Mr. Hanlin CAI

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EDUCATION

Fuzhou University (FZU) (China-Ireland Cooperative Program) ***Sep. 2020 – Jun. 2024***
Bachelor of Engineering in Automation (Full-time at FZU)
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:** XiamenAir Scholarship **(Highest Undergraduate Award at FZU, Top 1%),** Best Academic Performance Award, First Prize Scholarship (Top 1.7%, **Three Times**), Second Prize Scholarship (Top 8.5%)

RESEARCH EXPERIENCE

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.

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.

Visiting Student, Cambridge Centre for the Integration of Science, Technology and Culture (CCISTC)
Supervisors: Prof. Pietro Lio' and Dr. Kehai Qiu ***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 (CENIM), IEEE, 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".** *Sensors MDPI 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 & Computer Simulation. Still under working.*

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: 6.5**), 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, Bluetooth, Cloud, Arduino, Raspberry Pi, ESP32, nRF Connect
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 10/30000 in a year) ***Apr. 2022***
Outstanding Volunteer in the 44th Session of the World Heritage Committee ***July 2021***

Latest update on 10th Aug. 2023