

Mr. Hanlin CAI

D.O.B. Nov. 01, 2002 | Tel: (+86) 15905925789 | hanlin.cai@ieee.org | <https://caihanlin.com>
Building 7, Golden Garden, Quanzhou City, Fujian Province, China (362700)

EDUCATION

- Fuzhou University (FZU) (China-Ireland Cooperative Program)** *Sep. 2020 – Jun. 2024*
Bachelor of Engineering in Automation (Full-time at FZU, taught in English)
- National University of Ireland, Maynooth** *Sep. 2020 – Jun. 2024*
Bachelor of Science in Robotics and Intelligent Devices (Combined Degrees)
- **Current GPA: 3.81/4.00 (Top 8% at FZU)**
 - **Main Courses:** Control System Design (93), Software Engineering (97), Operating System (92), Real-time and Embedded System (90), Digital System (90), Robotics & Automation (90), Algorithms and Data Structures (90)
 - **Course Projects:** Industrial Internship Experience (98/100), Signals & Systems Integration Project (92/100)
 - **Scholarships:** FEPG Scholarship (**Highest Award at FZU, Top 0.5%**), XiamenAir Scholarship (**Top 1%**), First Prize Scholarship (Top 2%, **Three Times**), Best Academic Performance Award of Maynooth University

RESEARCH EXPERIENCE

- Embedded Development Intern, Huading Intelligent Manufacturing Technology Co. LTD., Fujian, China**
Mentors: SN.ENGR Yuxiong Xia and Dr. Dan Chen *Jan. 2023 – June 2023*
- **Description:** Tackled the complexities of instrument inspection within intricate industrial environments by devising an intelligent inspection system leveraging smart IoT and quadruped robots.
 - **My Role:** Implemented real-time data collection of sensor modules using ESP32; Integrated machine control with visual algorithms to empower robots to extract and analyze images of industrial instruments.
 - **Achievement:** Our system won the Best Technology Award at national youth innovation project competition.
- Research Assistant, Laboratory of Industrial Automation Control Technology and Information Processing**
Supervisors: Prof. Zhezhuang Xu and Dr. Yuan Meng *Oct. 2022 – Present*
- **Description:** Addressed the security vulnerabilities and susceptibility to attacks in Bluetooth Low Energy Networks utilizing a hybrid attack detection mechanism based on physical features and machine learning.
 - **My Role:** Established a BLE experimental platform, collected datasets using BLE Sniffer & nRF Connect, and developed attack detection algorithms based on LSTM and Random Forest models.
 - **Achievement:** Secured a research grant of \$3000; Authored a research paper submitted to **AAAI 2024**.
- Visiting Student, Cambridge Centre for the Integration of Science, Technology and Culture (CCISTC)**
Supervisors: Prof. Pietro Lio' *June 2022 – Dec. 2022*
- **Description:** Resolved the challenge of detecting Multiple-mix-attacks within IoT network systems by developing a detection framework that integrates reconstruction and classification learning approaches.
 - **My Role:** Developed a multiple-mix-attacks detection algorithm based on text-CNN and SVM models.
 - **Achievement:** Research Report received an A rating (Top 5%) upon evaluation and won \$2500 scholarship.

PUBLICATIONS

- [1] Hanlin Cai, Zheng Li, Jiaqi Hu, Wei Hong Lim, Sew Sun Tiang, Mastaneh Mokayef, Chin Hong Wong*. “Deep Residual Neural Network for Efficient Traffic Sign Detection”. *The 28th International Conference on Artificial Life and Robotics (ICAROB)*, 2023. **Oral Presentation.**
- [2] Hanlin Cai, Jiaqi Hu, Zheng Li, Wei Hong Lim, Mastaneh Mokayef, Chin Hong Wong*. “An IoT Garbage Monitoring System for Effective Garbage Management”. *The 4th International Conference on Computer Engineering, Network, and Intelligent Multimedia (IEEE CENIM)*, 2022. **Cited by 1 Paper.**

MANUSCRIPTS

- [3] Hanlin Cai, Yuchen Fang, Zhezhuang Xu. “**BLEGuard: Hybrid Detection Mechanism for Spoofing Attacks in Bluetooth Low Energy Networks (Student Abstract)**”. *AAAI Conference on Artificial Intelligence (One of most important conferences for AI Research)*. Under review, 2023.
- [4] Hanlin Cai, Jiacheng Huang, Yuchen Fang, Wenzhuo Fan, Zhezhuang Xu. “**Detecting Multiple-mix-attack in IoT Networks through Reconstruction and Classification Machine Learning Techniques**”. *MDPI Sensors Journal (IF: 3.847, JCR Q2)*. Under review, 2023.
- [5] Hanlin Cai, Yufei Wu, Wenxuan Luo. “**Multi-Objective Optimization Model Based on Analysis of Human-Land Relationship Coupling: A Case Study of the Masai Mara National Reserve**”. *The 3rd International Conference on Applied Mathematics, Modeling and Computer Simulation (EI)*. Under review.

RESEARCH FUNDINGS

- Industrial Inspection System based on Intelligent IoT and Bionic Quadruped Robot (\$3000). *China National Undergraduate Innovation and Entrepreneurship Training Program (No. 202310386056)*. **Project Leader**
- Community Monitoring System based on Smart IoT and Inspection Vehicle (\$1000). *National Youth Science Innovation Project Competition Award (No. 2023080208)*. **Project Leader & Student Investigator**

VOLUNTEER WORKS

Volunteer Work Department, Youth League Committee of Fuzhou University

Deputy President (Mentor: Dr. Yixuan Hu)

Sep. 2021 – Sep. 2022

- **Description:** Took charge of the planning, operation, and publicity of volunteer service work, and helped mentors to promote the improvement, digitization and intelligence of volunteer service management.
- **My Role:** Organized 39 activities (19 volunteer activities for epidemic prevention and control, 12 for community service, and 8 for environmental protection) with over 890 participants in related activities.
- **Achievement:** Responsible for the publicity work of 17 volunteer activities, with a total of more than 240,000 page views, covering more than 40,000 people. Personal volunteer service time exceeded 240 hours.

SKILLS & SPECIALTY

Language Skills: English (Fluent, IELTS: 7.0), Mandarin(Native), Hokkien (Native)

Programming: Python (Good), MATLAB, Java, C++, HTML, CSS, JavaScript, Bash

Tools: LaTeX, Git, Docker, Conda, Jupyter, Stata, Navicat, RSS, EndNote, Typora

Platforms: Linux, ROS, Cloud, Bluetooth (BLE), nRF Connect, ESP32, Arduino, Raspberry Pi

Specialty: Swimming (Reach China National Second-level Swimmer Standard, Championship of 100-meter Freestyle Swimming Competition of Fuzhou University in June 2022)

AWARDS & HONORS

Best Technology Award in China Youth Science Innovation Project Competition (National level) Aug. 2023

Finalist Award in COMAP's Mathematical Contest in Modeling (Top 1% of all 20508 paper) May 2023

First Prize (Championship, Top 2%) in Fujian Youth Science Innovation Project Competition May 2023

First Prize (Top 5%) in China Undergraduate Mathematical Contest in Modeling (Provincial Level) Dec. 2022

Third Prize (Top 8%) in China National College Student Computer Design Competition Aug. 2022

Second Prize in National College Digital Art & Design Awards (NCDA, provincial level) Aug. 2023

Maynooth University Best Student Course Project in Academic Year 2022 Oct. 2022

Top 10 Best Volunteers of FZU (Only 10 students are selected in a year, top 1%) Apr. 2022

Outstanding Volunteer in the 44th Session of the World Heritage Committee July 2021

Latest update on 26th Aug. 2023