

Mr. Hanlin CAI

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OVERVIEW

As a highly motivated and collaborative student majoring in engineering, I have a strong interest in the industrial automation and artificial intelligence. During undergraduate studies, I have gained valuable experience in sensor design, system modelling, and machine learning. This entails completing a six-month industrial internship, publishing three peer-reviewed papers, and securing five awards at the international level in competitions.

EDUCATION

University of Cambridge, United Kingdom

Sep. 2024 – Oct. 2025

Master of Philosophy in Engineering, supervised by IEEE Fellow Özgür B. Akan

➤ Research Project: Intelligent Communication Systems for Internet of Everything

National University of Ireland, Maynooth (MU)

Sep. 2022 – Jun. 2024

Bachelor of Science in Robotics and Intelligent Devices

➤ First Class Honours, Award Mark: 88.1% (Ranking: 1/52)

Fuzhou University (FZU, China-Ireland Cooperative Program)

Sep. 2020 – Jun. 2022

Bachelor of Engineering in Automation (Taught in English)

➤ GPA: 3.82/4.00, Average Score: 88.72

- **Scholarships:** Innovation Scholarship (Highest Award at FZU, \$2500), XiamenAir Scholarship (\$1000), First Prize Scholarship of FZU (\$1000, Four Times), Best Bachelor Thesis Award of MU (Top 1/300).

PUBLICATIONS

- [1] Hanlin Cai, Yuchen Fang, Jiacheng Huang, Hongling Liao, Meng Yuan, Zhezhuang Xu. “Securing Billion Bluetooth Low Energy Devices Using Cyber-Physical Analysis and Deep Learning Techniques”. *The 30th ACM SIGKDD Conference on Knowledge Discovery and Data Mining, Undergraduate Consortium, 2024.*
- [2] Hanlin Cai, Yuchen Fang, Jiacheng Huang, Meng Yuan, Zhezhuang Xu. “Poster: Hybrid Detection Mechanism for Spoofing Attacks in Bluetooth Low Energy Networks”. *The 22nd ACM International Conference on Mobile Systems, Applications, and Services, 2024.*
- [3] Hanlin Cai, Zheng Li, Jiaqi Hu, Wei Hong Lim, Sew Sun Tiang, Mastaneh Mokayef, Chin Hong Wong. “Optimising Traffic Sign Detection System Using Deep Residual Neural Networks Combined with Analytic Hierarchy Process Model”. *The 28th International Conference on Artificial Life and Robotics. Recommended for expanding publication in the Journal of Advances in Artificial Life Robotics, 2023.*
- [4] Hanlin Cai, Jiacheng Huang, Yuchen Fang, Chen Dan, Honglin Liao, Chin Hong Wong, Zhezhuang Xu. “Detecting Multiple-mix-attack in IoT Networks through Reconstruction and Classification Machine Learning Techniques”. *IEEE Sensors Journal. Under Review, 2024.*

RESEARCH EXPERIENCE

Embedded Development Intern, HUADING Intelligent Manufacturing Technology Co., Ltd., China

Mentors: SN.ENGR. Yuxiong Xia and Dr. Dan Chen

Jan. 2023 – June 2023

Outline:

- Successfully tackled the complexities of instrument inspection with intricate industrial environments by devising an intelligent inspection system leveraging IoT devices, quadruped robots and cloud computing.

Key Responsibilities:

- Implemented real-time data collection of sensor modules using ESP32; Integrated machine control with visual algorithms to empower quadruped robots to extract and analyse images of industrial instruments.

Achievement:

- Won the Best Technology Award in the 2023 China National Youth Science Innovation Project Competition.

Research Assistant, State Key Laboratory of Industrial Automation Control Technology, China

Supervisors: Prof. Zhezhuang Xu and Dr. Yuan Meng

Oct. 2022 – Jue. 2024

Outline:

- Addressed the security vulnerabilities and susceptibility to attacks in Bluetooth Low Energy Networks utilising a hybrid attack detection mechanism based on cyber-physical features and machine learning.

Key Responsibilities:

- Established a BLE experimental platform, collected datasets using BLE Sniffer, nRF Connect and Wireshark. Developed an attack detection algorithm based on temporal convolutional network, text-CNN and SVM.

Achievement:

- Secured a research grant over \$3000; Authored a research paper and was accepted into the **AAAI 2024**.

Exchange Student, Cambridge Centre for the Integration of Science, Technology and Culture, UK

Supervisor: Prof. Pietro Liò

June 2022 – Dec. 2022

Outline:

- Resolved the challenge of detecting multiple-mix-attacks within IoT networks by developing a detection framework that integrates reconstruction and classification learning approaches.

Key Responsibilities:

- Developed a multiple-mix-attacks detection algorithm based on LSTM model and random forest algorithm.

Achievement:

- Research report achieved a ranking within Top 5%; Won an outstanding oversea visiting scholarship (\$2400).

AWARDS & HONOURS

ACM KDD 2024 Undergraduate Scholars (\$1000, only 21 students are selected around the world)	<i>Jue. 2024</i>
AAAI 2024 Undergraduate Scholars (\$5000, only 18 students are selected around the world)	<i>Dec. 2023</i>
Finalist of China International Internet+ Innovation and Entrepreneurship Competition (Top 3%)	<i>Oct. 2023</i>
Best Technology Award in China National Youth Science Innovation Project Competition (Top 1%)	<i>Aug. 2023</i>
Finalist Award in International Mathematical Contest in Modeling (Top 1% of all 20508 paper)	<i>May 2023</i>
First Prize in China Contemporary Undergraduate Mathematical Contest in Modelling (Top 5%)	<i>Dec. 2022</i>
Outstanding volunteer in the 44th Session of the World Heritage Committee	<i>July 2021</i>

SKILLS

Language Skills: English (Fluent, IELTS 7.5), Mandarin (Native), Hokkien (Native)

Programming: Python, MATLAB, Java, C++, HTML, CSS, JavaScript, Bash, LaTeX

Specialty: Swimming (Reached Chinese national second-level swimming athlete standard; Championship of 100-meter freestyle swimming competition of Fuzhou University in *June 2022*)