

Dr. Zirui Zhuang

## CONTACT INFORMATION

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Research Building 511, XiTuCheng Rd. #10, zr.zz.alp@gmail.com,  
Beijing, China, 100876 zhuangzirui@bupt.edu.cn

## EDUCATION

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**Beijing University of Posts and Telecommunications**, Beijing, China  
Ph.D. in Information and Communication Engineering, November, 2020  
B.S. in Electronic Information Engineering, July, 2015

## ACADEMIA EXPERIENCE

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<b>Beijing University of Posts and Telecommunications</b> , Beijing, China	
<i>Associate Researcher</i>	<b>January, 2023 - Present</b>
<i>Postdoctoral Research Fellow</i>	<b>January, 2021 - January, 2023</b>
<b>University of Houston</b> , Texas, United States	
<i>Visiting Scholar</i>	<b>May, 2019 - November, 2019</b>

## INDUSTRY EXPERIENCE

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<b>E-Byte Co., Ltd.</b> , (formerly known as EBupt Co., Ltd.), Beijing, China	
<i>Technical Expert</i>	<b>February, 2022 - Present</b>
<i>Senior Research and Development</i>	<b>November, 2020 - February, 2022</b>
<i>Research and Development</i>	<b>September, 2015 - November, 2020</b>
<i>Internship</i>	<b>September, 2014 - September, 2015</b>

## GRANT

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### Academia Projects

1. **Principal Investigator** of general project: "Knowledge-Driven Intelligent Decision Theory for Edge Networks Routing," China Postdoc Science Foundation, CNY 80,000, 2022M710468, 2022-2024.
2. **Principal Investigator** of young scientists project: "Case-Based Learning for Intelligent Routing in Edge Networks: Mechanism, Theory, and Stability Analysis," National Natural Science Foundation of China, CNY 300,000, 62101064, 2021-2024.
3. **Participant** of general project: "A Research on Transient Edge Resource Collaboration Theory for Autonomous Driving Networks," National Natural Science Foundation of China, CNY 640,000, 62071067, 2021-2024.
4. **Participant** of a subproject of "Broadband Communications and New Networks," National Key Research and Development Program of China, CNY 6,740,000, 2020-2023.

5. **Participant** of general project: "A research on Machine Learning-Based Resource Management Optimization for Software-Defined Networks," Natural Science Foundation of Beijing, CNY 180,000, 4182041, 2018-2020.
6. **Participant** of general project: "A Research on Multi-Path Transmission Mechanism and Joint Optimization Theory for Software-Defined Data Centers," National Natural Science Foundation of China, CNY 580,000, 61671079, 2017-2020.

### **Industry Projects**

1. **Participant** of collaboration project "A Research on the Theory and Technologies of Knowledge-Defined Networking," BUPT-CM Innovation Center, CNY 2,450,000, 2020-2023.

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## **PROFESSIONAL ACTIVITIES**

### **Technical Program Committee**

- Member of Technical Program Committee of ACM International Conference on Multimedia Retrieval (ICMR), 2023

### **Invited Talk**

- Invited Talk, "Knowledge-Defined Edge Network Routing," 2022 Cross Strait Radio Science and Wireless Technology Conference (CSRSWTC), December, 2022

### **Reviewer**

- IEEE Journal on Selected Areas in Communications
- IEEE Internet of Things Journal
- IEEE Systems Journal
- IEEE Transactions on Mobile Computing
- IEEE Communications Letters
- Future Generation Computer Systems
- Ad Hoc & Sensor Wireless Networks
- Journal of Communications and Networks
- Springer Journal of Cloud Computing: Advances, Systems and Applications
- Scientific Reports
- SN Applied Sciences
- Artificial Intelligence in Medicine
- Results in Control and Optimization
- IEEE WCNC 2022

- IEEE WCNC 2021 Workshops
- IEEE ICC 2020
- MobiQuitous 2019

## PUBLICATIONS

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### Edited Books

1. Qi Qi, Xiaoyuan Fu, Zirui Zhuang, Jingyu Wang, and Jianxin Liao. *Deep Reinforcement Learning for Network Intelligence*. Posts & Telecom Press Co., Ltd., 2021.
2. Jingyu Wang, Haifeng Sun, Jianxin Liao, Jing Wang, Qi Qi, and Zirui Zhuang. *Smart Service Cloud Networks (Edition 2)*. Posts & Telecom Press Co., Ltd., 2019.
3. Jingyu Wang, Jianxin Liao, Jing Wang, Qi Qi, and Zirui Zhuang. *Smart Service Cloud Networks*. Posts & Telecom Press Co., Ltd., 2017.

### Journal Publications

*Published or Accepted*

1. Long Zhang, Xiaozheng Ma, Zirui Zhuang, Haitao Xu, Vishal Sharma, and Zhu Han. "Q-Learning Aided Intelligent Routing with Maximum Utility in Cognitive UAV Swarm for Emergency Communications." *IEEE Transactions on Vehicular Technology*, November 2022, 1–16. *Early access*.
2. Tianjian Dong, Qi Qi, Jingyu Wang, Zirui Zhuang, Haifeng Sun, Jianxin Liao, and Zhu Han. "Standing on the Shoulders of Giants: Cross-Slice Federated Meta Learning for Resource Orchestration to Cold-Start Slice." *IEEE/ACM Transactions on Networking*, August 2022, 1–18. *Early access*.
3. Tianjian Dong, Zirui Zhuang, Qi Qi, Jingyu Wang, Haifeng Sun, F. Richard Yu, Tao Sun, Cheng Zhou, and Jianxin Liao. "Intelligent Joint Network Slicing and Routing via GCN-Powered Multi-Task Deep Reinforcement Learning." *IEEE Transactions on Cognitive Communications and Networking* vol. 8, num. 2, (June 2022): 1269–1286.
4. Jingyu Wang, and Zirui Zhuang. "Research on a Knowledge-Defined Polymorphic Network Attainable Service Architecture." *Journal on Communications* vol. 43, num. 4, (April 2022): 71–82.
5. Jingyu Wang, Cheng Zhou, Lei Zhang, Cong Liu, Zirui Zhuang, Hongwei Yang, Danyang Chen, Yanhong Zhu, Lu Lu, and Jianxin Liao. "Knowledge-Defined Intent-Based Network Autonomy." *Telecommunications Science* vol. 37, num. 9, (September 2021): 1–13.
6. Tianjian Dong, Qi Qi, Jingyu Wang, Alex X. Liu, Haifeng Sun, Zirui Zhuang, and Jianxin Liao. "Generative Adversarial Network-Based Transfer Reinforcement Learning for Routing with Prior Knowledge."

- IEEE Transactions on Network and Service Management* vol. 18, num. 2, (May 2021): 1673–1689.
7. Zirui Zhuang, Jingyu Wang, Qi Qi, Jianxin Liao, and Zhu Han. “Adaptive and Robust Routing with Lyapunov-Based Deep RL in MEC Networks Enabled by Blockchains.” *IEEE Internet of Things Journal* vol. 8, num. 4, (February 2021): 2208–2225.
  8. Kai-Chu Tsai, Zirui Zhuang, Ricardo Lent, Jingyu Wang, Qi Qi, Lichun Wang, and Zhu Han. “Tensor-Based Reinforcement Learning for Network Routing.” *IEEE Journal of Selected Topics in Signal Processing* vol. 15, num. 3, (February 2021): 617–629.
  9. Dezhi Chen, Qi Qi, Zirui Zhuang, Jingyu Wang, Jianxin Liao, and Zhu Han. “Mean Field Deep Reinforcement Learning for Fair and Efficient UAV Control.” *IEEE Internet of Things Journal* vol. 8, num. 2, (January 2021): 813–828.
  10. Qi Qi, Lingxin Zhang, Jingyu Wang, Haifeng Sun, Zirui Zhuang, Jianxin Liao, and F Richard Yu. “Scalable Parallel Task Scheduling for Autonomous Driving Using Multi-Task Deep Reinforcement Learning.” *IEEE Transactions on Vehicular Technology* vol. 69, num. 11, (November 2020): 13861–13874.
  11. Zirui Zhuang, Jingyu Wang, Qi Qi, Haifeng Sun, and Jianxin Liao. “Toward Greater Intelligence in Route Planning: A Graph-Aware Deep Learning Approach.” *IEEE Systems Journal* vol. 14, num. 2, (June 2020): 1658–1669.
  12. Jingyu Wang, Zirui Zhuang, Qi Qi, Tonghong Li, and Jianxin Liao. “Deep Reinforcement Learning-Based Cooperative Interactions Among Heterogeneous Vehicular Networks.” *Applied Soft Computing* vol. 82, (September 2019): 105557.
  13. Zirui Zhuang, Wang Jingyu, and Tong Xu. “Tenant-Oriented Customized Vm Networking Technology.” *Telecommunications Science* vol. 31, num. 10, (October 2015): 144–150.

*In Revision or Submitted*

14. Yu Liu, Zirui Zhuang, Qi Qi, Jingyu Wang, Dezhi Chen, Lu Lu, Hongwei Yang, Jianxin Liao, and Zhu Han. “Slice Sandwich: Jagged Slicing Multi-tier Dynamic Resources for Diversified V2X Services.” Submitted to *IEEE Transactions on Mobile Computing*.
15. Yu Liu, Jingyu Wang, Qi Qi, Zirui Zhuang, Jianxin Liao, and Zhu Han. “Towards High-Powered Connected Autonomous Vehicles: A Cooperative Solution via Transient Edge Intelligence Provision.” Submitted to *IEEE Communications Magazine*.

**Conference Publications**

*Published or Accepted*

1. Menghao Zhang, Jingyu Wang, Jing Wang, Qi Qi, Zirui Zhuang, Haifeng Sun, and Ning Xiao. “Robust Video Anomaly Detection

- Framework via Prior Knowledge and Multi-Path Frame Prediction.” In *2023 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP’23)*. Rhodes Island, Greece, 2023. *Accepted*.
2. Peng Zhan, Guangyi Qin, Xingxin Qian, Xiong Wang, Jing Ren, Zirui Zhuang, and Shizhong Xu. “Deep Reinforcement Learning Based Fast Anomaly Detection and Localization for Programmable Networks.” In *2023 IEEE International Conference on Communications (ICC’23)*. Rome, Italy, 2023. *Accepted*.
  3. Shaoxiong Zhu, Qi Qi, Zirui Zhuang, Jingyu Wang, Haifeng Sun, and Jianxin Liao. “FedNKD: A Dependable Federated Learning Using Fine-Tuned Random Noise and Knowledge Distillation.” In *2022 ACM International Conference on Multimedia Retrieval (ICMR’22)*, 185–193. Newark, NJ, USA, 2022.
  4. Yixiao Li, Lixiang Li, Zirui Zhuang, Yuan Fang, and Yixian Yang. “ResNet Approach for Coding Unit Fast Splitting Decision of HEVC Intra Coding.” In *2021 IEEE Sixth International Conference on Data Science in Cyberspace (DSC’21)*, 130–135. IEEE, 2021.
  5. Bo He, Jingyu Wang, Qi Qi, Haifeng Sun, Zirui Zhuang, Cong Liu, and Jianxin Liao. “DeepHop on Edge: Hop-by-Hop Routing by Distributed Learning with Semantic Attention.” In *International Conference on Parallel Processing (ICPP’20)*, 1–11, 2020.
  6. Zirui Zhuang, Jingyu Wang, Qi Qi, Jianxin Liao, and Zhu Han. “Adaptive and Robust Network Routing Based on Deep Reinforcement Learning with Lyapunov Optimization.” In *IEEE/ACM International Symposium on Quality of Service (IWQoS’20)*, 1–10. IEEE, 2020.
  7. Yu Zhang, Zirui Zhuang, Feifei Gao, Jingyu Wang, and Zhu Han. “Multi-Agent Deep Reinforcement Learning for Secure UAV Communications.” In *IEEE Wireless Communications and Networking Conference (WCNC’20)*, 1–5. IEEE, 2020.
  8. Zirui Zhuang, Jingyu Wang, Qi Qi, Haifeng Sun, and Jianxin Liao. “A Case-Based Decision System for Routing in Packet-Switched Networks.” In *IEEE International Performance Computing and Communications Conference (IPCCC’18)*, 1–2. IEEE, 2018.
  9. Zirui Zhuang, Jingyu Wang, Qi Qi, Haifeng Sun, and Jianxin Liao. “Graph-Aware Deep Learning Based Intelligent Routing Strategy.” In *IEEE Conference on Local Computer Networks (LCN’18)*, 441–444. IEEE, 2018.
  10. Yunming Xiao, Haifeng Sun, Zirui Zhuang, Jingyu Wang, and Qi Qi. “Common Knowledge Based Transfer Learning for Traffic Classification.” In *IEEE Conference on Local Computer Networks (LCN’18)*, 311–314. IEEE, 2018.

## TEACHING EXPERIENCE

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**Beijing University of Posts and Telecommunications, Beijing, China**

- *Guest Lecturer, Undergraduate*
  - *The Introduction of Software-Defined Networking*
  - **Spring, 2023**
- *Guest Lecturer, Undergraduate*
  - *The Evolution of Information Technology*
  - **Fall, 2021, 2022**

**HOBBY**

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Swimming, cycling, and weight-lifting.