RUICHUN MA

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https://rui-chun.github.io/

EDUCATION

Yale University *September 2020 - 2024 (Expected)*
Research Interests: Wireless networking, Network systems, IoT
Ph.D. student in Electrical Engineering (CE track)
Advisor: Prof. Wenjun Hu

University of Science and Technology of China *September 2016 - July 2020*
School of the Gifted Young (Rank:1/28)
Bachelor of Engineering in EE & AI

PUBLICATIONS

[MobiCom'24] Ruichun Ma, Shicheng Zheng, Hao Pan, Lili Qiu, et al, **AutoMS: Automated Service for mmWave Coverage Optimization using Low-cost Metasurfaces**, In The International Conference On Mobile Computing And Networking, 2024. [pdf]

[MobiCom'24] Ruichun Ma and Wenjun Hu, **RF-Mediator: Tuning Medium Interfaces with Flexible Metasurfaces**, In The International Conference On Mobile Computing And Networking, 2024. [pdf]

[MobiCom'23] Ruichun Ma, R. Ivan Zelaya, and Wenjun Hu, **Softly, Deftly, Scrolls Unfurl Their Splendor: Rolling Flexible Surfaces for Wideband Wireless**, In The International Conference On Mobile Computing And Networking, 2023. [pdf]

[HotNets'21] R. Ivan Zelaya, Ruichun Ma, and Wenjun Hu, **Towards 6G Wireless: Smarten Everything with Metamorphic Surfaces**, ACM Workshop on Hot Topics in Networks, 2021. [pdf]

Hao Pan, Ruichun Ma, Lili Qiu, et al, **GluCSI: Enabling Glucose Sensing in Wireless Networks with a Passive Metasurface**, under submission.

RESEARCH EXPERIENCE

Bridging Heterogeneous Wireless Networks with Metasurfaces September 2020 - Now
Research @ Yale *Advisor: Prof. Wenjun Hu*

- Designed metasurface systems as a cross-layer tool to support heterogeneous wireless networks
- Built prototypes to enhance wireless/IoT links through beamforming and impedance matching
- Related research works are published in MobiCom'24, MobiCom'23 and HotNets'21

Metasurfaces for Next-gen Networks Jan 2023 - August 2023
Research Internship @ Microsoft Research Asia *Advisor: Prof. Lili Qiu*

- Designed several metasurfaces for mmWave coverage and wireless sensing projects
- Developed an automated service framework for metasurface-aided mmWave coverage (MobiCom'24)
- Built a mmWave testbed with 802.11ad routers and a ROS robot
- Demonstrated metasurface-based wireless glucose sensing to Mr. Bill Gates

Wireless Mesh Network Protocol Design July 2019 - October 2019
Research Internship @ UIUC *Advisor: Prof. Haitham Hassanieh*

- Built a mesh network testbed with Raspberry Pi nodes by modifying the 802.11n driver
- Improved the spatial reuse of mesh networks with preamble detection and concurrent transmission

· Reduced the average packet delay by 30% under NS3 simulation of 802.11ax networks

Meta-RL Based Bitrate Adaptation Model April 2019 - June 2019
Undergrad Research @ USTC *Advisor: Prof. Hancheng Lu*

· Applied meta-reinforcement learning method to bitrate adaptation for video streaming
· Implemented a meta-RL model based on Model-Agnostic Meta-Learning framework
· Achieved fast learning for different QoS metrics of rate adaptation

Wireless Backscatter Tracking System March 2018 - October 2018
Undergrad Research @ USTC *Advisor: Prof. Panlong Yang*

· Developed a hand-writing tracking system based on a wireless backscatter tag
· Achieved millimeter-level tracking accuracy and led to a UbiComp'19 paper

TECHNICAL SKILLS

Programming	C (embedded programming), C++ , MATLAB, Python, Rust, Go
Tools	HFSS (RF design and simulation), Altium (PCB design), PyTorch (ML)
	SDR (Software Defined Radios), ROS (Robot Operating System)

TEACHING EXPERIENCE

Neural Networks and Learning Systems — Teaching Assistant, 2021 Fall @ Yale
Digital Signals and Systems — Teaching Assistant, 2019 Fall @ USTC

SERVICE

Technical program committee member: ACM S3 workshop 2023
Artifact evaluation committee member: MobiCom'24

HONORS AND AWARDS

EE Honor Program (top 10%) 2016-2020
Merit Student Scholarship (top 5%) 2017-2020
Outstanding Cadres of Students Union 2017

SELECTED COURSES

Microwave Techniques and Measurement
Building Distributed Systems
Optimization and Computation
Principles of Modern Communications
Mobile and Embedded Systems
Topics in Networked Systems
Stochastic Processes
Computer Vision

PROJECTS

OLSRv2 Protocol Implementation on IoT devices March 2021 - May 2021
Course project of Topics in Networked Systems @ Yale

· Implemented OLSRv2(RFC7181) for mobile ad-hoc networks based on FreeRTOS with C
· Deployed and tested the implementation on resource-constrained ESP32 embedded devices
· Received Honor grade (highest) from the course instructor, Prof. Y. Richard Yang

Medical Robotic Project August 2018
Summer school project @ Imperial College London

· Developed an auxiliary robot arm prototype for surgery
· Designed a control system based on voice recognition and image processing
· Led the team and received Runner-up Award