Qiang Liu ***Assistant Professor*** **Last update: October 21, 2024**

CONTACT INFORMATION
School of Computing
University of Nebraska-Lincoln
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RESEARCH INTERESTS
Wireless Network, Edge Computing, Machine Learning, Autonomous Driving

EDUCATION

The University of North Carolina at Charlotte, Charlotte, NC 2016–2020

- Ph.D. in Electrical Engineering

University of Electronic Science and Technology of China, Chengdu, China 2013–2016

- M.S. in Communication and Information System

Jiangxi Normal University, Nanchang, China 2009–2013

- B.S. in Electronics and Information Engineering

HONORS AND AWARDS

◇ ***Best Paper Award***, IEEE International Conference on Communications (ICC) 2022

◇ ***Best Presentation Award***, ACM CoNEXT 2021

◇ ***Best Paper Award***, IEEE ComSoc on Transmission, Access, and Optical Systems (TAOS) 2019

◇ ***Best Paper Award***, IEEE International Conference on Communications (ICC) 2019

◇ ***Outstanding Graduate Student Award***, UNC-Charlotte 2019

◇ ***Graduate and Professional Student Government Travel Award***, UNC-Charlotte 2019

◇ ***Excellent Graduate Student Award***, UESTC 2016

GRANTS

- ***US DoT***, Roadside-to-Vehicle Crash Avoidance Warning System for Commercial Motor Vehicles on Rural Roads, **Co-PI**, $1,342,761 2024 -2026
- ***USDA NIFA***, CropTwin: Automatic Digital Twin for Crop Growth Modeling towards Smart Irrigation Management, **PI**, $300,000 2024 -2026
- ***Nation Science Foundation***, NeTS: Small: AutoSlicing: Safe Online Autonomous Network Orchestration Towards Pervasive Slicing-as-a-Service, **Sole PI**, $531,134 2024 - 2027
- ***NASA Nebraska Space Grant***, Bring Advanced Cellular Networks From Earth to Space, **Sole PI**, $5,000 2024 - 2025
- ***Toyota Motor North America***, Serverless Edge Computing for Large Machine Learning Models: Fundamentals, Optimization, and Use Cases, **Sole PI**, $50,000 2024 - 2025
- ***Nation Science Foundation***, CC* Integration-Large: Husker-Net: Open Nebraska End-to-End Wireless Edge Networks, **PI**, $891,000 2023 - 2025
- ***Nebraska EPSCoR FIRST Award***, Real-World Machine Learning in Mobile Network Slicing, **Sole PI**, $25,000 2023 - 2024
- ***Toyota Motor North America***, Collaborative Data Offloading and Resource Provisioning for Crowdsourcing HD Map in Automotive Edge Computing, **Sole PI**, $50,000 2022 - 2023
- ***Nation Science Foundation***, CNS Core: Medium: Field-Nets: Field-to-Edge Connectivity for Joint Communication and Sensing in Next-Generation Intelligent Agricultural Networks, **Co-PI**, $1,000,000 2022 - 2025
- ***UNL Layman Fund***, Automated Offline Simulator Augmentation with Real-to-Sim Learning in Mobile Networks, **Sole PI**, $10,000 2022 - 2023

PUBLICATIONS **Conferences**

28. M. Zhao, Y. Zhang, Q. Liu, T. Han, "LeFi: Learn to Incentivize Federated Learning in Automotive Edge Computing", *IEEE Global Communications Conference* (**GLOBECOM**), Cape Town, South Africa. Dec. 2024

27. J. Cao, Q. Liu, D. Chen, and K. Han, "CAVE: Crowdsourcing Passing-By Vehicles for Reliable In-Vehicle Edge Computing", *IEEE Global Communications Conference* (**GLOBECOM**), Cape Town, South Africa. Dec. 2024

26. Y. Zhang, M. Zhao, Q. Liu, N. Choi, "Learn to Augment Network Simulators Towards Digital Network Twins", *IEEE INFOCOM Workshop* (**NG-OPERA**), Vancouver, Canada. May. 2024

25. Q. Liu, Y. Xue, Y. Zhang, D. Chen, and K. Han, "AdaMap: High-Scalable Real-Time Cooperative Perception at the Edge", IEEE/ACM Symposium on Edge Computing (SEC), Wilmington, DE, Dec. 2023 (acceptance rate: **25.4%**)

24. T. Hu, Q. Liao, Q. Liu, A. Massaro, G. Carle, "Fast and Scalable Network Slicing by Integrating Deep Learning with Lagrangian Methods", *IEEE Global Communications Conference* (**GLOBECOM**), Kuala Lumpur, Malaysia. 2023

23. Y. Xue, Y. Zhang, Q. Liu, D. Chen, and K. Han, "CoMap: Proactive Provision for Crowdsourcing Map in Automotive Edge Computing", *IEEE International Conference on Communications* (**ICC**), Rome, Italy, June. 2023

22. Y. Zhang, Y. Xue, Q. Liu, N. Choi, and T. Han, "RoNet: Toward Robust Neural Assisted Mobile Network Configuration", *IEEE International Conference on Communications* (**ICC**), Rome, Italy, June. 2023

21. Q. Liu, N. Choi, T. Han, "Atlas: Automate Online Service Configuration in Network Slicing", *The 18th International Conference on emerging Networking EXperiments and Technologies* (**CoNEXT**), Rome, Italy, Dec. 2022 (acceptance rate: **18.5%**)

20. Q. Liu, Y. Zhang, H. Wang, "EdgeMap: CrowdSourcing High Definition Map in Automotive Edge Computing", *IEEE International Conference on Communications* (**ICC**), Virtual, May. 2022

19. T. Hu, Q. Liao, Q. Liu, G. Carle, "Network Slicing via Transfer Learning aided Distributed Deep Reinforcement Learning", *IEEE Global Communications Conference* (**GLOBECOM**), Rio de Janeiro, Brazil, Dec. 2022

18. T. Hu, Q. Liao, Q. Liu, D. Wellington, G. Carle, "Inter-Cell Slicing Resource Partitioning via Coordinated Multi-Agent Deep Reinforcement Learning", *IEEE International Conference on Communications* (**ICC**), Virtual, May. 2022 (**Best Paper Award**)

17. Q. Liu, N. Choi, T. Han, "OnSlicing: Online End-to-End Network Slicing with Reinforcement Learning", *The 17th International Conference on emerging Networking EXperiments and Technologies* (**CoNEXT**), Virtual, Dec. 2021 (acceptance rate: **22%**)

16. Q. Liu, N. Choi, T. Han, "Constraint-Aware Deep Reinforcement Learning for End-to-End Resource Orchestration in Mobile Networks", *IEEE International Conference on Network Protocols* (**ICNP**), Virtual, Nov. 2021 (acceptance rate: **24%**)

15. Q. Liu, T. Han, L. Xie, B. Kim, "LiveMap: Real-Time Dynamic Map in Automotive Edge Computing", *IEEE International Conference on Computer Communications* (**INFOCOM**), Virtual, May 2021 (acceptance rate: **19.9%**)

14. Q. Liu, T. Han, E. Moges, "EdgeSlice: Slicing Wireless Edge Computing Network with Decentralized Deep Reinforcement Learning", *IEEE International Conference on Distributed Computing Systems* (**ICDCS**), Singapore, Dec. 2020 (acceptance rate: **18%**)

13. Q. Liu, T. Han, N. Zhang, Y. Wang, "DeepSlicing: Deep Reinforcement Learning Assisted Resource Allocation for Network Slicing", *IEEE Global Communications Conference* (**GLOBECOM**), Taipei, Taiwan, Dec. 2020

12. Q. Liu, T. Han, "DIRECT: Distributed Cross-Domain Resource Orchestration in Cellular Edge Computing", *ACM International Symposium on Mobile Ad Hoc Networking and Computing* (**MOBIHOC**), Catania, Italy, Jul. 2019 (acceptance rate: **23.7%**)

11. Q. Liu, T. Han, "VirtualEdge: Multi-Domain Resource Orchestration and Virtualization in Cellular Edge Computing", *IEEE International Conference on Distributed Computing Systems* (**ICDCS**), Dallas, TX, Jul. 2019 (acceptance rate: **19.6%**)

10. Q. Liu, T. Han, "DARE: Dynamic Adaptive Mobile Augmented Reality with Edge Computing", *IEEE International Conference on Network Protocols* (**ICNP**), Cambridge, UK, Sep. 2018 (acceptance rate: **17.8%**)

9. Q. Liu, S. Huang, J. Opadere, T. Han, "An Edge Network Orchestrator for Mobile Augmented Reality", *IEEE International Conference on Computer Communications* (**INFOCOM**), Honolulu, HI, Apr. 2018 (acceptance rate: **19.2%**)

8. J. Opadere, Q. Liu, N. Zhang, T. Han, "Joint Computation and Communication Resource Allocation for Energy-Efficient Mobile Edge Networks", *IEEE International Conference on Communications* (**ICC**), Shanghai, China, May 2019 **(Best Paper Award)**

7. Q. Liu, T. Han, "Energy-Efficient On-demand Cloud Radio Access Networks Virtualization", *IEEE Global Communications Conference* (**GLOBECOM**), Abu Dhabi, UAE, Dec. 2018

6. Q. Liu, T. Han, N. Ansari, "Joint Radio and Computation Resource Management for Low Latency Mobile Edge Computing", *IEEE Global Communications Conference* (**GLOBECOM**), Abu Dhabi, UAE, Dec. 2018

5. J. Opadere, Q. Liu, T. Han, "Energy-Efficient RRH Sleep Mode for Virtual Radio Access Networks", *IEEE Global Communications Conference* (**GLOBECOM**), Singapore, Dec. 2017

4. S. Huang, Q. Liu, T. Han, N. Ansari, "Data-Driven Network Optimization in Ultra-Dense Radio Access Networks", *IEEE Global Communications Conference* (**GLOBECOM**), Singapore, Dec. 2017

3. Q. Liu, G. Wu, Y. Guo, Y. Zhang, S. Hu, "Energy Efficient Resource Allocation for Control Data Separated Heterogeneous-CRAN", *IEEE Global Communications Conference* (**GLOBECOM**), Washington DC, Dec. 2016

2. Q. Liu, T. Han, G. Wu, "Computing Resource Aware Energy Saving Scheme for Cloud Radio Access Networks", *IEEE Sustainable Computing and Communications* (**SustainCom**), Atlanta, GA, Oct. 2016

1. Y. Guo, Q. Liu, G. Wu, S. Li, "On the Impact of Power Amplifier Efficiency on the Energy Efficiency in a Massive MIMO System", *WiCOM*, Shanghai, China, 2015

Journal and Magazines

11. Y. Zhang, Q. Liu, H. Wang, D. Chen, and K. Han, "CrowdSourcing Live High Definition Map via Collaborative Computation in Automotive Edge Computing", *IEEE Transactions on Vehicular Technology*, 2024

10. T. Hu, Q. Liao, Q. Liu, G. Carle, "Inter-Cell Network Slicing with Transfer Learning Empowered Multi-Agent Deep Reinforcement Learning", *IEEE Open Journal of the Communications Society*, vol. 4, pp.1141 - 1155, May 2023

9. H. Wang, Z. Wang, D. Chen, Q. Liu, H. Ke, K. Han, "Metamobility: Connecting Future Mobility With the Metaverse", *IEEE Vehicular Technology Magazine*, 2023

8. Q. Liu, N. Choi, T. Han, "Deep Reinforcement Learning for End-to-End Network Slicing: Challenges and Solutions", *IEEE Network Magazine*, 2022

7. Q. Liu, T. Han, J. Xie, and B. Kim, "Real-Time Dynamic Map with Crowdsourcing Vehicles in Edge Computing", *IEEE Transactions on Intelligent Vehicles*, pp.1-10, 2022

6. F. Salahdine, Q. Liu, T. Han, "Towards Secure and Intelligent Network Slicing for 5G Networks", *IEEE Open Journal of the Computer Society*, vol. 3, pp.23-38, Mar 2022

5. F. Salahdine, J. Opadere, Q. Liu, T. Han, N. Zhang, S. Wu, "A survey on sleep mode techniques for ultra-dense networks in 5G and beyond", *Computer Networks*, vol. 201, pp.108567, 2021

4. Q. Liu, T. Han, N. Ansari, "Learning-Assisted Secure End-to-End Network Slicing for Cyber-Physical Systems", *IEEE Network Magazine*, vol. 34, no. 3, pp. 37-43, May 2020

3. J. Opadere, Q. Liu, T. Han, N. Ansari, "Energy-efficient Virtual Radio Access Networks for Multi-Operators Cooperative Cellular Networks", *IEEE Transactions on Green Communications and Networking* (**TGCN**), vol. 3, no. 3, pp. 603-614, Sep. 2019

2. Q. Liu, T. Han, N. Ansari, "Energy-Efficient On-demand Resource Provisioning in Cloud Radio Access Networks", *IEEE Transactions on Green Communications and Networking* (**TGCN**), vol. 3, no. 4, pp. 1142-1151, Jul. 2019

1. Q. Liu, T. Han, N. Ansari, G. Wu, "On Designing Energy-Efficient Heterogeneous Cloud Radio Access Networks", *IEEE Transactions on Green Communications and Networking* (**TGCN**), vol. 2, no. 3, pp. 721-734, May 2018

Posters and Demos

5. Y. Zhang, Y. Xue, Q. Liu, N. Choi, "Poster: Digital Network Twin via Learning-Based Simulator", *IEEE International Conference on Computer Communications* (**INFOCOM**), Hoboken, NJ, May. 2023

4. Q. Liu, T. Han, "When Network Slicing meets Deep Reinforcement Learning", *ACM International Conference on emerging Networking EXperiments and Technologies* (**CoNEXT**) Student Workshop, Orlando, FL, Dec. 2019

3. Q. Liu, T. Han, "Demo Abstract: Themis: Cross-Domain Resource Orchestration and Virtualization in Cellular Computing Networks", *IEEE International Conference on Network Protocols* (**ICNP**), Cambridge, UK, Sep. 2018

2. Q. Liu, S. Huang, T. Han, "Demo Abstract: Fast and Accurate Object Analysis at the Edge for Mobile Augmented Reality", *ACM/IEEE Symposium on Edge Computing* (**SEC**), San Jose, CA, Oct. 2017

1. Q. Liu, S. Huang, Y. Deng, T. Han, "Demo Abstract: MExR: Mobile Edge Resource Management for Mixed Reality Applications", *IEEE International Conference on Computer Communications* (**INFOCOM**), Atlanta, GA, Apr. 2017

Academic Experience

- **University of Nebraska-Lincoln** — Aug. 2021–Present
  Assistant Professor
- **University of North Carolina at Charlotte** — Aug. 2016–Dec. 2020
  Research, Teaching Assistant
- **University of Electronic Science and Technology of China** — Aug. 2013–Jun. 2016
  Research Assistant

Industry Experience

- **Nokia Bell Labs** — Jan. 2021–Aug. 2021
  Member of Technical Staff
- **Nokia Bell Labs** — Jun. 2020–Aug. 2020
  Research Intern
- **Toyota InfoTech Labs** — Jan. 2020–Jun. 2020
  Research Intern
- **Facebook Reality Labs** — May. 2019–Nov. 2019
  Research Intern

Teaching

◇ Instructor, CSCE 990: Multi-Access Edge Computing, Fall 2024, UNL

◇ Instructor, CSCE 464/864: Internet System and Programming, Spring 2024, UNL

◇ Instructor, CSCE 990: Multi-Access Edge Computing, Fall 2023, UNL

◇ Instructor, CSCE 464/864: Internet System and Programming, Spring 2023, UNL

◇ Instructor, CSCE 990: Multi-Access Edge Computing, Fall 2022, UNL

◇ Instructor, CSCE 464/864: Internet System and Programming, Spring 2022, UNL

◇ Instructor, CSCE 990: Multi-Access Edge Computing, Fall 2021, UNL

◇ Teaching Assistant, Power Electronics I, Fall 2018, UNCC

◇ Teaching Assistant, Computer Utilization in C++, Spring 2018, UNCC

◇ Teaching Assistant, Data Communications and Networking, Spring 2018, UNCC

◇ Teaching Assistant, Signals and Systems II, Fall 2017, UNCC

◇ Teaching Assistant, Logic and Networks, Spring 2017, UNCC

◇ Teaching Assistant, Signals and Systems I, Fall 2016, UNCC

Service

- **Associate Editor**, Multimedia Tools and Applications, Track 7: Connected and Autonomous Vehicles
- **TPC Co-Chairs**, IEEE INFOCOM WKSHPS: NG-OPERA 2023
- **TPC Member**, IEEE INFOCOM 2023, 2024, IEEE ICDCS 2023, IEEE ICCCN 2023, IEEE ICC 2023, IEEE/ACM SEC 2O23, ACM 5G-MeMU Workshop 2023
- **Poster Co-Chairs**, The Seventh ACM/IEEE Symposium on Edge Computing (SEC) 2022, 2023
- **Guest Editor**, MDPI Electronics Special Issue "Machine Learning for Next-Generation Wireless Networks and Computing Systems" 2022
- **TPC Member**, IEEE ICNP 2022, IEEE ICC 2022, IEEE VTC-Fall 2022
- **Reviewer**, IEEE ToN, IEEE TWC, IEEE TMC, IEEE OJCS, IEEE JSAC, IEEE TCCN, IEEE Access, IEEE TGCN, IEEE Communication Letters, IEEE ICC, IEEE GLOBECOM, IEEE System Journal, Elsevier Measurement, Elsevier Computer Communications, Elsevier Computer Networks, Digital Communication and Networks