

Zhenyu Ren

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EDUCATION

Southern University of Science and Technology (SUSTech) Shenzhen, China

B.Sc. in Communication Engineering; GPA: 3.69/4.00; Weighted Score: 88.07 Sep 2018 – Jun 2022

M.Sc. in Electronic Science and Technology; GPA: 3.44/4.00; Weighted Score: 88.52 Spec 2022 – Jun 2025

Supervised by Prof. [Rui Wang](#), focusing on the channel modeling and transfer learning techniques for the aim of wireless gesture recognition.

Core courses: 2022-Fall EE5046 Modern Signal Processing (Grade: A-, ranked: 1/90).

SKILLS

Programming Languages: C/C++, Python, MATLAB, Java

Technologies: PyTorch, Linux/Ubuntu, Git/GitHub, OpenCV, UHD/USRP, 60GHz Sivers, WinProp C++ API (Ray tracing software), Linux 802.11n CSI Tool, Mediapipe/ZED-SDK (Human/Hand keypoint extractor)

Writing: L^AT_EX, Markdown, Website (HTML, CSS, JavaScript)

English: IELTS 6.5

EXPERIENCE

Huawei Technology, Wireless Technology (WT) Laboratory Shenzhen, China

Research Intern June 2021 – June 2022

- Supervised by Dr. [Tony Han Xiao](#), focusing on the wireless communication and sensing technology.
- Developed a Wi-Fi based indoor near field imaging system base on one AD9361 board and one digital-controlled rail (all driven by MATLAB via my programming), which also served as my bachelor thesis: [Slides](#) and [Report](#) in Chinese.
- Contributed to the “Channel Models for WLAN Sensing Systems” for IEEE 802.11bf standard (doc.: IEEE 802.11-21/0782r5): [Link](#).

PUBLICATIONS

Ren, Zhenyu, Guoliang Li, Chenqing Ji, Chao Yu, Shuai Wang, and Rui Wang. “CASTER: A Computer-Vision-Assisted Wireless Channel Simulator for Gesture Recognition.” arXiv preprint arXiv:2311.07169 (2023). (**Revise and Resubmit, IEEE Open Journal of the Communications Society**).

[Arxiv](#) | [GitHub](#) | [Video](#) (in Chinese)

Reviewer’s comments:

- * “Your paper ‘CASTER: A Computer-Vision-Assisted Wireless Channel Simulator for Gesture Recognition’ showcases a thoughtful approach, blending computer vision with wireless gesture recognition. It’s an innovative concept, and your work in this space is commendable—more detail on gesture types and comparisons with existing methods could enhance the paper’s depth. Integrating your approach in real-world scenarios would also be intriguing to explore. Your contribution to this field is appreciated, and these suggestions further refine your already valuable research.”
- * “Using computer vision to create a wireless channel simulator for gesture recognition is innovative. This method addresses the challenge of efficiently generating training datasets for wireless gesture recognition systems, which significantly contributes to the field. While the concept of gesture recognition itself is not new, integrating computer vision techniques to improve wireless channel simulation represents a novel approach that adds value to the existing body of research. This combination of technologies and gesture recognition applications makes the paper’s content novel enough to warrant publication.”

PATENTS

Zhenyu Ren, Wanli Chen, Rui Wang, Chao Yu, “Wireless Channel Simulation Method, Device, Computer Equipment, and Storage Medium”, Patent Application No.: 2023110356420, Southern University of Science and Technology, Application Date: 2023.08.16 (Chinese Invention Patent).

AWARDS & ACHIEVEMENTS

Second Prize in the 17th "Challenge Cup" Guangdong University Student Extracurricular Academic Science and Technology Works Competition.

Guangdong University Students' Science and Technology Innovation Cultivation Special Fund ("Climbing Plan" Special Fund), Funding: 20,000 RMB.

2022 Excellent Graduate of Undergraduate for exceptional performance in the SUSTech.

2022 Distinguished Undergraduate Thesis of the SUSTech.

Southern University of Science and Technology Outstanding Student Third-Class Scholarship (2018~2019, 2020~2021).

First Prize in the 2020 National College Student Mathematics Modeling Competition.

PROJECTS

Note: You can look up my [GitHub](#) for my full project lists.

CASTER | [Arxiv](#) | [GitHub](#) | [Video](#) (in Chinese)

- CASTER: A Computer-vision-Assisted wireless channel SimulaTor for gEsture Recognition.
- An open-source platform for wireless channel simulation, human/hand pose extraction, gesture spectrogram generation, and real-time gesture recognition based on millimeter-wave passive sensing and communication systems.
 - * Submodules [mediapipe_spectrogram](#) and [testZED](#): I developed algorithms to extract human/hand keypoints from RGB or RGB-D video streams. Utilized a primitive-based channel model to generate channel impulse responses and corresponding spectrogram images, contributing to address the data collection issue for wireless sensing.
 - * Submodule [CASTER_classification](#): I implemented a Simulation-to-Reality transfer learning strategy for wireless gesture recognition. This involved utilizing ResNet18 as the backbone network to train a source domain model using a simulated spectrogram dataset generated by CASTER. Subsequently, I applied adversarial discriminative domain adaptation (ADDA) to fine-tune the source model with unlabeled real-world data (target domain). This approach significantly improved the gesture recognition accuracy tested on real-world datasets, boosting it from 83.0% to 96.5%.
 - * Submodule [RxRealTime_GUI](#): I implemented real-time gesture recognition based on millimeter-wave passive sensing and communication systems, based on USRP and Sivers 60GHz phased array.

Last Updated: April 17, 2024 by Zhenyu Ren