

CHIEH-YU PAN

chiehyu.pan@gmail.com | (+886) 900-633-755 | github.com/jyp-studio | linkedin.com/in/chiehyupan | Taiwan

Research Profile

My research interests lie in reliable LLM systems. I bring prior experience in multimodal learning and computer vision: I developed KARINA, a first-authored IEEE CAI 2026 framework that uses qualitative knowledge from a large multimodal model rather than unreliable numerical predictions, achieving the best reported nutrition-estimation results across three benchmarks. My research experience spans problem formulation, model design, cross-dataset evaluation, ablation analysis, and public implementation.

Education

National Cheng Kung University

M.S. in Computer Science and Information Engineering, GPA: 4.06/4.30

Sep. 2023 – Jan. 2026

Tainan, Taiwan

- **Thesis:** *KARINA: Knowledge-Augmented Representation for Ingredient-Level Nutrition Analysis from Food Images*; Advisor: Prof. Wei-Ta Chu. [Paper] [Code]
- Selected coursework: Computer Vision and Deep Learning; Image Processing; Reliability Data Analysis.

KTH Royal Institute of Technology

Exchange Studies in Computer Science, 37.5 ECTS

Aug. 2025 – Jan. 2026

Stockholm, Sweden

- Selected coursework: Image Analysis and Computer Vision; Big Data in Media Technology; Social Robotics.

National Cheng Kung University

B.S. in Engineering Science, GPA: 3.95/4.30

Sep. 2019 – Jun. 2023

Tainan, Taiwan

- Selected coursework: Introduction to Artificial Intelligence; Machine Learning; Multimedia Content Analysis; Algorithms; Linear Algebra.

Publications

1. **C.-Y. Pan** and W.-T. Chu, "KARINA: Knowledge-Augmented Representation for Ingredient-Level Nutrition Analysis from Food Images," in *Proceedings of the 2026 IEEE Conference on Artificial Intelligence (CAI)*, pp. 1–6, 2026. doi:10.1109/CAI68641.2026.11536297. [Code]
2. **C.-Y. Pan**, X.-N. Lu, Y.-P. Cheng, X.-Y. Li, and Y.-M. Huang, "Integrating Virtual Reality Technology and Simulation-Based Learning to Enhance Student Learning Performance and Engagement," in *Proceedings of the 2022 Taiwan Academic Network Conference (TANET)*, pp. 1268–1273, 2022. In Chinese; oral presentation.
3. **C.-Y. Pan**, Y.-P. Cheng, and Y.-M. Huang, "Enhancing Learning Performance of Engineering Students in Virtual Reality Environment," short paper and poster presented at the *20th International Symposium on Novel and Sustainable Technology (ISNST)*, Tainan, Taiwan, Oct. 27–28, 2022. Excellent Poster Presentation Award.

Research Experience

Graduate Researcher – KARINA Multimodal Nutrition Analysis

National Cheng Kung University; Master's thesis; Advisor: Prof. Wei-Ta Chu

2023 – 2025

Tainan, Taiwan

- Designed and implemented KARINA, a knowledge-augmented RGB-D vision-language framework that estimates calories, mass, fat, carbohydrates, and protein from food images. It achieved the best reported results on Nutrition5K, NutritionVerse-Real, and NutritionVerse-Synth, including 13.3% mean PMAE on Nutrition5K versus the previous best of 15.6%.
- Used a large multimodal model to generate ingredient descriptions and qualitative nutritional profiles as weak semantic supervision; ablation studies showed that this knowledge reduced protein error by 18% and fat and carbohydrate errors by 13%.
- Developed Mask-based Ingredient-level Augmentation to ground each ingredient description in its corresponding food region. Automatically generated Grounded SAM masks enabled fine-grained visual-text alignment without additional manual annotation and reduced mean PMAE from 14.1% to 13.3%.

Undergraduate Researcher – VR for Engineering Education

National Cheng Kung University; Undergraduate research project; Advisor: Prof. Yueh-Min Huang

2022 – 2023

Tainan, Taiwan

- Co-developed an NSTC-funded, narrative-driven VR learning environment that taught Raspberry Pi fundamentals through game scenarios culminating in a Python traffic-light programming challenge.
- Co-designed and conducted two evaluations: a pre/post study increased mean test scores from 39.39 to 86.36 ($p < .001$), while a separate controlled study with 28 undergraduates found significantly higher post-test performance in the VR group than in the control group ($p = .018$).

Selected Projects

- Proactive Multimodal Social Robot** | [Code] 2025 – Present
- Designed a proactive Misty II social robot that identifies opportunities to assist before being asked. Evaluated its responses across seven visual, voice, and multimodal scenarios, including self-initiated interventions and cases requiring deliberate non-response.
 - Integrated visual and speech perception, structured LLM planning, and three-tier persistent memory behind a bounded executor. The LLM produces high-level intent, while a closed-loop controller re-observes user distance and requests consent before movement, preventing unconstrained model outputs from directly controlling physical motion.
 - Re-architecting the single-pass planner as a ReAct-style loop that incorporates environmental feedback after each action, allowing the system to revise its plan rather than execute an unchecked sequence.
- Emergency Dispatch after AMHS Failure** | *TSMC Intelligent Manufacturing Workshop* 2025
- Led a cross-disciplinary team spanning industrial engineering, computer science, and engineering science during a five-day workshop; decomposed an unfamiliar semiconductor logistics problem into queue-time, capacity, and routing constraints, coordinated the schedule and task allocation, integrated the solution, and delivered the final presentation.
 - Developed a dispatch heuristic for 40 WIP lots, 20 carts with variable capacities, and a 50-location transfer-time matrix; completed both evaluated settings without Q-time violations and earned 2nd place.
- Invoice Recognition and ERP Automation** | *DIGI+ Talent Program* | [Code] 2022
- Led computer-vision development in a CS/EE/Finance team; combined YOLOv5, OCR, and iterative crop refinement to achieve 96% invoice-level exact-match accuracy on the test set.
 - Designed the system for a real-world volume of approximately 55,000 invoices per month and connected extracted fields to an RPA/ERP workflow, with an estimated 78% reduction in processing time from 1,833 to 403 staff-hours per month.

Teaching & Service

- Teaching Assistant, Introduction to Artificial Intelligence** 2023 – 2025
National Cheng Kung University Tainan, Taiwan
- Designed AI assignments and scalable grading workflows, held office hours, and provided technical guidance to more than 300 students as course enrollment tripled.
- Research Computing Administrator** 2023 – 2025
National Cheng Kung University Tainan, Taiwan
- Administered shared research infrastructure comprising seven Linux servers and 22 NVIDIA GPUs for 15 researchers, including operating-system, driver, and PyTorch upgrades, user management, and training-job troubleshooting.

Honors & Funding

- Transnational Study and Research Scholarship Grant** (NT\$82,500) 2025–2026
NCKU Office of International Affairs
- 2nd Place**, TSMC Intelligent Manufacturing Workshop 2025
- Research Creativity Award**, National Science and Technology Council, Taiwan 2023
- Undergraduate Research Project Grant** (NT\$48,000; 8 months) 2022–2023
National Science and Technology Council, Taiwan
- 2nd Place, Research Category**, NCKU Undergraduate Research Poster Competition 2022
- Excellent Poster Presentation Award**, 20th ISNST 2022
- Outstanding Award**, Ministry of Digital Affairs DIGI+ Talent Program 2022

Skills

- Programming and ML:** Python, C/C++, PyTorch, Hugging Face Transformers, OpenCV
- Computer vision:** Vision-language modeling, RGB-D fusion, image segmentation, object detection, multimodal alignment
- Systems and agents:** Linux, NVIDIA GPU administration, structured LLM planning, persistent memory, Git
- Languages:** Mandarin Chinese (native); English (professional working proficiency)