Yi-Chen Sun

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CV Website: https://nycu-syc.github.io/

RESEARCH INTERESTS

Computer vision, Deep Learning, Large Language Model, medical image analysis, multimodal learning, generative modeling, and vision-language systems for trustworthy AI in brain tumor analysis and clinical report generation.

EDUCATION

National Yang Ming Chiao Tung University (NYCU), Taiwan **2024–Present**
Direct Pursuit of Ph.D. Program, Institute of Biophotonics | Current GPA: 4.11/4.30

Yuan Ze University, Taiwan **2020–2024**
B.S., Department of Electrical Engineering

SELECTED PUBLICATIONS AND PRESENTATIONS

- **Medical Image Analysis (Impact Factor=11.8). 1st author**. "DBI-MambaUNet with Size-Aware Focal Tversky Loss: A Holistic Framework for Multi-Subtype Brain Tumor Micro-Lesion Segmentation in Stereotactic Radiosurgery." Under review.
- **Journal of Medical Systems (Impact Factor=5.7). 3rd author**. "A Standards-Based, PACS-Native AI Integration Architecture for Background Inference in Radiology Reporting Workflows." Under review.
- **Computer Methods and Programs in Biomedicine (Impact Factor=4.8). Co-author**. "Fully Automated AI-Based Aortic Quantification System for Opportunistic Aneurysm Detection on Routine CT." Under review.
- **FOM 2025 (Oral Presentation). 1st author**. "Enhancing 3D MRI Brain Tumor Segmentation with Dynamic Window Filtering."
- **IEEE AMLDS 2025 (Oral Presentation). 1st author.** "Lightweight 3D IDC-MambaUNet for Multi-Modal MRI Brain Tumor Segmentation Using Multi-Resolution Ensemble."
- **IEEE AMLDS 2025 (Oral Presentation). 2nd author.** "Real-time and Continuous AI Inference Workflow with PACS Integration."
- **IEEE AMLDS 2026 (Oral Presentation). 2nd author.** "Lesion-Wise False-Positive Reduction for Brain Tumor Candidate Masks in Multi-Modal MRI via Mask-Gated 2.5D Spatiotemporal Classification."

SELECTED HONORS AND AWARDS

- **Champion, AOCR Kaggle AI Challenge**, held under the Asian Oceanian Congress of Radiology (AOCR), one of the three major international radiology conferences.
- **21st National Innovation Award (Academic Innovation Award).**
- **Winner, AI Application Competition**, Digital Industry Administration, Taiwan.
- **Success-Case Project, Taiwan Ministry of Education College Innovation and Entrepreneurship Simulation Learning Platform**, ICF Smart AI Rehabilitation System **(CTO, NOVATERA)**.
- **Advanced to the semifinal round, FITI: From IP to IPO Program**, Ministry of Economic Affairs, Taiwan (CTO, NOVATERA).
- **Shortlisted for the Smart Innovation Award.**
- **Served as an AI Poster Mentor at StanCode**, leading student teams in hands-on AI project deployments.

TRANSLATIONAL INNOVATION

- **Co-developed** AItewan DeepBT Detector–Plus, with **TFDA medical device approval** obtained and **U.S. FDA application pending**.
- **Independently developed** AItewan DeepBT Detector–A Plus, with **TFDA** and **U.S. FDA medical device applications pending**.

PATENTS

- Implementation Method and Electronic Device for Acute Appendicitis Assisted Diagnosis: Taiwan utility patent granted; Taiwan invention patent pending.
- System and Method for Multimodal Language Models in Medical Imaging Diagnostic Assistance: Taiwan and U.S. invention patents pending.

RESEARCH EXPERIENCE

National Yang Ming Chiao Tung University, Institute of Biophotonics **2024–Present**

Ph.D. Researcher | Advisor: Prof. Yu-Te Wu

- Spearheaded an end-to-end clinical AI system for brain tumor SRS using an 11,000+ multicenter MRI dataset. Engineered the DBI-MambaUNet architecture and SA-FTL loss, surging <4mm lesion detection sensitivity from 38.8% to 63.8%. Leveraged GANs and knowledge distillation for contrast-free analysis, and integrated VLMs with hard constraints to generate hallucination-free structured reports. Standardized outputs into DICOM SEG/SR, enabling a zero-click, automated hospital PACS workflow. The initial system is TFDA-cleared and under FDA review, with advanced iterations actively pursuing dual-certification for high clinical and commercial impact.

NOVATERA (ICF Smart AI Rehabilitation System) **2025-2026**

Chief Technology Officer (CTO)

- Led the technical strategy and product development of an AI-assisted rehabilitation platform for home and clinical environments, overseeing system architecture, AI workflow design, and prototype development for functional assessment and translational deployment. Demonstrating strong clinical and commercial potential, the project was featured as a success case on the Taiwan Ministry of Education's College Innovation and Entrepreneurship Simulation Learning Platform, advanced to the semifinals of the FITI (From IP to IPO) Program, and is currently participating in the U-start Plan for Innovation and Entrepreneurship.

StanCode (founded by a Stanford alumnus, John Stephens Jr. Memorial Award recipient) **2025–2026**

AI Poster Mentor

- Served as an AI Poster Mentor, guiding student teams in the development of healthcare AI systems, including a smart medication delivery robot and an educational medication recognition APP powered by Image Detection/Classification, RAG, and LLMs. Provided technical mentorship on system architecture, computer vision modeling, and fact-grounded medical QA, with a strong emphasis on safety-oriented design and evaluation metrics. Effectively assisted teams in mitigating model hallucination risks, enforcing citation-based response mechanisms, and comprehensively enhancing the practical usability of AI applications in real-world clinical scenarios.

AOCR AI Challenge Project **2023–2024**

Research Team Leader

- Served as Team Captain, leading a research team in the AOCR Kaggle AI Challenge, organized by the Asian Oceanian Congress of Radiology (AOCR)—one of the world's three major radiological congresses. Developed a 3D CT-based segmentation framework for acute appendicitis to enhance high-sensitivity detection, localization, and segmentation in complex clinical cases. I orchestrated the entire lifecycle from model development to performance evaluation, prioritizing robustness and translational value to secure the Championship. The project's technical merit and clinical relevance earned numerous academic honors, including the National Innovation Award of Taiwan, and successfully secured a Taiwan patent. Furthermore, it garnered extensive media coverage and personal interviews, highlighting its strong potential for clinical deployment and commercial transformation.

Omniguider Inc. **2023–2024**

Research / Development Project

- Served as Team Leader to develop a highly realistic interactive image system for the National Museum of Natural Science. To overcome the inherent randomness of diffusion models, I implemented ControlNet for precise guidance and LoRA for fine-tuning exhibit details. By seamlessly integrating Stable Diffusion and Deepfake for face-swapping, we significantly enhanced image realism. This innovative solution won the Excellence Award at the "AI Application Challenge" hosted by Taiwan's Ministry of Digital Affairs.

National Chung-Shan Institute of Science and Technology **2022–2023**

Research Project Intern / Member

- Served as a core R&D member, leveraging cGAN and knowledge distillation to address data scarcity and edge deployment challenges in drone vision. Integrated a 3D flight simulator with limited real-world samples to generate multi-view, high-fidelity images (FID < 25), significantly expanding training datasets for downstream object detection and segmentation models. Additionally, developed a lightweight GAN model based on a modified U-Net and knowledge distillation for high-precision RGB-to-infrared cross-modal translation (SSIM 0.827, LPIPS 0.231), successfully overcoming practical deployment bottlenecks for drones in complex environments with restricted hardware.

TECHNICAL SKILLS

- Python, PyTorch, MONAI, nnUNet, Git
- Computer vision, 3D segmentation, multimodal learning, knowledge distillation, GANs, diffusion models, vision-language modeling
- Model evaluation with lesion-wise sensitivity, precision, F1, FP/scan, and clinically oriented analysis
- Mandarin Chinese (native), English (professional working proficiency)