Renjie Zhao | Curriculum Vitae

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RESEARCH INTEREST

• Wireless Systems and Networking: Designing and implementing next-generation wireless network architectures (based on millimeter-wave, 5G NR, vehicle networks, 6 GHz wide band); hardware and software design (SDR, ultra wide band and ultra low power communication system)

• Mobile and Ubiquitous Computing: Designing and implementing ubiquitous sensing systems for Internet-of-Things applications (virtual/augmented reality, smart homes/buildings, localization, smart supply chain and 3D human-mobile interaction)

EDUCATION

University of California San Diego (UCSD) **San Diego, CA, US**
Ph.D. Student, Electrical and Computer Engineering *Sept. 2018 - now*
Advisor: Professor Xinyu Zhang

Shanghai Jiao Tong University (SJTU) **Shanghai, China**
B.E. in Electric Power Engineering and Automation *Sept. 2014 - June 2018*

EMPLOYMENT

MicroSoft Research **Remote, US**
Research Intern. Host: Krishna Chintalapudi *June 2021 - Dec. 2020*
Research and develop wireless communication protocol for Xbox.

Alibaba Group **Remote, US**
Research Intern. Host: Pengyu Zhang, Yunfei Ma *June 2020 - Sept. 2020*
Research and develop accurate and reliable RFID based localization and sensing system.

Alibaba Group **Bellevue, WA, US**
Research Intern. Host: Pengyu Zhang, Yunfei Ma *Sept. 2019 - Jan. 2020*
Research and build long range, high accuracy object identification system based on NFC.

PUBLICATIONS

Note: '*' marks co-primary authors.

Conference Papers:

[C3] "NFC+: Breaking NFC Networking Limits through Resonance Engineering"
Renjie Zhao*, Purui Wang*, Yunfei Ma, Pengyu Zhang, Hongqiang Harry Liu, Xianshang Lin, Xinyu Zhang, Chenren Xu and Ming Zhang
Annual conference of the ACM Special Interest Group on Data Communication on the applications, technologies, architectures, and protocols for computer communication ***(SIGCOMM)***, 2020
(54 out of 250 submissions, acceptance ratio: 22%)

[C2] "M-Cube: A Millimeter-Wave Massive MIMO Software Radio" (Best Paper Award)
Renjie Zhao, Timothy Woodford, Teng Wei, Kun Qian and Xinyu Zhang

ACM International Conference on Mobile Computing and Networking ***(MobiCom)***, 2020
(62 out of 384 submissions, acceptance ratio: 16%)

[C1] "OFDMA-Enabled Wi-Fi Backscatter"
Renjie Zhao, Fengyuan Zhu, Siyuan Peng, Yuda Feng, Xiaohua Tian, Hui Yu and Xinbing Wang
ACM International Conference on Mobile Computing and Networking ***(MobiCom)***, 2019
(55 out of 290 submissions, acceptance ratio: 19%)

Journal:
Notes: Photoelectric Nanomaterial related works hided, please refer to *google profile*

Demo:
[D1] "Demo: M-Cube: An Open-Source Millimeter-Wave MIMO Software Radio for Wireless Communication and Sensing Applications"
Renjie Zhao, Timothy Woodford, Teng Wei, Kun Qian and Xinyu Zhang
ACM International Conference on Mobile Computing and Networking ***(MobiCom)***, 2020

RESEARCH EXPERIENCE

"Slim" radio design for passive wearables **UCSD**
Supervised by Prof. Xinyu Zhang *Jan. 2020 - now*
• Design simplified active radio architecture which consumes μW power
• Design cross technique communication (CTC) which enables commercial Wi-Fi devices to decode the waveform from "Slim" radio
• Working on Wi-Fi device firmware and driver to implement CTC with commercial Wi-Fi device

NFC+ long range high accuracy magnetic RFID (SIGCOMM '20) **Alibaba Group**
Supervised by Pengyu Zhang, Yunfei Ma and Prof. Xinyu Zhang *Sept. 2019 - Jan. 2020*
• Solve RFID object identification accuracy issue with magnetic wave
• Utilize resonance engineering for range boosting
• Design beamforming algorithm for arbitrary orientation coverage

Millimeter wave (mmWave) on V2X **UCSD**
Supervised by Prof. Xinyu Zhang *Sept. 2018 - Sept. 2019*
• Reality check for 5G Millimeter Wave V2X (outdoor experiment with 802.11ad platform)
• Hack firmware and revise controller for wireless card and phased array antenna
• Design and validate beam tracking and switching algorithm
• Implementing open source cellular network system (OAI)

Low cost mmWave massive MIMO (M-Cube) SDR (MobiCom '20) **UCSD**
Supervised by Prof. Xinyu Zhang *Sept. 2018 - now*
• Bridging commercialized phased array antenna and network card with SDR design
• Design cooperation mechanism between antenna control and data processing
• Design and validate bridging circuit

OFDMA Enabled Backscatter System (MobiCom '19) **IIoT, SJTU**
Supervised by Prof. Xinbing Wang and Prof. Xiaohua Tian *Dec. 2016 - Mar. 2018*
• Demonstrated for the first time how to enable OFDMA in the backscatter system
• Implemented the non-real time and real time system design with WARP
• Implemented transmission line on PCB to achieve RF phase delay
• Designed analog OFDM tag for OFDM implementation
• Solved asynchronization problem and phase offset problems of the system

HONORS AND AWARDS

- ACM MobiCom Best Paper Award (2 out of 384 submission) *2020*
- Academic Records Scholarship (first-class) **(Top 1 out of 158)**, SJTU *2016 - 2017*
- National Scholarship **(Top 3 out of 158)**, SJTU *2016 - 2017*
- Meritorious Winner of the Interdisciplinary Contest in Modeling, COMAP *2016 - 2017*
- Academic Records Scholarship (second-class), SJTU *2015 - 2016*
- UHV Scholarship **(Top 5 out of 160)**, UHV Scholarship Fund *2015 - 2016*
- Academic Records Scholarship (third class), SJTU *2014 - 2015*

TECHNICAL SKILLS

Programming Languages:

- C/C++, Python, MATLAB, LabVIEW, Assembly, Verilog, LaTeX

Platforms (Development Environment):

- Software-Defined Radio: WARP (MATLAB, Python, ISE), USRP (LabVIEW, UHD-based, GNU-Radio);
- Wi-Fi driver and firmware (nexmon toolsets, wil6210 for 802.11ad, Atheros HAL);
- Cellular network system (OAI, srsLTE);
- Embedded system development ARM Cortex-M3 (Keil);
- FPGA Nexys3, Basys2, Cmod A7 (ISE, Vivado);
- Microcontroller Unit MSP430 (CCS);
- PCB design software (Altium Designer);
- RFID system (Impinj);
- Typesetting system LaTeX (TexStudio).