

THANH P. LY

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PROFILE

Robotics researcher specializing in sim-to-real transfer and learned control for humanoid robots. MSE in Robotics from the University of Pennsylvania (Vingroup Scholar). Research contributions span GPU-parallel distributed RL training, terrain-aware foothold planning, variational force latent estimation, and impedance-based compliance control, all validated with zero-shot transfer on physical humanoid hardware. Backed by a strong perception foundation from large-scale synthetic data generation, multi-view geometry, and sensor fusion work at Penn.

EXPERIENCE

VinRobotics

Hanoi, Vietnam

Acting Head of Reinforcement Learning

04/2026 – Present

- Developed **TACT-ful** (CoRL 2026, under review): a perceptive locomotion system for payload-robust humanoid walking. Designed multi-channel terrain cost maps (flatness, steepness, height feasibility) guiding a GPU-parallel DCM foothold planner and reward shaping; introduced virtual wrench injection for payload compliance training without force sensors. Achieves 1.0 m/s on stairs with 20 cm risers and zero-shot transfer to physical humanoid carrying up to 20 kg. [Project page](#).
- Developed **CompliantWBC** (CoRL 2026, under review): whole-body compliance for a 70 kg heavy humanoid under high-payload and external-force scenarios — targeting tasks characteristic of home and service humanoid deployment. Designed a multi-site impedance reference controller, a variational force latent encoder, and a bounded residual mechanism that edits impedance equilibria. Validated on surface wiping, force reaction, loaded squatting, and cooperative transport with 0.98 success rate. [Project page](#).
- Mentored 8 interns across locomotion policy design, motion imitation, sim-to-sim and sim-to-real transfer, reward engineering, and pipeline and asset validation.

Senior Reinforcement Learning Engineer

12/2025 – 03/2026

- Developed and cross-validated multi-physics simulation environments in PhysX, MuJoCo, and Newton/Warp.
- Built high-throughput parallel simulation pipelines supporting multi-DOF humanoid embodiments for large-scale distributed GPU RL training across multi-node clusters.
- Collaborated with hardware and controls teams to design policies compatible with low-level joint PD controllers, torque limits, and safety constraints, directly informing actuator delay modeling and dynamics randomization strategies.

R&D Software Engineer - Reinforcement Learning Engineer

06/2025 – 11/2025

- Designed and trained RL policies for humanoid locomotion across varied terrain and disturbance conditions, achieving stable walking, recovery, and adaptive balancing on physical hardware.
- Developed custom locomotion environments in Isaac Gym and Isaac Lab with event-driven gait initialization and phase-based curriculum learning to accelerate convergence and transfer.
- Implemented reward functions targeting stability, energy efficiency, natural motion quality, and smooth sim-to-real transfer for high-dimensional continuous control.
- Conducted systematic domain randomization experiments across dynamics, contact, and sensing parameters to characterize and reduce sim-to-real gap on real humanoid deployments.

University of Pennsylvania

Philadelphia, USA

Research Assistant

05/2024 – 05/2025

- Generated large-scale synthetic visual datasets (1M+ photo-realistic images) in NVIDIA Omniverse, enabling robust robot perception models deployable in real warehouse environments with sub-30 cm localization accuracy — directly relevant to training visual policy components.
- Improved multi-view pose estimation by 40% through combined synthetic and real-data fine-tuning, demonstrating effective sim-to-real transfer for perception models.
- Developed homography-based multi-camera tracking and 3D reconstruction pipelines deployed in live environments; automated ground-truth labeling using Vicon motion capture for scalable training data collection.

- Built expertise across the full perception stack: camera calibration, multi-view geometry, sensor fusion, depth estimation, and dense 3D reconstruction from structured-light and stereo systems.

Teaching Assistant - Computer Vision & Computational Photography 08/2024 – 12/2024

- Led lab sessions and provided technical support for projects on multi-view geometry, camera calibration, and image-based reconstruction.

Procter & Gamble

Ho Chi Minh City, Vietnam

Process Engineer - Power Control & Information Systems

01/2023 – 05/2023

- Developed digital twins and applied machine learning models to optimize energy consumption in a large-scale industrial facility.

PUBLICATIONS & TECHNICAL REPORTS

Under Review

1. **Thanh Ly**, Truong-Duy Dang, Chien Le, Tan-Dzung Do, Phuong Tuan Dat, Cuc T. Trinh, Vien Anh Ngo, and An T. Le, “TACT-ful: Multi-Channel Terrain Affordance and Compliance Training for Payload-Robust Perceptive Humanoid Locomotion,” *Conference on Robot Learning (CoRL)*, 2026. *Under review.* [Project page](#).
2. Tan-Dzung Do, Cuc T. Trinh, Phuong Tuan Dat, Truong-Duy Dang, Chien Le, **Thanh Ly**, Vien Anh Ngo, and An T. Le, “Whole-Body Compliance for Heavy Humanoids via Force Latent Estimation and Residual Impedance Targets,” *Conference on Robot Learning (CoRL)*, 2026. *Under review.* [Project page](#).

Peer-Reviewed Publications

1. P. Thanh Ly, Q. Chi Nguyen, N. Duy Hung Nguyen, P.-T. Pham, and K.-S. Hong, “Structured-Light-Based 3D Scanning System for Industrial Manipulator in Bin-Picking Application,” *Australian & New Zealand Control Conference (ANZCC)*, 2022, pp. 34–39.
2. N. Duy Hung Nguyen, P.-T. Pham, P. Thanh Ly, L. H. Nguyen, and Q. Chi Nguyen, “Bin-Picking Solution for Industrial Robots Integrating a 2D Vision System,” *International Conference on High Performance Big Data and Intelligent Systems (HDIS)*, 2022, pp. 266–270.

Technical Reports and Project Demos

1. P. A. Hsieh, P. Thanh Ly, X. H. Ong, “Reinforcement Learning for Autonomous Drone Racing,” Final Project Report, Learning in Robotics, University of Pennsylvania, 2024.
2. P. Do, P. Thanh Ly, X. H. Ong, “Mini Minecraft,” Final Project, Interactive Computer Graphics, University of Pennsylvania, 2024. [Online]. Available: <https://youtu.be/Qss9ZLcg4YA>
3. P. Thanh Ly, X. H. Ong, Z. Osman, “Stable Diffusion 3 Visualization Using NCUT,” Final Project Report, Advanced Topics in Machine Perception, University of Pennsylvania, 2024.

EDUCATION

Master of Science in Engineering in Robotics

University of Pennsylvania, Philadelphia, USA

- Vingroup Scholar

Bachelor of Engineering in Mechatronic Engineering, *summa cum laude*

Ho Chi Minh City University of Technology (HCMUT-VNU), Ho Chi Minh City, Vietnam

- Thesis: Integration of an Industrial Robot with a 3D Scanning Stereo Vision System Using Gray Code and Phase Shift
- Valedictorian, Excellent Thesis Award
- Panasonic, Saigon Hi-tech Park Business Association (SBA) and KSYS-CUBE Scholar

SKILLS

Sim-to-Real	Domain randomization, dynamics & actuator delay sim, contact modeling, symmetry augmentation, real-robot validation
Simulation Engines	Isaac Lab, Isaac Sim, MuJoCo, PhysX, Newton/Warp
RL & Control	PPO/policy optimization, reward engineering, whole-body locomotion, terrain-aware foothold planning, disturbance recovery, contact-rich control
Perception	Multi-view geometry, camera calibration, sensor fusion, synthetic data generation, 3D reconstruction, depth estimation
Software	Python, C++, PyTorch, Slurm, distributed GPU training
Sensing Systems	Contact sensors, ray-cast terrain, height maps, depth cameras, Vicon/Qualisys/Nokov motion capture
Rendering & Graphics	OpenGL, GLSL shaders (vertex/fragment), procedural geometry pipelines, lighting & shadow systems, texture/material rendering

TECHNICAL PROJECTS

Reinforcement Learning for Autonomous Drone Racing

Learning in Robotics, University of Pennsylvania

- Designed and trained RL policies in custom simulation environments for agile drone navigation under dynamic constraints; investigated sim-to-real policy robustness.

RetroLifts – Infrastructure-Based Autonomous Forklift System

- Designed infrastructure-mounted perception architecture combining BEV global localization with FPV local planning, reducing onboard sensing and compute requirements.
- Implemented multi-camera calibration and multi-view geometry pipelines for accurate global object localization in warehouse environments.
- Built simulation models for motion planning and collision checking to support scalable deployment analysis.

Mini Minecraft

Interactive Computer Graphics, University of Pennsylvania

- Built a real-time 3D voxel rendering engine in C++ with a custom OpenGL pipeline, including chunk-based procedural terrain generation.
- Implemented GLSL vertex and fragment shaders for dynamic lighting, shadows, and physically-based material rendering.

EARLY EXPERIENCE & INTERNSHIPS

Vingroup Big Data Institute (VinBigData) Technology Specialist

Hanoi, Vietnam
07/2022 – 12/2022

- Researched monocular depth estimation methods for 3D reconstruction in robotic vision.
- Developed vision-based safety monitoring pipelines for construction environments.

Ho Chi Minh City University of Technology Undergraduate Research Assistant

Ho Chi Minh City, Vietnam
04/2021 – 06/2022

- Developed 3D reconstruction and calibration pipelines using active structured light and dual-quaternion formulations for precise robot-camera alignment.
- Automated image acquisition, stereo calibration, and grasp execution for a robotic manipulation pipeline.
- Applied PointNet-based deep learning for bin-picking part segmentation.

Intel Undergraduate Technical Intern

Ho Chi Minh City, Vietnam
02/2021 – 08/2021

- Supported equipment qualification and data analysis for chipset production.