Hao Zhou

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Education

- **South China University of Technology** *Sep 2022 – Jul 2026 (expected)*
  B.Eng, Majoring in Automation, Senior Undergraduate
  GPA: 3.7/4.0
  Main Course: Signal Analysis and Processing (4.0/4.0), Calculus (4.0, 4.0)/4.0, Linear Algebra (4.0/4.0) .....

Research Interests

Generative Multimodal Model, Efficiency, Robot

My interest in generative multimodal models and Efficiency stems from a question like: How can an AI system perceive and generate visual and textual information as humans do? Through hands-on projects and continuous exploration, I have come to appreciate how LLMs, MLLMs can simulate perception and generation in increasingly human-like ways. Looking ahead, I believe grounding these capabilities in robotic systems could further unlock their potential—empowering machines to act in the physical world with greater autonomy, adaptability, and alignment.

Research Experience

- **Shanghai Artificial Intelligence Laboratory** *Sep 2024 – Mar 2025*
  Research Intern, Advisor: Prof. Yu Cheng
  - Developed a Medical Assistant Agent for end-to-end healthcare workflows, where each LLM component handles a specialized subtask (e.g., appointment scheduling, medical QA), enabling full-process automation of real-world clinical consultation scenarios.
  - Constructed a reasoning-augmented dataset by sampling from open-source medical QA corpora and prompting a CoT-capable model to generate intermediate thought processes, then fine-tuned base LLMs for domain-specific reasoning capabilities and accurate medical QA performance
  - Co-leading a **joint first-author** study focused on enhancing reasoning capabilities in retrieval-augmented generation (RAG), aiming to improve alignment between retrieved content and multi-step inference.

- **One-Shot Industrial Defect Segmentation Challenge (ECCV 2024)** *Jul 2024 – Aug 2024*
  Collaborator, Advisor: Xiaoyang Wang
  - Tackled one-shot defect segmentation under severe data imbalance, requiring generalization to unseen defect types and adaptation to novel product categories without retraining.
  - Proposed a three-part solution: (1) high-resolution patch slicing (448×448) to preserve small-scale defect details; (2) an enhanced FPTrans-based dual-stream ViT with residual connections for improved feature retention; (3) visual prompting via red foreground masks to guide the support encoder toward defect regions.
  - Received **Third Prize** globally, demonstrating strong generalization in few-shot industrial defect segmentation.

- **Biometrics and Intelligence Perception Lab, SCUT** *Sep 2023 – May 2024*
  Research Intern, Advisor: Prof. Wenxiong Kang (IEEE Fellow)
  - Reproduced and analyzed recent works in knowledge distillation (KD) and gait recognition, with a focus on accuracy–efficiency trade-offs in model compression.
  - Applied KD techniques to optimize DeepGaitV2 and similar architectures for large-scale, outdoor datasets (e.g., GREW), improving model generalization under diverse viewing conditions.

Publication

1. **Retrieval is Not Enough: Enhancing RAG through Test-Time Critique and Optimization**
   Jiaqi Wei*, Hao Zhou*, Xiang Zhang, Di Zhang, Zijie Qiu, Wei Wei, Jinzhe Li, Wanli Ouyang, Siqi Sun
   Advances on Neural Information Processing Systems (NeurIPS), 2025.

Project Experience

- **China Undergraduate Engineering Practice and Innovation Ability Competition** *Jun 2023 – Oct 2023*
  - Built an end-to-end robotic system for real-time classification of four waste categories using YOLOv5 algorithm.
  - Collected and annotated custom dataset; trained models and deployed them on Nvidia Jetson devices with accelerated inference using TensorRT; implemented hardware-software communication with the STM32 microcontroller; received **Second Prize** in the competition.

- **Summer School, National University of Singapore (NUS)** *Jul 2023*
  - Applied classical machine learning algorithms (e.g., Decision Tree, Random Forest) to complete a traffic sign classification task involving seven classes.
  - Achieved a **Distinction** grade based on model performance and timely project completion.

- **Intramural Robot Competition** *Mar 2023 – May 2023*
  - Developed real-time visual algorithms in C++ using the OpenCV library on Linux to enable block detection and grasping in multi-terrain environments.
  - Co-designed and built a terrain-adaptive robotic system with teammates; received the **Open Source Award** (ranked 1st/21) in the same track.

Honors and Awards

- **Bronze Prize**, One Shot Industrial Defect Segmentation Challenge (ECCV2024)
- The Second Prize **(Top 6%)**, China Undergraduate Engineering Practice And Innovation Ability Competition
- Distinction Grade **(highest honor)**, Summer School of National University of Singapore
- Open Source Award **(ranked 1st/21 comprehensively)**, Intramural Robot Competition
- The Second Prize, Hunan Youth Creative Programming and Intelligent Design Competition