Yang XIAO

Postdoctoral Scholar, David R. Cheriton School of Computer Science
University of Waterloo
200 University Avenue West
Waterloo, ON, Canada N2L 3G1
yang.xiao@uwaterloo.ca — +1(548)390-6663 — **Personal Website** — **Google Scholar**

ACADEMIC APPOINTMENTS

University of Waterloo — Mar. 2025 – Feb. 2027
David R. Cheriton School of Computer Science — Waterloo, ON, Canada
Postdoctoral Scholar

EDUCATION

Beijing University of Posts and Telecommunications — Sep. 2020 – Jun. 2024
School of Artificial Intelligence — Beijing, China
Ph.D. in Information and Communication Engineering

Beijing University of Posts and Telecommunications — Sep. 2015 – Jun. 2019
School of Information and Communication Engineering — Beijing, China
B.Eng. in Electronic and Information Engineering

RESEARCH INTERESTS

Autonomous network, agentic artificial intelligence, knowledge-defined networking, network traffic engineering, routing optimization, radio access network, wireless resource management, multi-agent deep reinforcement learning, game theory.

PUBLICATIONS

Journal Articles

1. **Yang Xiao***, Noura Limam, Mohammad A. Salahuddin, and Raouf Boutaba, "DORIS: Channel-Aware Distributed O-RAN Intelligent Slicing with Multi-Agent Deep Reinforcement Learning," *IEEE Transactions on Mobile Computing*, Early access.
2. Guocheng Lin, **Yang Xiao***, Shudan Yu, Ke Yu, and Jun Liu, "Constrained Probabilistic Routing with RouterRL: A General Packet-Level Network Simulation Framework," *IEEE Transactions on Network Science and Engineering*, vol. 13, pp. 2604–2622, 2025.
3. **Yang Xiao***, Huihan Yu, Ying Yang, Yixing Wang, Jun Liu, and Nirwan Ansari, "Adaptive Joint Routing and Caching in Knowledge-Defined Networking: An Actor-Critic Deep Reinforcement Learning Approach," *IEEE Transactions on Mobile Computing*, vol. 24, no. 5, pp. 4118–4135, 2025.
4. Yuqian Song, **Yang Xiao**, and Jun Liu*, "Enabling Adaptive Optimization of Energy Efficiency and Quality of Service in NR-V2X Communications via Multi-Agent Deep Reinforcement Learning," *IEEE Internet of Things Journal*, vol. 12, no. 4, pp. 4022–4037, 2025.
5. **Yang Xiao***, Ying Yang, Huihan Yu, and Jun Liu, "Scalable QoS-Aware Multipath Routing in Hybrid Knowledge-Defined Networking with Multi-Agent Deep Reinforcement Learning," *IEEE Transactions on Mobile Computing*, vol. 23, no. 11, pp. 10628–10646, 2024.
6. **Yang Xiao**, Yuqian Song, and Jun Liu*, "Collaborative Multi-Agent Deep Reinforcement Learning for Energy-Efficient Resource Allocation in Heterogeneous Mobile Edge Computing Networks," *IEEE Transactions on Wireless Communications*, vol. 23, no. 6, pp. 6653–6668, 2024.
7. **Yang Xiao**, Yuqian Song, and Jun Liu*, "Multi-Agent Deep Reinforcement Learning Based Resource Allocation for Ultra-Reliable Low-Latency Internet of Controllable Things," *IEEE Transactions on Wireless Communications*, vol. 22, no. 8, pp. 5414–5430, 2023.
8. **Yang Xiao**, Jianxue Li, Jiawei Wu, and Jun Liu*, "On Design and Implementation of Reinforcement Learning Based Cognitive Routing for Autonomous Networks," *IEEE Communications Letters*, vol. 27, no. 1, pp. 205–209, 2023.
9. **Yang Xiao**, Jun Liu*, Jiawei Wu, and Nirwan Ansari, "Leveraging Deep Reinforcement Learning for Traffic Engineering: A Survey," *IEEE Communications Surveys and Tutorials*, vol. 23, no. 4, pp. 2064–2097, 2021.
10. Jingfei Huang, Yang Yang*, Gang He, **Yang Xiao**, and Jun Liu, "Deep Reinforcement Learning-Based Dynamic Spectrum Access for D2D Communication Underlay Cellular Networks," *IEEE Communications Letters*, vol. 25, no. 8, pp. 2614–2618, 2021.
11. **Yang Xiao***, Jiawei Wu, Jianxue Li, and Jun Liu, "A Dynamic Routing Algorithm Based on Deep Reinforcement Learning," *Information and Communications Technology and Policy*, vol. 46, no. 9, pp. 48–54, 2020.

12. Jun Liu*, Yuan Tian, Yu Zhou, **Yang Xiao**, and Nirwan Ansari, "Privacy Preserving Distributed Data Mining Based on Secure Multi-Party Computation," *Computer Communications*, vol. 153, pp. 208–216, 2020.

Conference Papers

1. Niloy Saha*, Noura Limam, **Yang Xiao**, and Raouf Boutaba, "Rethinking Telemetry Design for Fine-Grained Anomaly Detection in 5G User Planes," in *Proceedings of the 2026 IEEE/IFIP Network Operations and Management Symposium (NOMS '26)*, Rome, Italy, 2026, pp. 1–10. **(Best Paper Award)**
2. Mohamed Rouili*, **Yang Xiao**, Sihang Liu, and Raouf Boutaba, "RAID: In-Network RA Signaling Storm Detection for 5G Open RAN," in *Proceedings of the 2026 IEEE/IFIP Network Operations and Management Symposium (NOMS '26)*, Rome, Italy, 2026, pp. 1–7.
3. Ying Yang, **Yang Xiao***, and Jun Liu, "PVD-TD3: A Latency-Oriented Multi-Agent Reinforcement Learning Algorithm for Multipath Routing in DetNet," in *Proceedings of the 2025 IFIP Networking Conference (NETWORKING '25)*, Limassol, Cyprus, 2025, pp. 556–564.
4. Guocheng Lin, **Yang Xiao***, and Jun Liu, "Constraint-Aware Probabilistic Packet Forwarding Based on Deep Reinforcement Learning," in *Proceedings of the 2025 IFIP Networking Conference (NETWORKING '25)*, Limassol, Cyprus, 2025, pp. 301–309.
5. Xinyuan Li, Junze Li, **Yang Xiao**, Sixu Liu, and Jun Liu*, "CGTR: Leveraging Contrastive Learning and Graph Transformer for Deep Reinforcement Learning Based Robust Routing," in *Proceedings of the 2024 IEEE International Conference on Communications (ICC '24)*, Denver, CO, USA, 2024, pp. 472–478.
6. Jiawei Chen, **Yang Xiao***, Guocheng Lin, Gang He, Fang Liu, Wenli Zhou, and Jun Liu, "Deep Reinforcement Learning Based Dynamic Routing Optimization for Delay-Sensitive Applications," in *Proceedings of the 2023 IEEE Global Communications Conference (GLOBECOM '23)*, Kuala Lumpur, Malaysia, 2023, pp. 5208–5213.
7. Jiawei Chen, **Yang Xiao***, and Guocheng Lin, "RL4NET++: A Packet-Level Network Simulation Framework for DRL-Based Routing Algorithms," in *Proceedings of the 2023 IEEE International Conference on Network Intelligence and Digital Content (IC-NIDC '23)*, Beijing, China, 2023, pp. 248–253. **(Best Paper Award)**
8. Yixing Wang, **Yang Xiao***, Yuqian Song, Jingli Zhou, and Jun Liu, "Deep Reinforcement Learning Based Probabilistic Cognitive Routing: An Empirical Study with OMNeT++ and P4," in *Proceedings of the 2023 19th IEEE/ACM/IFIP International Conference on Network and Service Management (CNSM '23)*, Niagara Falls, ON, Canada, 2023, pp. 1–7.
9. Xinyuan Li, **Yang Xiao**, Sixu Liu, Xucong Lu, Fang Liu, Wenli Zhou, and Jun Liu*, "GAPPO - A Graph Attention Reinforcement Learning Based Robust Routing Algorithm," in *Proceedings of the 2023 IEEE 34th Annual International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC '23)*, Toronto, ON, Canada, 2023, pp. 1–7.
10. Yuqian Song, **Yang Xiao***, Yaozhi Chen, Guanyu Li, and Jun Liu, "Deep Reinforcement Learning Enabled Energy-Efficient Resource Allocation in Energy Harvesting Aided V2X Communication," in *Proceedings of the 2022 IEEE 33rd Annual International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC '22)*, Kyoto, Japan, 2022, pp. 313–319.
11. Jianxue Li, **Yang Xiao***, Jiawei Wu, Yaozhi Chen, and Jun Liu, "Attentive Dual-Head Spatial-Temporal Generative Adversarial Networks for Crowd Flow Generation," in *Proceedings of the 2022 IEEE 33rd Annual International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC '22)*, Kyoto, Japan, 2022, pp. 800–806.
12. **Yang Xiao**, Yuqian Song, and Jun Liu*, "Towards Energy Efficient Resource Allocation: When Green Mobile Edge Computing Meets Multi-Agent Deep Reinforcement Learning," in *Proceedings of the 2022 IEEE International Conference on Communications (ICC '22)*, Seoul, Republic of Korea, 2022, pp. 4056–4061.
13. Huihan Yu, **Yang Xiao**, Jiawei Wu, Zilong He, Fang Liu*, and Jun Liu, "Deep Reinforcement Learning Based Beamforming for Throughput Maximization in Ultra-Dense Networks," in *Proceedings of the 2022 IEEE Wireless Communications and Networking Conference (WCNC '22)*, Austin, TX, USA, 2022, pp. 1021–1026.
14. **Yang Xiao**, Jiawei Wu, and Jun Liu*, "Power Allocation for Device-to-Multi-Device Enabled HetNets: A Deep Reinforcement Learning Approach," in *Proceedings of the 2021 IEEE Global Communications Conference (GLOBECOM '21)*, Madrid, Spain, 2021, pp. 1–6.
15. Jianxue Li, **Yang Xiao**, Jiawei Wu, Jialong Feng, and Jun Liu*, "Network Flow Generation Based on Reinforcement Learning Powered Generative Adversarial Network," in *Proceedings of the 2021 IEEE International Conference on Network Intelligence and Digital Content (IC-NIDC '21)*, Beijing, China, 2021, pp. 235–239.
16. Jun Liu*, **Yang Xiao**, and Jiawei Wu, "From AI to CI: A Definition of Cooperative Intelligence in Autonomous Driving," in *Proceedings of the 2019 International Conference on Internet of Vehicles (IOV '19)*, Kaohsiung, Taiwan, 2019, pp. 64–75.
17. **Yang Xiao*** and Jun Liu, "Research of Website Community Identification Based on Node2vec," in *Proceedings of the 2018 International Conference on Network, Communication, Computer Engineering (NCCE '18)*, Chongqing, China, 2018, pp. 609–616.

Submitted Manuscripts

1. **Yang Xiao***, Mohammad A. Salahuddin, Noura Limam, and Raouf Boutaba, "Multi-Agent Reinforcement Learning for Agentic AI-RAN: A Game-Theoretic Perspective," *IEEE Communications Magazine*, Under review.
2. Ying Yang and **Yang Xiao***, "Multi-Agent Deep Reinforcement Learning for Delay-Critical Multipath Routing in Knowledge-Defined Deterministic Networking," *IEEE Transactions on Network Science and Engineering*, Under review.

3. Niloy Saha*, Noura Limam, **Yang Xiao**, and Raouf Boutaba, "Kestrel: Rethinking Telemetry Design for Fine-Grained Anomaly Detection in 5G User Planes," *IEEE Transactions on Network and Service Management*, Under review.
4. Qifan Yan*, Mohammad A. Salahuddin, **Yang Xiao**, Mina Tahmasbi Arashloo, and Raouf Boutaba, "DNATree: Dynamic Tree Adaptation for Multi-Tenant In-Network Aggregation," in *Proceedings of the 24th USENIX Symposium on Networked Systems Design and Implementation (NSDI '27)*, Under review.

(**Corresponding Author*)

RESEARCH PROJECTS

DRL-CR: Deep Reinforcement Learning Based Cognitive Routing for Autonomous Networks
Project Leader May 2022 – Jun. 2024

- Designed the conceptual framework of deep reinforcement learning based cognitive routing.
- Prototyped deep reinforcement learning based cognitive routing schemes with OMNeT++.
- Developed P4-based SDN experimental platform for deep reinforcement learning based cognitive routing.

RL4Net: Packet-Level Network Simulation for Deep Reinforcement Learning Based Routing
Project Leader Mar. 2020 – Jun. 2024

- Developed the packet-level network simulator for deep reinforcement learning based routing with ns-3 and Gym.
- Unified plug-and-play APIs for universal formulations of deep reinforcement learning algorithms.
- Implemented state-of-the-art deep reinforcement learning algorithms as plug-in benchmark methods.
- Extended the simulator with OMNeT++ for better efficiency, scalability, and compatibility.

DRL-RA: Scalable Radio Resource Allocation via Deep Reinforcement Learning
Project Leader Mar. 2021 – Dec. 2023

- Formulated (multi-agent) deep reinforcement learning modelings for energy efficient radio resource allocation.
- Established effective collaboration and efficient communication mechanisms for multi-agent interplays.
- Evaluated model performance in a variety of application scenarios (e.g., D2D, MEC, IoT).
- Analyzed KPIs achieved by the proposed methods compared to the benchmark AI-based and conventional methods.

HONORS AND AWARDS

IEEE NOMS 2026 Best Paper Award May 2026
Awarded by IEEE NOMS 2026 Technical Program Committee

BUPT Excellent Doctoral Dissertation Award Jun. 2024
Awarded by Beijing University of Posts and Telecommunications

Outstanding Graduates of General Colleges and Universities (Ph.D.) Jun. 2024
Awarded by Beijing Municipal Education Commission

Outstanding Doctoral Graduates Jun. 2024
Awarded by Beijing University of Posts and Telecommunications

TongTech Scholarship for Doctoral Students Dec. 2023
Awarded by Beijing University of Posts and Telecommunications

IEEE IC-NIDC 2023 Best Paper Award Nov. 2023
Awarded by IEEE IC-NIDC 2023 Technical Program Committee

National Scholarship for Doctoral Students Dec. 2022
Awarded by the Ministry of Education of the People's Republic of China

Outstanding Doctoral Student Nov. 2022
Awarded by Beijing University of Posts and Telecommunications

IEEE ICC 2022 Student Travel Grant May 2022
Awarded by IEEE Communications Society (ComSoc)

IEEE GLOBECOM 2021 Student Travel Grant Dec. 2021
Awarded by IEEE Communications Society (ComSoc)

First Class Academic Scholarship Nov. 2020 & 2021
Awarded by Beijing University of Posts and Telecommunications

BUPT Excellent Ph.D. Students Foundation May 2020
Awarded by Beijing University of Posts and Telecommunications

Outstanding Doctoral Students Reserve Program Scholarship Apr. 2020
Awarded by Beijing University of Posts and Telecommunications

Outstanding Graduates of General Colleges and Universities (Bachelor) Jun. 2019
Awarded by Beijing Municipal Education Commission

ACADEMIC AND PROFESSIONAL SERVICE

Editorial Service

- Lead Guest Editor, Electronics, Special Issue on Advances in Wireless Network Technologies 2026

Peer-Review Service

- Reviewer, IEEE Transactions on Networking (TNET)
- Reviewer, IEEE Transactions on Mobile Computing (TMC)
- Reviewer, IEEE Transactions on Wireless Communications (TWC)
- Reviewer, IEEE Transactions on Parallel and Distributed Systems (TPDS)
- Reviewer, IEEE Transactions on Network and Service Management (TNSM)
- Reviewer, IEEE Transactions on Network Science and Engineering (TNSE)
- Reviewer, IEEE Transactions on Cognitive Communications and Networking (TCCN)
- Reviewer, IEEE Transactions on Vehicular Technology (TVT)
- Reviewer, IEEE Transactions on Industrial Informatics (TII)
- Reviewer, IEEE Transactions on Emerging Topics in Computational Intelligence (TETCI)
- Reviewer, ACM Transactions on Software Engineering and Methodology (TOSEM)
- Reviewer, IEEE Network
- Reviewer, IEEE Internet of Things Journal
- Reviewer, IEEE Systems Journal
- Reviewer, Swarm and Evolutionary Computation
- Reviewer, Neurocomputing
- Reviewer, Engineering Applications of Artificial Intelligence
- Reviewer, Knowledge-Based Systems
- Reviewer, IEEE GLOBECOM 2022/2023/2025
- Reviewer, IEEE ICC 2026
- Reviewer, IEEE WCNC 2026