

# Yuhao Chen

Department of Electronic Engineering – Tsinghua University – China

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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

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### 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 95th 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

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- **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

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- 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