Jyun-Ping, Kao

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EDUCATION

- **National Taiwan University**   July 2023 - Present
  MS in Biomedical Electronics and Bioinformatics   Taipei, Taiwan
  - GPA: 4.3/4.3 (Ranked 1st of 62 students in the department)

- **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 Awards (Top 1 % graduates in the college 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
  - Developed a transparent, lightweight multitask model that couples a pretrained VoxelHop encoder with an AutoSurv-style classification head to jointly classify and segment 3D echocardiography ultrasound.
  - Achieved 90% classification accuracy and a 0.91 Dice segmentation score, demonstrating strong performance with interpretable features and efficient deployment potential.
  - Building an MRI ADHD classifier by fine-tuning a 3D medical foundation model with LoRA for parameter efficient adaptation, aiming for the best accuracy on our dataset.

- **National Taiwan University Hospital**   July 2023 - June 2025
  Research Assistant, Department of Physical Medicine and Rehabilitation   Taipei, Taiwan
  - Developed the first LoRA-enhanced real-time Detection Transformer (RT-DETR) model for musculoskeletal ultrasound imaging that solves the domain-shift problem in fine-tuned models and reduces trainable parameters by > 99 % while preserving high detection accuracy.
  - Engineered advanced deep learning frameworks for ultrasound image generation and precise anatomical structure detection, enabling real-time identification of critical musculoskeletal features (e.g., nerves, tendons, muscles).
  - Integrated low-rank adaptation (LoRA) techniques into transformer-based architectures to facilitate efficient fine-tuning on limited, institution-specific datasets, effectively addressing data scarcity and privacy constraints.
  - Led clinical collaborations by overseeing participant recruitment, managing comprehensive data collection protocols, and supervising meticulous data annotation to ensure high research quality and reproducibility.
  - Developed the first LLM for multi-image musculoskeletal ultrasound, synthesizing 12-frame shoulder exams into a unified radiologist-style impression with consistent laterality and strong report similarity.

- **The University of Hong Kong**   Jun 2024 - Aug 2024
  Visiting Research Student, Department of Orthopaedics and Traumatology   Hong Kong
  - Developed a deep learning–based ultrasound assessment tool for the Posterior Cruciate Ligament (PCL), achieving near-perfect location detection and under 5% error in width and angle measurements.
  - Implemented real-time inference pipelines that eliminate heavy segmentation overhead, enabling efficient, operator-independent ligament evaluation and reducing reliance on MRI.
  - Designed specialized labeling strategies (e.g., boundary annotation for PCL width and angle) and post-processing algorithms to translate bounding box coordinates directly into clinically meaningful measurements.
  - Organized and led data collection with orthopedic specialists, recruiting participants, acquiring knee ultrasound videos, and performing high-fidelity data labeling for robust model training.

- **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.
  - Designed and optimized optical systems in laser microscopy, incorporating non-linear optics for advanced imaging and simulation

PUBLICATIONS C=Conference, J=Journal, S=In Submission, T=Thesis

[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*. **Final Grade: A+**
Advisors: Chun-Ping Chen Ph.D.; Wen-Shiang Chen M.D., Ph.D.

[S.1] **Kao, J. P.,** Zhang, J., Lee, W. N., Chen, C. P., & Lau, C. M. Lawrence (2025). **A Novel Deep Learning Based Automatic Ultrasonic Posterior Cruciate Ligament Clinical Assessment Tool**. *npj Artificial Intelligence*, (Under Peer Review).

[J.1] **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.2] **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 Musculoskeletal 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.3] 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] Yu-Yang Chang, Shih-Hsuan Chia, **Jyun-Ping Kao**, et al. (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] **Jyun-Ping Kao**, et al. (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] **Jyun-Ping Kao**, et al. (2022). **Optical design and realization of nonlinear mesoscope**. *2022 Optics & Photonics Taiwan International Conference (OPTIC)*. Dec 2022, Taiwan.

PROFESSIONAL EXPERIENCE

• **Invited Journal Peer Reviewer**

Biomedical Signal Processing and Control (JCR Q1), 4 manuscripts	Apr - Aug 2025
International Journal of Medical Informatics (JCR Q1), 5 manuscripts	May - Aug 2025
Computerized Medical Imaging and Graphics (JCR Q1), 5 manuscripts	Mar - July 2025
IEEE Journal of Biomedical and Health Informatics (JCR Q1), 3 manuscripts	Apr - June 2025
Artificial Intelligence In Medicine (JCR Q1), 1 manuscript	June 2025
47th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)	Feb 2025

HONORS AND AWARDS

• **Graduate Student Research Scholarship** June 2025
Graduate Institute of Biomedical Electronics and Bioinformatics, National Taiwan University
◦ Awarded a $1,200 USD scholarship to support research activities.

• **International Conference Travel Grant** Nov 2024
National Science and Technology Council (NSTC), Taiwan
◦ Received the NSTC International Conference Travel Grant with $1,250 USD to present at the 24th IEEE International Conference on Bioinformatics and Bioengineering (Nov 2024, Kragujevac, Serbia).

- **The University of Hong Kong Summer Research Scholarship** Aug 2024
  The University of Hong Kong
  - Awarded The University of Hong Kong Summer Research Scholarship of $2,570 USD for participation in the 2024 Summer Research Programme.

- **The Phi Tau Phi Scholastic Honor Society of the Republic of China Honorary Membership** July 2023
  The Phi Tau Phi Scholastic Honor Society of the Republic of China, Taiwan
  - Awarded to the top 1% of undergraduate students at National Yang Ming Chiao Tung University for outstanding academic achievement.

- **2023 Synopsys ARC AIoT Design Contest Award – Finalist** Jun 2023
  Synopsys, Taiwan
  - Achieved Finalist status for a project utilizing deep learning on Synopsys ARC EM9D Processors for super-resolution in microscopic imaging.

- **Undergraduate Research Fellowship** Feb 2023
  Ministry of Science and Technology (MOST), Taiwan
  - Awarded by the Ministry of Science and Technology (MOST) valued $1,510 USD. The funded research focused on generating nonlinear optical microscopy images from fundamental microscopic images using generative AI, including optical system design.

- **2022 Intel DevCup x OpenVINO Toolkit Award – Finalist** Jan 2023
  Intel Corporation, Taiwan
  - 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** Jan 2022
  Intel Corporation, Taiwan
  - Secured Second Place with prize valued at $1,200 USD for a project developing a deep learning solution with the Intel OpenVINO Toolkit for edge computing, focused on analyzing ECG and GWAS data for Hemochromatosis prediction.

EXTRACURRICULAR EXPERIENCE

- **Teaching Assistant** Sep 2023 - Jun 2025
  National Taiwan University
  - 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** Feb 2021 - Jun 2022
  National Yang Ming Chiao Tung University
  - 2022 Spring : Calculus, College of Life Sciences
  - 2021 Spring : Laboratory in Fundamental Genetics and its Applications, College of Life Sciences

- **President of Yang Ming Board Game Club** Sep 2021 - Jun 2022
  National Yang Ming Chiao Tung University
  - Founder of Yang Ming Board Game Club

- **Student councilor** Sep 2020 - Jun 2021
  National Yang Ming Chiao Tung University
  - Supervised student council operations, audited budgets, and revised regulations.

REFERENCES

- **Prof. Jonghye Woo Ph.D.**
  Associate Professor, Harvard Medical School
  - Email: jwoo@mgh.harvard.edu
  - Relation: Supervisor of Visiting Research

- **Prof. Wen-Shiang Chen, M.D., Ph.D.**
  Professor / Attending Physician, National Taiwan University
  - Email: wenshiang@gmail.com
  - Relation: Advisor of Master's Thesis

- **Prof. Chung-Ping Chen, Ph.D.**
  Professor, National Taiwan University
  - Email: cpchen@ntu.edu.tw
  - Relation: Advisor of Master's Thesis