Tianyi Zhang

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EDUCATION

College of Electronics and Information Engineering, Tongji University Sep 2021 – Jul 2025

- B.E. in Microelectronics Science and Engineering
- Overall GPA: 4.64/5.00 (91.42/100.00)
- Relevant Coursework: Design and Analysis of Digital Integrated Circuits, Chip Design for Integrated Systems, Design automation of digital electronic system, Digital Signal Processing, and Embedded Systems

PATENTS

- Anti-interference Encoding Method for Commodity Packages (First Author Patent, Publication Number CN118333645A)
- A Novel Real-time Reordering Scheduler for Generic Sparse Matrix Multiplication (First Author Patent, Publication Number CN119003962A)

RESEARCH EXPERIENCES

A Novel Real-time Reordering Scheduler for Generic Sparse Matrix Multiplication May 2024 – Aug 2024

Advisor: Prof. Guochun Wan, College of Electronics and Information Engineering, Tongji University

- Designed a novel hardware structure leveraging locality-sensitive hashing for row reordering, improving data reuse and increasing the throughput of SpGEMM accelerators.
- Developed cascaded configurable function modules to accelerate the signature generation step in locality-sensitive hashing, reducing cycle requirements to the number of non-zeros.
- Proposed a fused method for dynamically selecting the next candidate row, achieving local optimization and real-time reordering.
- Published a first-author patent in November 2024 (Publication Number CN119003962A).

Anti-interference Encoding Method for Commodity Packages Jan 2024 – Apr 2024

Advisor: Prof. Guochun Wan, College of Electronics and Information Engineering, Tongji University

- Proposed a new anti-interference encoding method for commodity packaging.
- Designed linear algebra-based transformation rules for error-correction code generation, achieving a configurable error-correction level for package encoding.
- Developed a filling method where two processed binary sequences are placed into two square grids along diagonal lines, with vertex-to-vertex alignment between grids.
- Enhanced encoding robustness by ensuring insensitivity to diagonal stains within the designated error-correction level.
- Published a first-author patent in July 2024 (Publication Number CN118333645A).

Wheel-legged Robot Controlling System Aug 2023 – Apr 2024

- Built a three-rigid-body model of the robot, and constructed state-space equations.
- Simulated and tuned the main LQR controller using MATLAB (Simulink).
- Applied an ADRC controller to enable the robot's legs to function as five-link suspensions with approximate critical damping on uneven surfaces.
- Developed the complete chassis control system for the robot, with the prototype successfully passing tests for turning, jumping up stairs, falling, and navigating uneven terrains while maintaining upper chassis stability.
- Participated in the Eastern Competition Area of the RoboMaster University Championship (RMUC) 2024 as part of the battle formation team, earning second prize.

ACADEMIC PROJECTS

Image Median Filter Module

- Designed the architecture of an image median filter compatible with simple dual-port RAM. The design incorporates cache-like buffers, a scheduler, a fetcher, and a sorter.
- Modeled and simulated the complete design using Verilog HDL.
- Achieved a processing speed of 2.67 cycles per pixel, significantly outperforming naive sliding-window image median filter.

- Proposed an improved scheduling method and corresponding modified scheduler, increasing the theoretical processing speed to 0.75 cycles per pixel.

Radio Receiver/Transmitter

- Assembled and tuned a radio transmitter based on a provided schematic by soldering components onto a PCB and adjusting inductance to ensure the carrier wave at 75.0MHz.
- Integrated a microphone to enable voice transmission.
- Derived formulas of digital quadrature demodulation, and developed a software program for demodulation and auto channel search in C, tailored for the STM32F103 microcontroller series.
- Designed peripheral circuits for the radio receiver, enabling it to process RF signals for microcontroller handling and output audio to an earphone. The circuit included components such as a voltage stabilizing chip, USB-to-serial port transformation chip, power amplifier, and other analog devices.
- Created the PCB layout for the radio receiver, soldered the complete circuit, and conducted field tests. The receiver successfully captured the transmitter's audio several meters away and supported auto channel switching via a dedicated button.

PROFESSIONAL & SOCIAL ACTIVITIES

Leader, Electronic Control Department, team SuperPower, Tongji University June 2023 – June 2024

- Led the development of a power control software program for robots participating in the RoboMaster University Championship (RMUC) and RoboMaster University League (RMUL) competitions during the 2024 season.
- Completed a Shanghai Students' Innovation and Entrepreneurship Training Program focused on a "high-dynamic wheel-legged biped robot system based on LQR with WBC framework".

AWARDS

- Second-class Scholarship of Freshman College Undergraduate 2021–2022
- Second Prize of Shanghai Competition Area in China Undergraduate Mathematical Contest in Modeling 2023
- Third Prize of National Competition in RoboMaster University Championship (RMUC) 2023
- Second Prize of Central Competition Area in RoboMaster University Championship (RMUC) 2023
- Third Prize of National Competition in RoboMaster University Championship (RMUC) 2024
- Second Prize of Eastern Competition Area in RoboMaster University Championship (RMUC) 2024
- First Prize of Chemistry Knowledge Competition of Tongji University 2021

SKILLS

- Programming Languages: C/C++, Verilog HDL, Python, assembler
- Engineering Applications: Vivado, Quartus II, Multisim, Modelsim, Keil
- Office Applications: Microsoft Office

STANDARDIZED TESTS

- GRE: Verbal 157 (73%), Quantitative 170 (94%), Analytical Writing 3.5
- TOEFL: Total 107 (Reading 30+Listening 28+Speaking 23+Writing 26)