

# SHICONG LIU

Graduate Student Member, IEEE

☎ +852-54925833 | ✉ sc.liu@my.cityu.edu.hk | 🌐 scliubit | 📍 Hong Kong  
🆔 ORCID 0000-0003-4370-7869 | 👤 Google Scholar | 🏠 Homepage

## 🎓 EDUCATION

### City University of Hong Kong

Doctor of Philosophy  
Electrical Engineering

09 2023 ~ 08 2027 (Est.)

Hong Kong SAR, China  
3.92/4.0

### Beijing Institute of Technology

Master of Science  
Information and Communication Engineering

09 2020 ~ 06 2023

Beijing, China  
Outstanding Graduate, Beijing

### Beijing Institute of Technology

Bachelor of Science  
Electronics and Information Engineering

09 2016 ~ 06 2020

Beijing, China  
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 HKPFS and GRF Hong Kong. Supervisor: Prof. Xianghao YU* 08 2025

- **Pioneered** the Antenna Density Function (ADF) concept, a novel analytical tool providing the first tractable model to analyze and optimize massive movable antenna systems in the near-field. [J2]
- Derived the first-known closed-form optimal antenna positions for near-field communication maximizing achievable rates [J1, J2].
- Derived the **analytical solution** of optimal discrete antenna positions with asymptotic analysis [J1, C1].

### Sensing Assisted Channel Estimation for Near-Field XL-MIMO

*Funded by HKPFS and GRF Hong Kong. Supervisor: Prof. Xianghao YU* 09 2024

- Propose to adopt **back-projection** based algorithm for near-field localization with significantly **reduced complexity** [J3].
- Further utilize the estimated location coordinates for channel estimation/beamfocusing [C2, C3].

### 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 [J4, C5, C7].

- Semantic communications for texts [C4].

## 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 [J5].
- Proposed an AMP-based user detection method to achieve grant-free multiple access [J6].

## ✂ TECHNICAL SKILLS

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

## ✂ SERVICES

- **Academic**
  - **TPC Member**, *Wireless Communication*, ICC'26, Glasgow, Scotland, UK. 12 2025
  - **Session Chair**, *Antenna and Smart Antenna*, GLOBECOM'24, Cape Town. 12 2024
  - **Session Chair**, *Mobile and Wireless Networks*, ICC'23, Dalian, China. 08 2023
  - **Peer Reviewer**, IEEE ComSoc/SPS Journals and Conferences.
- **Teaching**
  - **Research Assistant** at Dept. EE, City University of Hong Kong. 08 2024 – 10 2025
  - **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\***, S. Song, and K. B. Letaief, "Near-field communication with massive movable antennas: An electrostatic equilibrium perspective," Dec. 2025, submitted to *IEEE Trans. Wireless Commun.*, Under Review. arXiv: 2512.21660 [cs.IT]. [Online]. Available: <https://arxiv.org/abs/2512.21660>.

- [J2] **S. Liu**, X. Yu\*, J. Xu, and R. Zhang, “Near-field communication with massive movable antennas: A functional perspective,” Aug. 2025, submitted to *IEEE Trans. Wireless Commun.*, Major Revision. arXiv: 2508.01201 [cs.IT]. [Online]. Available: <https://arxiv.org/abs/2508.01201>.
- [J3] **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.
- [J4] 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.
- [J5] **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**).
- [J6] X. Zhou, K. Ying, **S. Liu**, M. Ke, Z. Gao\*, and M.-S. Alouini, “Reconfigurable intelligent surface assisted grant-free massive access,” *Intell. Conver. Netw.*, vol. 3, no. 1, pp. 134–143, Mar. 2022.

### Articles/Magazines

- [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\*, “Near-field line-of-sight communication with massive movable antennas,” submitted to *IEEE Int. Conf. Commun. (ICC’26)*, Sep. 2026.
- [C2] **S. Liu** and X. Yu\*, “Low-complexity near-field localization with XL-MIMO sectorized uniform circular arrays,” in *Proc. IEEE Glob. Commun. Conf. (GLOBECOM)*, Cape Town, South Africa, Dec. 2024, pp. 4756–4761.
- [C3] **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.
- [C4] **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.
- [C5] **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.
- [C6] H. Sun, **S. Liu**, X. Yu, and Y. Sun, “Flow matching-based active learning for radio map construction with low-altitude UAVs,” submitted to *IEEE Int. Conf. Acoust. Speech Signal Process (ICASSP’26)*, 2025. arXiv: 2509.13822 [eess.SP]. [Online]. Available: <https://arxiv.org/abs/2509.13822>.
- [C7] 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.
- [C8] 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.

### Patents

- [P1] Y. Wang, K. Ying, **S. Liu**, Z. Gao, D. Zheng, and J. Zhang, *A method and system for optimizing drone trajectories in iot data collection*, CN Patent CN113382060B, Mar. 2022.