

# Qiushi Wei (she/her)

Ph.D. in Computer Science

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## EXECUTIVE SUMMARY

I am a Ph.D. in Computer Science at Colorado School of Mines (Mines). I completed my doctoral defense in October, with my official graduation in December 2025. I am actively looking for an assistant professor position at a research-intensive institute starting in 2026 Spring or Fall. I have published peer-reviewed papers across various areas, including Networks, Payment Channel Networks, Sharding Systems, Blockchains, Security and Satellite Networks, with some of these works appearing in prestigious conferences such as IEEE INFOCOM, IEEE ICC, IEEE ICDCS, and IEEE ICMLA. I have received INFOCOM and ICNP travel grants for my research, where I gained valuable insights into research presentation, explored potential collaborations, and deepened my understanding of the fundraising process from various sources, all of which will serve as a strong foundation for my future career. I have worked as a Teaching Assistant at Mines across many semesters. With support from the National Science Foundation (NSF), which cultivates the early-career research community to confront emerging challenges, I have been shaping research agendas in blockchains, networking, cybersecurity, and distributed systems.

## RESEARCH INTERESTS

- Systems** Computer Networking, Blockchain and Payment Channel Network, Cybersecurity, Edge Computing, Internet-of-Things (IoT), Quantum Computing, Satellite Networks
- Theories** Applied Cryptography, Universal Compatibility Framework, Game Theory, Optimization, Approximation Algorithms, Resource Allocation, Robust Design

## EDUCATION

- 2021–present** M.S. and Ph.D. in Computer Science, Colorado School of Mines.  
Advisor Dr. Dejun (DJ) Yang —✉ djyang@mines.edu —🌐 people.mines.edu/djyang/
- 2018–2021** M.S. in Applied Chemistry, Colorado School of Mines.
- 2015–2018** M.S. in Chemistry and Physics of Polymers (Material), South China University of Technology.
- 2011–2015** B.S. in Chemistry (Education), Hubei University.

## RESEARCH EXPERIENCES

- 2021–present** Research Assistant, Colorado School of Mines, Advisor: Dr. Dejun (DJ) Yang
- Project Topic** Design a sharding protocol integrated with multiparty virtual payment channels
- Proposed a secure, decentralized mechanism for cross-shard transactions by replacing single-point intermediaries.
  - Leveraged dynamically formed multiparty virtual payment channel for maximum channel capacity.
  - Supported transactions involving multiple senders and receivers.

**Project Topic** **Designed an innovative distributed sharding protocol for blockchains**

- Proposed a novel sharding protocol that leverages payment channels for efficient cross-shard transactions in sharded blockchains, further improving the scalability of blockchains and realizing distributed storage of blockchains.
- Utilized the threshold signature scheme to sign messages in batches to improve the transaction throughput.
- Developed an atomicity mechanism of cross-shard transactions, achieving constant communication complexity  $O(1)$  between shards and reducing over 40% latency compared to state-of-the-art protocols.

**Project Topic** **Designed an optimal virtual payment channel (VPC) construction protocol**

- Designed a new metric for evaluating both the number of intermediaries and the capacity of the constructed VPCs.
- Investigated a recursive VPC construction protocol based on the smallest architecture: one-intermediary two-end party VPC.
- Achieved the optimization of the VPC construction through a game-theory algorithm for multiple pairs of users.

**Project Topic** **Designed an innovative rebalancing protocol for payment channel networks**

- Invented a distributed balance-aware routing protocol, which reaches high throughput while considering the channel balance.
- Modified the original HTLC to provide efficiency and adapt it to balance-aware routing to guarantee atomicity.
- Achieved nearly 100% success ratio and 100% success volume based on real banking transaction history.

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## INTERNSHIPS

**2023 Spring** Undergraduate Mentor of **Google CSR Program, Colorado School of Mines:**

- Analyzed and summarized common rebalancing routing protocols with the undergraduate students.
- Developed new rebalancing protocols to replenish payment channels based on the circle-based rebalancing protocol.

**2018 Fall -** Undergraduate Lab Mentor, *Colorado School of Mines*:

**2019 Spring** ○ Supervised and trained undergraduate students in a chemistry lab.

- Supervised laboratory safety procedures, guided experimental design, and ensured adherence to proper research practices.

**2014 Fall** High School Teacher Intern, *Wuhan Middle No.15 School*:

- Taught high school chemistry and improved leadership and communication skills with students by troubleshooting.
- Evaluated student performance and communicated with students in weekly class meetings for mentorship.

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## PUBLICATIONS

**Conferences** Published papers with 80+ citations (according to Google Scholar as of Oct. 1, 2025).

- C.4 **Qiushi Wei**, Ruozhou Yu, Xiaojian Wang, Dejun Yang, and Guoliang Xue, "ShardTree: An Efficient Cross-Shard Protocol through Multi-party Virtual Payment Channel," Accepted by IEEE International Conference on Computer Communications (**INFOCOM**), 2026.
- C.3 Zhennan Shi, **Qiushi Wei**, "Learning Robust Simplex Sparse Representation Using Alternating Linearized Minimization Method," IEEE International Conference on Machine Learning and Applications (**ICMLA**), 2025.
- C.3 Xiaojian Wang, Ruozhou Yu, Dejun Yang, Guoliang Xue, **Qiushi Wei**, Huayue Gu and Zhouyu Li, "Space Booking: Enabling Performance-Critical Applications in Broadband Satellite Networks," IEEE International Conference on Distributed Computing Systems (**ICDCS**), 2025.
- C.2 **Qiushi Wei**, Yuhui Zhang, Dejun Yang, and Guoliang Xue. "BAR: A Balance-aware Routing Protocol in Payment Channel Networks," IEEE International Conference on Communications (**ICC**), 2025.
- C.1 **Qiushi Wei**, Dejun Yang, Ruozhou Yu, and Guoliang Xue. "Thor: A Virtual Payment Channel Network Construction Protocol over Cryptocurrencies," International Conference on Computer Communications (**INFOCOM**), 2024

### Selected Journals

- J.2 **Qiushi Wei**, James M Crawford, Colin A Wolden, Moises A Carreon, "ZIF-21 crystals: its morphology control and potential as an adsorbent for ammonia capture," *The Journal of Physical Chemistry C*, vol. 126, no. 30, pp. 12951–12957, 2022.
- J.1 **Qiushi Wei**, Jolie M Lucero, James M Crawford, J Douglas Way, Colin A Wolden, Moises A Carreon, "Ammonia separation from N<sub>2</sub> and H<sub>2</sub> over LTA zeolitic imidazolate framework membranes," *Journal of Membrane Science*, vol. 623, 119078, 2021.
- J.6 **Qiushi Wei**, Jiewei Chen, Feng Xue, Enyong Ding, "Green synthesis of mesoporous flower-like TiO<sub>2</sub>/graphite nanosheets (TGNS) prepared by high-pressure homogenization (HPH)," *New Journal of Chemistry*, vol. 42, no. 3, pp. 1779–1786, 2018.

### Under Review

- U.2 **Qiushi Wei**, Ruozhou Yu, Xiaojian Wang, Dejun Yang, and Guoliang Xue, "ShardBridge: Enabling Efficient Cross-Shard Transactions via Payment Channels," Under review, 2026.

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## TEACHING EXPERIENCES

**2018–present** Teaching Assistant at Colorado School of Mines

- CSCI 358: *Discrete Math*, Spring 2023
- CHGN 121: *General Chemistry Lab*, Fall 2018, Spring 2019
- CHGN 122: *Physical Chemistry Lab*, Fall 2019

## HONORS AND AWARDS

- 2018–present** Colorado School of Mines Graduate Research/Teaching Assistantship
- 2022, 2024** INFOCOM Student Travel Grant
- 2022** ICNP Student Travel Grant
- 2015–2018** South China University of Technology Excellent Graduate Student Scholarship
- 2012** Hubei University Excellent Student Scholarship

## PROFESSIONAL SERVICES

- Reviewer** IEEE TIFS, IEEE INFOCOM, IEEE IOT-J, IEEE TNSE, IEEE TMC
- Organizer** 2014–2015 English Broadcast Station at Hubei University
- Memberships** IEEE and IEEE ComSoc Student Member, ACM Student Member
- Activity** Poster presentations at the Computing Mines Affiliates Partnership Program (C-MAPP) Award Event in 2024

## REFERENCES

### **Dr. Dejun Yang**

Associate Professor, IEEE Senior Member  
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### **Dr. Ruozhou Yu**

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### **Dr. Guoliang Xue**

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### **Dr. Xiaojian Wang**

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