

SHIXIONG QI

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EXPERIENCE

University of Kentucky

Assistant Professor (tenure-track), Department of Computer Science

August 2024 - present

Hewlett Packard Labs

Research Intern

Summer 2022 – Summer 2023, Winter 2024

Mentor: Puneet Sharma, Diman Zad Tootaghaj

Intel

Research Intern

Summer 2021

Mentor: Poornima Lalwaney

EDUCATION

University of California, Riverside

Department of Computer Science and Engineering

PhD in Computer Science

September 2018 - June 2024

Advisor: K. K. Ramakrishnan

Committee Members: K. K. Ramakrishnan (chair), Nael B. Abu-Ghazaleh, Jiasi Chen, Rajiv Gupta, Zhaowei Tan

Xidian University, Xi'an, Shaanxi, China

School of Telecommunications Engineering

M.S. in Communication & Information Systems

September 2015 - June 2018

Advisor: Huaxi Gu

Nanjing University of Posts and Telecommunications, Nanjing, Jiangsu, China

School of Communications and Information Engineering

B.S. in Electronic Information Engineering

September 2011 - July 2015

PUBLICATIONS

Conference

- **Shixiong Qi**, Songyu Zhang, K. K. Ramakrishnan, Diman Z. Tootaghaj, Hardik Soni, Puneet Sharma, “Not A DPU in Name Only! Unleashing RDMA-capable DPUs in Multi-Tenant Serverless Clouds with NADINO,” accepted to EuroSys’26
- **Shixiong Qi**, Songyu Zhang, K. K. Ramakrishnan, Diman Z. Tootaghaj, Hardik Soni, Puneet Sharma, “Palladium: A DPU-enabled Multi-Tenant Serverless Cloud over Zero-copy Multi-node RDMA Fabrics,” Proceedings of the 2025 Conference of the ACM Special Interest Group on Data Communication (SIGCOMM’25)
- Yang-Zhe Lin, Chun-Ting Lin, Po-Yi Lin, **Shixiong Qi**, Jyh-Cheng Chen, K. K. Ramakrishnan, “Rethinking 5G Core for Performance, Fairness, and Flexibility,” The 1st free5GC World Forum 2025

- Federico Parola, **Shixiong Qi**, Anvaya B. Narappa, K. K. Ramakrishnan, Fulvio Risso, “SURE: Secure Unikernels Make Serverless Computing Rapid and Efficient,” 2024 ACM Symposium on Cloud Computing (SoCC’24)
- **Shixiong Qi**, K. K. Ramakrishnan, Myungjin Lee, “LIFL: A Lightweight, Event-driven Serverless Platform for Federated Learning,” The Seventh Conference on Machine Learning and Systems (MLSys 2024)
- Anvaya B. Narappa, Federico Parola, **Shixiong Qi**, K. K. Ramakrishnan, “Z-stack: A High-performance DPDK-based Zero-copy TCP/IP Protocol Stack,” The 30th IEEE International Symposium on Local and Metropolitan Area Networks (LANMAN 2024)
- Yu-Sheng Liu, **Shixiong Qi**, Po-Yi Lin, Han-Sing Tsai, K. K. Ramakrishnan, Jyh-Cheng Chen, “L²5GC+: An Improved, 3GPP-compliant 5G Core for Low-latency Control Plane Operations,” IEEE International Conference on Cloud Networking (IEEE CloudNet 2023).
- **Shixiong Qi**, Han-Sing Tsai, Yu-Sheng Liu, K. K. Ramakrishnan, Jyh-Cheng Chen, “X-IO: A High-performance Unified I/O Interface using Lock-free Shared Memory Processing,” The 9th IEEE International Conference on Network Softwarization (IEEE NetSoft 2023).
- **Shixiong Qi**, Leslie Monis, Ziteng Zeng, Ian-chin Wang, K. K. Ramakrishnan, “SPRIGHT: Extracting the Server from Serverless Computing! High-Performance eBPF-based Event-driven, Shared-Memory Processing” Proceedings of the 2022 Conference of the ACM Special Interest Group on Data Communication (SIGCOMM ’22).
- Vivek Jain, Hao-Tse Chu, **Shixiong Qi**, Chia-An Lee, Hung-Cheng Chang, Cheng-Ying Hsieh, K. K. Ramakrishnan, Jyh-Cheng Chen, “L²5GC: A Low Latency 5G Core Network based on High-Performance NFV Platforms” Proceedings of the 2022 Conference of the ACM Special Interest Group on Data Communication (SIGCOMM ’22).
- Ziteng Zeng, Leslie Monis, **Shixiong Qi**, K. K. Ramakrishnan, “MiddleNet: A High-Performance, Lightweight, Unified NFV and Middlebox Framework” The 8th IEEE International Conference on Network Softwarization (IEEE NetSoft 2022).
Selected as one of the top-scored papers and invited to provide an extended version to be submitted to the IEEE Transactions on Network and Service Management (TNSM).
- Vivek Jain, Sourav Panda, **Shixiong Qi**, K. K. Ramakrishnan, “Evolving to 6G: Improving the Cellular Core to lower control and data plane latency” The 1st International Conference on 6G Networking (6GNet 2022). **Best Paper Award**
- Viyom Mittal, **Shixiong Qi**, Ratnadeep Bhattacharya, Xiaosu Lyu, Junfeng Li, Sameer G Kulkarni, Dan Li, Jinho Hwang, K. K. Ramakrishnan, Timothy Wood, “Mu: An Efficient, Fair and Responsive Serverless Framework for Resource-Constrained Edge Clouds” 2021 ACM Symposium on Cloud Computing (SoCC’21).
- Ian-Chin Wang, **Shixiong Qi**, Elizabeth Liri and K.K. Ramakrishnan, “Towards a Proactive Lightweight Serverless Edge Cloud for Internet-of-Things Applications” The 15th International Conference on Networking, Architecture, and Storage (NAS 2021).
- Vivek Jain, **Shixiong Qi** and K. K. Ramakrishnan, “Fast Function Instantiation with Alternate Virtualization Approaches,” 2021 IEEE International Symposium on Local and Metropolitan Area Networks (LANMAN), 2021, pp. 1-6.
- **Shixiong Qi**, Sameer G. Kulkarni, and K. K. Ramakrishnan, “Understanding container network interface plugins: design considerations and performance,” *2020 IEEE International Symposium on Local and Metropolitan Area Networks (LANMAN)*. IEEE, 2020.
- **Shixiong Qi**, Huaxi Gu, Haibo Zhang, and Yawen Chen, “Testudo: A low latency and high-efficient memory-centric network using optical interconnect,” *GLOBECOM’2017 - 2017 IEEE Global Communications Conference*. IEEE, 2017.
- Lei Huang, **Shixiong Qi**, Kun Wang, and Huaxi Gu, “LACE: A non-blocking on-chip optical router by utilizing the wavelength routing technology,” *In 2017 16th International Conference on Optical Communications and Networks (ICOCN)*, pp. 1-3. IEEE, 2017.

- Xinglong Diao, Lei Huang, Wei Tan, **Shixiong Qi**, and Huaxi Gu, “A low-crosstalk optical router using multi-layer coupled MR for ONoC,” *In 2017 16th International Conference on Optical Communications and Networks (ICOON)*, pp. 1-3. IEEE, 2017.
- **Shixiong Qi**, Kun Wang, Huaxi Gu, Kang Wang, and Xiaolu Wang, “Crosstalk analysis for closed ring-based optical network-on-chip,” *In 2015 IEEE International Conference on Communication Problem-Solving (ICCP)*, pp. 331-333. IEEE, 2015.

Journal

- **Shixiong Qi**, K. K. Ramakrishnan, Jyh-Cheng Chen, “L²6GC: Evolving the Low Latency Core for Future Cellular Networks,” *IEEE Internet Computing*, 2024.
- **Shixiong Qi**, Leslie Monis, Ziteng Zeng, Ian-chin Wang, K. K. Ramakrishnan, “SPRIGHT: High-Performance eBPF-based Event-driven, Shared-Memory Processing for Serverless Computing,” *IEEE/ACM Transactions on Networking*, 2024.
- **Shixiong Qi**, Ziteng Zeng, Leslie Monis, and K. K. Ramakrishnan, “MiddleNet: A Unified, High-Performance NFV and Middlebox Framework with eBPF and DPDK,” *IEEE Transactions on Network and Service Management*. IEEE, 2023.
- **Shixiong Qi**, Sameer G. Kulkarni, and K. K. Ramakrishnan, “Assessing container network interface plugins: Functionality, performance, and scalability,” *IEEE Transactions on Network and Service Management*. IEEE, 2020.
- Kun Wang, **Shixiong Qi**, Zheng Chen, Yintang Yang, and Huaxi Gu, “SMONoC: Optical network-on-chip using a statistical multiplexing strategy,” *Optical Switching and Networking* 34 (2019): 1-9.
- Jiaxiang Li, Huaxi Gu, **Shixiong Qi**, Haoran Wang, and Kang Wang, “ALPHA: A hybrid topology for memory-centric network,” *IEICE Electronics Express* 16, no. 4 (2019): 20181108-20181108.
- Lei Huang, Kun Wang, **Shixiong Qi**, Huaxi Gu, and Yintang Yang, “Panzer: A 6 × 6 photonic router for optical network on chip,” *IEICE Electronics Express* 13, no. 21 (2016): 20160719-20160719.

PATENTS

P.R.C. Patents

- Huaxi Gu, Bowen Zhang, Kun Wang, Yintang Yang, Zhangming Zhu, **Shixiong Qi**, Wei Tan, “Three-dimensional optical on-chip network using a ring-based control network and its communication method,” P.R.C. Patent No. CN106331909B, Date of Patent (*Granted*): 2019-10-11
- Huaxi Gu, Lei Huang, Yintang Yang, Zhangming Zhu, **Shixiong Qi**, Kun Wang, “Scalable optical on-chip network structure based on double-layer layout and its communication method,” P.R.C. Patent No. CN106936736B, Date of Patent (*Granted*): 2019-05-21
- Lei Huang, Kun Wang, Huaxi Gu, Yintang Yang, **Shixiong Qi**, Wei Tan, “A Multi-port Scalable On-chip Optical Router Supporting Multicast Communication,” P.R.C. Patent No. CN105847166B, Date of Patent (*Granted*): 2019-05-07
- Huaxi Gu, Yue Wang, Kun Wang, Yintang Yang, Kang Wang, **Shixiong Qi**, “Micro-ring resonator-based optical network architecture for memory interconnect and its communication method,” P.R.C. Patent No. CN105635861B, Date of Patent (*Granted*): 2019-02-22
- Kun Wang, **Shixiong Qi**, Zheng Chen, Huaxi Gu, Yintang Yang, Long Zhao. “An Optical Network-on-Chip System and Communication Scheme based on Statistical Multiplexing Strategy,” P.R.C. Patent No. CN105812063B, Date of Patent (*Granted*): 2018-08-03

TALKS AND PRESENTATIONS

- SURE: Secure Unikernels Make Serverless Computing Rapid and Efficient.
Conference proceedings talk, ACM SoCC 2024, Redmond, WA

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

TEACHING AND MENTORING EXPERIENCE

Teaching (at University of Kentucky)

- *Instructor*, CS371, Introduction to Computer Networking, Spring 2025
- *Instructor*, CS687-001, Special Topics in Systems: Fundamentals and Trends, Fall 2024

Teaching (at UC Riverside)

- *Teaching Assistant*, CS203, Advanced Computer Architecture, Fall 2019, Instructor: Hung-Wei Tseng
- *Teaching Assistant and Lab instructor*, CS164, Computer Networks, Fall 2019, Instructor: K. K. Ramakrishnan
- *Teaching Assistant and Lab instructor*, CS164, Computer Networks, Fall 2020, Instructor: K. K. Ramakrishnan
- *Teaching Assistant*, CS179i, Project in Computer Science (Networks), Spring 2020, Instructor: K. K. Ramakrishnan
- *Student Mentor*, CS208, Cloud Computing and Cloud Networking, Winter 2021, Instructor: K. K. Ramakrishnan
- *Student Mentor*, CS208, Cloud Computing and Cloud Networking, Winter 2022, Instructor: K. K. Ramakrishnan
- *Student Mentor*, CS208, Cloud Computing and Cloud Networking, Winter 2023, Instructor: K. K. Ramakrishnan

Mentored Students (with publications or master's project)

- Ziteng Zeng, master student at UCR, 2022, now at Google.
- Leslie Monis, master student at UCR, 2022, now at Nvidia.
- Gaurav Gadewar, master student at UCR, 2023, now at Esri.
- Abhishek Sharma, master student at UCR, 2023, now at tZERO.
- Bharath Nagendra, master student at UCR, 2023, now at Apple.

Mentored Students (with course project)

- *Undergraduate*: Sergio Inzunza, Albert Dang, An Pho, Dumitru Chiriac, Alex Cui, Andrew Nguyen

- *Graduate*: Ted Kim, Janine Huang, Arun Venkatesh, Rucha Kolhatkar, Venkata Vamsi K. Mupparaju, Nadia Saba, Varun Sapre, Srinivasa Biradavolu, Akshay Gulabrao, Wyland Lau, Anjana Venkatesh, Sanchit Goel, Douglas Adjei-Fremphah, Shruti Jawale, Lawrence Wang, Mahaboob Ali A. Mohammad

SERVICE

- **Conference Organizing**: Publicity Co-Chair for IEEE MASS'24, Publicity Co-Chair for free5GC Workshop (held in conjunction with ACM CCS 2025)
- **Journal Reviewer**: IEEE Transactions on Parallel and Distributed Systems (TPDS), IEEE Transactions on Computers (TC), IEEE Transactions on Mobile Computing (TMC), IEEE Network, ACM Transactions on Internet Technology (TOIT), IET Network, Elsevier Parallel Computing
- **TPC**: IEEE ICDCS 2025, USENIX NSDI 2026, free5GC Workshop (held in conjunction with ACM CCS 2025)
- **Others**: NSF Reviewer, 2025

HONOURS AND AWARDS

- Dissertation Completion Fellowship Award, UCR 2024
- Dissertation Year Program Fellowship, UCR 2023
- IEEE CloudNet 2023 student travel grant 2023
- ACM SIGCOMM 2022 student travel grant 2022
- IEEE ICNP 2022 student travel grant 2022
- IEEE 6GNet 2022 best paper award 2022
- Dean's Distinguished Fellowship, UCR 2018
- National scholarship, Ministry of Education, China 2017
- Second-class scholarship, Xidian University 2016
- Excellent Student Award, Xidian University 2016
- First-class scholarship, Xidian University 2015
- Honorable Mention, Mathematical Contest In Modeling 2014
- Excellent Student Award, Nanjing University of Posts and Telecommunications 2013
- First Prize in Jiangsu Province, the National Mathematical Modeling Contest 2013
- Second-class scholarship, Nanjing University of Posts and Telecommunications 2012, 2013, 2014