Chi-Wei Lee

NeuroAI · Computer Vision · Predictive Coding · 3D Reconstruction from fMRI · Diffusion Models

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Education

National Tsing Hua University 2022 – 2026
B.S. in Physics and Electrical Engineering & Computer Science (Double Major, AI Track)
- **Mei Yi-Chi Memorial Medal** (2026) — NTHU's highest honor for graduating students
  - 1 of 8 university-wide, sole recipient in the College of Science, and the only Physics recipient in 9 years.
- Departmental rank 1 / 72 (Spring 2024 semester).
- Teaching Assistant, *Introduction to Machine Learning* (Fall 2025).

Publications & Manuscripts

Predictive Coding with a Sequential Memory-Driven Bayesian Denoiser Under review
C.-W. Lee (co-first author) et al. **NeurIPS 2026.**
- A Tweedie–Hopfield correspondence identifies associative memory as the Bayesian denoiser predictive coding implicitly requires, yielding HOPE — one energy unifying hierarchical inference, temporal prediction, and layer-wise memory. Beats predictive-coding and Hopfield baselines on Bouncing Moving-MNIST and UCF-101 recall using only local Hebbian updates (no BPTT or weight transport).

Langevin Temporal Predictive Coding Lifts Modes to Multimodal Densities Under review
C.-W. Lee (co-first author) et al. **NeurIPS 2026.**
- Replaces the deterministic MAP inference of temporal predictive coding with preconditioned Langevin dynamics, making the filtering posterior the flow's unique stationary density. Lifts mode coverage from 19.4% to 71.3% (3.67×) and cuts predictive MAE by 16.7% (22.3% on naturally multimodal tasks) over twelve UCI benchmarks.

MatrixQR: Matrix-Guided Refinement for Decoupling Reliability Control from Creative Edits in QR Code Generation 2025
C.-W. Lee, Y.-H. Hsueh, J.-A. Guo, J.-W. Liao, P.-Y. Chiu, J.-C. Chen. *TAAI 2025* — accepted poster (extended abstract).

Classifying Vibration Modes Generated by the Michelson Interferometer Using Machine Learning Methods 2024
X.-H. Tsai, A. A.-C. Yeh, C.-H. Lu, S.-Y. Chou, S.-W. Wang, **C.-W. Lee**, P.-H. Lee. *Journal of Modern Physics* 15(12). doi:10.4236/jmp.2024.1512087.

Building Machine Learning Challenges for Anomaly Detection in Science 2025
E. G. Campolongo et al. (incl. **C.-W. Lee**, among 150 authors). arXiv:2503.02112
- Datasets & challenge-design paper of the U.S. NSF HDR ML Challenge.

Research Experience

Human-Centered Machine Intelligence Lab, National Tsing Hua University – Taiwan 2026 – present
Undergraduate Researcher · PI: Prof. Po-Chih Kuo
- Reconstructing 3D spatial representations from fMRI signals with generative decoding models; manuscript in preparation (ICLR 2027 submission planned).

University of California, Los Angeles · Taiwan Global Pathfinders Initiative – Los Angeles, CA Jul – Sep 2026
Visiting Research Delegate, AI × Brain and Neuroscience Track
- One of 9 delegates selected nationally for a 60-day research placement at UCLA, funded by Taiwan's Ministry of Education.

Research Center for Information Technology Innovation, Academia Sinica – Taiwan 2025 – present
Summer Intern, then Part-time Research Assistant · Advisor: Dr. Jun-Cheng Chen
- Led diffusion-based aesthetic QR-code generation, decoupling creative editing from scan-reliability control (MatrixQR).

National Tsing Hua University – Taiwan 2024 – 2025
Undergraduate Researcher, Medical Imaging
- Built attention-transfer models for chest X-ray classification that target pathology-subgroup bias, long-tail label distributions, and class imbalance.

Honors & Awards

- **2nd overall** in Year 1 (2025); **2nd in Imageomics: Sentinel Beetles** and tied 4th overall in Year 2 (2026) — U.S. NSF HDR Machine Learning Challenge. Team lead (6) on autoencoder- and diffusion-based anomaly detection; presented at the AAAI-25 Workshop.
- **1st place** — Mei-Chu Hackathon, Maker Track (2025), one of Taiwan's largest student hackathons: a wearable-and-app system for dementia walking-safety monitoring.
- **Gold Medal** — iGEM 2023, Dry Lab Lead: ML colorectal-cancer screening plus an Arduino-integrated diagnostic device; presented in Paris.