PATT PHURTIVILAI

+852 94751602 pattgene@connect.hku.hk pattgene Patt Phurtivilai

THE UNIVERSITY OF HONG KONG (HKU) - FULL SCHOLAR **Expect May 2026**
Bachelor of Engineering Majoring in Computer Science

EXPERIENCE

RESEARCH ASSISTANT CGVU LAB, HKU **Jun 2025 - Now**
Under the supervision of Prof. Taku Komura
- Conducting independent research on an Object Tracking System, focusing on multi-camera association and effective triangulation techniques.
- Generating 3D synthetic motion data using Unreal Engine 5.

NVIDIA STUDENT AMBASSADORS **Jun 2025 - Now**
NVIDIA
- Collaborated with NVIDIA researchers to develop a paper on an endoscopic robot for visualizing and reconstructing human vessels using depth estimation models and SLAM reconstruction techniques.

FULL-TIME SUMMER AI RESEARCH ASSISTANT **May 2024 - Aug 2024**
Inno Wing, innovation academy, HKU
- Conducted individual research in computer graphics, focusing on 3DGS for real-time rendering using Lidar, depth sensors, and SLAM technologies.
- Developed a Multimodal RAG system by researching LLMs, OCR, and layout detection models, utilizing GPT-4.
- Collaborated with UBC and Tsinghua University on projects and hosted workshops on computer graphics, computer vision, and RAG.

PART-TIME AI RESEARCH ASSISTANT **Aug 2023 - Now**
Inno Wing, innovation academy, HKU
- Computer vision and graphics research team. Collaboration on a real work with MTR, scaning tunnel and create digital twins for them.
- Hosted workshops on computer vision, computer graphics, and large language models for participants from Hong Kong University.
- Conducted research on large language models and retrieval-augmented generation (RAG), developing a local chatbot for university.

SOFTWARE ENGINEERING & DATA ANALYST SUMMER INTERNSHIP **Jun 2023 - Aug 2023**
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- Engaged in data retrieval, preprocessing, and model training using Keras, OpenCV, and Scikit-learn
- Developed a web application utilizing frontend frameworks, including an interface for 3D visualization with Unity.

PAPER/ RESEARCH PROJECT

COLLECTIVE BEHAVIOR-MODELING AND ANALYSIS: **Jun 2025 - Now**
Tracking by Propagation Method and Effective Association/Triangulation for 3D Trajectory Recovery
First Author Paper - Ongoing
- Developing a Tracking by Propagation model for dense crowds of moving objects, introducing effective multi-camera associations and triangulation techniques for 3D trajectory recovery.

ENDOSCOPIC REAL-TIME RECONSTRUCTION: **Jun 2025 - Now**
Endoscopic Simulation and Depth Estimation Model for Real-Time Reconstruction Under Human Vessels
First Author Paper - Ongoing
- Creating a simulation system for an endoscopic robot navigating human vessels, coupled with a depth estimation model for real-time 3D reconstruction within these environments.

DIGITAL TWINS FOR MAKERSPACE: **Aug 2024 - Mar 2025**
Immersive Interactable Digital Twins Model for Academic Makerspace
First Author Poster - ISAM2025 Presentation
- Selected to present a poster at ISAM 2025, showcasing a digital twins model based on 3D Gaussian Splatting (3DGS) in collaboration with Unreal Engine 5 (UE5). Demonstrated the application and use of digital twins in an academic makerspace, featuring a PS5 controlling system.

DENSIFYBEFOREHAND: **Aug 2024 - Mar 2025**
LiDAR-assisted Content-aware Densification for Efficient and Quality 3D Gaussian Splatting
First Author Paper - ICCV Submission
- Developed a novel "densify beforehand" approach for 3D Gaussian Splatting that integrates sparse LiDAR data with monocular depth estimation, enhancing scene initialization and visual fidelity.
- Introduced a region-of-interest (ROI) aware sampling scheme that optimizes point cloud density, leading to reduced resource consumption and improved computational efficiency in 3D rendering.
- Conducted extensive comparisons and ablation studies on four newly collected datasets, demonstrating the effectiveness of the proposed method in preserving important features in complex 3D scenes while minimizing training time.

Paper: Download here, Project Page: DensifyBeforehand

MULTIMODAL AI ASSISTANT: RAG SYSTEM FOR BOTH IMAGE AND TEXT **May 2024 - Aug 2024**
- Developed a multimodal RAG system capable of processing and generating both text and images
- Implemented a data preprocessing pipeline utilizing layout detection and Azure OCR to extract and images and text from documents.
- Designed a retrieval mechanism and prompt engineering to output interleaved text and images, enabling traceability to original sources.

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COMPETITIONS

AZAI SOLUTION - CRM + PAYMENT API APPLICATION **Feb 2022 - Feb 2024**

Winning the 1st prize for Cyberport CUPP 2023 micro funding 100K HKD

- Developed AZAI, a smart CRM application for landlords in Thailand, utilizing React Native and TypeScript for an intuitive user experience on both Android and web platforms.
- Integrated payment APIs and Google Firebase to streamline contract creation, payment management, and property oversight, enhancing operational efficiency for landlords.
- Employed Next.js for backend development, implementing data analytics features to improve interactions between landlords and residents, supported by external APIs such as SlipOK and LINE.

HELLO MEMORIES - VR PROJECT **Dec 2023 - Feb 2024**

Merit Award - HKTechathon 2023/24

- Led the Hello Memory project, utilizing NeRF AI and Luma API to create a VR application that aids dementia patients by visualizing reconstructed 3D scenes from old images.
- Developed a robust pipeline for processing old images, which included preprocessing, 3D scene reconstruction, and integration into Unity for immersive VR experiences.
- Demonstrated innovative use of AI in computer graphics, enhancing memory recall and emotional connection for users, while driving team collaboration and project management.

GROUNDING-DINO: ZERO SHOT TRAINING WITH REAL TIME CAMREA FEED **Jan 2024 - Apr 2024**

participate in HKU innoshow2024

- Developed a real-time object detection and tracking system utilizing the Grounding DINO model and live camera feed.
- Implemented keyword-based detection, enabling continuous tracking of specified objects as the camera moves.
- Demonstrated advanced real-time computer vision techniques, enhancing dynamic interaction capabilities in mobile environments.

FARMGPT **Feb 2024 - Apr 2024**

Participate in HKAES2024

- Represented Hong Kong University in a competition focused on developing AI-powered solutions to address global climate change challenges, leading the creation of FarmGPT.
- Developed a federated learning model combined with a data hub and chatbot assistant, enabling farmers to share and analyze data collaboratively while accessing real-time, updated agricultural knowledge.
- Enhanced community farming practices by providing a platform that facilitates data-driven insights and support, ultimately benefiting farmers through improved decision-making and resource management.

MEDICYCLE **Sep 2024 - Oct 2024**

First Runner up GENAI Hackathon 2024

- Developed a Retrieval-Augmented Generation (RAG) system to reduce medicine wastage by providing information on donation options.
- Created a user-friendly chatbot that consolidates knowledge from organizations and hospitals for easy access to donation guidelines.
- Promoted community engagement in medical donations, facilitating responsible medicine usage and minimizing waste.

INNOGROW **Oct 2024 - Now**

Winning 1st place in HKAE2025 Team Represented HKU

Winning InnoShow Award 2025

Winning regional round Hong Kong, Silver Medal National round @ Beijing CP Cup 2025

- Developed INNOGROW, a non-toxic laser weed control solution for sustainable farming in Asia.
- Trained a weed detection model using a custom dataset and integrated it with a Raspberry Pi for an affordable, compact design.
- Provided a cost-effective alternative to traditional machines, enhancing accessibility for small-scale farmers while minimizing environmental impact.

TECHNICAL SKILLS

- **Language:** Python, Java, JavaScript, C++, C#
- **Technologies:** TensorFlow, PyTorch, React.js, Node.js, SQL, Git, Blender, Unity
- **Concept:** Computer Vision, Computer Graphic, Artificial Intelligence, Machine Learning, Neural Networks, Operating System, API, Finetuning, Large Language Model, Mobile/Web App Development, Agile Development

EXTRACURRICULAR

- **Vice President of Association of Thai Student in Hong Kong and Macau** **Sep 2022 - Dec 2023**
- **HKU Student Ambassador** **Sep 2022 - Now**
- **College Student Commitee** **Sep 2022 - May 2024**
- **College Photo & Media team** **Sep 2022 - May 2024**

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