Binghui Wu

Blk E4 #06-11/12 Comms & Networks Lab, Singapore, 117583

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Personal Profile

I am a Ph.D. student enrolled in the Electrical and Computer Engineering program in National University of Singapore (NUS). My research focuses on AI-based network security, network traffic analysis, explainable AI, and trustworthy machine learning (ML). I am dedicated to making contributions to the communications society. I also enjoy sports, reading books, and watching movies. I believe that kindness and a smile can create a better world.

Education

National University of Singapore (NUS)   *Singapore*

Ph.D. in Electrical and Computer Engineering   *Jan 2023 - Current*

- **Advisor** : Prof. Mohan Gurusamy (Main-advisor) & Dr. Dinil Mon Divakaran (Co-advisor)
- **Research Interests:** Network Security, Network Traffic Analysis, Trustworthy ML, eXplainable AI, Foundation Model
- **Courses:** Network Security, Computer Networks, Advanced ML, Trustworthy ML, Visual Computing, Information Theory

National University of Singapore (NUS)   *Singapore*

M.Eng in Electrical and Computer Engineering   *Jan 2021 - Nov 2022*

- **Thesis Advisor** : Prof. Mohan Gurusamy
- **Research Interests**: Resource Allocation, Network Slicing, Reinforcement Learning
- **Courses**: Wireless Communication, Sensor Networks, Pattern Recognition, Machine Learning

The Chinese University of Hong Kong, Shenzhen (CUHKSZ)   *Shenzhen, China*

B.Eng in Electronic Information Engineering   *Sep 2017 - May 2021*

- Excellent Student Leader & Excellent Student
- **Courses**: Optimization, Digital Logic and Systems, Digital Signal Processing, Digital Communication, Analog Integrated Circuit, Microprocessor and Computer System Design

Work Experience

Acronis   *Singapore*

IoT Security Research Intern   *Nov 2022 - Jan 2023*

- In charge of building the Zero-Shot Learning model for IoT devices Fingerprinting.
- The first attempt to build transformer-based zero-shot learning method for IoT fingerprinting.
- Created a new way to extract attribute vectors for IoT devices based on the network traffic data
- Utilized Transformer to extract features and use cVAE to generate fake data for unseen devices.
- Achieved nearly 90% accuracy (state-of-the-art) for unseen devices fingerprinting.
- **Technical Skills:** Wireshark, tshark, PyTorch & TensorFLow, NumPy, Matplotlib, Pandas, Scikit-learn, GCP(Google), AWS(Amazon), Git.
- **Soft Skills:** Teamwork, Time Management, Communication, Presentation skills.

Publications

CONFERENCE PROCEEDINGS

ZEST: Attention-based Zero-Shot Learning for Unseen IoT Device Classification
    Binghui Wu, Philipp Gysel, Dinil Mon Divakaran, Mohan Gurusamy
    2024 IEEE/IFIP NOMS. 2024

NPRA: A Novel Predictive Resource Allocation Mechanism for Next Generation Network Slicing
    Binghui Wu, Nalam Venkata Abhishek, Amogh PC, Mohan Gurusamy
    2023 IEEE 20th Consumer Communications and Networking Conference (CCNC), 2023

D3T: Double Deep Q-Network Decision Transformer for Service Function Chain Placement
    Binghui Wu, Dongbo Chen, Nalam Venkata Abhishek, Mohan Gurusamy
    2023 IEEE 24th International Conference on High Performance Switching and Routing (HPSR), 2023

University Projects

Visualization for Speech Emotion Recognition Neural Networks

Group Leader, National University of Singapore (NUS)

Singapore

Jan 2022 - May 2022

- Analyzed the existing methods for Speech Emotion Recognition and find the bottleneck.
- Extracted the speech features from RAW data and stored the data in the form of images.
- Implemented Grad-Cam to visualize the neural network attention to check which features are most important.
- Utilized visualization results that cleaned the data size by 50% keeping the similar accuracy.
- **Technical Skills:** Matlab, Python for PyTorch, Pandas, Overleaf, LaTeX.
- **Soft Skills:** Time Management, Teamwork, Presentation skills, Report writing.

IoT Network Cloud Service for Smart Home

Decision Maker, National University of Singapore (NUS)

Singapore

Jan 2021 - May 2021

- Built IoT network topology for a chicken hatching system.
- Employed NetSim to analyze throughput, collision rate, and power consumption.
- Utilized sensors to collect temperature, humidity, and light data.
- Applied Linear Regression, Naive Bayes, etc., to implement data training and classification.
- **Technical Skills:** Python, matplotlib, Raspberry Pi, NetSim software, Sensor data collection .
- **Soft Skills:** Presentation skills, Leadership, Teamwork, Logical Thinking.

Simulation of Operating System

Group Leader, CUHKSZ

Shenzhen, China

Mar 2019 - May 2020

- Created a simulation operating system on the QT platform using C++.
- Realized the functions of the file system, task scheduling, memory allocation, and error system.
- Designed a user-friendly UI to show how the operation system works.
- Decided the project's direction, assigned the task to group members, and made the timeline.
- **Technical Skills:** QT, C++, Operating System.
- **Soft Skills:** Presentation skills, Leadership, Teamwork, Report writing, Logical Thinking.

Skills

Programming	Python (Pandas, PyTorch, TensorFlow, NumPy, Scikit-learn. etc.), Matlab.
Computer Networks	Wireshark, Tshark, Mininet, Sensor Tag, Raspberry Pi, NetSim.
Cloud Services	GCP(Google), Azure(Microsoft), AWS(Amazon)
Miscellaneous	Linux, LaTeX(Overleaf Markdown), Tableau, Microsoft Office, Git.
Soft Skills	Time Management, Leadership, Teamwork, Problem-solving, Documentation, Engaging Presentation.

Teaching

Electrical Computer Engineering, NUS

Teaching Assistant

Singapore

Jan 2021 - present

- EE4204 Computer Networks — 23-24 Sem I & II
- EE5021 Cloud based Services for Internet of Things — 23-24 Sem II
- EE5134 Optical Communications and Network — 23-24 Sem II
- CEG5101 Modern Computer Networking — 23-24 Sem I & II
- **Technical Skills:** Mininet, Azure(Microsoft), Raspberry Pi, C programming, Virtual Box
- **Soft Skills:** Problem solving, Time Management, Communication, Presentation skills.

Activities

Shaw College Student Association

President & Co-Founder

Shenzhen, China

Apr 2019 - Dec 2020

- Organized and planned more than 10 large-scale events in the academy, with participants exceeding 100.
- Provided a positive environment for residents to live and study.
- **Technical Skills:** Streaming, Video Editing, Documentation
- **Soft Skills:** Teamwork, leadership, problem solving, Team Management, Communication, Presentation skills.

Office of Student Affairs, CUHKSZ

Peer Counselor & Minister of Academic Department

Shenzhen, China

Mar 2018 - Dec 2020

- In charge of the peer psychological counseling hotline and sandbox.
- Helped more than 50 students relieve stress and explore their inner world.
- Arranged academic training seminars and activities for organization members.
- **Technical Skills:** Peer Consulting, Sandbox, psychological counseling
- **Soft Skills:** Teamwork, leadership, problem solving, Listening, Communication.

Achievements

2020	**Shaw Achievement Award**, Shaw College Annual Event	*Shenzhen, China*
2020	**Excellent Student Leader Award**, CUHKSZ Annual Event	*Shenzhen, China*
2020	**National Encouragement Scholarship**, CUHKSZ Annual Event	*Shenzhen, China*
2019	**Shaw Spirit Award**, Shaw College Annual Event	*Shenzhen, China*
2018	**Excellent Student Leader Award**, CUHKSZ Annual Event	*Shenzhen, China*

Interests

Reading	I love reading. When reading books, I gain inspiration on how to spend my life and how to face the difficulties.
Movies	Movies that provoke deep thought can always provide me with insights into my life.
Table Tennis	I have always enjoyed table tennis. I played it with my father when I was young. It is a convenient and healthy sport.
Badminton	I enjoy playing badminton. The feeling of executing a massive smash with the shuttlecock is amazing.

Languages

English	Professional proficiency
Chinese	Native proficiency