Minmei Wang

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Research Interests

Internet of Things, network security, SDN, edge computing, data management

Education

09/2017 - now **University of California, Santa Cruz**, USA
Ph.D. in Computer Science and Engineering
Chancellor's Dissertation-Year Fellowship, only *one* recipient in the School of Engineering
Advisor: Chen Qian

09/2014 - 06/2017 **Nanjing University**, China
Master in Computer Science and Technology
Advisor: Yihua Huang

09/2010 - 06/2014 **Nanjing University of Posts and Telecommunications**, China
B.E. in Computer Science,
Advisor: Long Hong (Excellent graduation thesis)

Publications

2021

1. **[CCS]** Xiaofeng Shi, Shouqian Shi, **Minmei Wang**, Jonne Kaunisto, Chen Qian, On-device IoT Certificate Revocation Checking with Small Memory and Low Latency, in *Proceedings of ACM Conference on Computer and Communications Security(CCS)*, 2021.
2. **[ToN]** Xiaofeng Shi, Haofan Cai, **Minmei Wang**, Ge Wang, Baiwen Huang, Junjie Xie, and Chen Qian, TagAttention: Mobile Object Tracing without Object Appearance Information by Vision-RFID Fusion, in *Proceedings of IEEE Transactions on Networking (ToN)*, 2021.
3. **[ToN]** Junjie Xie, Chen Qian, Deke Guo, **Minmei Wang**, Ge Wang, Honghui Chen, COIN: An Efficient Indexing Mechanism for Unstructured Data Sharing Systems, in *Proceedings of IEEE Transactions on Networking (ToN)*, 2021.

2020

4. **[ToN]** **Minmei Wang**, Chen Qian, Xin Li and Shouqian Shi, Collaborative Validation of Public-Key Certificates for IoT by Distributed Caching, in *Proceddings of IEEE Transactions on Networking (ToN)*, 2020.
5. **[HotNets]** Chen Qian, Shouqian Shi, Xiaofeng Shi, and **Minmei Wang**, Don't Work on Individual Data Plane Algorithms. Put Them Together! in *Proceedings of ACM Workshop on Hot Topics in Networks (HotNets)*, 2020.

2019

6. **[VLDB]** **Minmei Wang**, Mingxun Zhou, Shouqian Shi, and Chen Qian. Vacuum Filters: More Space-Efficient and Faster Replacement for Bloom and Cuckoo Filters, in *Proceedings of the International Conference on Very Large Data Bases (VLDB)*, 2019.
7. **[INFOCOM]** **Minmei Wang**, Chen Qian, Xin Li and Shouqian Shi, Collaborative Validation of Public-Key Certificates for IoT by Distributed Caching, in *Proceedings of IEEE International Conference on Computer Communications (INFOCOM)*, 2019.

8. [**ToN**] Xin Li, **Minmei Wang**, Huazhe Wang, Ye Yu, and Chen Qian, Towards Secure and Efficient Communication for the Internet of Things, in *Proceedings of IEEE Transactions on Networking (ToN)*, 2019.
9. [**ICNP**] Xiaofeng Shi, **Minmei Wang**, Ge Wang, Baiwen Huang, Haofan Cai, Junjie Xie, and Chen Qian, TagAttention: Mobile Object Tracing without Object Appearance Information by Vision-RFID Fusion, in *Proceedings of IEEE International Conference on Network Protocols (ICNP)*, 2019.
10. [**ICNP**] Shouqian Shi, Chen Qian, and **Minmei Wang**, Re-designing Compact-structure based Forwarding for Programmable Networks, in *Proceedings of IEEE International Conference on Network Protocols (ICNP)*, 2019.
11. [**INFOCOM**] Junjie Xie, Chen Qian, Deke Guo, **Minmei Wang**, Shouqian Shi, and Honghui Chen, Efficient Indexing Mechanism for Unstructured Data Sharing Systems in Edge Computing, in *Proceedings of IEEE International Conference on Computer Communications (INFOCOM)*, 2019.
12. [**IoTDI**] Xin Li, **Minmei Wang**, Shouqian Shi, and Chen Qian, VERID: Towards Verifiable IoT Data Management, in *Proceedings of ACM/IEEE International Conference on Internet of Things Design and Implementation (IoTDI)*, 2019.
13. [**ICNP**] Haofan Cai, Ge Wang, Xiaofeng Shi, Junjie Xie, **Minmei Wang**, and Chen Qian, When Tags 'Read' Each Other: Enabling Low-cost and Convenient Tag Mutual Identification, in *Proceedings of IEEE International Conference on Network Protocols (ICNP)*, 2019.

2018

14. [**Tapia**] Ge Wang, Haofan Cai, **Minmei Wang**, Chen Qian, and Jinsong Han, Poster: Replay-resilient Physical-layer Authentication for Battery-free IoT Devices, in *Proceedings of ACM Richard Tapia Celebration of Diversity in Computing (Tapia)*, 2018.

2016

15. [**ICONIP**] **Minmei Wang**, Bo Zhao, Yihua Huang, PTR: phrase-based topical ranking for automatic keyphrase extraction in scientific publications, in *Proceedings of International Conference on Neural Information Processing (ICONIP)*, 2016.

Honors and Awards

• Chancellor's Dissertation-Year Fellowship (only one recipient in the School of Engineering), UCSC, 2021-2022

• Finalists of UCSC Grad Slam 2019

• Student Travel Award of IEEE INFOCOM, 2019

• Enterprise Individual Award-Excellence Award on the sentiment analysis task for Big Data & Computing Intelligence Contest, China, 2016

• 10th in the 1002 team in 2016 BYTECUP International Machine Learning Competition, China, 2016

• 2nd Prize for Graduate Academic Scholarship for each year, Nanjing University Sept. 2014-June 2017

• 1st Prize (top 3) School Scholarship, Nanjing University of Post & Telecommunications Sept. 2012-June 2013

• 2nd Prize (top 10) School Scholarship for each year, Nanjing U. of Post & Telecommunications Sept.2010-June 2012

Research Projects

HyperMerger: enabling consolidated data plane algorithms

Nov. 2020 – present, UC Santa Cruz

• Investigated different data structures and algorithms for various network functions (NFs) and found that they share similar computation steps (e.g., hash computations) and they can be co-located to reduce space cost and/or reduce the number of memory accesses per packet.

• Designed the HyperMerger, an automatic tool to generate consolidated data plane algorithms based on reusing of hash computations and co-location of data structures for multiple NFs.

• Implemented the HyperMerger for P4 programs on the Tofino switch.

• Results show that HyperMerger can generate resource-efficient consolidated data plane programs.

LOIS: low-cost packet header protection for IoT devices

Oct. 2019 – Oct. 2020, UC Santa Cruz

• Designed the LOIS framework, a packet-level header protector based on one-time keystreams when IoT devices communicate with remote cloud servers.

• LOIS can hide service IPs, the device identity, and activities from passive adversaries.

• Implemented the LOIS framework on commodity servers running on a public cloud and on a Raspberry Pi 3 for the client side.

• Results show that LOIS can save 80% - 90% latency than that of IPsec.

Vacuum filters: a more memory-efficient and faster replacement of Bloom and cuckoo filters

Sept. 2018 – Sept. 2019, UC Santa Cruz

• Designed vacuum filters, which is a type of data structure for approximate membership queries (AMQ).

• Proposed a new fingerprint eviction strategy to achieve both high load factor and better data locality.

• Proposed an instant updates and periodical reconstruction method to resolve set resizing under dynamics.

• Evaluation results show that vacuum filters can achieve 15% less space and $>10x$ throughput compared to Bloom filters and achieve 25% less space on average compared to cuckoo filters.

Collaborative certificate validation protocol (CCV) for IoT by distributed caching

Dec. 2017 – July. 2018, UC Santa Cruz

• Designed the CCV protocol, which provides fast certificate validation for IoT devices by utilizing the overall computation and storage resources in a local IoT network.

• Designed a memory-efficient and fast locator for certificate holders, called OLoc, based on Othello hashing.

• Introduced a trust model to evaluate the trustworthiness of each device to avoid dishonest collaborative validation from malicious devices.

• Evaluation results show that CCV only uses less than 25% time compared to original validation process.

Talks & Presentations

1. **Vacuum Filters: More Space-Efficient and Faster Replacement for Bloom and Cuckoo Filters**, on VLDB conference, virtual, 2020;
2. **Efficient and secure communication for the Internet of Things (IoT)**, UCSC Grad Slam 2019;
3. **Collaborative Validation of Public-Key Certificates for IoT by Distributed Caching**, on IEEE INFOCOM conference, Paris, France, 2019;
4. **Efficient Indexing Mechanism for Unstructured Data Sharing Systems in Edge Computing**, on IEEE INFOCOM conference, Paris, France, 2019.

Teaching Experience

Teaching Assistant, CMPE150: Introduction to Computer Networks, UC Santa Cruz, Winter 2018.

Teaching Assistant, CSE80N: Introduction to Networking and the Internet, UC Santa Cruz, Fall 2019.

Teaching Assistant, CSE253: Network Security, UC Santa Cruz, Winter 2020.

Teaching Assistant, CSE250A: Computer Networks, UC Santa Cruz, Fall 2020.

Teaching Assistant, CSE107: Probability and Statistics for Engineers, UC Santa Cruz, Winter 2021.