XIAOPENG ZHAO

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BIOGRAPHY

My name is Zhao Xiaopeng. Currently, I am a Ph.D. student in the Department of Computing at the Hong Kong Polytechnic University, under the supervision of Dr. Lei Yang. Previously, I received my B.E. from Nanjing University. My main research interests focus on AI-driven wireless technologies, including indoor localization, channel prediction, etc.

EDUCATION

The Hong Kong Polytechnic University *Sep 2020 – Dec 2024 (expected)*
Ph.D. Student in the Department of Computing
Supervisor: Dr. Lei Yang, Associate Professor

Nanjing University *2016 - 2020*
B.Eng. in Control Science and Intelligent Engineering

PUBLICATION

Conference Proceedings

- Xiaopeng Zhao, Shen Wang, Zhenlin An, Lei Yang, "Crowdsourced Geospatial Intelligence: Constructing 3D Urban Maps with Satellitic Radiance Fields," **ACM IMWUT/UbiComp 2024**.
- Xiaopeng Zhao, Guosheng Wang, Zhenlin An, Qingrui Pan, Lei Yang, "Understanding Localization by a Tailored GPT," **ACM Mobisys 2024**.
- Xiaopeng Zhao, Zhenlin An, Qingrui Pan, Lei Yang, "NeRF2: Neural Radio-Frequency Radiance Fields," **ACM MobiCom 2023**. (Best Paper Award Runner-up)
- Shen Wang, Xiaopeng Zhao, Donghui Dai, Lei Yang, "Mirror Never Lies: Unveiling Reflective Privacy Risks in Glass-laden Short Videos," **ACM MobiCom 2024 (conditionally accepted)**.
- Qingrui Pan, Zhenlin An, Xiaopeng Zhao, Lei Yang, "Revisiting Backscatter Frequency Drifts for Fingerprinting RFIDs: A Perspective of Frequency Resolution," **IEEE SECON 2023**. (Best Paper Award)
- Sicong Liao, Zhenlin An, Qingrui Pan, Xiaopeng Zhao, Jingyu Tong, Lei Yang, "XiTuXi: Sealing the Gaps in Cross-Technology Communication by Neural Machine Transition," **ACM SenSys 2023**.
- Xueyuan Yang, Zhenlin An, Xiaopeng Zhao, Lei Yang, "Transfer Beamforming via Beamforming for Transfer," **IEEE INFOCOM 2023**.
- Qingrui Pan, Zhenlin An, Xueyuan Yang, Xiaopeng Zhao, Lei Yang, "RF-DNA: Large-Scale Physical-layer Identifications of RFIDs via Dual Natural Attributes," **ACM MobiCom 2022**.
- Zhenlin An, Qiongzheng Lin, Xiaopeng Zhao, Lei Yang, Dongjiang Zheng, GuiqingWu, Shan Chang, "One Tag, Two Codes: Identifying Optical Barcodes with NFC," **ACM MobiCom 2021**.

Journal Articles

- Xiaopeng Zhao, Guosheng Wang, Zhenlin An, Qingrui Pan, Qiongzheng Lin, Lei Yang, "Pushing the Boundaries of High-Precision AoA Estimation with Enhanced Phase Estimation Protocol," **IEEE IoTJ 2024.**
- Qingrui Pan, Zhenlin An, Xiaopeng Zhao, Lei Yang, "The Power of Precision: High-Resolution Backscatter Frequency Drift in RFID Identification," **IEEE TMC 2023.**
- Xueyuan Yang, Zhenlin An, Xiaopeng Zhao, Lei Yang, "Transfer Beamforming via Beamforming for Transfer," **IEEE TMC 2023.**

Demos and Posters

- Xiaopeng Zhao, Zhenlin An, Qingrui Pan, Lei Yang, "Understanding Wireless Channels through NeRF^2," **ACM GetMobile 2024.**
- Jingyu Tong, Zhenlin An, Xiaopeng Zhao, Sicong Liao, Lei Yang, "Radio Frequency Neural Networks for Wireless Sensing," **ACM MobiCom 2023 Demo.** (Best Graduate Award)

RESEARCH PROJECTS

AI-driven Wireless Localization

We developed a comprehensive 3D indoor localization dataset, encompassing over a million data points across 50 diverse scenarios. This dataset integrated RFID and BLE modalities. My role primarily focused on the development of an AoA-based wireless localization system, spanning from the physical layer to the learnware layer. Key contributions include:

- **Physical Layer:** Pushing Boundaries in High-Precision Localization with Enhanced Phase Estimation Protocol.
- **Learnware Layer:** Understanding Localization by a Tailored GPT.

AI-driven Channel Prediction

Inspired by the great success of neural radiance field, our project adopts the concept of representing scenes as continuous volumetric functions. This approach is innovatively applied to the prediction of RF signals. Our objective is to integrate the RF propagation model with a learned statistical model. This integration will enable the accurate prediction of the characteristics and reception of signals at any given location, provided the transmitter's position is known. Our model shows the potential applications in indoor localization, 5G MIMO technologies, and building reconstruction using GNSS signals.

- NeRF2: Neural Radio-Frequency Radiance Fields
- Crowdsourced Geospatial Intelligence: Constructing 3D Urban Maps with Satellitic Radiance Fields

WORK EXPERIENCE

Huawei Technologies, Co. Ltd *Oct - Dec 2020*

Research Topic: RFID localization system

The goal of the project is to develop an indoor RFID localization system for warehouse goods tracking, using three 4x4 antenna arrays to locate passive UHF RFID tags. My role primarily focused on building a bistatic RFID system with USRP X310 and developing algorithms to extract RSS and phase from raw IQ data. I am also investigating deep learning models to accurately localize RFID tags, achieving less than 10 cm error at a 10m distance.

TEACHING EXPERIENCE

Information Technology, ENG 2003, Teaching Assistant. (Lecturer: Dr. Lei Yang.)	*2022/2023*
Web Application Design, COMP 3421, Teaching Assistant. (Lecturer: Dr. Lei Yang.)	*2021*
Computer Programming, ENG 2002, Teaching Assistant. (Lecturer: Dr. Dennis Liu.)	*2020 Fall*

AWARDS & HONORS

MobiCom'23 Best Paper Award Runner-Up (1/93), ACM MobiCom	*2023*
MobiCom'23 Demo Best Graduate Award, ACM MobiCom	*2023*
SECON'23 Best Paper Award (1/43), IEEE SECON	*2023*
People Scholarship, Nanjing University	*2018 – 2019*
1st Winner in Education Robot Contest of China, CAAI	*2018*