Jida Zhang

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EDUCATION

Tsinghua University, *Undergraduate* 2020 - Present
B.Eng. in Electronic Information Science and Technology

GPA: 3.96 / 4.0 (**Rank 2/232**)

Core Courses: *Communications and Networks* (A), *Probability and Stochastic Processes* (A), *Digital Signal Processing* (A), *Signals and Systems* (A), *Communication Systems Design and Implementation* (A), *Fundamentals of Statistical Signal Processing* (A), *Fundamentals of Electronic Circuits and System II* (A^+)

PUBLICATIONS

- **J. Zhang**, Z. Li and Z. Zhang, "Wideband Active RISs: Architecture, Modeling, and Beamforming Design," in *IEEE Communications Letters*, vol. 27, no. 7, pp. 1899-1903, July 2023, doi: 10.1109/LCOMM.2023.3274433
- Z. Li, **J. Zhang**, J. Zhu and L. Dai, "RIS Energy Efficiency Optimization with Practical Power Models," *2023 International Wireless Communications and Mobile Computing (IWCMC)*, Marrakesh, Morocco, 2023, pp. 1172-1177, doi: 10.1109/IWCMC58020.2023.10183034
- Z. Li, **J. Zhang**, J. Zhu, S. Jin and L. Dai, "Enhancing Energy Efficiency for Reconfigurable Intelligent Surfaces with Practical Power Models," *arXiv preprint*, arXiv:2310.15901, 2023

PATENT

- L. Dai, **J. Zhang**, and Z. Zhang, "Precoding method and device for RIS aided OFDM communication systems", *CN Patent CN202310539494.X*, Oct. 2023 (Grant number: CN113452642B)

RESEARCH EXPERIENCES

Localization based on the Downlink Wideband Signal from Starlink Satellites Jun. 2023 - Present

Advisor: Prof. Deepak Vasisht, Department of Computer Science, University of Illinois Urbana-Champaign (UIUC)

- Built a hardware platform to capture the downlink wideband signal from the Low Earth Orbit (LEO) Starlink satellites
- Leveraged the central beacons transmitted at the guard intervals of the wideband spectrum to estimate the doppler shift and doppler rate, which is one of the key challenges faced by LEO satellites
- Analyzed the received signal in time and frequency domain and identified the Orthogonal Frequency Division Multiplexing (OFDM) frame structure and decoded the synchronization symbols
- Estimated the time and frequency domain wideband channel from the satellite to the receiver, which is expected to provide localization information along with doppler shift, making the LEO satellites an alternative to the conventional Global Navigation Satellite System (GNSS)

Wideband Reconfigurable Intelligent Surface (RIS) Architecture Design Jan. 2023 - May 2023

Advisor: Prof. Linglong Dai, Department of Electronic Engineering, Tsinghua University

- Proposed a wideband RIS architecture design to compensate for the loss of conventional narrowband RIS, which is caused by the frequency-selective channels in wideband communication scenarios. The key idea is to integrate multiple circuits in a single RIS element, enabling it to configure different subcarriers independently
- Derived the time-domain and frequency-domain channel model based on the architecture and formulated the spectrum efficiency optimization problem

- ◇ Designed joint transmit precoding and reflect beamforming algorithms and verified the performance via MATLAB simulation that shows the proposed architecture improves the gain by 30% compared with conventional narrowband RIS
- ◇ **Published a journal paper to *IEEE Communications Letters* as the first author**

Practical Power Consumption Model for RIS Sep. 2022 - Dec. 2022

Advisor: Prof. Linglong Dai, Department of Electronic Engineering, Tsinghua University

- ◇ Established a practical power consumption model for RIS to address the issue that prior works ignored the different power consumption between the ON and OFF states of each RIS element
- ◇ Formulated the energy efficiency problem based on the power consumption model and proposed an efficient algorithm based on semidefinite relaxation (SDR), which outperforms the existing baseline algorithm
- ◇ Proposed a gradient descent based algorithm with low computational complexity to achieve a trade-off between performance and computational time
- ◇ **Published a conference paper to *IEEE IWCMC 2023***

Software Defined Radio (SDR) based Synthetic Aperture Radar (SAR) Imaging Mar. 2023 - Jun. 2023

Advisor: Dr. Yinan Sun, Department of Electronic Engineering, Tsinghua University

- ◇ Designed and built a frequency modulated continuous wave (FMCW) radar with antenna assembling and testing
- ◇ Different from the conventional design which generates the transmit signal, receives the signal and mixes them in analog domain, the robustness of the mix result to spectrum aliasing has been fully exploited. Instead, SDR based digital mixing was selected to achieve better universality and easier control
- ◇ Implemented the "Range Migration Algorithm" (RMA) via MATLAB, which converts the received baseband signal captured from the FMCW radar to a 2-D location map, and further conducted simulation to validate the accuracy
- ◇ Captured experimental data on bicycle around the university campus. By collecting data from different scenarios and comparing the imaging result with the satellite image, the effectiveness of both hardware and software design was verified

SELECTED AWARDS & HONORS

- ◇ National Scholarship (5/230) 2023
- ◇ First Prize in Beijing Challenge Cup Academic Competition 2023
- ◇ Academic Excellence Scholarship (25/230) 2021 & 2022
- ◇ Five-Star (Highest Honor) Volunteer of Tsinghua University 2023

SKILLS

Programming Languages

C, C++, Python, Matlab, Verilog HDL, Assembly Language

Software/Tools

LaTeX, Linux, GNU Radio, Xilinx Vivado, Adobe Premiere

Standard English Tests

- ◇ TOEFL 107/120 (Reading 28, Listening 26, Speaking 27, Writing 26)
- ◇ GRE 322/340 (Verbal Reasoning 152/170, Quantitative Reasoning 170/170, Analytical Writing 4/6)