

Patt Phurtivilai

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EDUCATION

The University of Hong Kong (HKU) — Full Scholarship

Sep 2026 – Expected May 2028

MPhil-PhD in Artificial Intelligence, School of Computing and Data Science
Computer Vision and Graphics Group, AI Lab

The University of Hong Kong (HKU) — Full Scholarship

Sep 2022 – May 2026

Bachelor of Engineering, Majoring in Computer Science, Graduated with Honours

EXPERIENCE

Research Assistant, CGVU Lab

Jun 2025 – Present

The University of Hong Kong — Under the supervision of Prof. Taku Komura

- Developed a self-supervised 3D tracking system that eliminates manual annotation requirements by learning identity correspondence through multi-camera association and geometric triangulation.
- Enabled scalable model training without real-world labeled data by generating large-scale 3D synthetic motion datasets using Unreal Engine 5.

NVIDIA AI Research Collaborator

Jun 2025 – Present

NVIDIA

- Co-authored two research papers with NVIDIA AI researchers by developing depth estimation and 3D Gaussian Splatting models for endoscopic perception, advancing state-of-the-art in surgical imaging.

Full-Time Summer AI Research Assistant

May 2024 – Aug 2024

Inno Wing, Innovation Academy, HKU

- Improved real-time 3D rendering quality for an MTR tunnel inspection system by developing a 3DGS pipeline integrating LiDAR, depth sensors, and SLAM technologies.
- Built a multimodal RAG system enabling document-level Q&A with both text and image retrieval by integrating GPT-4 with OCR and layout detection models.
- Facilitated cross-institutional research collaboration with UBC and Tsinghua University by co-leading projects and hosting workshops on computer graphics, computer vision, and RAG.

Part-Time AI Research Assistant

Aug 2023 – Present

Inno Wing, Innovation Academy, HKU

- Delivered a digital twin system for MTR tunnel inspection by building a 3D scanning and reconstruction pipeline using computer vision and graphics techniques.
- Trained 50+ HKU participants in emerging AI technologies by hosting workshops on computer vision, computer graphics, and large language models.
- Deployed a local university chatbot by researching and implementing retrieval-augmented generation (RAG) with large language models.

Co-Founder & CEO, AZAI Solution

Feb 2022 – Feb 2024

Cyberport-backed Startup — 1st Prize, Cyberport CUPP 2023 (100K HKD Micro Funding)

- Won 1st Prize and secured 100K HKD in micro funding at Cyberport CUPP 2023 by co-founding and running AZAI, a smart CRM for landlords in Thailand built with React Native and TypeScript.
- Streamlined contract creation and payment management for landlords by integrating payment APIs and Google Firebase into a unified property oversight platform.
- Improved landlord-resident interactions through data-driven insights by building a Next.js backend with analytics features powered by SlipOK and LINE APIs.

Software Engineering & Data Analyst Intern

Jun 2023 – Aug 2023

Risksis Technology Limited

- Improved model accuracy for risk assessment by building data retrieval, preprocessing, and training pipelines using Keras, OpenCV, and Scikit-learn.
- Delivered an interactive 3D visualization interface by developing a web application with frontend frameworks and Unity integration.

PAPERS / RESEARCH PROJECTS

TrackFish3D: Self-Supervised 3D Tracking of Schooling Fish from Multi-view Videos Jun 2025 – Present

First Author Paper — Submitted to *Nature Methods* (March 2026), *Proceeding in NeurIPS2026*

- Achieved dense 3D multi-object tracking of visually identical fish without any manual annotations by developing a fully self-supervised framework that learns cross-view correspondence and temporal identity linking from geometric consistency across calibrated multi-view video.

Endoscopic Depth Estimation with Physics-Based Light Modeling

Jun 2025 – Present

First Author Paper — Ongoing, in collaboration with *NVIDIA AI*

- Addressed the challenge of scarce ground-truth depth data in endoscopic imaging by developing a multi-camera depth estimation model robust to high specularities in intestinal and colonic environments.

- Improved depth prediction accuracy under complex endoscopic lighting by proposing a physics-based light equation prediction model that guides the estimation process.

EndoX: A GPU-Accelerated Endoscopic Perception Simulation Framework **Jun 2025 – Present**
Proceeding to MICCAI 2026 — in collaboration with NVIDIA AI

- Established 3DGS rendering benchmarks for small intestine datasets by contributing a 3D Gaussian Splatting model and conducting systematic evaluations within the simulation framework.

Digital Twins for Makerspace: Immersive Interactable Digital Twins Model **Aug 2024 – Mar 2025**
First Author Poster — ISAM 2025 Presentation

- Selected to present at ISAM 2025 by developing an interactive digital twin of an academic makerspace using 3D Gaussian Splatting (3DGS) integrated with Unreal Engine 5 and a PS5 controller interface.

DensifyBeforehand: LiDAR-assisted Content-aware Densification for 3DGS **Aug 2024 – Mar 2025**
First Author Paper — Accepted Technical Brief, CVM 2026

Paper: [arXiv](#) Project Page: [DensifyBeforehand](#)

- Enhanced 3DGS scene initialization and visual fidelity by developing a novel “densify beforehand” approach that integrates sparse LiDAR data with monocular depth estimation.
- Reduced resource consumption and improved computational efficiency in 3D rendering by introducing a region-of-interest (ROI) aware sampling scheme that optimizes point cloud density.
- Validated the method’s effectiveness across four newly collected datasets through extensive comparisons and ablation studies, demonstrating preservation of important features while minimizing training time.

Multimodal AI Assistant: RAG System for Both Image and Text **May 2024 – Aug 2024**

- Enabled document-level Q&A with interleaved text and image outputs by building a multimodal RAG system with traceability to original sources.
- Achieved accurate extraction from complex document layouts by implementing a preprocessing pipeline combining Azure OCR with layout detection models.

COMPETITIONS

INNOGROW **Oct 2024 – Present**
1st Place HKAE 2025 (Represented HKU) · InnoShow Award 2025 · Silver Medal National Round @ Beijing, CP Cup 2025

- Won 1st place at HKAE 2025 and a Silver Medal at Beijing CP Cup by developing INNOGROW, a non-toxic laser weed control solution for sustainable farming in Asia.
- Achieved affordable, field-ready deployment by training a custom weed detection model and integrating it with a Raspberry Pi for a compact design.

MediCycle **Sep 2024 – Oct 2024**
First Runner-up, GenAI Hackathon 2024

- Won First Runner-up at GenAI Hackathon 2024 by building a RAG-powered chatbot that reduces medicine wastage through consolidated donation guidelines from hospitals and organizations.

FarmGPT **Feb 2024 – Apr 2024**
HKAES 2024 — Represented HKU

- Enabled collaborative data sharing among farmers by developing a federated learning model combined with a data hub and real-time chatbot assistant for agricultural knowledge.

Grounding-DINO: Zero-Shot with Real-Time Camera **Jan 2024 – Apr 2024**
HKU InnoShow 2024

- Achieved zero-shot real-time object detection and continuous tracking by building a system with the Grounding DINO model and keyword-based detection on live camera feed.

Hello Memories — VR Project **Dec 2023 – Feb 2024**
Merit Award, HKTechathon 2023/24

- Won Merit Award at HKTechathon 2023/24 by leading the development of a VR application that aids dementia patients through 3D scene reconstruction from old images using NeRF AI, Luma API, and Unity.

TECHNICAL SKILLS

- Languages:** Python, SQL, Java (*basic: JavaScript, C++*)
- Technologies:** PyTorch, TensorFlow, scikit-learn, MLflow/W&B, Docker, FastAPI/Flask, Git, SQL databases
- Concepts:** Machine Learning, Deep Learning, NLP, LLMs (fine-tuning, RAG), MLOps (deployment/monitoring), Data Preparation & Evaluation, API Integration, Experiment Design, Agile/Scrum

EXTRACURRICULAR

- Vice President**, Association of Thai Students in Hong Kong and Macau Sep 2022 – Dec 2023
- HKU Student Ambassador** Sep 2022 – Present
- College Student Committee** Sep 2022 – May 2024
- College Photo & Media Team** Sep 2022 – May 2024