

Jyun-Ping Kao

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EDUCATION

- **National Taiwan University** Sep 2023 - Present
MS in Biomedical Electronics and Bioinformatics Taipei, Taiwan
 - GPA: 4.3/4.3 (Rank: 1/62)
 - Awards: Outstanding Paper Award (Published in a JCR Top 15% journal)
- **National Yang Ming Chiao Tung University** Sep 2019 - Jun 2023
BS in Electronics and Electrical Engineering (Double Major) Taipei & Hsinchu, Taiwan
BS in Digital Healthcare (Double Major)
 - GPA: 3.8/4.3
 - Awards: Phi Tau Phi Scholastic Honor (Top 1% of graduates based on 4-year cumulative GPA)

RESEARCH EXPERIENCE

- **Harvard Medical School & Massachusetts General Hospital** July 2025 - Present
Visiting Research Student, Department of Radiology Boston, MA, United States
 - **Green Learning Framework:** Developed an interpretable, backpropagation-free Green Learning framework for multi-task echocardiography. Achieved state-of-the-art segmentation and classification accuracy, outperforming conventional 3D CNN models while utilizing 10x fewer parameters and reducing energy consumption by >35%.
 - **Cross-Modal Foundation Model Adaptation:** Pioneered a parameter-efficient transfer learning strategy to adapt a CT-pretrained 3D Foundation Model for MRI-based ADHD classification and achieved SOTA accuracy while reducing trainable parameters by 113x compared to full fine-tuning.
 - **Advanced Tensor Decomposition:** Developing a novel high-order tensor decomposition method for 3D Convolutional Low-Rank Adaptation (LoRA). Currently optimizing the trade-off between parameter efficiency and grid-searchable architectural heads to enable extreme compression of medical foundation models.
- **National Taiwan University Hospital** July 2023 - June 2025
Research Assistant, Department of Physical Medicine and Rehabilitation Taipei, Taiwan
 - **Efficient Medical AI:** Developed the first LoRA-enhanced Real-Time Detection Transformer for musculoskeletal ultrasound. Successfully addressed domain-shift issues in fine-tuning, reducing trainable parameters by >99% while preserving high detection accuracy, leading to a Q1 journal publication.
 - **Medical LLM Development:** Engineered a multi-modal Large Language Model pipeline to synthesize 12-frame shoulder ultrasound exams into unified, radiologist-style impression reports, ensuring high clinical semantic consistency and correct laterality.
 - **Clinical Leadership & Governance:** Led large-scale clinical collaborations by independently authoring and securing IRB approvals for prospective studies. Oversaw participant recruitment and data annotation while implementing privacy-preserving architectures for institution-specific datasets.
- **The University of Hong Kong** Jun 2024 - Aug 2024
Visiting Research Student, Department of Orthopaedics and Traumatology Hong Kong
 - **Automated Assessment Tool:** Engineered a Deep Learning-based assessment system for the Posterior Cruciate Ligament (PCL) with a novel labeling protocol and a geometric post-processing step, achieving <5% error in width and angle measurements, reducing the clinical need for verification via MRI.
 - **Real-Time Inference:** Implemented efficient inference pipelines that eliminate heavy segmentation overhead, enabling operator-independent ligament evaluation on edge devices.
 - **Study Design & Ethics:** Authored IRB application for clinical data collection, orchestrating protocols with orthopedic specialists to ensure high-fidelity, ethically compliant ultrasound video acquisition.
- **National Yang Ming Chiao Tung University** July 2020 - July 2023
Undergraduate Research Student, Institute of Biophotonics Taipei, Taiwan
 - Developed the first 3D conditional Generative Adversarial Network (cGAN) for Femto-Laser Scanning Microscopy, enabling the generation of high-quality harmonic generation images from confocal images.
 - Implemented deep-learning models for image generation and analysis of human-skin samples and optimized optical systems incorporating non-linear optics.

- [T.1] Jyun-Ping Kao (2025). Advancing Computer-Aided Diagnosis in Musculoskeletal Ultrasound: First Low-Rank Adaptation Based DETR for Real-Time Full Body Anatomical Structures Identification with Prospective Study in Intelligent Diagnosis Using Large Language. *Graduate Institute of Biomedical Electronics and Bioinformatics, National Taiwan University*, DOI:10.6342/NTU202504693 (In Press). **Final Grade: A+**
Advisors: Chung-Ping Chen Ph.D.; Wen-Shiang Chen M.D., Ph.D.
- [S.1] Kao, J. P.*, Yang, J.*., Kuo, C. C. Jay, & Woo, J. (2025). Interpretable and backpropagation-free Green Learning for efficient multi-task echocardiographic segmentation and classification. *Radiology: Artificial Intelligence*, (Under Review).
- [S.2] Kao, J. P., Rho, S., Lazarev, S., Cho, H. H., Xing, F., G., Shin, T., Kuo, C. C. Jay & Woo, J. (2025). **Cross-Modal Fine-Tuning of Foundation Models for ADHD Classification via First Low-Rank Adaptation.** *2026 IEEE International Symposium on Biomedical Imaging (ISBI)*, (Under Peer Review).
- [J.1] Kao, J. P., Zhang, J., Lee, W. N., Chen, C. P., & Lau, C. M. L. (2025). A Novel Deep Learning Based Automatic Ultrasonic Posterior Cruciate Ligament Clinical Assessment Tool. *npj Artificial Intelligence*. (Accept, In Press)
- [J.2] Kao, J. P., Chung Y. C., Hung, H. Y., Chen, C. P., & Chen, W. S. (2025). **LoRA-Enhanced RT-DETR: First Low-Rank Adaptation Based DETR Model and Enable Real-Time Full Body Anatomical Structures Detection in Musculoskeletal Ultrasound.** *Computerized Medical Imaging and Graphics*, (2025): 102583. **(JCR Q1)**
- [C.1] Kao, J. P., Chen, C. P., & Chen, W. S. (2025). **MULTI-IMAGE MUSCULOSKELETAL ULTRASOUND INTERPRETATION USING A LARGE LANGUAGE MODEL.** *Radiological Society of North America Annual Meeting (RSNA 2025)*.
- [J.3] Kao, J. P. & Kao, H. T. (2025). **Large Language Models in Radiology: A Technical and Clinical Perspective.** *European Journal of Radiology Artificial Intelligence*, 100021.
- [C.2] Kao, J. P., Hung, H. Y., Chen, P. X., Chen, C. P., & Chen, W. S. (2024). **Transformer Based Real Time Muscle-skeletal Anatomical Structure Detection in Clinical Use.** *The IEEE International Conference on Bioinformatics & Bioengineering*, IEEE. Nov 2024, Kragujevac, Serbia.
- [C.3] Hung, H. Y., Kao, J. P., Chu, H. Y., Chen, C. P., & Chen, W. S. (2024). **Real Time Musculoskeletal Ultrasound Image Annotations.** *The 10th Biomedical Imaging and Sensing Conference (BISC2024)*, SPIE. 2024, Yokohama, Japan.
- [J.4] Chu, H. Y., Wu, C. H., Chen, P. X., Hung, H. Y., Kao, J. P., Chen, C. P., & Chen, W. S. (2024). **Enhancing Multi-Object Detection in Ultrasound Images through Semi-Supervised Learning, Focal Loss, and Relation of Frame.** *Ultrasound in Medicine & Biology* 50 (12), 1868-1878.
- [C.4] Chang, Y. Y., Chia, S. H., Kao, J. P., Liu, C., Lin, X. (2024). **Enhanced In Vivo Skin Diagnostics: A Comparative Study of Reflective Confocal Microscopy and Harmonic Generation Microscopy.** *2024 Optics & Photonics Taiwan International Conference (OPTIC)*. Dec 2024, Taiwan.
- [C.5] Kao, J. P., Lin, X., Zhang, Y. Y., Liu, C., Chia, S. H. (2023). **Deep-Learning-Enabled Third-Harmonic-Generation Imaging for Skin Virtual Biopsy from Reflectance Scanning Microscope.** *2023 Optics & Photonics Taiwan International Conference (OPTIC)*. Dec 2023, Taiwan.
- [C.6] Kao, J. P., Yu, C. Q., Lin, W. Z., Pan, B. H., Jang, J. C., Tsai, T. C., Chia, S. H. (2022). **Optical design and realization of nonlinear mesoscope.** *2022 Optics & Photonics Taiwan International Conference (OPTIC)*. Dec 2022, Taiwan.

PROFESSIONAL EXPERIENCE

- **Invited Peer Reviewer** 2025 - Present
- **Journals (39 Manuscripts):** Artificial Intelligence In Medicine, IEEE Journal of Biomedical and Health Informatics, International Journal of Medical Informatics, Computerized Medical Imaging and Graphics, Biomedical Signal Processing and Control, Heliyon, APSIPA Transactions on Signal and Information Processing, Clinical Radiology.
- **Conferences:** IEEE ISBI 2026, MIDL 2026, IEEE EMBC 2025, IEEE ICSPC 2025.

HONORS AND AWARDS

- **Outstanding Paper Award** Oct 2025
National Taiwan University
◦ Thesis published in a journal ranked in the top 15% by JCR and awarded a \$340 USD scholarship.
- **International Conference Travel Grant** Oct 2025
National Taiwan University
◦ Received \$550 USD to present at the Radiological Society of North America Annual Meeting (RSNA 2025).

• Graduate Student Research Scholarship <i>National Taiwan University</i>	June 2025
◦ Awarded \$1,200 USD to support AI in medical imaging research.	
• 2025 Intel AI Innovation Application Competition - Semi-Finalist <i>Intel Greater Bay Area Innovation Center, China</i>	May 2025
◦ Recognized for Graph Neural Network application in decision making on Intel AI PCs.	
• International Conference Travel Grant <i>National Science and Technology Council (NSTC), Taiwan</i>	Nov 2024
◦ Received \$1,250 USD to present at the 24th IEEE BIBE Conference.	
• The University of Hong Kong Summer Research Scholarship <i>The University of Hong Kong</i>	Aug 2024
◦ Awarded \$2,570 USD for participation in the highly competitive 2024 Summer Research Program.	
• Phi Tau Phi Honorary Membership <i>The Phi Tau Phi Scholastic Honor Society of the Republic of China, Taiwan</i>	July 2023
◦ Awarded to the top 1% of graduating students for academic excellence.	
• 2023 Synopsys ARC AIoT Design Contest - Finalist <i>Synopsys, Taiwan</i>	Jun 2023
◦ Finalist for super-resolution imaging utilizing deep learning on Synopsys ARC EM9D Processors.	
• Undergraduate Research Fellowship <i>Ministry of Science and Technology (MOST), Taiwan</i>	Feb 2023
◦ Awarded \$1,510 USD research grant for generative AI in non-linear optical microscopy.	
• 2022 Intel DevCup x OpenVINO Toolkit Award Finalist <i>Intel Corporation, Taiwan</i>	Feb 2023
◦ Achieved Finalist status for a project employing deep learning with the Intel OpenVINO Toolkit for edge computing applications in microscopic image generation.	
• 2021 Intel DevCup x OpenVINO Toolkit Award Second Place <i>Intel Corporation, Taiwan</i>	Jan 2022
◦ Secured 2nd Place (\$1,200 USD) for edge computing prediction of Hemochromatosis using ECG/GWAS data.	

EXTRACURRICULAR EXPERIENCE

• Teaching Assistant <i>National Taiwan University</i>	Sep 2023 - Jun 2025
◦ 2025 Spring: Management of Technological Innovation, College of Electrical Engineering and Computer Science	
◦ 2024 Fall: Introduction to Biomedical Engineering, College of Electrical Engineering and Computer Science	
◦ 2023 Fall, 2024 Spring: Service Learning, College of Electrical Engineering and Computer Science	
• Teaching Assistant <i>National Yang Ming Chiao Tung University</i>	Feb 2021 - Jun 2022
◦ 2022 Spring: Calculus, College of Life Sciences	
◦ 2021 Spring: Laboratory in Fundamental Genetics and its Applications, College of Life Sciences	
• Founder & President <i>Yang Ming Board Game Club</i>	Sep 2021 - Jun 2022
◦ Established the university club and managed operations.	
• Student Councilor <i>National Yang Ming Chiao Tung University</i>	Sep 2020 - Jun 2021
◦ Supervised student council operations, audited budgets, and revised regulations.	

SKILLS

• Programming & Tools
◦ Languages: Python, C/C++, MATLAB, SQL, Verilog, LabVIEW.
◦ DevOps & Environment: Linux, Docker, SLURM (HPC Cluster), LaTeX.
◦ Hardware & Optics: HSPICE, LTSPICE, Custom Compiler, Zemax (Optical Design).
• Deep Learning & AI
◦ Frameworks: PyTorch, TensorFlow, Keras, Hugging Face, Lightning.
◦ Computer Vision: OpenCV, MONAI, skimage, Albumentations.
◦ Data Science: Pandas, NumPy, Scikit-learn, SciPy, Matplotlib, WandB.