Yuhao Chen

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Education

Master in Electronic Engineering, Tsinghua University **08/2021-06/2024**
Thesis: Channel State Information Acquisition for Extremely Large-Scale Antenna Array

- GPA: 3.87/4.0, supervisor: Prof. Linglong Dai (*IEEE Fellow*)
- National Scholarship (**Top 2 among 82** candidates)

Bachelor in Electronic Engineering, Tsinghua University **08/2017-06/2021**
Thesis: Wideband Beamforming for Reconfigurable Intelligent Surface

- GPA: 3.74/4.0, supervisor: Prof. Linglong Dai (*IEEE Fellow*)

Research Interests

- Reconfigurable intelligent surface (RIS) assisted 6G wireless communications
- Channel state information (CSI) acquisition for extremely large-scale antenna array (ELAA)
- Signal processing for massive multiple-input-multiple-output (MIMO)

Research Experiences

RIS-assisted wireless communications (National Key R & D Program of China)
Research Assistant to Professor Linglong Dai *10/2020-Present*

- To enable accurate beam training in RIS-assisted wideband communication systems in the presence of the beam split effect, analyzed the power distribution pattern and proposed a novel analytical beam training framework, which directly calculated the direction of the user rather than choosing in traditional schemes. (accepted by *IEEE Transactions on Communications*)
- To reduce the unacceptable codebook size in near-field RIS-assisted communication systems, designed a dynamic codebook, which exploited the geometric relationship among sub-arrays to represent the near-field channel with a small codebook size dynamically. (submitted to *IEEE Transactions on Communications*)
- Collaborated with students from the Microwave Research Institute at Tsinghua University to develop an AI-based end-to-end communication prototype together with a 2304-element RIS @ 28 GHz. Published demo at *IEEE International Conference on Communications Workshops*; received the IEEE ICC 2022 Outstanding Demo Award.
- Collaborated with students from the Microwave Research Institute at Tsinghua University to develop a prototype based on a 64-element active RIS @ 3.5 GHz. Published demo at *IEEE Global Communications Conference*. Received the National First Prize of the 17th China Graduate Electronic Design Competition, 2022.
- Conducted several field tests on the RIS performance, and the results have been included in several white papers and reported at Global 6G Development Conference, 2022.

CSI acquisition for ELAA (Key Project of National Natural Science Foundation of China)
Research Assistant to Professor Linglong Dai *06/2022-Present*

- To enable accurate channel estimation in non-stationary ELAA systems with hybrid precoding architectures, inspired by classical STBC code, proposed a group time block code-based signal extraction scheme, which redesigned traditional configurations at the base station to make the recognition of spatial non-stationary effect possible in future ELAA systems. (accepted by *IEEE Transactions on Wireless Communications*)
- To realize effective beam training in near-field uniform circular array systems, analyzed the frequency-dependent focusing property and proposed an angle-distance beam training framework, which simultaneously explored different distances and angles. (submitted to *Science China Information Science*, Major Revision)
- Conducted the test of the proposed beam training framework in the prototype based on NI mmWave Transceiver System and verified the efficiency of the proposed framework.

Publications

Book Chapter

- Z. Zhang, **Y. Chen**, Q. Yu, and L. Dai, "IRS architecture and hardware design," *Intelligent Surfaces Empowered 6G Wireless Network*, Wiley-IEEE Press, 2023.

Journal Papers

- **Y. Chen** and L. Dai, "Non-stationary channel estimation for extremely large-scale MIMO," *IEEE Transactions on Wireless Communications*, 2023.
- **Y. Chen**, J. Tan, M. Hao, R. MacKenzie, and L. Dai, "Accurate beam training for RIS-assisted wideband Terahertz communication," *IEEE Transactions on Communications*, vol. 71, no. 12, pp. 7425-7440, Dec. 2023.
- **Y. Chen** and L. Dai, "Near-field wideband beam training for ELAA with uniform circular array," *Science China Information Sciences*, 2024.
- **Y. Chen** and L. Dai, "Channel estimation for RIS assisted wireless communications: Stationary or non-stationary?," submitted to *IEEE Transactions on Signal Processing*. (Under Review)
- M. Cui, H. Jiang, **Y. Chen**, and L. Dai, "Continuous-time channel prediction based on tensor neural ordinary differential equation," *China Communications*, vol. 21, no. 1, pp. 163-174, 2024.

Conference Papers

- **Y. Chen**, J. Tan, and L. Dai, "Analytical beam training for RIS-assisted wideband terahertz communication," in *Proc. IEEE Global Communications Conference (IEEE GLOBECOM'23)*, Dec. 2023.
- **Y. Chen**, Z. Zhang, M. Cui, and L. Dai, "Channel estimation for non-stationary extremely large-scale MIMO," in *Proc. IEEE 97th Vehicle Technology Conference (IEEE VTC'23 Spring)*, Jun. 2023.
- M. Cui, Z. Wu, **Y. Chen**, S. Xu, F. Yang, and L. Dai, "Demo: Low-power communications based on RIS and AI for 6G," in *Proc. IEEE International Conference on Communications (IEEE ICC'22) Workshops*, May 2022. (**IEEE ICC 2022 Outstanding Demo Award**)

Patents

- L. Dai, **Y. Chen**, J. Li, J. Tan, M. Hao, and R. MacKenzie, "Low cost beam training method and codebook design for RIS-assisted wideband wireless communication system," 2022-08-07, PCTCN2022/104529. (Granted)
- L. Dai, **Y. Chen**, "Channel estimation for extremely large-scale MIMO," 2023-08-09, ZL202310680438.8. (Granted)

Honors and Awards

- **National Scholarship** at Tsinghua University (**Top 2 among 82** candidates at Dept. EE), 2023
- **National First Prize** of the China Graduate Electronic Design Competition, 2022
- **IEEE ICC Outstanding Demo Award,** 2022
- **Gold Medal** of International Exhibition of Inventions of Geneva, 2022
- **Gold Medal** of Invention and Innovation Competition of Beijing, 2022
- **Gold Medal** of National Exhibition of Inventions of China, 2021
- **Grand Prize** of the 11th "Challenge Cup" Technological Innovation Competition of Capital, 2021
- **Comprehensive Excellence Scholarship** of Tsinghua University, 2020
- **"Stars of Electronic" Award** at Tsinghua University (**Top 5 among 1089** candidates at Dept. EE), 2020
- **Comprehensive Excellence Scholarship** of Tsinghua University, 2018

Skills

- Languages: Native Mandarin Speaker, Advanced English (TOFEL-iBT score of 104)
- Proficiency in simulations using C/C++, MATLAB, Python, and Pytorch for deep learning
- Proficiency in prototype development and field test