

Chia-Yi Yeh

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Senior PhD student with solid background in WLAN and cellular communication systems across layers. Experienced with hardware experiment, simulation, signal processing, and wireless standards. Interested in wireless cross-layer (PHY, MAC) design, attacks, and physical layer security in emerging wireless systems.

Education

Rice University

PhD of Electrical and Computer Engineering (GPA 3.70/4.0)

MS of Electrical and Computer Engineering (GPA 3.75/4.0)

Houston, TX

Expected 05/2021

12/2017

National Taiwan University (NTU)

BS in Electrical Engineering (GPA 3.65/4.0)

Taipei, Taiwan

06/2014

Research Experience

Ph.D. Student in Rice Networks Group

Advisor: Edward W. Knightly

Houston, TX

08/2015 - Present

Security in Terahertz WLANs with Leaky Wave Antennas (LWA)

- Assessed the eavesdropping threat of LWA links featuring varying radiation pattern across the TX band
- Identified unique security properties e.g. non-uniform secrecy across TX band, bandwidth-beamwidth coupling
- Verified security properties with analytical model and experimental measurements

Single Shot Single Antenna Path Discovery in THz Networks

- Proposed paths discovery in THz networks leveraging LWG's unique signatures across different angles
- Shown experimentally to achieve direction estimates within 2 degrees of ground truth on average while incurring only tens of nanoseconds overhead

Physical layer security of highly-directional sub-THz communication

- Studied the reflectivity and blockage of small objects in 100-400 GHz highly-directional link
- Designed experiments to examine the effectiveness of object scattering eavesdropping strategies
- Shown experimentally that eavesdropping is increasingly difficult with a narrower beam in higher frequency

Experimental analysis of passive eavesdropping in Massive MIMO

- Extended the eavesdropping analysis from channel perspective to practical antenna size and MCS limitations
- Shown Eve's advantages in practical systems using 96-antenna massive MIMO measurements
- Proposed power allocation as a countermeasure for MCS-limited systems

Energy-efficient cross-layer jamming attack against TCP in 802.11 (WiFi) WLAN

- Proposed an energy-efficient periodic jam-and-sleep attack in 802.11 WLAN targeting TCP retransmission timeout mechanism
- Simulated the attack in NS3 and showed the persistent effect of MAC-layer jamming on transport layer

Research Assistant in NTU Wireless Mobile Network Laboratory

Advisor: Hung-Yu Wei

Taipei, Taiwan

09/2014 - 07/2015

- Proposed auction-based resource allocation for energy-aware M2M devices in cellular networks
- Led 5 undergrad students' research projects in mmWave and game theory

Publications

- Y. Ghasempour, **C.-Y. Yeh**, R. Shrestha, D. M. Mittleman, E. W. Knightly, "Single Shot Single Antenna Path Discovery in THz Networks," to appear in *Proceedings of ACM MobiCom 2020*, London, U.K., September 2020.
- C.-Y. Yeh**, Y. Ghasempour, Y. Amarasinghe, D. M. Mittleman, and E. W. Knightly, "Security in Terahertz WLANs with Leaky Wave Antennas," in *Proceedings of ACM WiSec 2020*, Linz (Virtual Event), Austria, July 2020.
- J. Ma, R. Shrestha, J. Adelberg, **C.-Y. Yeh**, Z. Hossain, E. W. Knightly, J. M. Jornet, and D. M. Mittleman. "Security and Eavesdropping in Terahertz Wireless Links," *Nature*, 563, 89-93, October 2018.
- C.-Y. Yeh**, and E. W. Knightly. "Feasibility of Passive Eavesdropping in Massive MIMO: An Experimental Approach," in *Proceedings of IEEE CNS 2018*, Beijing, China, May 2018.
- M.-J. Shih, **C.-Y. Yeh**, K. D. Huang, and H.-Y. Wei. "Energy-Aware Waiting-Line Based Resource Allocation in Cellular Network with M2M/H2H Co-existence," in *Proceedings of IEEE ICC 2015*, London, UK, June 2015.

Skills

Wireless: OFDM, IEEE 802.11, LTE, TCP, Information Theory, Digital Communications

Programming: MATLAB, C++, Python, LaTeX, Rust

Simulation Software: NS3 network simulator

Machine Learning

Hardware: Argos Large-Antenna BS, Iris, WARP

FPGA Design: Xilinx System Generator/Vivado/SDK

Language: English, Chinese

Course Projects

RF System Design and Implementation	<i>01/2018 – 04/2018</i>
▫ Simulated, designed, and implemented RF systems on Skylark Iris board with Xilinx Zynq SoC	
Downlink Multi-User Precoder Designs in Massive MIMO	<i>08/2017 - 12/2017</i>
▫ Compared performance of Conjugate and ZF beamforming in large-antenna regime	
▫ Studied performance loss due to pilot contamination and survey methods to mitigate	
Human Activity Recognition Using Smartphone Internal Sensors	<i>01/2017 - 04/2017</i>
▫ Compared performance of neural network, KNN, SVM, and random forest on sensor data	
Multiuser Detection	<i>01/2016 - 04/2016</i>
▫ Reviewed the optimum detector for synchronous & asynchronous multi-user systems	

Leadership

Co-Chair of ACM S3 (of the Students, by the Students, and for the Students) Workshop	<i>02/2019 – 10/2019</i>
▫ Form a student TPC and organize the review process	
▫ Build and manage the workshop website	
▫ Publicize the workshop and find sponsorship	
Board Member of National Taiwan University Alumni Association in Houston	<i>02/2019 - Present</i>
▫ Manage the website and publicize social and culture events	
▫ Hold social events and traditional Taiwanese celebrations for Taiwanese in Houston	
Secretary of National Taiwan University Alumni Association in Houston	<i>02/2018 - 01/2019</i>
▫ Arranged meetings, composed and distributed meeting agendas and meeting minutes	
President of Rice Taiwanese Student Association	<i>07/2016 – 06/2017</i>
▫ Managed the Rice Taiwanese student population	
▫ Held social events and traditional Taiwanese celebrations at Rice University	