor
  Academic Advisor of MSIS program, INI, Affiliated with: CyLab
  Electrical and Computer Engineering, Carnegie Mellon University
  Contact: liminjia@cmu.edu
- **Wenchao Zhou**, Assistant Professor
  Department of Computer Science, Georgetown University
  Contact: wzhou@cs.georgetown.edu