Hao Zhou

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Education

- **South China University of Technology** *Sep 2022 – Jul 2026*
  B.Eng, Majoring in Automation, Junior 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, 3D Vision, Robot

My interest in generative multimodal models and physically grounded 3D vision stems from a question like: How can an AI system perceive and generate visual and text information just like humans can? 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: Prf. Yu Cheng
  The first completed engineering project consisted of three main components: (1) fine-tuning LLMs on a dataset and evaluating their effectiveness on multiple benchmarks; (2) building a medical QA chatbot powered by LLMs; and (3) developing an LLM-based recommendation system using RAG, through which I gained solid experience in LLM post-training, inference, and deployment techniques; The second ongoing project is a **joint first-author** study aimed at enhancing reasoning capabilities in the context of RAG.

- **One Shot Industrial Defect Segmentation Challenge (ECCV2024)** *Jul 2024 – Aug 2024*
  We are required to perform one-shot defect segmentation under severe data imbalance across five industrial product categories, and the task required models to generalize to previously unseen defect types, and adapt to new product categories without retraining. We mainly proposed (1) an image-preprocessing method that slices high-resolution images into multiple 448×448 patches to preserve small-scale anomalies.(2) an enhanced FPTrans-based framework that leverages a dual-stream Vision Transformer with residual connections every two transformer layers to improve feature retention. (3) visual prompts—implemented as red foreground masks—guide the support encoder to focus on defect regions. Finally, we received the Third Prize.

- **Biometrics and Intelligence Perception Lab of SCUT** *Sep 2023 – May 2024*
  Research Intern, Advisor: Prof. WenXiong Kang (IEEE Fellow)
  Interned with the Gait Recognition Research Group, initially focusing on deep learning fundamentals (e.g., PyTorch, CNNs, Transformers). Subsequently, I studied and reproduced a few papers in gait recognition and knowledge distillation (KD). My work involves leveraging KD and other techniques to optimize and lightweight gait recognition models, such as DeepGaitV2, for improved performance on outdoor datasets like GREW.

Project Experience

- **China Undergraduate Engineering Practice and Innovation Ability Competition** *Jun 2023 – Oct 2023*
  The task involved **building a robotic system** capable of real-time classification of four types of waste. My responsibilities included dataset collection, YOLOv5 model training, deployment on edge devices (Nvidia Jetson series) with TensorRT, development of a Qt graphical interface, and communication with the STM32 MCU. Finally, we received the Second Prize.

- **Summer School of National University of Singapore (NUS)** *Jul 2023*
  The lecture mainly focused on traditional ML algorithms, such as Random Forest, Decision Tree, and two vision patterns, Local Binary Pattern (LBP) and HOG. I completed final task of classifying seven kinds of traffic signs in time, and got a Distinction grade eventually.

- **Intramural Robot Competition** *Mar 2023 – May 2023*
  I was mainly responsible for the development of visual algorithm (C++) using OpenCV library on Linux system, as well as constructing a robot with block grabbing ability to adapt to multi-terrain with other team members, and finally won the open source award (ranked 1/21) of 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**, Summer School of National University of Singapore
- Open Source Award **(ranked 1/21 comprehensively)**, Intramural Robot Competition
- The Second Prize, Hunan Youth Creative Programming and Intelligent Design Competition
- The First Prize, Hengyang Youth Robot Competition

Skills

Languages: Python, C++
Frameworks: PyTorch
Tools: Linux, OpenCV