

RUICHUN MA

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EDUCATION

Yale University

September 2020 - Now

Research Interests: Wireless networking, Network systems, Internet of Things

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, **Softly, Deftly, Scrolls Unfurl Their Splendor: Rolling Flexible Surfaces for Wideband Wireless**, In MobiCom'23

- *A 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

Bridging heterogeneous wireless networks with smart surfaces

September 2020 - Now

Research @ Yale

Advisor: Prof. Wenjun Hu

- Designed smart surfaces as an infrastructure support for different wireless networks.
- Built prototypes to enhance wireless/IoT links through beamforming and impedance matching.
- 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 SKILLS

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)

Stochastic Processes (95)

Principles of Modern Communications(95)

Operation Research(97)

Neural Networks and Learning Systems(high pass)

Techniques of Microwave Measurements(Honor)

Wireless Technologies and Internet of Things(Honor)

Topics in Networked Systems(Honor)