RUICHUN MA

ruichun.ma@yale.edu

EDUCATION

Yale University *September 2020 - Now*
Research Interests: wireless networking, 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

Ruichun Ma and Wenjun Hu, **Cross-Media Wireless Made Easier: Tuning Media Interfaces with Flexible Metasurfaces**, https://arxiv.org/abs/2306.02367

- The first electronically programmable impedance-matching metasurface design and an end-to-end system that dynamically controls reflection and beamforming jointly at media interfaces.

Ruichun Ma, R. Ivan Zelaya, and Wenjun Hu, **Scrolls: Rolling Flexible Surfaces for Wideband, Multi-Network Wireless Coverage**, In MobiCom'23

- A new soft smart surface design with a tunable frequency response and the associated control algorithms to support different IoT networks over sub-6 GHz bands

R. Ivan Zelaya, Ruichun Ma, and Wenjun Hu, **Towards 6G Wireless: Smarten Everything with Metamorphic Surfaces**, In HotNets'21

RESEARCH EXPERIENCE

Wireless Smart Surface Design and Prototyping September 2020 - Now
Research @ Yale *Advisor: Prof. Wenjun Hu*

· Designed various smart surfaces for wireless networks with Ansys HFSS.
· Built smart surface prototype systems to enhance wireless/IoT links
· Our works are published in MobiCom'23 and HotNets'21.

Metasurfaces for mmWave Coverage Jan 2023 - August 2023
Research Internship @ MSR Asia *Advisor: Prof. Lili Qiu*

· Developed an automated service framework for metasurface-aide mmWave network deployment.
· Designed metasurfaces that allow low-cost hot-stamping fabrication with papers.
· Demonstrated metasurface-based wireless sensing to Bill Gates at MSRA (Beijing).

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 wireless driver
· Improved the spatial reuse of mesh networks with preamble detection and concurrent transmission
· Reduced the average packet delay by 30% under NS3 simulation

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 Streaming Media

· Implemented a meta-RL model based on Model-Agnostic Meta-Learning framework
· Achieved fast learning for different QoS metrics of rate adaptation

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

· Developed a method for tracking based on a wireless back-scattering tag
· Collected experiment data to verify the method and achieved millimeter-level accuracy
· Implemented a real-time demo system for hand-writing tracking

PROJECTS

OLSRv2 Protocol Implementation on ESP32 March 2021 - May 2021
Course project @ Yale

· Implemented OLSRv2(RFC7181) of mobile adhoc networks on ESP32 platform with C
· Deployed and tested the implementation on resource constrained ESP32 devices
· Received Honor grade from the instructor, Prof. Y. Richard Yang

Medical Robot Arm Project 5 August 2018 - 20 August 2018
Summer school project @ Imperial College London

· Developed a prototype of auxiliary robot arm for surgery
· Designed a control system based on voice recognition and image processing
· Received Runner-up Award (second among 7 teams)

TECHNICAL STRENGTHS

Programming	C/C++, Python, Rust, Go
Software & Tools	Matlab, HFSS (EM simulation), Altium (PCB design), Pytorch, LaTeX, NS-3

HONORS AND AWARDS

EIE Honor Program(top 10%)	2016-2020
Merit Student Scholarship	2019,2018,2017
Outstanding Cadres of Students Union	2017

RELEVANT COURSES

Mathematical Analysis(96)
Principles of Modern Communications(95)
Neural Networks and Learning Systems(high pass)
Wireless Technologies and Internet of Things(Honor)
Stochastic Processes (95)
Operation Research(97)
Techniques of Microwave Measurements(Honor)
Topics in Networked Systems(Honor)