Ziyue Peng

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EDUCATIONS

Zhejiang University   Hangzhou, China
BEng. Robotic Engineering (Honors Degree)   GPA: 4.18/4.3   Rank: 1/44   Expected Jun.2026

University of Toronto   Toronto, Canada
Exchange Program Applied Science and Engineering   GPA: 3.93/4.00   Sept.2024 − Dec.2024

EXPERIENCE

The University of Texas at Austin   Austin, United States
Research Internship Department of Computer Science   Jun.2025 − Oct.2025

RESEARCH INTERESTS

I am broadly interested in Computer Vision, with a particular focus on Physical Understanding. My research explores how AI systems can infer physical properties from video data, how to leverage this knowledge to equip visual foundation models with physical reasoning, how incorporating physical laws can enhance the realism and consistency of generative models, and how to accelerate physical simulation and narrow the Sim2Real gap.

SELECTED AWARDS

- Chu Ko-Chen Scholarship *(Highest Honor at Zhejiang University, top 12 undergraduates)*   2025
- Chinese National Scholarship   2023 & 2024
- Zhejiang University First-Class Scholarship   2023 & 2024
- Supcon Group Scholarship   2024
- Zhejiang University Outstanding Student Award   2023 & 2024
- First Prize in National College Students Mathematics Competition   2023
- First Prize in Zhejiang Province College Students Physics Competition   2023
- First Prize in Zhejiang University Robot Competition   2024
- First Prize in the National Olympiad in Informatics   2020

PUBLICATION

- Yi Yang, **Ziyue Peng**, Kang Zhang, Xincheng Tan, Fan Lu, Jingting Ding, Kecheng Zheng, Minfeng Zhu, Wei Chen, "HiTag: Hierarchical Image Tagging with Hyperbolic Vision–Language Modeling" in *CVPR 2026* (under review).

RESEARCH PROJECTS

Physical Understanding from Real-World Video   The University of Texas at Austin
Advisors: Qixing Huang, Brandon Y. Feng, Chandrajit Bajaj, Etienne Vouga   Jun.2025 − Present

- Leading a research project studying the understanding of dynamic objects from video that extends beyond geometry into physics. Unlike recent works focused on synthetic data, this project focuses on generalization to real-world data.
- Modified the Material Point Method (MPM) simulator for greater physical accuracy, and created a large-scale synthetic dataset of 200K video-physical parameter pairs of objects dropping to the ground.
- Established geometric representations (i.e., dense pixel depth and optical flow) that exhibit minimal domain gaps between real and simulated videos to make training on synthetic data generalizable; designed and fine-tuned the model from a pre-trained visual understanding network to leverage priors and significantly boost real-world performance.
- Captured and processed a real-world dataset of 100 videos (20 objects × 5 trials) and established a benchmark to measure real-world prediction: reconstructing 3D scenes, simulating with predicted physical parameters, and comparing the rendered video with the real one; currently finalizing experiments for a SIGGRAPH 2026 submission.

Hierarchical Image Tagging with Hyperbolic Vision-Language Modeling   Zhejiang University
Advisors: Wei Chen, Minfeng Zhu   Jan.2025 − Jun.2025

- Proposed HiTag, a novel hierarchical image tagging method and benchmark capable of explicitly capturing parent-child concept relationships (e.g., Shiba Inu → Dog → Animal) in in-the-wild images.
- Constructed a 10-level, 3,334-word hierarchy by integrating WordNet and YAGO; utilized large vision-language models to annotate 2.87M training images (CC3M) and manually verified 57K test images (OpenImages).
- Designed and trained a Hyperbolic Vision-Language Model that embeds images, captions, and hierarchical tags into hyperbolic space, leveraging its inherent geometric capacity to encode tree-structured data.
- Established comprehensive evaluation metrics (including Tree Edit Distance, Hierarchical Precision/Recall) and achieved SOTA performance in zero-shot hierarchical image tagging; Co-authored the paper submitted to CVPR 2026.

Sim2Real Style Transfer for Surgical Robot Rope Cutting — University of Toronto
Advisor: Lueder Kahrs — Nov.2024 – Dec.2024
- Developed a Sim2Real pipeline for autonomous rope-cutting tasks on the dVRK surgical robot; bridged the visual domain gap by integrating diffusion-based style transfer directly into the Reinforcement Learning (RL) training loop in Unity.
- Leveraged 16 parallel Unity environments (15 vanilla, 1 stylized) for PPO-based RL. At each decision step, replaced that 1 environment's visual observation with the stylized frame and pushed all 16 environments into the mlagents' buffer.
- To make style transfer stable and fast, implemented a modified Stable Diffusion pipeline by injecting Query Q and Key K features (extracted from real surgical images during DDIM inversion) into the simulation frames during DDIM reversion, effectively injecting realistic textures while strictly preserving semantic content.
- Applied domain randomization across lighting conditions, camera viewpoints, and cutting-target positions to enhance policy robustness; real-robot deployment and further modifications are currently being conducted by lab collaborators.

Multi-robot's Navigation and Exploration Based on Omnidirectional Control — Zhejiang University
National Innovation Program   Advisor: Yuanchao Shu — Jun.2023 − May.2024
The project was recognized as a national-level outstanding project.
- Developed a modular and reusable software framework for Mecanum-wheeled robots, including control, mapping, localization, navigation, and exploration; this platform supports both single- and multi-robot systems to validate high-level planning algorithms in ROS simulations and real-world environments.
- Optimized omnidirectional control and navigation by implementing a recovery mechanism that dynamically reduces inflation layers in narrow passages, enhancing maneuverability while ensuring collision-free motion in constrained environments.
- Refined RRT-based exploration and frontier management by incorporating Busy Cost Weighting to avoid repeated assignments, Forward Exploration Weighting to mitigate radar blind spots, Frontier Width Filtering to exclude pseudo-frontiers in unreachable narrow gaps, and a TF Waiting Routine to prevent coordinate calculation errors caused by latency.

LEADERSHIP
Student Innovation and Entrepreneurship Center, Zhejiang University — Sep.2023 – Jun.2024
Vice President
- Led cross-sector collaboration among university administration, research laboratories, industry partners, and alumni networks to support student startups; managed the daily operations of the Innovation & Entrepreneurship Base.
- Organized the annual "Entrepreneurship Journey" competition, providing a platform for students to pitch innovative ideas to industry leaders and investors for professional mentorship and seed funding.

SERVICES
Orientation Program, Zhejiang University — Aug.2023 – Sep.2023
Student Mentor, Robotics Engineering Class of 2027
- Led a mentor team to host orientation events and alumni seminars, helping freshmen adapt to campus life; provided personal guidance on course selection and academic planning.
- Organized peer study groups for challenging core courses to help freshmen quickly adapt to college-level coursework.

The Hangzhou 19th Asian Games — Aug.2023 – Oct.2023
Technology Volunteer
- Managed the Results Printing and Distribution System (RPDS) for accurate, timely score dissemination.
- Served as an English interpreter connecting international basketball teams with local technical staff.

Zhejiang Provincial People's Hospital — Jan.2021 – Present
Volunteer
- Directed patient flow and managed queues in the Clinical Laboratory and Ultrasound departments to reduce congestion.
- Guided patients through the hospital layout and provided emotional support to calm anxious or distressed patients.

ACTIVITIES
Varsity Swimming Team, Zhejiang University — Oct.2023 − Present
Team Member
- Bronze Medal in Men's 50m Breaststroke at Zhejiang University Swimming Competition, 2023
- Gold Medal in "Speed Rescue" at Zhejiang University Swimming Competition, 2023

Piano Association, Zhejiang University — Sept.2022 − Present
Pianist and Tutor
- Organized the annual campus concert and provided piano tutoring to student enthusiasts.
- Invited by Steinway to perform Debussy's *Arabesque* for a Mother's Day recording special; served as the piano accompanist for the University Anthem at the Freshman Choir Competition.