Hanlin (Lance) Cai

Nationality: Chinese **Date of birth:** 1 Nov 2002 📞 **Phone number:** (+86) 15905925789

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ABOUT ME

I am a junior majoring in Automation at Fuzhou University (China) and Robotics and Intelligent Devices at Maynooth University (Ireland, Combined Degrees). Currently, I am interested in Internet of Things and Machine Learning.

EDUCATION AND TRAINING

Bachelor of Engineering in Automation
Fuzhou University, China [1 Sep 2020 – Current]

Address: 350108 Fuzhou (China)
Website: https://www.fzu.edu.cn/

Bachelor of Science in Robotics and Intelligent Devices (Combined Degrees)
Maynooth University, Ireland [1 Sep 2020 – Current]

Address: (Ireland)
Website: https://maynoothuniversity.ie/

Student Research Assistant
CCISTC, University of Cambridge [20 Jun 2022 – 21 Oct 2022]

Address: (United Kingdom)
Website: https://www.ccistc.psychol.cam.ac.uk/

PUBLICATIONS

An IoT Garbage Monitoring System for Effective Garbage Management
[2022]

Nowadays, with the increasing output of municipal waste, the pressure on municipal waste treatment is increasing. In this case, utilizing low-cost and low-power IoT technology to improve urban waste management has become a popular trend. This paper proposes an intelligent garbage management system for urban communities: Garbage Manager. The Garbage Manager aspires to create energy-efficient and real-time waste detection based on IoT and data visualization technology. In this work, the NodeMCU chip integrated with a high-precision ultrasonic sensor is used to measure the height of the waste in the garbage bin and transmits the data to the database through the Ali-cloud IoT platform. In addition, a web page is created as a graphical user interface to display the status of the garbage bins in real-time. Experimental results show that the Garbage Manager is able to decrease the manpower from clearing the garbage by 24.07 % and reduce the garbage overflow times by 83.33 %.

Link: https://caihanlin.com/mypaper/slides/2022-CENIM-Pre-v2.pdf

RIGMS Testbed for IoT Cybersecurity Research Using Machine Learning Based Approach
[2023]

This paper proposes a real-time intelligent garbage monitoring system (RIGMS) testbed for IoT cybersecurity research. The testbed is established by realistic devices in the physical world, which is a stage in the process of municipal waste disposal. Multiple-mix-attacks were conducted based on the testbed. During the attack scenarios, the network activities were analyzed, and the traffic features were extracted to design a representative RIGMS dataset for training and verifying the authenticity of the machine learning based models. In this paper, five advanced ML models were utilized to detect the cyber-attacks. Experiment results verified the feasibility of implementing learning based models to detect multiple-mix-attacks.

Link: https://caihanlin.com/mypaper/202210camb.pdf

WORK EXPERIENCE

Student Deputy President
Volunteer Department, Fuzhou University Youth League Committee [1 Sep 2021 – 1 Sep 2022]

City: Fuzhou
Country: China

- Took charge of the planning, operation, and publicity of Fuzhou University's volunteer service work, and helped instructors to promote the improvement, digitization and intelligence of Fuzhou University's volunteer service management;
- During the period, 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;
- 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.

New Media Intern
Jinjiang Daotian Xingguang Cultural Creativity Co., Ltd. Jinjiang, China [12 Jan 2021 – 28 Aug 2021]

City: Quanzhou
Country: China

- Assisted the leader in carrying out 12 new media projects and organizing on-site activities;
- Responsible for some new media work such as UI design modeling, image beautification, video rendering, audio editing, etc., and produced 7 works in total;
- Participated in the operation of on-site activities, including the construction of technical scenarios in the early stage and settlement of various unexpected problems in the activity process;
- Organized user experience feedback at the later stage of activities and analyzed and sorted out 796 questionnaires in total to help improve user experience and the company's product competitiveness.

PROJECTS

Garbage Manager
[1 Mar 2022 – 25 Nov 2022]

- Took charge of the software and hardware interface part of the IoT Monitoring System, thousands of lines of high-quality and efficient code writing, and the technical documentation preparation of this system;
- Grasped the comprehensive knowledge of IoT systems and learned how to connect software with hardware and how to use cloud computing to process IoT-generated data, etc.;
- Penned a paper named An IoT Garbage Monitoring System for Effective Garbage Management and will report on this project as a presenter at IEEE CENIM in Nov 2022.

RIGMS Testbed
[20 Jun 2022 – Current]

- Responsible for the establishment and improvement of the Real-time Intelligent Garbage Monitoring System (RIGMS) Testbed for IoT cybersecurity research;
- Master basic machine learning algorithms, further explore the design of IoT cybersecurity algorithms, and apply machine learning approaches to prevent IoT multiple-mix-attacks;
- Until to now, have obtained a series of experimental data, and carried out corresponding data preprocessing, preliminary result analysis, and algorithm evaluation;
- Still under working that will be finalized in Dec 2022, and expect to submit to Rivest, Shamir and Adleman (RSA) Conference 2023.

HONOURS AND AWARDS

First Prize (Fujian Competition Area, Top 8%) in China Undergraduate Mathematical Contest in Modeling
[Nov 2022]

Maynooth International Engineering College Best Student Project in Academic Year 2021/2022 (Top 8%, Only One Team in my major)
[Oct 2022]

Nomination for China National Scholarship (Top 1%)
[Sep 2022]

First Prize Scholarship of FZU (Only Best Student in my major, 1/60)
[Sep 2022]

Third Prize (Top 5%, Only One Team at Fuzhou University) in China National College Student Computer Design Competition
[Aug 2022]

Second Prize (Top 10%) in Fujian College Student Computer Design Competition
[Jun 2022]

Third Prize (Top 15%) in the 2022 13th "Nanwei" Cup Mathematical Mathematical Contest in Modeling
[Jun 2022]

Champion of 100-meter Freestyle Swimming Competition of Fuzhou University
[Jun 2022]

Third Prize (Top 10%, Short Videos Group) in China National College Student New Media Competition
[May 2022]

Top 10 Best Volunteers (Only 10/30000) of the year 2021-2022 at Fuzhou University
[Mar 2022]

First Prize Scholarship of FZU (Only Best Student in my major, 1/60)
[Mar 2022]

Third Prize Scholarship of FZU (Top 15% in my major)
[Nov 2021]

Merit Student of Fuzhou University
[May 2021]

First Prize Scholarship of FZU (Only Best Student in my major, 1/60)
[Mar 2021]

CONFERENCES AND SEMINARS

Presenter and author at International Conference on Computer Engineering, Network, and Intelligent Multimedia (CENIM) 2022
[Surabaya, Malaysia, 20 Nov 2022 – 23 Nov 2022]
Link: http://cenim.its.ac.id/#pdfexpress

Volunteer at 44th session of the World Heritage Committee
[Fuzhou, China, 16 Jul 2021 – 30 Jul 2021]
Link: https://www.44whcfuzhou2021.cn/en.shtml

Volunteer at 4th DIGITAL CHINA SUMMIT
[Fuzhou, China, 19 Apr 2021 – 25 Apr 2022]
Link: https://www.szzg.gov.cn/

RECOMMENDATIONS

Supervisor
Name: Zhicong Chen

Email: zhicong.chen@fzu.edu.cn

Hanlin is a good team player, conscientious and dedicated. I have no doubt that he will excel in the future. Should you wish to discuss this reference in detail, please feel free to contact me directly.

Supervisor
Name: Chin-Hong Wong
Email: chinhong.wong@mu.ie

Mr. Hanlin has performed consistently in his study throughout the years and has a strong ability to understand theories and apply them into practical situations.

Supervisor
Name: Pietro Lio'
Email: pl219@cl.cam.ac.uk

Based on the student's skills and capabilities that I have witnessed during this programme and the academic development that this programme has resulted in, I can confidently recommend Cai for an advanced degree programme and rest assured that he will excel in this degree.

LANGUAGE SKILLS

Mother tongue(s): **Chinese**

Other language(s):

English

LISTENING C1 **READING** C1 **WRITING** C1

SPOKEN PRODUCTION B2 **SPOKEN INTERACTION** B2

HOBBIES AND INTERESTS

Prelection and Presentation

There must be something truly magical about standing on stage to give a fantastic speech, which considerably lifts my spirits and energizes my entire body. If you desire to master a specific knowledge in depth, just give a prelection. If you can explain to others for complete understanding, you are already an expert. I really enjoy the accomplishment of imparting my knowledge to others, so what I strive for is to be a student's favorite lecturer at the best universities in my hometown.

Swimming and Surfing

Swimming removes my worries, refreshes my body, and brings me courage to address any challenges. I extremely enjoy the feeling of being immersed in the water. Besides, I am a member of the Swimming Team at Fuzhou University, where I meet many sincere friends. I have reached China National Second-level athlete Standard in 50m breaststroke and won Five Gold Medals during my swimming career. Recently, I am also keen on surfing.