

# Tuen-Yue Tsui

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## Research Vision

My research interests lies in the intersection of *robotics*, *world models* and *physics-aware vision/graphics*, drawing on cognitive science for inspiration. My goal is to build **human-like cognitive systems** that enable **highly autonomous**, generalizable robot behavior.

**Keywords:** Embodied AI • World Models • Physics-aware Vision/Graphics • Cognitive Science • GenAI

## Education

**University of Pennsylvania**

Sept 2024 – Present

*MSE in Robotics*

- GPA: 4.0/4.0    Core Courses: Learning in Robotics, Machine Perception, Differential Geometry

**Wuhan University**

Sept 2020 – Jun 2024

*BE in Artificial Intelligence*

- GPA: 3.75/4.0

## Research Experience

**GRASP Lab, University of Pennsylvania**

Philadelphia, USA

Advisor: Lingjie Liu

Sept 2024 – Present

- **Lead researcher** on *Intention-Aware Imitation Learning* for contact-rich tasks.
- Built a large, unscripted **random-interaction** dataset by allowing curiosity-driven policies to freely manipulate objects; yielding diverse, high-quality rollouts at scale.
- Proposed a **skill-manifold** with an **adapter-conditioned policy decoder**; an early prototype reproduces locomotion policies in one shot (short demo on my website) with a sequence-wide FK deviation of **1.4 cm**.
- Added a lightweight **learned world model** to enable end-to-end training.

**Machine Vision & Robotics Laboratory, Wuhan University**

Wuhan, China

Advisor: Qin Zou

Sept 2022 – Jun 2024

- Resulted in a first-author preprint **NePF**, a fast single-stage inverse rendering framework (see Publications).

## Publications

**T.-Y. Tsui, Q. Zou.** *NePF: Neural Photon Field for Single-Stage Inverse Rendering* (preprint, arXiv).    Nov 2023

## Projects

**Scalable Quadruped Imitation from Monocular Video**

[github link](#)

- **CV/CG + Robotics.** Retargeted quadruped motions from monocular videos via a learnable skeleton; removed MoCap/manual keypoints.

**Minimum-Snap Trajectory Generation for Quadrotors**

[github link](#)

- **SLAM + Planning + Control.** Integrated VIO, SE(3) controller, and ray-casting-powered A\* (**30×** faster: **22 s** → **0.7 s**; **1st** on leaderboard) for path planning with a time-optimal snap solver.

## Skills

**Programming:** C++, Python, C, MATLAB, SQL

**Tools/Frameworks:** ROS, PyTorch, JAX, Drake, Isaac Gym, Genesis, Linux, Git, Docker, Slurm

**Languages:** Cantonese (Native), Mandarin (Native), English (Full Professional)