

Research Interest

Wireless Communication, Wireless Sensing, Machine Learning (ML), Edge Computing

Education

Arizona State University

Tempe, Arizona, United States

PH.D. IN ELECTRICAL ENGINEERING

Aug. 2022 - Present

- Wireless Intelligence Lab. Advised by Prof. Ahmed Alkhateeb

National Taiwan University

Taipei, Taiwan

M.S. IN ELECTRICAL ENGINEERING

Feb. 2020 - Jan. 2022

- Wireless Mobile Network Lab. Advised by Prof. Hung-Yu Wei
- Thesis: "Orchestration of Machine Learning Aided mmWave System for Mobile Edge Gaming QoE Enhancement"
- GPA: 4.17/4.3 (4.0/4.0)

National Taiwan University

Taipei, Taiwan

B.S. IN ELECTRICAL ENGINEERING

Sep. 2015 - Jan. 2020

Publications

Journals

1. Hao Luo and Hung-Yu Wei, "Resource Orchestration at the Edge: Intelligent Management of mmWave RAN and Gaming Application QoE Enhancement," *IEEE Transactions on Network and Service Management*, accepted and to appear, 2022
2. Po-Yuan Su, Yi-Chia Wei, Hao Luo, Chi-Hung Liu, Wen-Yi Huang, Kuan-Fu Chen, Ching-Po Lin, Hung-Yu Wei, and Tsong-Hai Lee, "Machine Learning Models for Predicting Influential Factors of Early Outcomes in Acute Ischemic Stroke," *JMIR Medical Informatics*, vol. 10, no. 3, Mar. 2022
3. Wen-Chin Huang, Hao Luo, Hsin-Te Hwang, Chen-Chou Lo, Yu-Huai Peng, Yu Tsao, and Hsin-Min Wang, "Unsupervised Representation Disentanglement using Cross Domain Features and Adversarial Learning in Variational Autoencoder based Voice Conversion," *IEEE Transactions on Emerging Topics in Computational Intelligence*, vol. 4, no. 4, pp. 468–479, Apr. 2020

Peer-reviewed Conferences and Workshops

1. Hao Luo and Hung-Yu Wei, "Machine Learning Based mmWave Orchestration for Edge Gaming QoE Enhancement," in *Proc. IEEE VTC-Fall*, 2021

Research Experience

Wireless Intelligence Lab, Arizona State University (Prof. Ahmed Alkhateeb)

Tempe, Arizona, United States

GRADUATE RESEARCH ASSOCIATE

Aug. 2022 - Present

Project: **Reconfigurable Intelligent Surfaces Aided AR/VR Sensing Systems (active)**

Wireless Mobile Network Lab, National Taiwan University (Prof. Hung-Yu Wei)

Taipei, Taiwan

MASTER STUDENT

Feb. 2020 - Jan. 2022

Project: **Edge Orchestration for Intelligent mmWave Management and Gaming Application QoE Enhancement**

- **Proposed a sequence-to-sequence learning (Seq2Seq) based mmWave beam tracking model** for codebook-based beamforming architecture.
- **Researched on resource management strategies for ML-aided communication systems** supported by edge computing techniques, focusing on the scenario of ML-based network management algorithms and user applications operating on a shared edge computing platform.
- Publications: one published conference paper, one accepted journal article, and the M.S. thesis.

Project: **Edge Computing Platform Prototyping**

- **Implemented an edge computing system aligned with the IEEE P1935 Standard** using Python scripts, Kubernetes, and Openstack.
- Designed UI for P1935-compliant edge computing system to support the management and orchestration of applications and resources.

Project: **Machine Learning Based Prediction of Early Outcomes in Stroke Patients**

- Studied ML development, validation and model analysis for predicting Discharge-mRS and deterioration of stroke patients.
- Publication: one published journal article.

Speech, Language and Music Processing Lab, Academia Sinica (Prof. Hsin-Min Wang)

Taipei, Taiwan

RESEARCH INTERN

Jul. 2018 - Feb. 2020

Project: **Variational Autoencoder Based Voice Conversion with Adversarial Learning**

- Improved the *cross-domain variational autoencoder (VAE) voice conversion* model by introducing *generative adversarial networks (GANs)* and *domain adversarial training*.
- Analyzed the degree of disentanglement of the voice conversion model to achieve enhanced latent representation.
- Publication: one published journal article.

Project: **Speech Enhancement for Electrolarynx Speech**

- Studied speech enhancement for electrolarynx speech using voice conversion and speech synthesis techniques.

Access Lab, National Taiwan University (Prof. An-Yeu (Andy) Wu)

Taipei, Taiwan

UNDERGRADUATE RESEARCHER

Feb. 2018 - Jul. 2018

Project: **Machine Learning Based Facial Expression Recognition**

- Implemented a *support vector machine* based *facial expression recognition model* using Local Binary Patterns and Histograms of Oriented Gradients features based on CK+ dataset, resulting in **81% prediction accuracy**.
- Applied deep learning (CNN) to facial expression recognition.

Speech Processing Lab, National Taiwan University (Prof. Lin-Shan Lee)

Taipei, Taiwan

UNDERGRADUATE RESEARCHER

Sep. 2017 - Jul. 2018

Project: **Automatic Speech Recognition**

- Built an automatic speech recognition system by using Kaldi toolkit to generate MFCC features, an acoustic model, and a language model.

Project: **Voice Conversion**

- Implement a voice conversion system from an unaligned corpora (VCC 2018) using a VAE model.

Teaching Experience

National Taiwan University

Taipei, Taiwan

COMPUTER PROGRAMMING LABORATORY, TEACHING ASSISTANT

2020, Fall

- Designed C++ practice problems for students every week.
- Provided homework consultancy for students 3 hours per week.

Selected Courses

Arizona State University Digital&Wireless Communication

National Taiwan University Introduction to Wireless and Mobile Networking, Personal Communications Services, Machine Learning, Convex Optimization, Algorithms, Data Structure and Programming, Information Theory

Selected Projects

Find My Phone - SMS Approach

FINAL PROJECT IN PERSONAL COMMUNICATIONS SERVICES

2020, Fall

- Implemented an App which can find the lost phone using Short Message Service (SMS).

A Simulation of Streaming Performance Based on Femtocell Planning Strategy - in the Context of Vehicles

FINAL PROJECT IN INTRODUCTION TO WIRELESS AND MOBILE NETWORKING

2019, Spring

- Simulated different conditions of car traffic using Simulation of Urban Mobility (SUMO) and observed the impact of femtocell planning under each traffic situation.

Chinese Conversation Prediction

FINAL PROJECT IN MACHINE LEARNING

2017, Fall

- Implemented NLP techniques for Chinese conversation prediction.

Honors & Awards

2020 **Second Place**, ViWi Vision-Aided Millimeter Wave Beam Tracking Competition (ViWi-BT) at ICC 2020

2019 **E.SUN Bank Enterprise Award**, 2019 MakeNTU

2018 **Nanya Technology Enterprise Award**, 2018 MakeNTU

Skills

Programming Languages Python, Javascript, HTML/CSS, C/C++

Software Knowledge Pytorch, Tensorflow, Flask, Git, Docker, Kubernetes, Openstack