

# Tuen-Yue Tsui

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## Research Vision

My long-term goal is to build systems that are not only more capable, but also conceptually clarifying: embodied learning architectures that make explicit how intelligence can emerge from continuous interaction with the world, placing philosophical questions about mind and consciousness under genuine empirical pressure.

**Keywords:** Embodied Intelligence • Perpetual Learning • Planning & Reasoning • Cognitive Science

## Education

### University of Pennsylvania

*MSE in Robotics*

Sept 2024 – Present

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

### Wuhan University

*BE in Artificial Intelligence*

Sept 2020 – Jun 2024

- GPA: 3.75/4.0

## Research Experience

### GRASP Lab, University of Pennsylvania

Advisor: Lingjie Liu

Philadelphia, USA

Sept 2024 – Present

- **Lead researcher** and sole architect of *Let Learning Bend Its Space*. Early demo available at [link](#).
- Formulated a **closed-loop learning dynamics** in which model parameters evolve on a time-varying statistical manifold whose geometry is shaped by, and in turn, shapes the sampled data, creating a perpetual, non-equilibrium learning process instead of convergence to a fixed objective.
- Designed and implemented an **endogenous chaos engine** that injects bounded, reversible dynamics into the parameter flow, sustaining non-equilibrium steady states and preventing collapse of exploration.
- Applied the framework in a quadruped-object simulation, where the agent, in an open-ended setting without external rewards or labels, **learns contact-event representations** purely through self-organized interaction.

### Machine Vision & Robotics Laboratory, Wuhan University

Advisor: Qin Zou

Wuhan, China

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 Lab, Newton, Genesis, Linux, Git, Docker, Slurm

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