

Curriculum Vitae

Dr. Qiao Xiang

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Education

- 2014 Ph.D. Wayne State University, Detroit, MI, Computer Science (advisor: Hongwei Zhang)
- 2011 M.S. Wayne State University, Detroit, MI, Computer Science (advisor: Hongwei Zhang)
- 2007 B.Eng Nankai University, Tianjin, China, Information Security (advisor: Xiaojie Yuan)
- 2007 B.Econ Nankai University, Tianjin, China, Economics (advisor: Jie Gao)

Work Experiences

- 2021 – present Professor, Department of Cyber Space Security, Xiamen University, China
- 2019 – 2020 Associate Research Scientist (faculty track), Department of Computer Science, Yale University, United States
- 2016 – 2019 Postdoctoral Fellow, Department of Computer Science, Yale University, United States
- 2014 – 2015 Postdoctoral Fellow, School of Computer Science, McGill University, Canada

Research Interests

Software-Defined Networking, Network Verification, Machine Learning and Optimization Theory, Interdomain Networking, Data Center Networks, Machine Learning Systems, Wireless Cyber-Physical Systems,

Projects

- 2022 – 2025 NSF-China: Fast, Efficient Network Verification for Large-Scale Networks, PI, 590K (CNY)
- 2022 – 2024 Zhejiang Lab: Resource Management for Large-Scale, Multimodal Networks, PI, 500K (CNY)
- 2022 – 2023 China Ministry of Education: High-Level Programming of Large-Scale SDN, PI, 200K (CNY)
- 2022 – 2023 Alibaba Innovative Research Award: Application-Defined, Multi-Tenant, Cloud Storage Networks, PI, 500K (CNY)
- 2019 – 2020 Facebook Research Award: Toward Highly Reliable, Programmable, and Efficient Network Control, Co-PI, 50K (USD)

Invited Talks

- 2021.12 Toward Flexible, Efficient Smart Cities: A Network-Application Integration Perspective, Future Smart Cities (FCS'21), Malaysia (online)
- 2021.11 Scaling Network Verification to Large Networks: Progress and Opportunities, Formal Foundations of Software Defined Networks (FoFoSDN'21), Greece (online)
- 2017.11 Unicorn: Unified Resource Orchestration for Multi-Domain Data Analytics, National University of Singapore, Singapore
- 2016.11 Simplifying SDN Programming using a Data-Driven Function Store: A Journey Originating from Routing State Abstraction, Wayne State University, US
- 2016.08 Auc2Reserve: A Differentially Private Auction for Electric Vehicle Fast Charging Reservation, IEEE RTCSA 2016 Invited Paper, South Korea
- 2016.07 Toward Real-time, Reliable and Efficient Services in Smart City, National University of Singapore, Singapore

- 2015.08 Emerging Topics in Wireless Networking, Nankai University, Tianjin, China
2015.05 Designing Real-Time, Reliable and Efficient Cyber-Physical Systems for Future Smart City, MIT, Massachusetts, US
2015.04 Towards Real-time, Reliable and Efficient Service in Wireless Cyber-Physical Systems, McDaniel College, Maryland, US
2014.12 In-Network Processing in Wireless Control Systems: Experience and Case Studies, Nankai University, Tianjin, China

Teaching activities

Xiamen University

2021 Fall Instructor: Computer Networks and Network Security

Yale University

2018 Fall Teaching Fellow: Object-Oriented Programming

2017 Fall Teaching Fellow: Computer Networks (rated "**best TF ever**" by students)

2017 Spring Head Teaching Fellow: Introduction to Computer Programming

2016 Spring Teaching Fellow: Computer Networks

Wayne State University

2007 – 2013 Lecturers: Introduction to Computer Science, Computer Operating Systems-Lab and Computer Architecture and Organization-Lab

2009 – 2013 Teaching Assistant for graduate courses: Network, Distributed and Concurrent Programming, Theory of Languages and Automata, Data Communication and Computer Networks, Advanced Computer Networking and Seminar in Networking, Distributed Systems and Parallel Systems

2009 – 2012 Teaching Assistant for undergraduate courses: Algorithm Design and Analysis, Introduction to Theoretical Computer Science, Computer Operating Systems and Introduction to Computer Networking

Nankai University

2006 Fall Lecturers: Database Systems-Lab and MFC programming-Lab

Professional Services

ACM DAC, TPC member, 2022

IEEE INFOCOM, TPC member, 2021, 2022, 2023

IEEE/ACM IWQoS, TPC member, 2020, 2021

ACM SIGCOMM-NAI Workshop, Publicity Chair/TPC Member, 2020, 2021

IEEE VNC, Publicity Chair, 2019

ACM eEnergy EV-Sys Workshop, TPC member, 2017

ARO SDNA, Web chair, 2016

ACM CoNEXT, Shadow TPC member, 2015

IEEE ICCCN, TPC member, 2015

Scientific/Academic honors

- 2019 IEEE MASS 2019 Best Paper Award
- 2013 – 2018 Travel Grants: SIGCOMM, N2Women, SIGMETRICS, ICNP, eEnergy, IC2E, and Yale University
- 2016 – 2018 Postdoctoral Fellowship, Yale University
- 2014 – 2015 Postdoctoral Fellowship, McGill University
- 2007 – 2013 Graduate Teaching/Research Assistantships, Wayne State University
- 2006 First prize in the Entrepreneur Tournament Challenge Cup, Tianjin Medical University
- 2003 – 2007 Outstanding Student Scholarships (three times), Nankai University

Teaching award

- 2012 – 2013 Outstanding Teaching Award, College of Engineering, Wayne State University

Miscellaneous

My Erdős number is 3: Qiao Xiang → James Aspnes → Miklós Ajtai → Paul Erdős

List of Publications

Book Chapter

- 2015 1. **Qiao Xiang**, Hongwei Zhang, In-Network Processing in Wireless Sensor Networks, *Handbook of Sensor Networking: Advanced Technologies and Applications, Chapter 4*, CRC Press

Journals

- 2021 13. **Qiao Xiang**, Haitao Yu, James Aspnes, Franck Le, Linghe Kong, Yang Richard Yang, Optimizing in the Dark: Learning Optimal Network Resource Reservation Through a Simple Request Interface, in *ACM/IEEE Transactions on Networking (ToN)*.
- 2020 12. Yuwei Xu, Shuai Tong, Tiantian Zhang, Wen Sun, Xiaoyan Hu, **Qiao Xiang**, COMPASS: Directing Named Data Transmission in VANETs by Dynamic Directional Interfaces, in *IEEE Access*.
11. Xingjian Lu, Fanxin Kong, Xue Liu, Jianwei Yin, **Qiao Xiang**, Huiqun Yu, Bulk Savings for Bulk Transfers: Minimizing Energy Cost on Inter-Data-Center Traffic, in *IEEE Transactions on Cloud Computing (TCC)*.
- 2019 10. **Qiao Xiang**, Jingxuan Zhang, Xin Wang, Yang Liu, Chin Guok, Franck Le, John MacAuley, Harvey Newman, Yang Richard Yang, Toward Fine-Grained, Privacy-Preserving, Efficient Multi-Domain Network Resource Discovery, in *IEEE Journal on Selected Areas in Communications (JSAC)*.
9. Kai Gao, **Qiao Xiang**, Xin Wang, Yang Richard Yang, Jun Bi, An Objective-Driven On-Demand Network Abstraction for Adaptive Applications, in *ACM/IEEE Transactions on Networking (ToN)*.
- 2018 8. **Qiao Xiang**, Xin Wang, Jingxuan Zhang, Harvey Newman, Yang Liu, Yang Richard Yang, Unicorn: Unified Resource Orchestration for Multi-Domain, Geo-Distributed Data Analytics, in *Future Generation Computer Systems (FGCS)*.
- 2017 7. Linghe Kong, Xi Chen, Xue Liu, **Qiao Xiang**, Yi Gao, Noam Ben Baruch, Guihai Chen AdaSharing: Adaptive Data Sharing in Collaborative Robots, in *IEEE Transactions on Industrial Electronics (TIE)*.
- 2016 6. H. Newman, M. Spiropulu, J. Balcas, J. Bendavid, T. Hendricks, D. Kcira, I. Legrand, A. Mughal, J.R. Vlimant (Caltech/HEP); P. Spentzouris, P. DeMar (Fermilab); I. Monga, C. Guok (ESnet/LBNL); K. Riley, W. Allcock, V. Vishwanath, L. Winkler (Argonne LCF); R.Y. Yang, M. Chen, G. Kai, X. Lin, **Q. Xiang**, J. Zhang (Yale) (alphabetical order except PI), Next Generation Exascale Network Integrated Architecture for HEP and Global Science, Whitepaper for US HPC Leadership.
5. Linghe Kong, Daqiang Zhang, Zongjian He, **Qiao Xiang**, Jiafu Wan, Meixia Tao, Embracing Big Data with Compressive Sensing: A Green Approach in Industrial Wireless Networks, *IEEE Communications Magazine*, 2016.
4. Linghe Kong, **Qiao Xiang**, Xue Liu, Xiao-Yang Liu, Xiaofeng Gao, Guihai Chen, Min-You Wu, ICP: Instantaneous Clustering Protocol for Wireless Sensor Networks, *Computer Networks*, special issue on "Internet of Things", 2016.

- 2013 3. Xiaohui Liu, Hongwei Zhang, **Qiao Xiang**, Xin Che, Xi Ju, Taming Uncertainties in Real-Time Routing for Wireless Networked Sensing and Control, *IEEE Transactions on Smart Grid (TSG)*, special issue on "Smart Grid Communication Systems", 4(1), pp. 288-301, March 2013.
- 2011 2. **Qiao Xiang**, Jinhong Xu, Xiaohui Liu, Hongwei Zhang, Loren J. Rittle, When In-Network Processing Meets Time: Complexity and Effects of Joint Optimization in Wireless Sensor Networks, *IEEE Transaction of Mobile Computing (TMC)*, 10(10), pp. 1488-1502, October 2011.
- 2006 1. Yang Wang, Bo Meng, **Qiao Xiang**, Comparison on Survival Analysis of Traumatic Brain Injury Patients Treated at Normal Temperature and Mild Hypothermia, *Chinese General Practice*, December 2006.

Conferences, Workshops and Posters

- 2022 33. Yutong Liu, Landu Jiang, Linghe Kong, **Qiao Xiang**, Xue Liu, Guihai Chen, Wi-Fruit: See Through Fruits with Smart Devices, to appear at **UbiComp'22**.
- 2021 32. Yichao Cheng, Ning Luo, Jingxuan Zhang, Timos Antetimos, Ruzica Piskac, **Qiao Xiang**, Looking for the Maximal Independent Set: A New Perspective of Stable Path Problem, in the 40th Annual IEEE International Conference on Computer Communications (**INFOCOM'21**).
31. **Qiao Xiang**, Franck Le, Jingxuan Zhang, Y. Richard Yang, Toward Stable Interdomain Network-Application Integration, in ACM SIGCOMM 2021 Workshop on Network Application Integration/CoDesign (**NAI'21**).
30. Shuyu Wu, Linghe Kong, **Qiao Xiang**, Zhenzhe Zheng, Luoyi Fu, Guihai Chen, A Lightweight, Privacy-Preserving Tensor Completion Framework for Internet of Things, in IEEE **ISPA'21**.
- 2020 29. **Qiao Xiang**, Jensen Zhang, Franck Le, Yang Richard Yang, Toward Programmable Interdomain Routing , in *2020 ACM/IRTF Applied Networking Research Workshop 2020 (ANRW'20)*.
28. Danny Alex Lachos Perez, Christian Esteve Rothenberg, **Qiao Xiang**, Yang Richard Yang, Börje Ohlman, Sabine Randriamasy, Luis M. Contreras, Kai Gao, Multi-Domain Information Exposure using ALTO: The Good, the Bad and the Solution, in *2020 ACM/IRTF Applied Networking Research Workshop 2020 (ANRW'20)*.
27. Danny Alex Lachos Perez, **Qiao Xiang**, Christian Esteve Rothenberg, Sabine Randriamasy, Luis M. Contreras, Börje Ohlman, Towards Deep Network & Application Integration: Possibilities, Challenges, and Research Directions, in *ACM SIGCOMM 2020 Workshop on Network Application Integration/CoDesign (NAI'20)*.
26. **Qiao Xiang**, Jensen Zhang, Kai Gao, Yeon-sup Lim, Franck Le, Geng Li, Yang Richard Yang, Toward Optimal Software-Defined Interdomain Routing, in *the 39th Annual IEEE International Conference on Computer Communications (INFOCOM'20)*. Acceptance rate: 19.8% = 268/1354.
- 2019 25. Tony Wang, **Qiao Xiang**, Jeremy Tucker, Vinod Mishra, Yang Richard Yang, Dandelion: A Novel, High-Level Programming System for Software Defined Coalitions with Local State Sharing, in *the 38th AFCEA/IEEE Military Communications Conference (MILCOM'19)*, one of the highest review scores (5, 5, 5, 3).

24. Xi Chen, **Qiao Xiang** (co-primary author), Linghe Kong, Xue Liu, RadioLoc: Learning Vehicle Locations with FM Signal in All-Terrain Environments, in *2019 IEEE International Conference on Mobile Ad-Hoc and Smart Systems (MASS'19)*, **Best Paper Award**, 1 out of 116 submissions.
23. Danny Alex Lachos Perez, Christian Esteve Rothenberg, **Qiao Xiang**, Yang Richard Yang, Börje Ohlman, Sabine Randriamasy, Farni Boten, Luis M. Contreras, Supporting Multi-Domain Use cases with ALTO, in *2019 Applied Networking Research Workshop (ANRW'19)*.
22. **Qiao Xiang**, Linghe Kong, Xi Chen, Zhe Wang, Lei Rao, Xue Liu, GreenBroker: Optimal Electric Vehicle Park-and-Charge Control via Vehicle-to-Infrastructure Communication, **Invited Paper**, in *2019 IEEE International Black Sea Conference on Communications and Networking (BlackSeaCom'19)*.
21. **Qiao Xiang**, Haitao Yu, James Aspnes, Franck Le, Linghe Kong, Yang Richard Yang, Optimizing in the Dark: Learning an Optimal Solution Through a Simple Request Interface, in *2019 AAAI Conference on Artificial Intelligence (AAAI'19)*, oral presentation, Acceptance rate: 4.7% (oral) /16.2%.
- 2018 20. **Qiao Xiang**, Jingxuan Zhang, Xin Wang, Yang Liu, Chin Guok, Franck Le, John MacAuley, Harvey Newman, Yang Richard Yang, Fine-Grained, Multi-Domain Network Resource Abstraction as a Fundamental Primitive to Enable High-Performance, Collaborative Data Sciences, in *2018 ACM/IEEE International Conference for High Performance Computing, Networking, Storage, and Analysis (Supercomputing'18)*, Acceptance rate: 20%.
19. **Qiao Xiang**, Franck Le, Yeon-sup Lim, Vinod K. Mishra, Christopher Williams, Yang Richard Yang, Hongwei Zhang, OpenSDC: A Novel, Generic Datapath for Software Defined Coalitions, in *the 37th AFCEA/IEEE Military Communications Conference (MILCOM'18)*, the highest review scores (5, 5, 5).
18. **Qiao Xiang**, Chin Guok, Franck Le, John MacAuley, Harvey Newman, Yang Richard Yang, SFP: Toward Interdomain Routing for SDN Networks, in *the 2018 Conference of the ACM Special Interest Group on Data Communication (SIGCOMM'18)*, poster.
17. **Qiao Xiang**, Jingxuan Zhang, Xin Wang, Yang Liu, Chin Guok, Franck Le, John MacAuley, Harvey Newman, Yang Richard Yang, Fine-Grained, Multi-Domain Network Resource Abstraction as a Fundamental Primitive to Enable High-Performance, Collaborative Data Sciences, in *the 2018 Conference of the ACM Special Interest Group on Data Communication (SIGCOMM'18)*, poster.
- 2017 16. **Qiao Xiang**, Xin Wang, Jingxuan Zhang, Harvey Newman, Yang Liu, Yang Richard Yang, Unicorn: Unified Resource Orchestration for Multi-Domain, Geo-Distributed Data Analytics, in *2017 INDIS Workshop*. Acceptance rate: 20%.
15. **Qiao Xiang**, Jingxuan Zhang, Kai Gao, Shenshen Chen, Harvey Newman, Justas Balcas, Yang Richard Yang, ExaO: Multi-Resource Orchestration for Multi-Domain Geo-Distributed Data Analytics (position paper), in *ITA Workshop on Distributed Analytics InfraStructure and Algorithms for Multi-Organization Federations (DAIS'17)*.
14. Kai Gao, **Qiao Xiang**, Xin Wang, Yang Richard Yang, Jun Bi, NOVA: Towards On-Demand Equivalent Network View Abstraction for Network Optimization, *the 25th IEEE/ACM International Symposium on Quality of Service (IWQoS'17)*. Acceptance rate: 19.9%.

- 2016 13. Fanxin Kong, **Qiao Xiang**, Qinglong Wang, Xue Liu, On-line Event-Driven Scheduling for Electric Vehicle Charging via Park-and-Charge, *the 37th IEEE Real-Time Systems Symposium (RTSS'16)*. Acceptance rate: 23%.
12. Kai Gao, Chen Gu, **Qiao Xiang**, Xin Wang, Yang Richard Yang, Jun Bi, RSAP: An On-Demand, Minimal Equivalent Routing State Abstraction Protocol, *the 24th IEEE International Conference on Network Protocols (ICNP'16)*, poster, top 30% of all submitted full papers.
11. Kai Gao, Chen Gu, **Qiao Xiang**, Yang Richard Yang, Jun Bi, FAST: Enabling Simplified Programming Abstraction for Complex State-Dependent SDN Programming, *the 2016 Conference of the ACM Special Interest Group on Data Communication (SIGCOMM'16)*, poster.
10. Xi Chen, Lei Rao, **Qiao Xiang**, Xue Liu, Fan Bai, DRIVING: Distributed Scheduling for Video Streaming in Vehicular Wi-Fi Systems, to appear in *the 24th ACM Multimedia Conference (MM'16)*. Acceptance rate: 20% = 52/260.
9. **Qiao Xiang**, Linghe Kong, Xue Liu, Jingdong Xu, Wei Wang, Auc2Reserve: A Differentially Private Auction for Electric Vehicle Fast Charging Reservation, **Invited Paper**, *the 22th IEEE International Conference on Embedded and Real-Time Computing Systems and Applications (RTCSA'16)*.
8. Xi Chen, Linghe Kong, Xue Liu, Lei Rao, Fan Bai, **Qiao Xiang**, How Cars Talk Louder, Clearer and Fairer: Optimizing the Communication Performance of Connected Vehicles via Online Synchronous Control, *the 35th Annual IEEE International Conference on Computer Communications (INFOCOM'16)*. Acceptance rate: 18.25% = 300/1644.
- 2015 7. **Qiao Xiang**, Fanxin Kong, Xue Liu, Xi Chen, Linghe Kong, Lei Rao, Auc2Charge: An Online Auction Framework for Electric Vehicle Park-and-Charge, *the sixth International Conference on Future Energy Systems (ACM eEnergy'15)*. Acceptance rate: 22.8% = 16/70.
6. **Qiao Xiang**, Hongwei Zhang, Jianping Wang, Guoliang Xing, Shan Lin, Xue Liu, On Optimal Diversity in Network-Coding-Based Routing in Wireless Networks, *the 34th Annual IEEE International Conference on Computer Communications (INFOCOM'15)*. Acceptance rate: 19% = 316/1640.
5. **Qiao Xiang**, Xi Chen, Linghe Kong, Lei Rao, Xue Liu, Data Preference Matters: A New Perspective of Safety Data Dissemination in Vehicular Ad Hoc Networks, *the 34th Annual IEEE International Conference on Computer Communications (INFOCOM'15)*. Acceptance rate: 19% = 316/1640.
- 2012 4. **Qiao Xiang**, Hongwei Zhang, QoS-Aware In-Network Processing for Mission-Critical Wireless Cyber-Physical Systems, *Doctoral Colloquium on the 10th ACM Conference on Embedded Networked Sensor Systems (DC SenSys'12)*.
3. Xiaohui Liu, Hongwei Zhang, **Qiao Xiang**, Xin Che, Xi Ju, Taming Uncertainties in Real-Time Routing for Wireless Networked Sensing and Control, *the 13th ACM International Symposium on Mobile Ad Hoc Networking and Computing (MobiHoc'12)*. Acceptance rate: 20% = 24/120.
- 2011 2. Xiaohui Liu, Hongwei Zhang, **Qiao Xiang**, Towards Predictable Real-Time Routing for Wireless Networked Sensing and Control, *the Cyber-Physical-Systems (CPS) Week Workshop on Real-Time Wireless for Industrial Applications (RealWin'11)*.

- 2009 1. **Qiao Xiang**, Jinhong Xu, Xiaohui Liu, Hongwei Zhang, Loren J. Rittle, When In-Network Processing Meets Time: Complexity and Effects of Joint Optimization in Wireless Sensor Networks, *the 30th IEEE Real-Time Systems Symposium (RTSS'09)*. Acceptance Rate: < 20%.

Dissertation, Thesis and Technical Report

- 2014 3. In-Network Processing for Mission-Critical Wireless Networked Sensing and Control: A Real-Time, Efficiency, and Resiliency Perspective *PhD Dissertation*, Wayne State University
- 2011 2. When In-Network Processing Meets Time: Complexity and Effects of Joint Optimization in Wireless Sensor Networks, *Master Thesis*, Wayne State University
- 2009 1. **Qiao Xiang**, QoS-Assured In-Network Processing in Wireless Cyber-Physical Systems: A Survey, *Technical Report, Dependable Networking and Computing Group*, Wayne State University