

# 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

- 2019.9 – Facebook Research Award: Toward Highly Reliable, Programmable, and Efficient Network Control, Co-PI
- 2017 – 2019 International Technology Alliance Agreement No. W911NF-16-3-0002: Software Defined Coalitions, participating postdoc
- 2016 – 2018 NSF grant #1440745, CC\*IIE Integration: Dynamically Optimizing Research Data Workflow with a Software Defined Science Network, participating postdoc
- 2016 – 2018 Google Research Award, SDN Programming Using Just Minimal Abstractions, participating postdoc
- 2014 – 2015 NSERC Collaborative Research and Development Grant (CRDJP 418713), lead postdoc
- 2014 – 2015 CFI Leaders Opportunity Fund 23090, lead postdoc
- 2014 – 2015 General Motors Research Award, Connected Vehicles Using DSRC, lead postdoc
- 2011 – 2015 NSF grant CNS-1136007, CPS Medium: A Cross-Layer Approach to Taming Cyber-Physical Uncertainties in Vehicular Wireless Networking and Platoon Control, lead student
- 2011 – 2015 NSF grant CNS-1054634, CAREER: Taming Uncertainties in Reliable, Real-Time Messaging for Wireless Networked Sensing and Control, lead student
- 2013 – 2015 GENI-1890, GENI-Enabled Vehicular Sensing and Control Networking: from Experiments to Applications, lead student
- 2011 – 2014 GENI-1633, WiMAX Prototyping in Metro Detroit: Integrating GENI Engineering with Wireless Network Applications and Science, lead student
- 2008 – 2011 GENI-fying and Federating Autonomous Kansei Wireless Sensor Networks, lead student

**Invited Talks**

- 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**

## 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**

- IEEE International Conference on Computer Communications (INFOCOM), TPC member, 2021
- IEEE/ACM International Symposium on Quality of Service (IWQoS), TPC member, 2020
- IEEE Vehicular Networking Conference (VNC), Publicity Co-Chair, 2019
- Workshop on Electric Vehicle Systems, Data and Applications (EV-Sys), TPC member, 2017
- ARO Workshop on Software Defined Networking for Army Applications (SDNA), Web chair, 2016
- International Journal of Wireless Communication (IJWC), Editorial board member, 2015-present
- ACM International Conference on emerging Networking EXperiments and Technologies (CoNEXT), Shadow TPC member, 2015

Euromicro Conference on Digital System Design (DSD), TPC member, 2015-present

IEEE International Conference on Computer Communications and Networks (ICCCN), TPC member, 2015

IEEE International Instrumentation and Measurement Technology Conference (I2MTC), TPC member, 2012-present

IEEE Sensors Applications Symposium (SAS), TPC member, 2013-present

International Conference on Network-Based Information Systems (NBiS), TPC member, 2015

International Conference on Smart Sensors and Application (ICSSA), TPC member, 2015

**Scientific/Academic honors**

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

- 2020 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, accepted to *ACM/IEEE Transactions on Networking (TON)*.
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

- 2021 30. Yichao Cheng, Ning Luo, Jingxuan Zhang, Timos Antetomos, Ruzica Piskac, **Qiao Xiang**, Looking for the Maximal Independent Set: A New Perspective of Stable Path Problem, accepted to **INFOCOM'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