

SHIXIONG QI

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EXPERIENCE

University of Kentucky

Assistant Professor, 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

Overall GPA: 3.85/4

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

Overall GPA: 3.71/4 (Ranking 25/284)

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

Overall GPA: 3.69/4 (Ranking 5/97)

PUBLICATIONS

Conference

- **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)
- 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 (ICOON)*, 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

- 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

- *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

- Publicity Co-Chair for IEEE MASS'24
- Reviewer: Parallel Computing (Elsevier), IET Network, IEEE Network

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, Xidian University (Top 3% of 700+) 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