

Xinchen Yao

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Education

Zhejiang University - University of Illinois Urbana-Champaign Institute (ZJUI)

Sep 2022 – May 2026

Dual degree program:

- Zhejiang University: BS in Electrical and Computer Engineering
- University of Illinois Urbana-Champaign: BS in Computer Engineering

GPA: 3.77/4.0

Technical Skills

Programming Languages: Python, C/C++, CUDA, Matlab, Rust

Learning Frameworks: PyTorch, RSL-RL, Jax, Brax

Simulators: Isaac Lab, Isaac Gym, Genesis, Mujoco MJX, MJ Lab

Low-level Software: ROS/ROS2, Concurrency, STM32, Communication Protocols, SLAM, OpenCV

Control Theory: PID, LQR, MPC

Experience

Physical Intelligence Lab, Zhejiang, China

Undergraduate Researcher

Zhejiang University - University of Illinois Urbana-Champaign Institute

July 2025 - Present

Advisor: **Hua Chen**

- Motivating emergent behaviors in locomotion controllers for bipedal robots and humanoids, using Isaac Lab and Genesis simulation platforms with custom RSL-RL implementations.
- Developing sim-to-sim evaluation pipelines in Mujoco. Deploying trained policies onto various real robots.
- Research on minimizing sim-to-real gap with learned dynamics models and simulation alignment.
- Developing algorithms based on PPO and APG, which can realize higher sample efficiency and stability.

Human Dynamics and Controls Lab, Illinois, US

Undergraduate Researcher

The Grainger College of Engineering, University of Illinois Urbana-Champaign

Sep 2024 - Jun 2025

Advisor: **Elizabeth Hsiao-Wecksler**

- Built a dynamics model in Genesis simulator for ballbot PURE Gen3 platform, which aims to accurately simulate the omniwheels while preserving computational efficiency.
- Implemented a learning-based control policies in Genesis to optimize balancing and movement performance and robustness for the PURE Gen3.
- Integrated new force sensors into PURE Gen3 hardware, improving reliability of existing model-based controller.

RoboMaster Meta Team, Zhejiang, China

Control Group Leader

Zhejiang University - University of Illinois Urbana-Champaign Institute

Jun 2023 - Present

Advisor: **Jiahuang Cui**

- Won second prize in RoboMaster regional competitions, as the leader of the control group.
- Architected and implemented an ROS2-based distributed control system supporting multiple robots (sentry, hero, infantry, engineer robots) with modular asynchronous communication infrastructure.
- Implemented software and hardware for real-time motor control and sensor data acquisition through their protocols, as well as high-level autonomous navigation and decision-making algorithms.
- Trained and mentored new team members on control theory fundamentals, ROS2 framework, robot hardware architecture, embedded systems programming, and algorithm design.
- Collaborated in mechanics-control co-design iterations to optimize robot kinematics, actuator selection, and sensor placement for improved controllability and performance.

Projects

Where to Learn: Analytical Policy Gradient Directed Exploration for On-Policy Robotic Reinforcement Learning

Second Author

- Overview: A novel reinforcement learning algorithm combining Proximal Policy Optimization (PPO) with Adaptive Policy Gradient (APG) mechanisms to dynamically allocate learning focus across state-action spaces.
- My contribution: Implemented the algorithm in PyTorch, conducted training experiments in Isaac Lab and MuJoCo environments, performed hyperparameter tuning, and deployed trained policies on simulated and real robot platforms. Contributed to experimental design and ablation studies.
- Website: wheretolearn.github.io

Omni WBR: Learning Adaptive Hybrid Wheeled-Biped Robot Omnidirectional Locomotion via Position-Based Incentive

First Author

- Overview: A reinforcement learning framework to generate emergent omnidirectional gaits for wheeled bipedal robots, enabling smooth transitions between forward, lateral, and rotational motions without explicit gait planning.
- My contribution: Designed the reward shaping scheme and training curriculum, implemented the simulation environment in Isaac Lab with accurate wheel-ground contact modeling, trained PPO policies with domain randomization, and conducted sim-to-real transfer experiments on a custom wheeled bipedal platform.
- Demonstration available on my website: yao-xinchen.github.io/projects/omni-wbr/.

Meta-Team/Meta-ROS: Modular ROS2 Control Framework

Creator, Maintainer

- Overview: A comprehensive ROS2-based control system architecture encompassing sensor integration, actuator control, forward/inverse kinematics, and autonomous decision-making modules for multi-robot coordination.
- Features: Supports heterogeneous robot platforms with dynamically configurable parameters, modular package structure for easy extension, and real-time performance optimization for competition scenarios.
- Code: github.com/Meta-Team/Meta-ROS