Shicong LIU

Graduate Student Member, IEEE

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Education

City University of Hong Kong — **09 2023 ~ 08 2027 (Est.)**
Doctor of Philosophy — Hong Kong SAR, China
Electrical Engineering — 3.92/4.0

Beijing Institute of Technology — **09 2020 ~ 06 2023**
Master of Science — Beijing, China
Information and Communication Engineering — Outstanding Graduate, Beijing

Beijing Institute of Technology — **09 2016 ~ 06 2020**
Bachelor of Science — Beijing, China
Electronics and Information Engineering — 7-th/94

Awards

- Exemplary Reviewer of IEEE Communications Letters — 12 2024
- CityU Academic Excellence and QE Award — 09 2024
- Entrance Fellowship of CityU Graduate School — 09 2023
- Beijing Municipal Outstanding Master Graduate — 06 2023
- **Hong Kong Ph.D. Fellowship Scheme (HKPFS) Awardee** — 04 2023
- 2021 **National Scholarship** (~ 0.2%) for Graduate Students — 09 2021
- OPPO AI Wireless Contest 2nd Prize — 08 2021
- 2020 **National Scholarship** (~ 0.2%) for Graduate Students — 09 2020
- Meritorious Winner (~ 4%) in Mathematical Contest in Modeling (MCM). — 04 2019
- **1st place** in National Undergraduate Algorithmic Game Theory Championship. — 08 2018

Research

Massive Movable Antennas in Near-Field Communications

Funded by GRF Hong Kong. Supervisor: Prof. Xianghao YU — 08 2025

- Introduce the concept *Antenna Density Function* (ADF) to better analyze the effect of movable antennas.
- Derived the optimal antenna positions for near-field communication maximizing achievable rates [J1].

Sensing Assisted Channel Estimation for Near-Field XL-MIMO

Funded by GRF Hong Kong. Supervisor: Prof. Xianghao YU — 09 2024

- Propose to adopt **back-projection** based algorithm for near-field localization with significantly **reduced complexity** [J2].
- Further utilize the estimated location coordinates for channel estimation/beamfocusing [C1, C2].

Learning-based Communication Signal Processing with XL-MIMO

Funded by Beijing Municipal NSF. Supervisor: Prof. Zhen Gao — 06 2023

- Channel estimation and CSI feedback techniques with XL-MIMO antenna arrays [J3, C4, C5].
- Semantic communications for texts [C3].

Reconfigurable Intelligent Surface (RIS) assisted Wireless Commun.

Funded by Beijing Municipal NSF. Supervisor: Prof. Zhen Gao 09 2019

- Designed architectures and algorithms for RIS-assisted MIMO-OFDM systems.
- Proposed an OMP-based uplink channel estimation method to efficiently reconstruct the **sparse channel matrix** with low overhead. Enhanced the estimation performance with denoising neural networks [J4].
- Proposed an AMP-based user detection method to achieve grant-free multiple access [J5].

Technical Skills

- **Coding**: Skilled in **MATLAB** and **Python** for communication system algorithm simulations and AI-related algorithms. Available for **C++**, **Verilog**, and **ASM**.
- **Language**: **IELTS: 7.5 (L/R/W/S: 8.5/8/6.5/6.5)**.

Services

- **Academic**
  - **Session Chair**, *Antenna and Smart Antenna*, GLOBECOM'24, Cape Town. 12 2024
  - **Session Chair**, *Mobile and Wireless Networks*, ICCC'23, Dalian, China. 08 2023
  - **Peer Reviewer**, IEEE ComSoc Journals and Conferences.
- **Teaching**
  - **Research Assistant** at Dept. EE, City University of Hong Kong. 08 2024
  - **Teaching Assistant**:
    - EE3008 Principles of Communications, City University of Hong Kong Fall 2024
    - EE3008 Principles of Communications, City University of Hong Kong Spring 2024
    - EE3008 Principles of Communications, City University of Hong Kong Fall 2023
    - Innovation and Entrepreneurship Projects, Beijing Institute of Technology Spring 2023
    - Frontiers of Communication Technology, Beijing Institute of Technology Spring 2022

Internship

ByteDance Ltd. **Beijing, China**
Researcher and Developer 06 2022 - 09 2022

- Implementation research on multi-path UDP transmission schemes under real-time communication (RTC) scenario.
- Optimization of RTC transmission protocols on packet scheduling and buffering strategies.

Cambricon Technology **Beijing, China**
Hardware Developer 08 2019 - 09 2019

- Application Specific Integrated Chips (ASIPs) for neural network calculation acceleration.
- Software development for deploying Inception V3 model on Cambricon ASIPs by C++.

Publications

Journals

[J1] **S. Liu**, *X. Yu**, J. Xu, and R. Zhang, "Near-field communication with massive movable antennas: A functional perspective," 2025. arXiv: 2508.01201 [cs.IT]. [Online]. Available: https://arxiv.org/abs/2508.01201.

[J2] **S. Liu**, *X. Yu**, Z. Gao, J. Xu, D. W. K. Ng, and S. Cui, "Sensing-enhanced channel estimation for near-field XL-MIMO systems," *IEEE J. Sel. Areas Commun.*, vol. 43, no. 3, pp. 628–643, Mar. 2025.

[J3] Z. Gao, **S. Liu**, Y. Su, Z. Li, and D. Zheng, "Hybrid knowledge-data driven channel semantic acquisition and beamforming for cell-free massive MIMO," *IEEE J. Sel. Top. Signal Process.*, vol. 17, no. 5, pp. 964–979, Sep. 2023.

[J4] **S. Liu**, *Z. Gao**, J. Zhang, M. D. Renzo, and M.-S. Alouini, "Deep denoising neural network assisted compressive channel estimation for mmWave intelligent reflecting surfaces," *IEEE Trans. Veh. Technol.*, vol. 69, no. 8, pp. 9223–9228, Aug. 2020, (**ESI Highly Cited**).

[J5] X. Zhou, K. Ying, **S. Liu**, M. Ke, *Z. Gao**, and M.-S. Alouini, "Reconfigurable intelligent surface assisted grant-free massive access," *Intell. Converg. Netw.*, vol. 3, no. 1, pp. 134–143, Mar. 2022.

Articles

[A1] L. Bian, X. Chang, S. Jiang, L. Yang, X. Zhan, **S. Liu**, D. Li, R. Yan, Z. Gao, and J. Zhang, "Large-scale scattering-augmented optical encryption," *Nat. Commun.*, vol. 15, no. 1, p. 9807, Dec. 2024.

[A2] **S. Liu**, *Z. Gao**, Y. Wu, D. W. Kwan Ng, X. Gao, K.-K. Wong, S. Chatzinotas, and B. Ottersten, "LEO satellite constellations for 5G and beyond: How will they reshape vertical domains?" *IEEE Commun. Mag.*, vol. 59, no. 7, pp. 30–36, Jul. 2021.

Conferences

[C1] **S. Liu** and *X. Yu**, "Low-complexity near-field localization with XL-MIMO sectored uniform circular arrays," in *Proc. IEEE Glob. Commun. Conf. (GLOBECOM)*, Cape Town, South Africa, Dec. 2024, pp. 4756–4761.

[C2] **S. Liu**, *X. Yu**, Z. Gao, and D. W. K. Ng, "DPSS-based codebook design for near-field XL-MIMO channel estimation," in *Proc. IEEE Int. Conf. Commun. (ICC)*, Aug. 2024, pp. 3864–3870.

[C3] **S. Liu**, *Z. Gao**, G. Chen, Y. Su, and L. Peng, "Transformer-based joint source channel coding for textual semantic communication," in *Proc. IEEE/CIC International Conference on Communications in China (ICCC)*, 2023, pp. 1–6.

[C4] **S. Liu**, *Z. Gao**, C. Hu, S. Tan, L. Fang, and L. Qiao, "Model-driven deep learning based precoding for FDD cell-free massive MIMO with imperfect CSI," in *Proc. International Wireless Communications and Mobile Computing (IWCMC)*, 2022, pp. 696–701.

[C5] M. Wu, Z. Wan, Y. Wang, **S. Liu**, and *Z. Gao**, "Deep learning-based rate-splitting multiple access for massive MIMO-OFDM systems with imperfect CSIT," in *Proc. International Symposium on Wireless Communication Systems (ISWCS)*, 2022, pp. 1–6.

[C6] C. Zhang, H. Huang, Z. Zhang, and **S. Liu**, "Optimization of VCDTS algorithm in Connect6 game," in *Proc. Chinese Control And Decision Conference (CCDC)*, 2018, pp. 6643–6646.