

SHIXIONG QI

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Research Interests

Cloud computing, serverless computing, high-performance networking, cellular networks, machine learning (ML) systems

The overarching goal of my research is to design and optimize cloud-native and networked systems that enable ultra-low-latency, high-throughput services at scale. Current directions include: (1) DPU-enabled cloud frameworks for multi-tenant, zero-copy data planes that unify shared memory and RDMA for scalable, cross-node function execution. (2) Carrier-grade 5G core platforms that integrate hardware offload and fine-grained QoS to improve user-plane performance, energy efficiency, and network slicing. (3) Hybrid service meshes and cloud ingress designs that balance security, isolation, and performance in large-scale distributed environments. (4) Machine learning-assisted resource management for adaptive scheduling, traffic engineering, and performance tuning in modern cloud and edge systems.

Professional Experience and Employment

- 08/2024–present **Assistant Professor (tenure-track)**, *University of Kentucky*, Lexington, KY.
Department of Computer Science
- 2018–2024 **Research/Teaching Assistant**, *University of California, Riverside*, Riverside, CA.
Department of Computer Science and Engineering
- 2022–2024 **Research Intern**, Hewlett Packard Labs.
- 06/2021–09/2021 **Research Intern**, Intel.

Education

- 2018–2024 **PhD, Computer Science**, *University of California, Riverside*.
Advisor: K. K. Ramakrishnan
- 2015–2018 **Master of Science, Communication and Information Systems**, *Xidian University*.
Advisor: Huaxi Gu
- 2011–2015 **Bachelor of Science, Electronic Information Engineering**, *Nanjing University of Posts and Telecommunications*.

Honors & Awards

- 2025 free5GC'25 Best Paper Award
- 2024 Dissertation Completion Fellowship Award, UCR
- 2023 Dissertation Year Program Fellowship, UCR
- 2023 IEEE CloudNet 2023 Student Travel Grant
- 2022 ACM SIGCOMM 2022 Student Travel Grant
- 2022 IEEE ICNP 2022 Student Travel Grant
- 2022 IEEE 6GNet 2022 Best Paper Award
- 2018 Dean's Distinguished Fellowship, UCR
- 2017 National scholarship, Ministry of Education, China

Publications

Refereed Conferences and Workshops

- [EuroSys '26] **Not A DPU in Name Only! Unleashing RDMA-capable DPUs in Multi-Tenant Serverless Clouds with NADINO**
21st European Conference on Computer Systems (*EuroSys'26*), (To appear. AR: 79/467 = 16.9%).
Shixiong Qi, Songyu Zhang, K. K. Ramakrishnan, Diman Z. Tootaghaj, Hardik Soni, Puneet Sharma
- [SIGCOMM '25] **Palladium: A DPU-enabled Multi-Tenant Serverless Cloud over Zero-copy Multi-node RDMA Fabrics**
ACM SIGCOMM 2025 Conference (*SIGCOMM'25*),
Shixiong Qi, Songyu Zhang, K. K. Ramakrishnan, Diman Z. Tootaghaj, Hardik Soni, Puneet Sharma
- [free5GC '25] **Rethinking 5G Core for Performance, Fairness, and Flexibility**
1st free5GC World Forum 2025 (*free5GC'25*), **Best Paper Award**
Yang-Zhe Lin, Chun-Ting Lin, Po-Yi Lin, **Shixiong Qi**, Jyh-Cheng Chen, K. K. Ramakrishnan
- [MLSys '24] **LIFL: A Lightweight, Event-driven Serverless Platform for Federated Learning**
7th Annual Conference on Machine Learning and Systems (*MLSys'24*),
Shixiong Qi, K. K. Ramakrishnan, Myungjin Lee
- [SoCC '24] **SURE: Secure Unikernels Make Serverless Computing Rapid and Efficient**
15th ACM Symposium on Cloud Computing (*SoCC'24*), (AR: 63/209 = 30.1%)
Federico Parola, **Shixiong Qi**, Anvaya B. Narappa, K. K. Ramakrishnan, Fulvio Risso
- [LANMAN '24] **Z-Stack: A High-Performance DPDK-Based Zero-Copy TCP/IP Protocol Stack**
IEEE 30th International Symposium on Local and Metropolitan Area Networks (*LANMAN'24*),
Anvaya B. Narappa, Federico Parola, **Shixiong Qi**, K. K. Ramakrishnan
- [NetSoft '23] **X-IO: A High-performance Unified I/O Interface using Lock-free Shared Memory Processing**
IEEE 9th International Conference on Network Softwarization (*NetSoft'23*),
Shixiong Qi, Han-Sing Tsai, Yu-Sheng Liu, K. K. Ramakrishnan, Jyh-Cheng Chen
- [CloudNet '23] **L²5GC⁺: An Improved, 3GPP-compliant 5G Core for Low-latency Control Plane Operations**
IEEE 12th International Conference on Cloud Networking (*CloudNet'23*),
Yu-Sheng Liu, **Shixiong Qi**, Po-Yi Lin, Han-Sing Tsai, K. K. Ramakrishnan, Jyh-Cheng Chen
- [NetSoft '22] **MiddleNet: A High-Performance, Lightweight, Unified NFV and Middlebox Framework**
IEEE 8th International Conference on Network Softwarization (*NetSoft'22*),
Ziteng Zeng, Leslie Monis, **Shixiong Qi**, K. K. Ramakrishnan
- [SIGCOMM '22] **SPRIGHT: Extracting the Server from Serverless Computing! High-performance eBPF-based Event-driven, Shared-memory Processing**
ACM SIGCOMM 2022 Conference (*SIGCOMM'22*),
Shixiong Qi, Leslie Monis, Ziteng Zeng, Ian-chin Wang, K. K. Ramakrishnan
- [SIGCOMM '22] **L²5GC: A Low Latency 5G Core Network based on High-performance NFV Platforms**
ACM SIGCOMM 2022 Conference (*SIGCOMM'22*),
Vivek Jain, Hao-Tse Chu, **Shixiong Qi**, Chia-An Lee, Hung-Cheng Chang, Cheng-Ying Hsieh, K. K. Ramakrishnan, Jyh-Cheng Chen
- [6GNet '22] **Evolving to 6G: Improving the Cellular Core to Lower Control And Data Plane Latency**
1st International Conference on 6G Networking (*6GNet'22*), **Best Paper Award**
Vivek Jain, Sourav Panda, **Shixiong Qi**, K. K. Ramakrishnan

- [NAS '21] **Towards a Proactive Lightweight Serverless Edge Cloud for Internet-of-Things Applications**
IEEE 15th International Conference on Networking, Architecture and Storage (*NAS'21*),
Ian-Chin Wang, **Shixiong Qi**, Elizabeth Liri, K. K. Ramakrishnan

Refereed Journals

- [Internet Computing '24] **L²6GC: Evolving the Low-Latency Core for Future Cellular Networks**
IEEE Internet Computing, Volume: 28, Issue: 2, Pages: 29–36, March/April 2024
Shixiong Qi, K. K. Ramakrishnan, Jyh-Cheng Chen
- [ToN '24] **SPRIGHT: High-Performance eBPF-Based Event-Driven, Shared-Memory Processing for Serverless Computing**
IEEE/ACM Transactions on Networking (*ToN*), Volume: 32, Issue: 3, Pages: 2539–2554, February 2024
Shixiong Qi, Leslie Monis, Ziteng Zeng, Ian-Chin Wang, K. K. Ramakrishnan
- [TNSM '23] **MiddleNet: A Unified, High-Performance NFV and Middlebox Framework With eBPF and DPDK**
IEEE Transactions on Network and Service Management (*TNSM*), Volume: 20, Issue: 4, Pages: 3950–3967, March 2023
Shixiong Qi, Ziteng Zeng, Leslie Monis, K. K. Ramakrishnan
- [TNSM '20] **Assessing Container Network Interface Plugins: Functionality, Performance, and Scalability**
IEEE Transactions on Network and Service Management (*TNSM*), Volume: 18, Issue: 1, Pages: 656–671, December 2020
Shixiong Qi, Sameer G. Kulkarni, K. K. Ramakrishnan
- [OSN '19] **SMONoC: Optical Network-on-chip Using A Statistical Multiplexing Strategy**
Optical Switching and Networking (*OSN*), Volume: 34, Pages: 1-9, November 2019
Kun Wang, **Shixiong Qi**, Zheng Chen, Yintang Yang, Huaxi Gu
- [ELEX' 19] **ALPHA: A Hybrid Topology for Memory-centric Network**
IEICE Electronics Express (*ELEX*), Volume 16, Pages: 1-6, February 2019
Jiaxiang Li, Huaxi Gu, **Shixiong Qi**, Haoran Wang, Kang Wang
- [ELEX' 16] **Panzer: A 6×6 Photonic Router for Optical Network on Chip**
IEICE Electronics Express (*ELEX*), Volume: 13, Issue: 21, Pages: 1-6, September 2016
Lei Huang, Kun Wang, **Shixiong Qi**, Huaxi Gu, Yintang Yang

Patents

- 2019 **Three-dimensional Optical On-chip Network Using A Ring-based Control Network and its Communication Method**, *P.R.C. Patent*, No. CN106331909B, Granted (Oct 11, 2019).
Huaxi Gu, Bowen Zhang, Kun Wang, Yintang Yang, Zhangming Zhu, **Shixiong Qi**, Wei Tan
- 2019 **Scalable Optical On-chip Network Structure based on Double-layer Layout and its Communication Method**, *P.R.C. Patent*, No. CN106936736B, Granted (May 21, 2019).
Huaxi Gu, Lei Huang, Yintang Yang, Zhangming Zhu, **Shixiong Qi**, Kun Wang
- 2019 **A Multi-port Scalable On-chip Optical Router Supporting Multicast Communication**, *P.R.C. Patent*, No. CN105847166B, Granted (May 7, 2019).
Lei Huang, Kun Wang, Huaxi Gu, Yintang Yang, **Shixiong Qi**, Wei Tan
- 2019 **Micro-ring Resonator-based Optical Network Architecture for Memory Interconnect and its Communication Method**, *P.R.C. Patent*, No. CN105635861B, Granted (Feb 22, 2019).
Huaxi Gu, Yue Wang, Kun Wang, Yintang Yang, Kang Wang, **Shixiong Qi**

- 2018 **An Optical Network-on-Chip System and Communication Scheme based on Statistical Multiplexing Strategy**, *P.R.C. Patent*, No. CN105812063B, Granted (Aug 3, 2018).
Kun Wang, **Shixiong Qi**, Zheng Chen, Huaxi Gu, Yintang Yang, Long Zhao

Talks and Presentations

- 2024 **SURE: Secure Unikernels Make Serverless Computing Rapid and Efficient.**
Conference proceedings talk, ACM SoCC 2024, Redmond, WA
- 2024 **Z-stack: A High-performance DPDK-based Zero-copy TCP/IP Protocol Stack.**
Conference proceedings talk, IEEE LANMAN 2024, Boston, MA
- 2023 **L²5GC⁺: An Improved, 3GPP-compliant 5G Core for Low-latency Control Plane Operations.**
Conference proceedings talk, IEEE CloudNet 2023, Hoboken, NJ
- 2022 **SPRIGHT: Extracting the Server from Serverless Computing! High-performance eBPF-based Event-driven, Shared-memory Processing.**
Invited talk at Vmware, Online, 2022
- 2022 **SPRIGHT: Extracting the Server from Serverless Computing! High-performance eBPF-based Event-driven, Shared-memory Processing.**
Conference proceedings talk, ACM SIGCOMM 2022, Amsterdam, the Netherlands
- 2022 **MiddleNet: A High-Performance, Lightweight, Unified NFV and Middlebox Framework.**
Conference proceedings talk, IEEE NetSoft 2022, Online
- 2021 **Mu: An Efficient, Fair and Responsive Serverless Framework for Resource-Constrained Edge Clouds.**
Conference proceedings talk, ACM SoCC 2021, Online
- 2021 **Assessing Container Network Interface Plugins: Functionality, Performance, and Scalability.**
Invited talk at Brown University, Nov-15-2021, Online
- 2020 **Understanding Container Network Interface Plugins: Design Considerations and Performance.**
Conference proceedings talk, IEEE LANMAN 2020, Online

Teaching and Mentoring

Teaching

- 2026 **CS371 Introduction to Computer Networking.**
Instructor, University of Kentucky, Spring 2026
- 2025 **CS687-001 Special Topics in Systems: Fundamentals and Trends.**
Instructor, University of Kentucky, Fall 2025
- 2025 **CS371 Introduction to Computer Networking.**
Instructor, University of Kentucky, Spring 2025
- 2024 **CS687-001, Special Topics in Systems: Fundamentals and Trends.**
Instructor, University of Kentucky, Fall 2024
- 2023 **CS208 Cloud Computing and Cloud Networking.**
Student Mentor, UC Riverside, Winter 2023
- 2022 **CS208 Cloud Computing and Cloud Networking.**
Student Mentor, UC Riverside, Winter 2022
- 2021 **CS208 Cloud Computing and Cloud Networking.**
Student Mentor, UC Riverside, Winter 2021

- 2020 **CS164 Computer Networks.**
Teaching Assistant and Lab instructor, UC Riverside, Fall 2020
- 2020 **CS179I Project in Computer Science (Networks).**
Teaching Assistant, UC Riverside, Spring 2020
- 2019 **CS164 Computer Networks.**
Teaching Assistant and Lab instructor, UC Riverside, Fall 2019
- 2019 **CS203 Advanced Computer Architecture.**
Teaching Assistant and Lab instructor, UC Riverside, Fall 2019
- [Mentoring \(students with publications or master's project\)](#)
- 2023 **Bharath Nagendra.**
Master student at UCR, now at Apple
- 2023 **Abhishek Sharma.**
Master student at UCR, now at tZERO
- 2023 **Gaurav Gadewar.**
Master student at UCR, now at Esri
- 2022 **Leslie Monis.**
Master student at UCR, now at Nvidia
- 2022 **Ziteng Zeng.**
Master student at UCR, now at Google

Professional Services

[University, College, and Department Service](#)

- 2024-2025 **Computer Science Graduate Admissions Committee, UKY.**

[Conference Organizer and Community Services](#)

- 2025 **free5GC**, *Publicity Co-Chair*, 1st free5GC World Forum.
- 2024 **MASS**, *Publicity Co-Chair*, 21st IEEE International Conference on Mobile Ad-Hoc and Smart Systems.

[Technical Program Committee](#)

- 2027 **NSDI**, 24th USENIX Symposium on Networked Systems Design and Implementation.
- 2026 **ICDCS**, 46th IEEE International Conference on Distributed Computing Systems.
- 2026 **EuroSys**, 21st European Conference on Computer Systems: Fall cycle.
- 2026 **NSDI**, 23rd USENIX Symposium on Networked Systems Design and Implementation: Spring cycle + Fall cycle.
- 2025 **free5GC**, 1st free5GC World Forum.
- 2025 **ICDCS**, 45th IEEE International Conference on Distributed Computing Systems.

[Journal Reviews](#)

- 2024 **TMC**, IEEE Transactions on Mobile Computing.
- 2024 **TC**, IEEE Transactions on Computers.
- 2024 **TPDS**, IEEE Transactions on Parallel and Distributed Systems.
- 2024 **TOIT**, ACM Transactions on Internet Technology.
- 2024 **IEEE Network**, IEEE Network.
- 2024 **IET Network**, IET Network.
- 2024 **Parallel Computing**, Parallel Computing.

Others

2025 NSF Reviewer