

Shouqian Shi

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Research Interests

Computer networks and distributed systems, quantum networks, cloud computing and data center networks, network security and privacy, edge computing and mobile computing, vehicular ad-hoc networks.

Education

08/2017 - Present **All but Dissertation, University of California, Santa Cruz (UCSC)**
Ph.D., Department of Computer Science and Engineering

Advisor: Prof. Chen Qian

Advanced to PhD candidacy with honor, Nov, 2019.

Committee member:

- Prof. Phokion G. Kolaitis, Chair, Distinguished Research Professor, UCSC
- Prof. Heiner Litz, Assistant Professor, UCSC
- Prof. Chen Qian, Associate Professor, UCSC
- Dr. Ying Zhang, Staff Engineer, Facebook

09/2014 - 06/2017 **University of Chinese Academy of Sciences (UCAS)**

Postgraduate in Computer Science and Technology

08/2010 - 07/2014 **University of Science and Technology of China (USTC)**

B.E. in Computer Science, B.S. in Applied Physics, *Excellence Graduate*

Refereed Journal Publications

1. **Collaborative Validation of Public-Key Certificates for IoT by Distributed Caching**
Minmei Wang, Chen Qian, Xin Li, *Shouqian Shi*, and Shigang Chen
in *IEEE/ACM Transactions on Networking (ToN)*, 2020
2. **Ludo Hashing: Compact, Fast, and Dynamic Key-value Lookups for Practical Network Systems**
Shouqian Shi, Chen Qian
in *Proceedings of the ACM on Measurement and Analysis of Computing Systems (POMACS)*, 2020.
3. **Hu-Fu: Replay-Resilient RFID Authentication**
Ge Wang, Haofan Cai, Chen Qian, Jinsong Han, *Shouqian Shi*, Xin Li, Han Ding, Wei Xi, and Jizhong Zhao
in *IEEE/ACM Transactions on Networking (ToN)*, 2020
4. **SDN-based privacy preserving cross domain routing**
Qingjun Chen, *Shouqian Shi*, Xin Li, Chen Qian, and Sheng Zhong
in *IEEE Transactions on Dependable and Secure Computing (TDSC)*, 2018.

Refereed Conference Publications

1. **Concurry: A Fast and Light-weight Software Cloud Load Balancer**
Shouqian Shi, Ye Yu, Minghao Xie, Xin Li, Xiaozhou Li, Ying Zhang, Chen Qian
in *Proceedings of the eleventh ACM symposium on cloud computing (SOCC)*, 2020. (Long paper presentation. Acceptance rate: 35/143=24.5%)

2. **Concurrent Entanglement Routing for Quantum Networks: Model and Designs**
Shouqian Shi, Chen Qian
in *Proceedings of ACM Special Interest Group on Data Communication (SIGCOMM)*, 2020. (Long paper presentation. Acceptance rate: 54/250=21.6%)
3. **Ludo Hashing: Compact, Fast, and Dynamic Key-value Lookups for Practical Network Systems**
Shouqian Shi, Chen Qian
in *Proceedings of the ACM International Conference on Measurement and Modeling of Computer Systems (SIGMETRICS)*, 2020. (Long paper presentation. Winter acceptance rate: 18/117=15.38%)
4. **Don't Work on Individual Data Plane Algorithms. Put Them Together!**
Chen Qian, *Shouqian Shi*, Xiaofeng Shi, Minmei Wang
in *Proceedings of The Nineteenth ACM Workshop on Hot Topics in Networks (HotNets)*, 2020. (Acceptance rate: 30/121 = 24.8%)
5. **Vacuum filters: more space-efficient and faster replacement for bloom and cuckoo filters**
Minmei Wang, Mingxun Zhou, *Shouqian Shi*, and Chen Qian
in *Proceedings of the VLDB Endowment*, 2019.
6. **Re-designing Compact-structure based Forwarding for Programmable Networks**
Shouqian Shi, Chen Qian, and Minmei Wang
in *Proceedings of the 27th IEEE International Conference on Network Protocols (ICNP)*, 2019. (Acceptance rate: 30/210 = 14.2%)
7. **Efficient Indexing Mechanism for Unstructured Data Sharing Systems in Edge Computing**
Junjie Xie, Chen Qian, Deke Guo, Minmei Wang, *Shouqian Shi*, and Honghui Chen
in *Proceedings of the IEEE Conference on Computer Communications (INFOCOM)*, 2019. (Acceptance rate: 30/210 = 19.7%)
8. **Collaborative Validation of Public-Key Certificates for IoT by Distributed Caching**
Minmei Wang, Chen Qian, Xin Li, and *Shouqian Shi*
in *Proceedings of the IEEE Conference on Computer Communications (INFOCOM)*, 2019. (Acceptance rate: 30/210 = 19.7%)
9. **VERID: Towards Verifiable IoT Data Management**
Xin Li, Minmei Wang, *Shouqian Shi*, and Chen Qian
in *Proceedings of the International Conference on Internet of Things Design and Implementation (IoTDI)*, 2019. (Acceptance rate: 20/71 = 28.1%)
10. **Efficient Data Placement and Retrieval Services in Edge Computing**
Junjie Xie, Chen Qian, Deke Guo, Xin Li, *Shouqian Shi*, and Honghui Chen
in *Proceedings of the 39th IEEE International Conference on Distributed Computing Systems (ICDCS)*, 2019. (Acceptance rate: 19.6%)

Publications in Submission

1. **WebFlow: Scalable Decentralized Routing for Blockchain Payment Networks**
Xiaoxue Zhang, *Shouqian Shi*, Chen Qian
submitted to an ACM conference.
2. **A Survey of Entanglement Routing in Quantum Networks**
Shouqian Shi, Chen Qian
Invited submission to IEEE Networks Magazine.
3. **Concurrent Entanglement Routing for Quantum Networks: Model and Designs**
Shouqian Shi, Chen Qian
submitted to *IEEE/ACM Transactions on Networking (ToN)*.

4. **Concure: A Fast and Light-weight Software Cloud Load Balancer**
Shouqian Shi, Ye Yu, Minghao Xie, Xin Li, Xiaozhou Li, Ying Zhang, Heiner Litz, Chen Qian
 submitted to *IEEE/ACM Transactions on Networking (ToN)*.
5. **Re-designing Compact-structure based Forwarding for Programmable Networks**
Shouqian Shi, Chen Qian, and Minmei Wang
 submitted to *ACM Transactions on Modeling and Performance Evaluation of Computing Systems*.
6. **Concurrent Selective Reading with MU-MIMO Beamforming in Passive RFID**
 Ge Wang, *Shouqian Shi*, et. al.
 submitted to a USENIX conference.
7. **On-device Certificate Revocation Checking with Small Memory and Low Latency**
 Xiaofeng Shi, *Shouqian Shi*, et. al.
 submitted to an ACM conference.

Publications in Preparation

1. **Practical Routing Protocol for Quantum Networks with Long Entanglement Preservation**
Shouqian Shi, Chen Qian
2. **Smash: A Flexible and Efficient Indexing on Distributed Object Storage**
Shouqian Shi, Heiner Litz, Chen Qian
3. **Precise Intent Verification with Undecidable Network States**
Shouqian Shi, Hongkun Yang, Ivy Liu, Chen Qian
4. **EnclaveHub: Sharing, Hosting, and Unit-Testing Verifiable Secure Execution Environment in the Cloud**
Shouqian Shi, Yifan Hua, Chen Qian

Non-refereed Publications

1. **Design and Implementation of An Entropy Decoding Module of High-Definition Videos**
Shouqian Shi
 B.S. Thesis at Institute of Automation, Chinese Academy of Sciences, Apr 2014
2. **The Primary Exploration of A Configurable Intelligent Game System**
Shouqian Shi
 B.E. Thesis at University of Science and Technology of China, Jan 2014

Patent

A zero-order exponential Columbo code decoder and decoding method

Ling Li, Hao Chen, *Shouqian Shi*, and Jilai Tan

filed for Chinese patent protection, Document Number: 201410799892.6.

CAVLC entropy decoder and entropy decoding method

Donglin Wang, Ling Li, *Shouqian Shi*, Hao Chen, and Yuzhi Zhou

filed for Chinese patent protection, Document Number: 201410796177.7.

Honors and Awards

- PhD candidacy with honor, UCSC, 2019
- Regents' Fellowship, UCSC, 2018 - 2019
- ACM SOCC Student Scholarship, 2018
- Regents' Fellowship, UCSC, 2017 - 2018
- Excellent Student Scholarship, CASIA, 2016
- Excellent Student Scholarship, CASIA, 2015

- Graduate Excellent in Character and Learning (Anhui Province), USTC, 2014
- Chinese Academy of Sciences and Institutes to Build “Training Base for Innovators” Scholarship, CAS, 2013
- National Scholarship, USTC, 2012
- The Second Prize in the third National Mathematics Contest for College Students (Non-math Major), Anhui Province, 2011
- National Scholarship for Encouragement, USTC, 2011
- Excellent League Member, USTC, 2011
- Excellent Student Scholarship, USTC, 2010

Research Experience

Intern 08/2020–Present
Google Sunnyvale, CA

- Google Cloud Platform features a high-level user-configurable network model, which is implemented by Andromeda (NSDI’18). My research focuses on design and implementation of a verification platform for various user intents. The challenges involve: complicated and interfering behavior models of network components, complex routing order, unstable outbound links with on-premise networks, and dynamic routing priority for internal routing rules.

Research Assistant 08/2017–Present
University of California, Santa Cruz Santa Cruz, CA

- Redesigning forwarding information tables for programmable networks.
- L4 load balancer in data center networks and edges networks.
- Memory efficient Key-value lookup table.
- Geographic routing for vehicular ad-hoc networks.
- Routing protocol for quantum networks.
- Application systems for Trusted Execution Environments (TEEs).

Research Assistant 08/2014–06/2017
University of Chinese Academy of Sciences Beijing, China

- A tool chain for MaPU, a 4D SIMD coprocessor for ARM CPUs. Customized ISA, assembler, compiler, dynamic loader, cycle-precise simulator, Linux driver and user space library.

Research Assistant 04/2014–08/2014
University of Chinese Academy of Sciences Beijing, China

- An RTL description of an H.264 entropy decoder cooperating with MaPU. The RTL code passed the full series of official test cases and was patented.

Research Assistant 10/2012–04/2014
Univ. of Sci. and Tech. of China Anhui, China

- A graphics card in the SoC lab, which involves writing RTL descriptions and porting OpenGL-2D features to it. Now this project is still active in a startup, Suzhou Suxianwei Electronic Technology Ltd., in Suzhou, China.

Talks & Presentations

1. **Concurry: A Fast and Light-weight Software Cloud Load Balancer**,
 - on ACM SOCC conference, Oct., 2020 (virtual)
2. **Concurrent Entanglement Routing for Quantum Networks: Model and Designs**,
 - on ACM SIGCOMM conference, New York City, Aug., 2020 (virtual)
 - UMass Amherst, Amherst, MA, July, 2020 (virtual, invited by Don Towsley)
3. **Ludo Hashing: Compact, Fast, and Dynamic Key-value Lookups for Practical Network Systems**,
 - on ACM SIGMETRICS conference, Boston, MA, June, 2020 (virtual)
 - Industrial Advisory Board (IAB), Center for Research in Storage Systems (CRSS), UC Santa Cruz, CA, May, 2019
4. **Smash: A Flexible and Efficient Indexing on Distributed Object Storage**
 - Industrial Advisory Board (IAB), Center for Research in Storage Systems (CRSS), UC Santa Cruz, CA., May, 2020 (virtual)
5. **Re-designing Compact-structure based Forwarding for Programmable Networks**
 - on IEEE ICNP conference, Chicago, IL, Oct., 2019

Teaching Experience

Teaching Assistant, Introduction to Computer Networks, UCSC, Spring 2019

Teaching Assistant, Computer Networks, UCSC, Fall 2018

Teaching Assistant, Introduction to Computer Networks, UCSC, Winter 2018

Membership

- ACM student member.
- IEEE student member.