

# Yaoliang BIAN

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## EDUCATION

**University of Science and Technology of China (USTC)**, Hefei, China Sept. 2022 - Present

**Bachelor of Engineering in Electrical Engineering** (Expected in July 2026)

**Selected courses:** Design and Practice of Robot (A+); Foundation of Electronic Design Practice (A-); Electronic Technology Experiment; Computer Programming A; Linear Algebra; Mathematical Analysis

## AWARDS & Honors

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| USTC Sunshine Scholarship (1/49)  | 2025 |
| USTC Fellowship Undergraduate A-Class Funding (Top 5%)                                | 2023 |
| USTC Sunshine Scholarship (1/45)  | 2023 |
| Robogame Competition at USTC, 2nd Prize (2/39)  | 2023 |
| Scholarships for Electrical Engineering Program of Excellence (for talented students) | 2023 |
| USTC 2022 "Star of Inspiration" Honorary Title (1/45)                                 | 2023 |
| "Outstanding Campus Journalist" Honorary Title (Top 1.5%)                             | 2022 |

## RESEARCH & PROJECT EXPERIENCE

**Harnessing Multi-Frequency Carriers for Commodity Bluetooth Backscatter** Sept. 2024-Present  
Research Assistant | Advisor: [Prof. Wei Gong](#) (Department of Computer Science, USTC)

- Designed a backscatter system that is compatible with multi-frequency commercial Bluetooth signals and backscatters them to any Bluetooth channel in a standard Bluetooth frequency hopping manner.
- Built a low-cost edge prototype using off-the-shelf chips, the edge is prototyped with a TI CC2640R2F, a TI CC3200, and an STM32F103RC.
- Conducted end-to-end experiments on an empty second-floor platform, achieved a maximum utilization rate of 97.8% and 98.4% under 8 and 34 carrier channels, which are 8.73x and 34.5x better than FreeRider.
- Trying to explore how to multiplex multiple carrier sources currently, especially when these carriers have different hopping sequences. I plan to submit the paper to MobiHoc 2025.

**A Survey on Custom Hardware for Deep Reinforcement Learning** Jul. 2024 - Sept. 2024  
Research Assistant | Advisor: [Prof. Ameer Abdelhadi](#) (Department of ECE, McMaster University)

- Explored the development of domain-specific architectures for reinforcement learning (RL), highlighting advancements and challenges in implementing RL on specialized hardware.
- Reviewed architectures for accelerating RL algorithms and their key contributions for Internet of things, hardware prefetching and processors; Provided a comprehensive comparison of FPGA and GPU implementations; Explored near-memory computing and state-of-the-art DRL algorithms on custom hardware.
- Concluded with future research directions, including integrating advanced neural network layers in FPGA designs and exploring near-memory computing to further enhance RL capabilities on custom hardware.

**Robogame, USTC** May 2023 - Oct. 2023  
Project Manager | Advisor: **Prof. Huichun Ye** (Department of Engineering, USTC)

- Built a robot with my teammates in USTC's 2023 Robogame. I was responsible for the electrical wiring of the robot chassis and the coding of motion control. Our Robot can independently identify, grab ores of different colors and transport them to the designated area in time.
- Selected the STM32F407ZGT6 minimum system board as the main control module with a 32-bit ARM microcontroller. The computing platform was a high-performance laptop and a Raspberry Pi 4B. Motor drive schemes were designed, including brushed DC motor and stepper motor drives.
- Used the vector synthesis control algorithm to decompose the robot motion into x, y two-direction translational movement as well as rotation around the center of mass, and the velocity in each direction was controlled by a PID controller. The grasping strategy adopted the center of gravity balance method and force-controlled grasping method to achieve accurate grasping and placement of minerals.
- Chose Raspberry Pi as the computing platform and openCV library for image processing. The selected camera was the Logitech C920 HD Pro Webcam, which transmitted images to the host computer via a wired

connection and used Zigbee for data transmission. Image preprocessing includes bilateral filtering, edge detection and color recognition to classify and identify roadblocks, minerals and robot surroundings.

- Won the **2nd prize among 39 teams**. (More detail can be found: [Project code](#))

### **18th National College Students' Smart Car Competition, USTC**

Nov. 2022 - Jul. 2023

Project Manager | Advisor: **Prof. Huichun Ye** (Department of Engineering, USTC)

- Participated in the power relay group of Anhui division. I was responsible for the PCB design of the core boards for the rescue vehicle and the rescued vehicle of the electrical energy relay team.
- Designed a solution to a real-life scenario: a rescue vehicle with its own battery is used to rescue a power-drained vehicle after passing through various obstacles by its own sensors and programs. The road has various terrains including uphill and downhill, corners, intersections, traffic circles, roadblocks, garages, and so on. Difficulties include dual-vehicle communication, entering and exiting traffic circles, and speed control on uphill and downhill roads.
- Realized the calling and linkage of sensors and driving devices through programming, which mainly included calling these circuit modules of the motherboard, core board and driving board, as well as driving these external devices of motors, servos and cameras. And the hardware part included the design of the circuit board (PCB), the construction of the frame of the car model, as well as the installation and maintenance of peripherals..
- Provided help to the team of Shanghai Jiao Tong University in the intelligent vision group of East China Division.

### **Examining the Influences of Skyrmion Movement**

Sept. 2022 - Jun. 2023

Research Assistant | Advisor: [Prof. Peng Li](#) (Department of ECE, USTC)

- Investigated the effect of magnetic crystal anisotropy constant  $K$ , geometry on Skyrmion motion
- Explored the effects of varying the one-dimensional  $K_u$  field intercept, slope, and the two-dimensional  $K_u$  field (adjusting the shape of the wedge) on the motion of Skyrmion; Obtained a series of Skyrmion motions by varying the parameter; Wrote [a summary essay](#).
- Drew conclusions about the associated integral-leakage-ignition model; Summarized, reflected upon and refined the simulation process.

## **STUDY ABROAD EXPERIENCE**

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**McMaster University**, Hamilton, Canada

Jul. 2024 - Sept. 2024

McMaster - USTC's Summer Research Internship Program

Relevant Research: A Survey on Custom Hardware for Deep Reinforcement Learning

**The University of Texas at Austin**, Austin, TX

Jan. 2024 - Feb. 2024

International Academy Winter 2024. Software Engineering

Relevant Coursework: Programming in Python and Java, Academic Writing, Oral Communication

**Oriel College of Oxford University**, Oxford, UK

Jul. 2023 - Aug. 2023

Summer Institute 2023. Quantum Computing

Relevant Coursework: Mastered the basics of quantum computing

**Warsaw University**, Online

Jan. 2023 - Feb. 2023

Winter School Program 2023. IT

Relevant Coursework: Engaged in a crash course in R, learned to analyze data with Rstudio and use the data analysis software Orange

## **SKILLS**

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**Programming:** C, C++, Python, Java, R, Verilog

**Hardware:** nRF52840 SoC, TI CC2640R2F, TI CC3200, FPGA, STM32F103, Raspberry Pi, ATmega8A

**Software:** Mathematica, MATLAB, Altium Designer, Microsoft Excel, Origin, Wireshark, Vivado, STM32CubeMX, SmartRF Studio 7

**Language:** Proficient English, Fluent Chinese