RUICHUN MA

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

EDUCATION

Yale University *September 2020 - 2024 (Expected)*
Research Interests: Wireless networking, RF 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] <u>Ruichun Ma</u>, 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] <u>Ruichun Ma</u> and Wenjun Hu, **RF-Mediator: Tuning Medium Interfaces with Flexible Metasurfaces**, In The International Conference On Mobile Computing And Networking, 2024. [pdf]

[MobiCom'23] <u>Ruichun Ma</u>, 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, <u>Ruichun Ma</u>, and Wenjun Hu, **Towards 6G Wireless: Smarten Everything with Metamorphic Surfaces**, ACM Workshop on Hot Topics in Networks, 2021. [pdf]

Hao Pan, <u>Ruichun Ma</u>, 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 Sep 2020 - Now
Research @ Yale *Advisor: Prof. Wenjun Hu*

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

mmWave Sensing for AR/VR May - Aug 2024
Research Internship @ Meta Reality Labs

· (In-coming summer intern)

Metasurfaces for Wireless Coverage and Sensing Jan - Aug 2023
Research Internship @ Microsoft Research Asia *Advisor: Prof. Lili Qiu*

· Designed novel metasurfaces for mmWave coverage and wireless sensing projects (one patent pending)
· 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
Research Internship @ UIUC   Jul - Oct 2019   *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
Undergrad Research @ USTC   Apr - Jun 2019   *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
Undergrad Research @ USTC   Mar - Oct 2018   *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)
	mmWave Radar, 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

PROJECTS

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

· 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
Summer school project @ Imperial College London   August 2018

· 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