Haonan WANG

Graduate Student Member, IEEE

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Education

City University of Hong Kong **09 2024 ∼ 08 2028 (Est.)**
Doctor of Philosophy (Advisor: Prof. Xianghao YU) Hong Kong SAR, China
Electrical Engineering

Xi'an Jiaotong University **09 2020 ∼ 06 2023**
Master of Engineering (Advisor: Prof. Ang LI) Xi'an, Shaanxi, China
Information and Communications Engineering 3.83/4.3

Xi'an Jiaotong University **09 2016 ∼ 06 2020**
Bachelor of Engineering (Advisor: Dr. Li SUN) Xi'an, Shaanxi, China
Information Engineering 3.76/4.3

Research Interests

Wireless Communications, Reconfigurable MIMO, Movable (or Fluid) Antenna, Hybrid Beamforming, Symbol-Level Precoding, Convex Optimization, Manifold Optimization, Matrix Analysis, Reinforcement Learning

Awards

- IEEE ICC 2026 Student Travel Grant 2026
- Exemplary Reviewer of IEEE Commun. Lett. 2022, 2023, 2025
- China Scholarship Council (CSC) Full PhD Scholarship 2023
- Xi'an Jiaotong University Excellent Postgraduate 2021 -- 2022
- Xi'an Jiaotong University Academic Scholarship 2020 -- 2021
- Excellent Student at Xi'an Jiaotong University 2016 -- 2019
- Xi'an Jiaotong University Siyuan Academic Scholarship 2016 -- 2017

Research

Submodular Optimization for Discrete Movable Antenna Positioning

Advisor: Prof. Xianghao YU, City University of Hong Kong 02 2024 -- 06 2025

- Proved that the discrete MA positioning problem exhibits **monotone submodular property** subject to a 2-system constraint. [J1]
- Proposed the DCSPS algorithm with theoretical $1/3$-approximation guarantee relative to the optimum [C1].
- Extended the framework to imperfect CSI scenarios and proposed the robust DCSPS scheme [J1].

Achievable Rate Maximization Pattern Design for Reconfigurable MIMO

Advisor: Prof. Ang LI, Xi'an Jiaotong University 07 2020 -- 06 2023

- Constructed the matrix-representation channel model for the pattern reconfigurable MIMO system [J2].
- Formulated the pattern design problem and revealed the physical mechanism of the pattern effect on wireless channel [C2, C3].

- Proposed the sequential optimization framework for pattern design based on **manifold optimization** [J2].

Joint Design of Symbol-Level Precoding and Reconfigurable Pattern

Advisor: Prof. Ang LI, Xi'an Jiaotong University 03 2022 -- 06 2023

- Constructed the optimization problem for the joint design of symbol-level precoding and reconfigurable pattern [J3].
- Proposed the **alternating optimization**-based scheme to design the precoding and the pattern jointly [C4].
- Proposed a low-complexity optimization scheme for practical applications and discussed antenna design issues [J3].

Technical Skills

- **Research Skills**: Optimization Algorithms, Matrix Analysis, and Reinforcement Learning.
- **Software**: Proficiency in **MATLAB** and LaTeX, familiar with **Python**.
- **Languages**: Mandarin (Native); English (Adequate, **IELTS: 7.0** (Speaking: 7.0)).

Services

- **Academic**
  - **Session Chair**, *Novel Antenna Systems I: Movable & Fluid Antennas*, ICC'26, Glasgow, UK.05 2026
  - **TPC Member**, *Wireless Communication*, ICC'26, Glasgow, Scotland, UK. 12 2025
  - **Peer Reviewer**: *IEEE J. Sel. Areas Commun. (JSAC)*, *IEEE Trans. Commun. (TC)*, *IEEE Trans. Mob. Comput. (TMC)*, *IEEE Trans. Signal Process. (TSP)*, *IEEE Commun. Lett. (CL)*, *IEEE Open J. Signal Process. (OJ-SP)*, *EURASIP J. Wireless Commun. Netw.*, ICC, GLOBECOM, ICCC, ISWCS, WCNC.
- **Employment**
  - **Research Assistant** at Dept. EE, City University of Hong Kong. 02 2024 -- 08 2024
  - **Research Assistant** at Xi'an Jiaotong University. 06 2023 -- 12 2023
- **Teaching**
  - **Final Year Project Guider**, City University of Hong Kong. Sem A 24/25, Sem B 25/26
  - **Teaching Assistant**:
    - EE3008 Principles of Communications, City University of Hong Kong Spring 2026
    - EE3008 Principles of Communications, City University of Hong Kong Fall 2025
    - EE5415, City University of Hong Kong Fall 2024

Publications

Journals

[J1] **H. Wang**, *X. Yu**, R. Wang, A. Li, and Y.-J. A. Zhang, "Efficient discrete position design for movable antenna systems: Low-complexity and robustness," *IEEE J. Sel. Areas Commun.*, Aug. 2025, Under Review (JCR Q1, IF: 17.2).

[J2] **H. Wang**, *A. Li**, Y.-F. Liu, Q. Qin, L. Song, and Y. Li, "Achievable rate maximization pattern design for reconfigurable MIMO antenna array," *IEEE Trans. Wireless Commun.*, 2023, (JCR Q1, IF: 10.7).

[J3] **H. Wang**, L. Zhang, M. Liang, *A. Li**, F. Liu, Y. Li, and L. Song, "Joint symbol-level precoding and radiation pattern design for downlink reconfigurable antenna systems," *IEEE Trans. Wireless Commun.*, 2024, (JCR Q1, IF: 10.7).

[J4] Y. Wen, **H. Wang**, *A. Li**, X. Liao, and C. Masouros, "Low-complexity interference exploitation MISO precoding under per-antenna power constraint," *IEEE Trans. Wireless Commun.*, 2024, (JCR Q1, IF: 10.7).

Book Chapters

[B1] **H. Wang** and *A. Li**, "Spatial multiplexing for MIMO/massive MIMO," in *MIMO Communications – Fundamental Theory, Propagation Channels, and Antenna Systems*. IntechOpen, 2023.

Conferences

[C1] **H. Wang**, *X. Yu**, R. Wang, A. Li, and Y.-J. A. Zhang, "Exploiting submodularity for efficient discrete movable antenna placement," in *IEEE Int. Conf. Commun. (ICC'26)*, Glasgow, Scotland, UK, May 2026.

[C2] **H. Wang**, *A. Li**, Y.-F. Liu, Q. Qin, L. Song, and Y. Li, "Reconfigurable MIMO towards electromagnetic information theory: Capacity maximization pattern design," in *Proc. IEEE Veh. Technol. Conf. (VTC-Spring'22)*, Helsinki, Finland, Jun. 2022.

[C3] **H. Wang**, *A. Li**, Y.-F. Liu, Q. Qin, L. Song, and Y. Li, "Active reconfigurable MIMO communications: Capacity maximization pattern design," in *Proc. IEEE Sens. Array Multichannel Signal Process. Workshop (SAM'22)*, Trondheim, Norway, Jun. 2022.

[C4] **H. Wang**, *A. Li**, Y. Shen, B. Vucetic, and Y. Li, "Multi-user symbol-level precoding for downlink reconfigurable MIMO communication systems," in *Proc. IEEE Int. Symp. Wirel. Commun. Syst. (ISWCS'22)*, Hangzhou, China, Oct. 2022.

[C5] Y. Wen, **H. Wang**, *A. Li**, X. Liao, and C. Masouros, "Interference exploitation MU-MISO precoding under per-antenna power constraint," in *Proc. IEEE Int. Workshop Signal Process. Adv. Wirel. Commun. (SPAWC'23)*, Shanghai, China, Sep. 2023.