

Guolin Yin

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WORK EXPERIENCE

- **Research Fellow** May 2025 - Present
Queen's University Belfast
 - Focusing on Wi-Fi sensing.
- **Research Associate** July 2024 - May 2025
University of Liverpool
 - Developing innovative wireless security solutions for WiFi devices using advanced machine learning techniques as a PDRA supported by HASC: Future Communications Hub in All-Spectrum Connectivity [🌐]. Collaborating with Heriot-Watt University, Queen's University Belfast, and MathWorks to advance the integration of AI with wireless technologies, contributing significantly to the UK's technological advancements.
 - Design RFFI algorithm for Wi-Fi devices, and prototype a Wi-Fi-based RFFI system using the USRP N210 platform with PicoScenes for CSI extraction. Here is the DEMO create during this position. [🌐]

EDUCATION

- **Device-Free Wireless Sensing, PhD** Sep 2020 - Sep 2024
University of Liverpool, Department of Electronics, Electrical Engineering Liverpool UK
 - Thesis: **Deep Learning Powered Wi-Fi Sensing**, supervised by [Dr. Junqing Zhang](#) [🌐]
- **Communication and Signal Processing, M.Sc** Oct 2018 – Dec 2019
University of Manchester, Department of Electronics, Electrical Engineering Manchester, UK
 - Result: Merit
- **Electronic Engineering, B.Eng.** Sep 2016 – Sep 2018
Coventry University, Department of Electronics, Electrical Engineering Coventry, UK
 - Result: First class

RESEARCH EXPERIENCES

- **Denoise Diffusion Model for Radio Frequency Fingerprint Identification** July 2024 – Dec 2024
Tools: USRP N210 University of Liverpool
 - Developing an advanced Radio Frequency Fingerprinting Identification (RFFI) algorithm to address challenges related to the multipath channel, with ongoing research utilising **MATLAB WLAN Toolbox** and **Communication Toolbox** for channel modeling, simulation, and signal processing.
 - Designed a **diffusion model** for noise removal of the band signal that enhanced the accuracy and robustness of RFFI under various noise conditions. Developed a robust classification model based on the transformer.
 - Conducted extensive real-world experiments using **USRP N210** and built a prototype RFFI system with a commercial Wi-Fi dongle, laptops, and USRPs.
- **Adapting Wi-Fi Sensing Model to Dynamic Packets Transmission Rate** May 2023 – May 2024
Tools: Nexmon CSI tool, Asus RT-AC86U Router University of Liverpool
 - Evaluated real-world application scenarios for Wi-Fi sensing systems by managing variable packet transmission rates in Wi-Fi networks to achieve **Integrated Sensing and Communication (ISAC)** during system deployment. Developed a novel Wi-Fi sensing approach capable of working on variable transmission rate, enabling the system to handle variable input sizes from different devices and network conditions. Enhanced the system robustness through custom-designed augmentation techniques, which significantly improved performance across diverse real-world deployment scenarios.

- Prototyped Wi-Fi sensing with a complete pipeline, including collection of a **gesture and activity dataset** using an **ASUS AC-86U router** equipped with the **nexmon CSI tool**. As well as data processing, incorporating practical signal processing algorithms for CSI data preprocessing, including noise reduction, outlier removal, etc. Applied channel modeling expertise to analyse multipath effects and channel variations while implementing deep learning models optimised for wireless signals.
- Research contributions are submitted to IEEE Transactions on Mobile Computing.

• Adversarial Machine Learning in Wi-Fi Sensing Systems

Feb 2022 – Feb 2023

University of Liverpool

- Developed and validated various Wi-Fi sensing security analysis frameworks, and adapted various attack algorithms white and black box attacks to sensing systems, including FGSM, PGD, and DeepFool, to assess system vulnerabilities. Demonstrated the effectiveness of these attacks across different models and environments, achieving attack success rates of 97.0% and 95.6%.
- Designed and implemented a robust certifiable defence mechanism through adversarial training, which effectively reduced attack success rates to 6% while preserving system performance across different environments. This method not only mitigated adversarial threats but also qualified the robustness of Wi-Fi sensing models, ensuring they remain reliable and resilient against various attacks in diverse scenarios.
- Research contributions are published to IEEE Transactions on Mobile Computing.

• Wi-Fi-based Cross-domain Gesture Recognition System

Feb 2021 – Dec 2021

University of Liverpool

[Github](#) 

- Conducted research on Wi-Fi sensing systems to enhance adaptability and scalability in cross-domain scenarios. Built a Wi-Fi sensing system named FewSense which is capable of recognizing new activities in unseen environments with minimal data, addressing the scalability and domain dependency issues inherent in existing Wi-Fi sensing technologies. FewSense demonstrated reliable accuracy across diverse environments and outperformed existing methods in cross-domain recognition of novel classes.
- Evaluated the prototyped system, achieving 90% accuracy in challenging cross-environment recognition for novel classes, outperforming existing methods. This result significantly enhances the practical applicability and reliability of Wi-Fi-based sensing systems, demonstrating robustness and adaptability in diverse real-world scenarios.
- Research contributions are published to IEEE Transactions on Mobile Computing.

PUBLICATIONS

- [1] **G. Yin**, J. Zhang, G. Shen, and Y. Chen, "FewSense, Towards a Scalable and Cross-domain Wi-Fi Sensing System using Few-shot Learning," *IEEE Trans. Mobile Comput.*, vol. 23, no. 1, pp. 453-468, Jan. 2024.
- [2] **G. Yin**, J. Zhang, X. Yi and X. Wang, "Evasion Attacks and Countermeasures in Deep Learning-Based Wi-Fi Gesture Recognition". *IEEE Trans. Mobile Comput.*, Mar. 2025.
- [3] **G. Yin**, J. Zhang, G. Shen, "Towards a Practical Wi-Fi Sensing Under Variable Traffic Patterns," *IEEE Trans. Mobile Comput.*, 2024, Under Review.
- [4] **G. Yin**, J. Zhang, Y. Ding, and S. Cotton, "Noise-Robust Radio Frequency Fingerprint Identification using Denoise Diffusion Model" 2025 *IEEE Wireless Communications and Networking Conference (WCNC)*, Milan, Italy, 2025, Accepted. ***Best Workshop Paper Award***

SERVICES

• TPC Member

- 2025 International Conference on Computing, Networking and Communication (ICNC): AMCN
- 2025 ICC Workshop: Machine Learning and Deep Learning for Wireless Security (MLDLWiSec).
- 2025 INFOCOM DeepWireless.
- 2025 IEEE World Forum on Internet of Things (WF-IoT).
- 2024 IEEE Globecom Workshops: Second Workshop on Machine Learning and Deep Learning for Wireless Security.

AWARDS

- **2025 IEEE WCNC Best Workshop Paper Award**
2025 *IEEE Wireless Communications and Networking Conference*.

2025



TEACHING EXPERIENCE

- **Teaching Assistant**

Dec 2020 – Jun 2024

University of Liverpool

- Assisted students in both data-focused subjects (e.g., statistics, machine learning, databases) using Python, and hardware-oriented subjects (e.g., electronic circuit design, communication systems). Provided one-on-one support and group guidance, fostering a productive and engaging learning environment.
- Demonstrated strong leadership and communication skills by preparing and delivering educational content, leading discussions, and managing lab activities. Effectively organized and coordinated course components, ensuring that students received comprehensive support and mentorship throughout their studies.

SKILLS

- **Programming Languages:** Python, Matlab.
- **Packages & Libraries:** WLAN Toolbox, Communication Toolbox, Pandas, Geopandas, Numpy, Tensorflow, Pytorch.
- **Deep Learning:** Generative model, CNN, Transformer, UNET.
- **Hardware & Tools** USRP N210, Raspberry Pi, Nexmoon CSI tool, IEEE 802.11 CSI tool, Picoscenes.