PENGYUAN WANG

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EDUCATION

Zhejiang University (ZJU), Hangzhou, China — 2023–2027 (expected)
B.Eng. in Robotics Engineering (Honors Program) — GPA: 4.04/4.3 (89.09/100)

RESEARCH EXPERIENCE

Tsinghua University (THU), Beijing, China — Oct 2025–Present
Research Intern at THU Spatial Intelligence Lab (Supervised by Prof. Yiming Li)

RESEARCH INTERESTS

My current research interests focus on machine learning-based control methodologies for complex dynamic systems, specifically encompassing reinforcement learning, imitation learning, the perception-action loop, and robust sim-to-real transfer.

RESEARCH PROJECTS

End-to-End Humanoid Soccer Control via Depth-Based Active Perception — Dec 2025–Present
To be submitted to CoRL 2026
Yixiao Huo*, *Pengyuan Wang*, *Jiakang Jin*, *Yinan Han*, et al. (Advised by Prof. Yiming Li)

- Designed perception-control architecture and led sim-to-real deployment for a 25-DOF humanoid. Integrated a 2-DOF active vision head to decouple perception, enhancing dynamic tracking.
- Developed an end-to-end RL framework centered on depth perception. Integrated auxiliary prediction heads within the vision encoder to extract target latents and strengthen feature-driven state estimation, ensuring precise target localization under severe sensory noise and occlusions.
- Currently architecting and validating adaptive task-switching policies for hierarchical dribbling and shooting, systematically structuring autonomous searching and chasing behaviors as essential prerequisites to consistently achieve highly cohesive and strategic gameplay.

Autonomous Humanoid Exploration in Multi-Level Terrains — Jan 2026–Present
To be submitted to CoRL 2026
Yinan Han*, *Yixiao Huo*, *Pengyuan Wang*, *Jiakang Jin*, et al. (Advised by Prof. Yiming Li)

- Designed a goal-free exploratory framework for a 25-DOF humanoid using an active vision head to proactively scan environments, enabling robust pathfinding beyond static perception limits.
- Designing and evaluating a structural-feature encoder with an auxiliary terrain predictor to prioritize traversal toward high-variance topographies, aiming to enable autonomous direction guidance via localized depth complexity for stable progression in unpredictable environments.
- Formulating and validating competitive reward dynamics to balance displacement efficiency against survival constraints. This aims to induce emergent locomotion that modulates traversal speed based on terrain risks, significantly improving the humanoid's navigational resilience.

COMPETITIONS

RoboMaster University Series: Embedded System Architecture — 2023–2025

- Architected the embedded software framework and electrical topology for 4-swerve infantry and quadrotor platforms, and implemented a multi-layer state machine to ensure deterministic low-level motion control and system reliability during intense, highly adversarial match conditions across prolonged operational periods.
- Developed a high-bandwidth communication protocol using bit-fields to maximize transmission frequency and maintain data integrity, effectively minimizing control latency for highly dynamic maneuvers and ensuring that the pressure load on the communication bus remained strictly manageable and stable.
- Refined actuator dynamics through feed-forward cascaded PID and feedback control, achieving precise projectile velocity convergence and responsive gimbal tracking with zero overshoot.

ENGINEERING PROJECTS

General Motion Tracking on Noetix E1 Humanoid Platform 2025
Internship at Noetix Robotics

- Reproduced GMT frameworks (BeyondMimic/HoloMotion) on the E1 platform, and optimized training via adaptive sampling and dataset cleaning, significantly improving tracking fidelity for complex, high-dynamic dance sequences, successfully bridging the gap between kinematic retargeting and physical dynamic execution.
- Actively engaged in the complete Sim-to-Real deployment workflow, developing a solid understanding of the sim2real transition. Collaborated with technical teams to perform training-level optimizations, directly supporting policy deployments that achieved stable whole-body coordination on physical robots.

Agile UAV Flight Control via Deep Reinforcement Learning 2025
Research project at FAST Lab, ZJU

- Constructed a high-mobility control system integrating Jetson ORIN NX and PX4, and implemented cascaded PID controllers to decouple position and attitude, ensuring high-frequency response for agile flight maneuvers and providing a highly dependable foundation for aggressive trajectory tracking tasks.
- Deployed a PPO-based RL framework for aggressive motion control, leveraging extensive domain randomization to bridge the sim-to-real gap and facilitate robust policy transfer from virtual environments to hardware, successfully mitigating aerodynamic disturbances, sensor noise, and unmodeled physical dynamics.
- Accomplished autonomous execution of complex trajectories including high-speed figure-8 maneuvers, integrating the system via ROS to optimize data synchronization between high-level neural policies and low-level flight hardware, proving the viability of the proposed aerial control paradigm in deployments.

SELECTED AWARDS

- First Prize in China University Robot Competition (RMUC) (National Top 4) 2024, (National Top 8) 2025
- First Prize in China University Robot Competition (RMUL) (Regional 3rd Place) 2024, (Regional 2nd Place) 2025
- First Prize in Zhejiang University Robot Competition (2nd Place) 2024
- Outstanding Student & Academic Excellence Award, ZJU 2024, 2025
- Zhejiang University Third-Class Scholarship (Top 20%) 2024, 2025

SERVICE

- **Project Lead (Infantry & Aerial)** | ZJU RoboMaster Team "Hello World" 2023–2025
- **Minister** | Zhejiang University Student Robotics Association (100+ members) 2024–2025
- **Volunteer** | Opening Ceremony of Zhejiang University 2023
- **Volunteer** | Zhejiang University Annual Sports Meet 2025

SKILLS

- **Robot Platforms** Noetix E1, Noetix N2
- **Programming** Python, PyTorch, C/C++
- **Software** IsaacGym/Lab, Gazebo, SolidWorks
- **Hardware** Arduino/51/STM32, Circuit Design
- **Others** ROS, Git, Linux, LaTeX