Langtian Qin

+1 9492664056 langtiq@uci.edu My Github My Google Scholar

EDUCATION

University of California, Irvine **Sep. 2024 – Now**
Ph.D. in Computer Science *Irvine, CA*

University of Science and Technology of China (USTC) **Sep. 2021 – Jun. 2024**
M.S. in Electrical Engineering *Hefei, China*

- **GPA:3.78/4.3 - Rank: 4/71**

Xidian University **Sep. 2017 – Jun. 2021**
B.E. in Information Engineering *Xi'an, China*

- **GPA:3.8/4.0 - Rank: 3/156**

RESEARCH EXPERIENCE

Intelligent and Autonomous Systems Lab, UC Irvine, CA **Apr. 2024 – Now**
Research Assistant

- ***Title: Hierarchical Semantic Communications for Distributed Dynamic Sensor Fusion***
- Proposed a hierarchical semantic communication framework for distributed dynamic sensor fusion for autonomous vehicles.
- Developed a semantic encoder/decoder to extract the semantic features of sensor data via dynamic neural networks (Resnet-18/50/101).
- Designed a semantic channel encoder/decoder to transmit the sensor features via hierarchical modulation.
- Designed an optimization framework to minimize the delay and energy consumption under accuracy constraints. Implemented Rainbow Deep Q-learning (Rainbow-DQN) to obtain the dynamic sensor fusion and transmission strategy.

Center for Wireless Communications, UC San Diego, CA **Sep. 2023 – Dec. 2023**
Graduate Visiting Student

- ***Title: Bridging the Sim-to-real Gap in AI-Driven Networks Using Hybrid Simulation***
- Implemented a mmWave mesh network testbed based on 802.11ad 60GHz radios. Collected various performance trace data such as per-beam received signal strength (RSS) and throughput based on the testbed.
- Designed a deep reinforcement learning (DRL)-enhanced wireless network simulator to fill the sim-to-real gap between simulation and actual network implementation.
- Designed DRL models like deep Q-learning (DQN) and twin delayed deep deterministic policy gradient algorithm (TD3) to configure the network simulator based on the testbed data.
- Implemented the DRL-enhanced simulator to two use cases for evaluation, i.e., interference-aware link scheduling and base station association. The proposed hybrid simulation can generate the throughput traces that are most similar to the testbed.

Broadband Communications Lab, UC Santa Cruz, CA **Jun. 2022 – Sep. 2022**
Summer Research Intern

- ***Title: Adaptive Deep Neural Network for Dynamic Wireless Channel Estimation***
- Designed deep learning (DL)-based channel estimators with different training methods or data inputs. Verified the channel estimation mean square error (MSE) and bit error rate (BER) performance of the system.
- Designed an online DL-based channel estimator that can use existing detected packets to continuously update the weights, which can be implemented in the unseen dynamic wireless channel.

Information Network Lab, USTC, China **Sep. 2021 – Jun. 2024**
Research Assistant

- ***Title: Task Offloading and Resource Allocation in User-Centric Mobile Edge Computing***
- Designed a task offloading and resource allocation algorithm in edge computing-enabled cell-free multiple-input multiple-output (MIMO) using DRL. The total energy consumption and average delay can be reduced by at most 67.48% and 48.1%.
- Proposed a joint user access, grouping, power control, and computing resource allocation algorithm in non-orthogonal multiple access (NOMA)-assisted edge computing systems using matching game theory and graph theory. The average uplink rate and average delay can be improved by at most 79.1% and 92.43%.
- Designed a joint service caching and base station clustering algorithm in cell-free MIMO systems using generalized Benders decomposition (GBD) and alternating direction method of multipliers (ADMM) optimization methods. The long-term delay and caching cost can be reduced by at most 93.75% and 53.12%.

SELECTED PUBLICATIONS

[**J1**] **L. Qin**, H. Lu, Y. Chen, B. Chong and F. Wu, "Towards Decentralized Task Offloading and Resource Allocation in User-Centric Mobile Edge Computing," in ***IEEE Transactions on Mobile Computing***, 2024.

[**J2**] **L. Qin**, H. Lu, Y. Chen, Z. Gu, D. Zhao and F. Wu, "Energy-Efficient Blockchain-enabled User-Centric Mobile Edge Computing," in ***IEEE Transactions on Cognitive Communications and Networking***, vol. 10, no. 4, pp. 1452-1466, Aug. 2024.

[**J3**] **L. Qin**, H. Lu, Y. Chen, B. Chong and F. Guo, "Joint Transmission and Resource Optimization in NOMA-assisted IoVT with Mobile Edge Computing," in ***IEEE Transactions on Vehicular Technology***, vol. 73, no. 7, pp. 9984-9999, Jul. 2024.

[**J4**] **L. Qin**, H. Lu, Y. Lu, C. Zhang and F. Wu, "Joint Optimization of Base Station Clustering and Service Caching in User-Centric MEC," in ***IEEE Transactions on Mobile Computing***, vol. 23, no. 5, pp. 6455-6469, May 2024.

[**J5**] **L. Qin**, H. Lu and F. Wu, "When the User-Centric Network Meets Mobile Edge Computing: Challenges and Optimization," in ***IEEE Communications Magazine***, vol. 61, no. 1, pp. 114-120, Jan. 2023.

[**J6**] B. Chong, F. Guo, H. Lu and **L. Qin**, "On the Distribution of SINR for Cell-Free Massive MIMO Systems," in IEEE Transactions on Communications," in ***IEEE Transactions on Communications***, 2024.

[**J7**] B. Chong, H. Lu, **L. Qin**, Z. Xue and F. Guo and F. Guo, "Performance Optimization on Cell-Free Massive MIMO-Aided URLLC Systems With User Grouping," in ***IEEE Transactions on Wireless Communications***, vol. 23, no. 10, pp. 13977-13992, Oct. 2024.

[**J8**] Y. Chen, H. Lu, **L. Qin**, C. Zhang and C. Chen, "Statistical QoS Provisioning Analysis and Performance Optimization in xURLLC-enabled Massive MU-MIMO Networks: A Stochastic Network Calculus Perspective," in ***IEEE Transactions on Wireless Communications***, vol. 23, no. 7, pp. 8044-8058, Jul. 2024.

[**J9**] C. Wu, H. Lu, Y Chen and **L. Qin**, "Cross-Layer Optimization for Statistical QoS Provision in C-RAN with Finite-Length Coding," in ***IEEE Transactions on Communications***, vol. 72, no. 6, pp. 3393-3407, Jun. 2024.

[**J10**] Y. Chen, H. Lu, **L. Qin**, Y. Deng and A. Nallanathan, "When xURLLC Meets NOMA: A Stochastic Network Calculus Perspective," in ***IEEE Communications Magazine***, vol. 62, no. 6, pp. 90-96, Jun. 2024.

AWARDS & HONORS

- 2023 National Scholarship (Awarded to 1% of 1100+ students)
- 2022 First Class Scholarship of University of Science and Technology of China
- 2021 First Class Scholarship of University of Science and Technology of China
- 2020 National Scholarship (Awarded to 1% of 156 students)
- 2020 Meritorious Winner of The Interdisciplinary Contest in Modeling (ICM) (Awarded to 8% of 7199 teams over the world)
- 2019 National Scholarship (Awarded to 1% of 156 students)
- Provincial Second Prize in National Mathematical Modeling Contest, 2019
- Provincial Second Prize in Chinese Mathematics Competition, 2019

SKILLS

Languages: MATLAB, Python, C/C++, Java, JavaScript, Solidity
Developer Tools: Pycharm, VS Code, WebStorm, Eclipse, Keil, Remix, CORE, Mininet
Technologies/Frameworks: Linux, GitHub, Git, Tensorflow, Pytorch, Cesium