Wanli Ni

School of Information and Communication Engineering charleswall@bupt.edu.cn

Beijing University of Posts and Telecommunications Telephone:+8615801681939

Education

Beijing University of Posts and Telecommunications Ph.D. September 2018 - June 2023

Supervisor: Hui Tian (Professor)

Research: 6G Networks, Edge Intelligence

Department: State Key Laboratory of Networking and Switching Technology

Beijing University of Posts and Telecommunications B.Eng. September 2014 - June 2018

Major: Communication Engineering

Department: School of Information and Communication Engineering

Research Experience

Nanyang Technological University Visiting Student December 2022 - June 2023

Supervisor: Dusit Niyato (President's Chair Professor)

Research: Federated Learning, Semantic Communication

Department: School of Computer Science and Engineering

Southern University of Science and Technology Visiting Student July 2022 - Sept. 2022

Supervisor: Changsheng You (Assistant Professor)

Research: Machine Learning in Wireless Communications

Department: Department of Electronic and Electrical Engineering

Queen Mary University of London Visiting Student September 2020 - June 2022

Supervisor: Yuanwei Liu (Senior Lecturer)

Research: Reconfigurable Intelligent Surface, Federated Learning

Department: School of Electronic Engineering and Computer Science

Working Type: Remote

Research Interests

** Communication-Efficient Federated Learning (FL) in Wireless Networks

** Multi-Functional Reconfigurable Intelligent Surface (RIS) Aided Communication

** Non-Orthogonal Multiple Access (NOMA) Inspired Next-Generation Communication

* Optimization Theory and Deep Reinforcement Learning (DRL) for Edge Intelligence

- Semantic Communication and Task-Oriented Transmission for Future 6G Networks
- Performance Analysis and Optimization of Integrated Sensing and Communication (ISAC)
- Intelligent Signal Processing for Emerging Topics in Internet of Things (IoT)
- Quantum Federated Learning, Medical Image Processing, AI-Generated Content, Metaverse

Journal Papers

[1] **Wanli Ni**, Y. Liu, Z. Yang, H. Tian and X. Shen, "Integrating Over-the-Air Federated Learning and Non-Orthogonal Multiple Access: What Role can RIS Play?," *IEEE Transactions on Wireless Communications*, vol. 21, no. 12, pp. 10083-10099, 2022.

[2] **Wanli Ni**, X. Liu, Y. Liu, H. Tian and Y. Chen, "Resource Allocation for Multi-Cell IRS-Aided NOMA Networks," *IEEE Transactions on Wireless Communications*, vol. 20, no. 7, pp. 4253-4268, 2021.

[3] **Wanli Ni**, Y. Liu, Y. C. Eldar, Z. Yang and H. Tian, "STAR-RIS Integrated Nonorthogonal Multiple Access and Over-the-Air Federated Learning: Framework, Analysis, and Optimization," *IEEE Internet of Things Journal*, vol. 9, no. 18, pp. 17136-17156, 2022.

[4] **Wanli Ni**, Y. Liu, Z. Yang, H. Tian and X. Shen, "Federated Learning in Multi-RIS-Aided Systems," *IEEE Internet of Things Journal*, vol. 9, no. 12, pp. 9608-9624, 2022.

[5] **Wanli Ni**, J. Zheng and H. Tian, "Semi-Federated Learning for Collaborative Intelligence in Massive IoT Networks," *IEEE Internet of Things Journal*, early access, 2023, doi: 10.1109/JIOT.2023.3253853.

[6] **Wanli Ni**, H. Tian, X. Lyu and S. Fan, "Service-dependent task offloading for multiuser mobile edge computing system," *Electronics Letters*, vol. 55, no. 15, pp. 839-841, 2019.

[7] W. Wang, H. Tian, and **Wanli Ni**, "Secrecy Performance Analysis of IRS-Aided UAV Relay System," *IEEE Wireless Communications Letters*, vol. 10, no. 12, pp. 2693-2697, 2021.

[8] M. Hua, H. Tian, X. Lyu, **Wanli Ni** and G. Nie, "Online Offloading Scheduling for NOMA-Aided MEC Under Partial Device Knowledge," *IEEE Internet of Things Journal*, vol. 9, no. 3, pp. 2227-2241, 2022.

[9] W. Wang, **Wanli Ni**, H. Tian and L. Song, "Intelligent Omni-Surface Enhanced Aerial Secure Offloading," *IEEE Transactions on Vehicular Technology*, vol. 71, no. 5, pp. 5007-5022, 2022.

[10] J. Ren, **Wanli Ni** and H. Tian, "Toward Communication-Learning Trade-off for Federated Learning at the Network Edge," *IEEE Communications Letters*, vol. 26, no. 8, pp. 1858-1862, 2022.

[11] W. Wang, **Wanli Ni**, H. Tian, Z. Yang, C. Huang and K.-K. Wong, "Safeguarding NOMA Networks via Reconfigurable Dual-Functional Surface Under Imperfect CSI," *IEEE Journal of Selected Topics in Signal Processing*, vol. 16, no. 5, pp. 950-966, 2022.

[12] R. Luo, **Wanli Ni**, H. Tian and J. Cheng, "Federated Deep Reinforcement Learning for RIS-Assisted Indoor Multi-Robot Communication Systems," *IEEE Transactions on Vehicular Technology*, vol. 71, no. 11, pp. 12321-12326, 2022.

[13] J. Zheng, H. Tian, **Wanli Ni**, W. Ni and P. Zhang, "Balancing Accuracy and Integrity for Reconfigurable Intelligent Surface-aided Over-the-Air Federated Learning," *IEEE Transactions on Wireless Communications*, vol. 21, no. 12, pp. 10964-10980, 2022.

[14] A. Zheng, **Wanli Ni**, W. Wang and H. Tian, "Enhancing NOMA Networks via Reconfigurable Multi-Functional Surface," *IEEE Communications Letters*, vol. 27, no. 4, pp. 1195-1199, 2023.

[15] J. Zheng, **Wanli Ni**, H. Tian, D. Gündüz, T. Q. S. Quek and Z. Han "Semi-Federated Learning: Convergence Analysis and Optimization of A Two-Tier Computing Framework," *IEEE Transactions on Wireless Communications*, early access, 2023, doi: 10.1109/TWC.2023.3270908.

Journal Papers Under Revision

[1] **Wanli Ni**, Y. Liu, H. Tian, K. Huang and N. A. Dhahir, "SemiFL: Semi-Federated Learning for Intelligent IoT Exploiting Next-Generation Multiple Access," *IEEE Internet of Things Journal*, major revision, 2023.

[2] **Wanli Ni**, H. Ao, H. Tian, Y. C. Eldar and D. Niyato, "FedSL: Federated Split Learning for Collaborative Healthcare Analytics on Resource-Constrained Wearable IoMT Devices," *IEEE Internet of Things Journal*, major revision, 2023.

[3] W. Wang, **Wanli Ni**, H. Tian, Y. C. Eldar and R. Zhang, "Multi-Functional Reconfigurable Intelligent Surface: System Modeling and Performance Optimization," *IEEE Transactions on Wireless Communications*, major revision, 2023.

[4] W. Wang, **Wanli Ni**, H. Tian and N. Al-Dhahir , "Performance Analysis and Optimization of Reconfigurable Multi-Functional Surface Assisted Wireless Communications," *IEEE Transactions on Communications*, major revision, 2023.

[5] R. Luo, **Wanli Ni**, H. Tian, J. Cheng and K.-C. Chen "Joint Trajectory and Radio Resource Optimization for Autonomous Mobile Robots Exploiting Multi-Agent Reinforcement Learning," *IEEE Transactions on Communications*, major revision, 2023.

[6] W. Wang, **Wanli Ni**, H. Tian, Y. C. Eldar and D. Niyato, "UAV-Mounted Multi-Functional RIS for Combating Eavesdropping in Wireless Networks," *IEEE Wireless Communications Letters*, minor revision, 2023.

Journal Papers Under Review

[1] J. Ren, **Wanli Ni**, H. Tian and G. Nie, "Convergence Analysis and Latency Minimization for Semi-Federated Learning in Massive IoT Networks," *IEEE Transactions on Green Communications and Networking*, under review, 2023.

[2] X. Zhang, H. Tian, **Wanli Ni**, Z. Yang and M. Sun, "Deep Reinforcement Learning for Energy Efficiency Maximization in SWIPT-Based Over-the-Air Federated Learning," *IEEE Transactions on Green Communications and Networking*, under review, 2023.

[3] A. Zheng, **Wanli Ni**, W. Wang, H. Tian, Y. C. Eldar and D. Niyato, "Multi-Functional RIS: Signal Modeling and Optimization," *IEEE Wireless Communications Letters*, under review, 2023.

[4] A. Zheng, **Wanli Ni**, W. Wang and H. Tian, "Next-Generation RIS: From Single to Multiple Functions," *IEEE Wireless Communications Letters*, under review, 2023.

[5] Y. Yan, Y. Wang, **Wanli Ni** and D. Niyato, "Joint Beamforming Design for Multi-Functional RIS-Aided Uplink Communications," *IEEE Communications Letters*, under review, 2023.

[6] H. Wei, **Wanli Ni**, W. Xu, F. wang, D. Niyato and P. Zhang, "Federated Semantic Learning Driven by Information Bottleneck for Task-Oriented Communications," *IEEE Communications Letters*, under review, 2023.

Conference Papers

[1] **Wanli Ni**, J. Zheng, Y. C. Eldar, C. You and K. Huang, "Semi-Federated Learning for Edge Intelligence with Imperfect SIC," in *Proc. IEEE ICASSP*, Rhodes Island, Greece, 2023.

[2] **Wanli Ni**, Y. Liu, H. Tian, Y. C. Eldar and K. Huang, "SemiFL: Semi-Federated Learning Empowered by Simultaneously Transmitting and Reflecting Reconfigurable Intelligent Surface," in *Proc. IEEE ICC*, Seoul, South Korea, 2022.

[3] **Wanli Ni**, X. Liu and H. Tian, "Battery-less Massive Access for Simultaneous Information Transmission and Federated Learning in WPT Networks," in *Proc. IEEE INFOCOM Posters*, virtual, 2022.

[4] **Wanli Ni**, Y. Liu, Y. C. Eldar, Z. Yang and H. Tian, "Enabling Ubiquitous Non-Orthogonal Multiple Access and Pervasive Federated Learning via STAR-RIS," in *Proc. IEEE GLOBECOM*, Madrid, Spain, 2021.

[5] **Wanli Ni**, Y. Liu, Z. Yang and H. Tian, "Over-the-Air Federated Learning and Non-Orthogonal Multiple Access Unified by Reconfigurable Intelligent Surface," in *Proc. IEEE INFOCOM Workshops*, Vancouver, Canada, 2021.

[6] **Wanli Ni**, Y. Liu and H. Tian, "Intelligent Reflecting Surfaces Enhanced Federated Learning," in *Proc. IEEE GLOBECOM Workshops*, Taipei, Taiwan, 2020.

[7] **Wanli Ni**, X. Liu, Y. Liu, H. Tian and Y. Chen, "Intelligent Reflecting Surface Aided Multi-Cell NOMA Networks," in *Proc. IEEE GLOBECOM Workshops*, Taipei, Taiwan, 2020.

[8] **Wanli Ni**, H. Tian, S. Fan and G. Nie, "Optimal Transmission Control and Learning-Based Trajectory Design for UAV-Assisted Detection and Communication," in *Proc. IEEE PIMRC*, London, UK, 2020.

[9] **Wanli Ni**, H. Tian, S. Fan and B. Liu, "Revenue-Maximized Offloading Decision and Fine-Grained Resource Allocation in Edge Network," in *Proc. IEEE WCNC*, Marrakesh, Morocco, 2019.

[10] M. Hua, H. Tian, **Wanli Ni** and S. Fan, "Energy Efficient Task Offloading in NOMA-Based Mobile Edge Computing System," in *Proc. IEEE PIMRC*, Istanbul, Turkey, 2019.

[11] J. Zheng, H. Tian, **Wanli Ni** and Y. Sun, "Cost Minimization for Remote Health Monitoring Under Delay and Reliability Constraints," in *Proc. IEEE ICCC Workshops*, Chongqing, China, 2020.

[12] G. Hao, **Wanli Ni**, H. Tian and L. Cao, "Mobility-Aware Trajectory Design for Aerial Base Station Using Deep Reinforcement Learning," in *Proc. IEEE WCSP*, Nanjing, China, 2020.

[13] L. Cao, **Wanli Ni**, H. Tian, M. Hua and G. Hao, "UAV-Assisted Cellular System: Offloading Strategy and Bandwidth Allocation," in *Proc. IEEE SAGC*, Beijing, China, 2020.

[14] W. Li, **Wanli Ni**, H. Tian and M. Hua, "Deep Reinforcement Learning for Energy-Efficient Beamforming Design in Cell-Free Networks," in *Proc. IEEE WCNC Workshops*, Nanjing, China, 2021.

[15] J. Ren, J. Sun, H. Tian, **Wanli Ni**, G. Nie and Y. Wang, "Joint Resource Allocation for Efficient Federated Learning in Internet of Things Supported by Edge Computing," in *Proc. IEEE ICC Workshops*, Montreal, Canada, 2021.

[16] M. Hua, H. Tian and **Wanli Ni**, "Online Scheduling and Optimality Analysis for NOMA-Based MEC Systems," in *Proc. IEEE ICC Workshops*, Montreal, Canada, 2021.

[17] M. Hua, **Wanli Ni**, H. Tian and G. Nie, "Energy-Efficient Uplink Power Control in NOMA Enhanced Cell-Free Massive MIMO Networks," in *Proc. IEEE ICCC Workshops*, Xiamen, China, 2021.

[18] Y. Li, **Wanli Ni**, H. Tian, M. Hua and S. Fan, "Rate Splitting Multiple Access for Joint Communication and Sensing Systems with Unmanned Aerial Vehicles," in *Proc. IEEE ICCC Workshops*, Xiamen, China, 2021.

[19] R. Luo, H. Tian and **Wanli Ni**, "Communication-Aware Path Design for Indoor Robots Exploiting Federated Deep Reinforcement Learning," in *Proc. IEEE PIMRC*, Helsinki, Finland, 2021.

[20] W. Wang, H. Tian, **Wanli Ni** and M. Hua, "Reconfigurable Intelligent Surface Aided Secure UAV Communications," in *Proc. IEEE PIMRC*, Helsinki, Finland, 2021.

[21] J. Zheng, **Wanli Ni**, H. Tian and Y. Wang, "QoS-Constrained Federated Learning Empowered by Intelligent Reflecting Surface," in *Proc. IEEE PIMRC*, Helsinki, Finland, 2021.

[22] W. Wang, **Wanli Ni** and H. Tian, "Securing Aerial Offloading via Intelligent Omni-Surface," in *Proc. IEEE GLOBECOM Workshops*, Madrid, Spain, 2021.

[23] X. Zhang, G. Nie, **Wanli Ni** and H. Tian, "Multi-Agent Deep Reinforcement Learning Based Consistency Control in Train Platoon Systems," in *Proc. IEEE Smart City*, Haikou, China, 2021.

[24] Y. Ruan, G. Nie, **Wanli Ni**, H. Tian and J. Ren, "Efficient Traffic Scheduling for Coexistence of eMBB and uRLLC in Industrial IoT Networks," in *Proc. IEEE WCNC*, Austin, USA, 2022.

[25] W. Wang, **Wanli Ni**, H. Tian, Z. Yang, C. Huang and K.-K. Wong, "Robust Design for STAR-RIS Secured Internet of Medical Things," in *Proc. IEEE ICC Workshops*, Seoul, South Korea, 2022.

[26] J. Zheng, **Wanli Ni**, H. Tian, D. Gündüz and T. Q. S. Quek, "Semi-Federated Learning: An Integrated Framework for Pervasive Intelligence in 6G Networks," in *Proc. IEEE INFOCOM Workshops*, virtual, 2022.

[27] R. Luo, **Wanli Ni** and H. Tian, "Visualizing Multi-Agent Reinforcement Learning for Robotic Communication in Industrial IoT Networks," in *Proc. IEEE INFOCOM Demos*, virtual, 2022.

[28] X. Zhang, H. Tian, **Wanli Ni** and M. Sun, "Deep Reinforcement Learning for Over-the-Air Federated Learning in SWIPT-Enabled IoT Networks," in *Proc. IEEE VTC-Fall Workshops*, London/Beijing, 2022.

[29] W. Wang, **Wanli Ni**, H. Tian and N. A. Dhahir, "Multi-Functional RIS: An Integration of Reflection, Amplification, and Energy Harvesting," in *Proc. IEEE GLOBECOM*, Rio de Janeiro, Brazil, 2022.

[30] X. Liu, **Wanli Ni**, H. Tian and Y. Wu, "Simultaneous Federated Learning and Information Transmission Over Time-Varying MIMO Channels," in *Proc. IEEE GLOBECOM Workshops*, Rio de Janeiro, Brazil, 2022.

[31] W. Li, **Wanli Ni**, R. Luo, H. Tian, Z. Yang and C. Huang, "Distributed RIS-Enhanced Cell-Free NOMA Networks," in *Proc. IEEE GLOBECOM Workshops*, Rio de Janeiro, Brazil, 2022.

[32] Y. Yan, Y. Wang, J. Zhao and **Wanli Ni**, "Request Oriented Cache Update for Age of Information Minimization in Industrial Control Systems," in *Proc. IEEE ICC*, Rome, Italy, 2023.

[33] Y. Wang, J. Zheng, **Wanli Ni** and H. Tian, "Convergence Analysis and Optimization of Over-the-Air Federated Meta-Learning," in *Proc. IEEE ICC Workshops*, Rome, Italy, 2023.

[34] Y. Zhang, Y. Zhang, J. Wang, S. Xiao, **Wanli Ni** and W. Tang, "Robust Beamfocusing for FDA-Aided Near-Field Covert Communications With Uncertain Location," in *Proc. IEEE ICC Workshops*, Rome, Italy, 2023.

[35] W. Wang, **Wanli Ni**, H. Tian and Y. C. Eldar, "Multi-Functional Reconfigurable Intelligent Surface," in *Proc. IEEE ICASSP*, Rhodes Island, Greece, 2023.

Awards and Scholarships

Outstanding Graduate, Beijing University of Posts and Telecommunications (BUPT) 2023
Exemplary Reviewer, IEEE Transactions on Communications (TCOM) 2022
Exemplary Reviewer, IEEE Communications Letters (CL) 2022
IEEE GLOBECOM Student Travel Grant, IEEE Communications Society (ComSoc) 2022
National Scholarship, Beijing University of Posts and Telecommunications (BUPT) 2022
IEEE ICC Student Travel Grant, IEEE Communications Society (ComSoc) 2022
IEEE INFOCOM Student Conference Grant, IEEE Communications Society (ComSoc) 2022
IEEE GLOBECOM Student Travel Grant, IEEE Communications Society (ComSoc) 2021
Exemplary Reviewer, IEEE Wireless Communications Letters (WCL) 2021
National Scholarship, Beijing University of Posts and Telecommunications (BUPT) 2021
Best Paper Award, International Conference on Space-Air-Ground Computing (SAGC) 2020
First-Class PhD Scholarship, Beijing University of Posts and Telecommunications (BUPT) 2020
Excellent Graduate Student Award, Beijing Univ. of Posts and Telecommun. (BUPT) 2020
First-Class PhD Scholarship, Beijing University of Posts and Telecommunications (BUPT) 2019
Samsung Scholarship, Beijing University of Posts and Telecommunications (BUPT) 2019
Outstanding Undergraduate Thesis Award, Beijing Univ. of Posts and Telecommun. 2018

Professional Service

Journal Reviewer

IEEE Journal on Selected Areas in Communications
IEEE Journal of Selected Topics in Signal Processing
IEEE Internet of Things Journal
IEEE Transactions on Wireless Communications
IEEE Transactions on Communications
IEEE Transactions on Vehicular Technology
IEEE Transactions on Signal Processing
IEEE Transactions on Information Forensics & Security
IEEE Transactions on Green Communications and Networking
IEEE Transactions on Machine Learning in Communications and Networking
IEEE Wireless Communications Letters
IEEE Communications Letters
IEEE Wireless Communications Magazine
IEEE Network
IEEE Sensors Journal
IEEE Systems Journal

Conference TPC Member

IEEE ICC Workshop on Edge5GMN 2023
IEEE INFOCOM Workshop on ICCN 2023
IEEE GLOBECOM Workshop on EL5GMNB 2022
IEEE WCSP 2022

Conference Session Chair

IEEE VTC-Fall, Session on Power Allocation 2022