Jiquan Xie

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Contact information

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Research interests

Wireless networking, V2X, Motion Planning, Game theory, Reinforcement learning

Education career

September 23, 1991	Born in Ruijin City, Jiangxi Province, China	
June 31, 2013	Communication engineering, University of Electronic Science and technology	**Bachelor's degree**
June 31, 2016	Electronic engineering, University of Electronic Science and technology	**Master's degree**
July 2016 ~ August 2018	Information Technology Department, Bank of Shanghai	**Software Engineer**
September 2018 ~ March 2019	Shanghai Jiao tong University	**Ph.D. (Quit), Research Assistant**
April 2019 ~ September 2021	Computing and Software systems, Nagoya University	**Doctor's degree**
October 2021 ~ present	Information Technology Center, Nagoya University	**Postdoctoral researcher**

Research projects

✧ **Multiuser collaborative mobility control based on Game Theory**   (Co-operation with Toyota Central R&D labs)

Multiple intelligent terminals are limited by external interference and noise in complex traffic environments. The communication performance of wireless transmission is a bottleneck, and the accuracy and time complexity of traditional algorithms are low. A new IPG game based on multiuser collaboration is proposed, which makes full use of the cooperative mobility feature to break through the user's inherent selfish transmission bottleneck. Compared with traditional algorithms, the throughput is improved by **27.27%** and the complexity is reduced by **60.39%**.   [J4, C11]

✧ **V2P-NOMA Path planning based on Graph Theory**   (Co-operation with National Institute of Informatics, Prof. Y. Ji)

Vehicular data offloading is a closed-loop of vehicle 5G technology, which transmits data to edge server via vehicle-person (V2P) to achieve low latency and high-speed. To solve the vehicle path planning problem (NP-hard) based on NOMA communication in complex traffic, a conflict graph search (MTOP) algorithm is proposed. By calculating upper and lower bound, the domain of the approximate optimal solution is obtained, which reduces the complexity. Compared with the traditional algorithm, the complexity and transmission delay are reduced by **44.12%** and **37.91%**.   [J3, C10]

✧ **CWS-V2V trajectory planning based on reinforcement learning**   (Co-operation with Toyota Central R&D labs)

Among the solutions for CWS, the effective smoothing of track changes to prevent vehicle collisions has been the focus of ADAS research. However, most current V2V control research does not consider the implementation in real-time communication systems. We propose a reinforcement learning-based control method for trajectory planning in NOMA communication systems. Distinguishing from traditional methods, we compute thresholds in NOMA-CWS communication frames by adding a reinforcement learning module and a collision threshold alarm module in the decision layer. Referring to industry metrics (Baidu Apollo, Toyota Central R&D labs), the solution achieves a **12.78%** improvement in the smoothness of the variable trajectory and in a NOMA system that satisfies anti-collision. [J1, C5]

✧ **Experiment: Performance evaluation of wire harness in IEEE 802.11ad** (Co-operation with Kyoto University)

To explore the interference and path fading of in-vehicle electronic devices by Wire harness, we evaluate the transmission performance of in-vehicle IEEE 802.11 ad. The experiment is carried out in the microwave anechoic

chamber, and the communication results of each location (Dashboard, Front seat, etc.) are obtained.   [J2, C5]

Awards & Social activities

IEEE Member, IEICE Member, Visiting researcher, National Institute of Information Science (NII)

IEEE Communication Society CQR-TC member, IEEE Transactions on Industrial Electronics, GLOBECOM reviewer

[1] 2021 IEEE Nagoya Section Young Researcher Award

[2] Nagoya University Academic Award nomination (top 1% PhD)

[3] 2021 IEEE Nagoya Section International Conference Award

[4] 2015 Award of ZTE moon cup algorithm competition (Chengdu)

IT Skills

[1] Master the implementation of probabilistic roadmaps (PRM), rapid exploring random trees (RRT), rapid exploring random graphs (RRG) and other algorithms in MATLAB, as well as the joint simulation of Prescan & Automated Driving Toolbox.

[2] Familiar with Python development framework, solid **C/Python/MATLAB** ability. (2 years of work experience)

Research funding

★ 2019 Doctoral Education Promotion Institute, Graduate School of Informatics, Nagoya University   **280,000 ¥**
   Research theme: Multiuser Cooperative Mobility in Mobile Ad Hoc Network System Based on Game Theory

★ 2020 Doctoral Education Promotion Institute, Graduate School of Informatics, Nagoya University   **280,000 ¥**
   Research theme: V2X Mobile Control Communication System Based on Graph Theory

★ 2021 The Public Foundation of Chubu Science and Technology Center, AI research   **1,000,000 ¥** (Under view)
   Research theme: V2V Path Planning Algorithm Based on Reinforcement Learning

Publication

✱ **4** **IEEE journals, 5 IEEE International Conferences, 2 IEICE conferences and 3 patents.**

[J1] **Jiquan Xie**, Yusheng Ji, Takeshi Hirai, Tutomu Murase, "Potential games for maximizing throughput based on multiuser cooperative mobility in social MANETs", IEEE Internet of Things Journal, 2021. (under view)

[J2] **Jiquan Xie** and Tutomu Murase, "Effective Collaboration to Maximize Throughput Based on Multiuser Cooperative Mobility in Social-Physical Ad Hoc Networks", IEEE Open Journal of the Communications Society, vol. 2, pp. 818-835, Apr. 2021.

[J3] **Jiquan Xie** and Tutomu Murase, "An Optimal Location Allocation by Multi-User Cooperative Mobility for Maximizing Throughput in MANETs", IEEE Access, vol. 8, pp. 226089 - 226107, Dec. 2020.

[J4] **Jiquan Xie** and Tutomu Murase, "Multiple User Cooperative Mobility in Mobile Ad Hoc Networks: An Interaction Position Game", IEEE Access, vol. 8, pp. 126297 - 126314, Jul. 2020.

[C5] **Jiquan Xie**, Takeshi Hirai, Yulan Gao and Tutomu Murase. "Optimal dynamic power allocation based on multiuser cooperative mobility for energy efficiency", IEEE International Conference on Communications (ICC), Seoul, May. 2022. (under view)

[C6] **Jiquan Xie** and Tutomu Murase. "Potential Games for Improving Throughput of Social Relay Networks by Multi-User Cooperative Mobility", IEEE International Conference on Communications (ICC), Montreal, Jun. 2021.

[C7] **Jiquan Xie** and Tutomu Murase. "Maximum Throughput Strategy Based on Multiuser Cooperative Mobility Under Different Location Distributions in MANETs", 2021 IEEE 10th Global Conference on Consumer Electronics (GCCE), Oct. 2021.

[C8] **Jiquan Xie**, L. Dan, L. Yin, Z. Sun, and Y. Xiao, "An energy-optimal scheduling for collaborative execution in mobile cloud computing", IEEE international conference and workshop on computing and communication (IEMCON), Oct. 2015, pp. 1–6.

[C9] Zou X B, Ma Q L, **Jiquan Xie**. "Performance evaluation in PAPR for SIM-OFDM systems", Multimedia, Communication and Computing Application: Proceedings of the 2014 International Conference on Multimedia, Communication and Computing Application (MCCA 2014), Xiamen, China, October 16-17, 2014.

[C10] **Jiquan Xie**, Tutomu Murase, "Multiple User Cooperative Mobility with An Interaction Position Game in Ad Hoc Networks for Improving Throughput," in IEICE Technical Report, Mar. 2021.

[C11] **Jiquan Xie**, Tutomu Murase, "Improvement of System Throughput by Multiple User Mobility in Multiple Ad Hoc Networks," in IEICE Technical Report, Mar. 2020.

[P12] Lilin Dan, **Jiquan Xie,** "A resource optimization algorithm based on cloud computing platform", CN201410439319.4, 2014.

[P13] Lilin Dan, **Jiquan Xie**, S.H. Cheng, Z.J. Sun, X.B. Liu, "A relay selection algorithm based on body area network platform", CN105246122A, 2015.

[P14] Lilin Dan, **Jiquan Xie**, W.C Guo, S.J. Cai, Y.Y Zhu, "A critical data unloading method based on mobile cloud computing", CN105100500A, 2015.