Po-Ching Hsu

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EDUCATION

Ph.D. Candidate in Mechanical Engineering, GPA 3.9/4.0 — Expected May 2026
University of Maryland, College Park — College Park, MD

- Dissertation: Experimental Investigation and Data-Driven Modeling for Variable Refrigerant Flow Systems

M.S. in Mechanical Engineering — June 2017
National Taiwan University — Taipei, Taiwan

- Thesis: A Bi-cell Proton Exchange Membrane Fuel Cell Stack with a Magnetically Driven Piezoelectric Actuator

B.S. in Energy and Refrigerating Air-Conditioning Engineering — June 2015
National Taipei University of Technology — Taipei, Taiwan

- Capstone Project: An Experimental and Numerical Study of Impinging Micro Channels of Di-electric Fluid for Chip Cooling (Best Undergraduate Capstone Project)

SKILLS

- **Thermal Management**: Heat transfer, thermodynamics, electronics cooling, single- and two-phase cooling
- **CFD & CAD Software:** Ansys Icepak, Ansys Fluent, Flotherm, Pro/ENGINEER (Creo), SolidWorks
- **Lab Skills:** Thermal chamber/wind tunnel testing, DAQ (NI/Agilent), sensor instrumentation and calibration (thermocouples, pressure, IoT), prototyping, failure analysis, uncertainty analysis, fixture design
- **Optimization & Optimal Control:** Design-of-experiments (DOE), Multivariable optimization, surrogate modeling, Bayesian optimization, model predictive control (MPC), LQR, dynamic programming
- **Programming & Data Analysis:** Python, MATLAB, LabVIEW, C/C#
- **Machine Learning:** PyTorch, TensorFlow, Keras, Scikit-learn, Hyperopt

PROFESSIONAL AND RESEARCH EXPERIENCE

Graduate Research Assistant (Ph.D.) — Aug. 2021 – Present
Center for Environmental Energy Engineering — College Park, MD

- Created an automated CFD-based surrogate modeling workflow (PyAnsys) that reduced simulation time by 90%, enabling rapid trade-off studies of heat exchanger thermal performance for system design decisions
- Improved accuracy by 46% and physical consistency by 67% by developing a physics-informed hybrid model for refrigerant-based thermal systems (VRF) and implementing an MPC framework, reducing energy consumption by 10% while maintaining thermal comfort, demonstrated via a Pareto-front trade-off study
- Conducted vapor compression cycle tests with internal heat exchangers (IHX) and two-phase refrigerant circuits, validating first-principles models and guiding next-generation low GWP refrigerant system designs
- Redesigned and improved two-phase thermal test facilities, reducing uncertainty in two-phase heat transfer measurements for tube-in-tube heat exchangers and improving experimental accuracy
- Developed compact autoregressive dynamic models for refrigerant-based thermal systems (VRF) to capture system transient behavior, achieving 87% model size reduction and 11% accuracy improvement through parameter optimization, validated with experimental field test data

Thermal Engineer — Nov. 2017 – Mar. 2021
Foxconn Technology Group — New Taipei, Taiwan

- Led thermal design, simulation, and experimental validation for data center and high-power electronics cooling systems, including GPUs, HPC, storage, edge servers, and AI accelerator cards, ensuring compliance with thermal and mechanical requirements
- Designed and optimized vapor chamber and heat pipe heatsinks via DOE-driven CFD, prototype testing, and tolerance analysis, reducing thermal resistance by 12% and improving major chipset thermal margins by 5 °C under strict design constraints for **Qualcomm AI Accelerator Cards (projected for 1M annual sales)**
- Improved the thermal margins of critical components by 5 °C to mitigate thermal throttling under fan redundancy via CFD-driven airflow optimization, collaborating with cross-disciplinary teams (HW and ME) to ensure manufacturability and installation compliance for **High-Density Storage Server (EBOF)**
- Reduced manufacturing costs by 10% while maintaining thermal performance by refining product architecture and component selection (fans, TIMs) via thermal design reviews, leading supplier heatsink designs, and applying design-for-manufacturing principles to streamline an **HPC Server Cooling Solution**
- Cut chamber test time by 70% by identifying critical cases via CFD simulations, and collaborating with the SW team to develop thermal policies that improved reliability of **GPU Server Cooling Systems**

Graduate Research Assistant (M.S.) — Sept. 2015 – June 2017
Energy and Environment Lab — Taipei, Taiwan

- Improved the airflow of a piezoelectric air-breathing pump for a PEM fuel cell stack by 30% through CFD-optimized design
- Boosted maximum net power output of the fuel cell stack by 20% via a novel air-breathing pump design

- Reduced fuel cell stack volume by 68% and weight by 76% through an innovative actuator design

Undergraduate Researcher Feb. 2014 – Jan. 2015
Two Phase Flow and Heat Transfer Enhancement Lab Taipei, Taiwan

- Reduced thermal resistance by 30% in a two-phase dielectric fluid (FC-72) chip cooling module by optimizing impinging microchannel geometry through CFD modeling and experimental validation of phase-change heat transfer

SELECTED PROJECTS EXPERIENCE

Blade Server CPU Heatsink Optimization Sept. 2022
Graduate Course Project – Engineering Optimization College Park, MD

- Conceived and led a semester project leveraging prior industry experience to optimize server CPU heatsink design, reducing thermal resistance by 56% under constraints by obtaining the Pareto front via optimization

Intelligent Control of Space Heaters for Room-Level Temperature Regulation June 2025
Independent Invention (patent filing in progress with University of Maryland) College Park, MD

- Improved thermal comfort by 96% and reduced energy consumption by 19% in field tests by designing and prototyping a smart heater control system integrating IoT sensing, predictive control, and weather data APIs

PUBLICATIONS

- **Hsu, P.-C.**, Gao, L., Hwang, Y., Radermacher, R. (2025). A review of the state-of-the-art data-driven modeling of building HVAC systems. Energy and Buildings, 342, 115881. https://doi.org/10.1016/j.enbuild.2025.115881
- **Hsu, P.-C.**, Gao, L., Hwang, Y. (2025). Comparative study of LSTM and ANN models for power consumption prediction of variable refrigerant flow (VRF) systems in buildings. International Journal of Refrigeration, 169, 55–68. https://doi.org/10.1016/j.ijrefrig.2024.10.020
  – Recognized as the most downloaded paper in the journal over a 90-day period (2025)
- Ma, H., Hsu, Y., **Hsu, P.-C.** (2017). A Novel Hybrid Actuator Driven Magnetically in the Bi-Cell PEM Fuel Cell Stack. Metals, 7(11), 453. https://doi.org/10.3390/met7110453

PRESENTATIONS & CONFERENCES

Deep Learning for Science School — Lawrence Berkeley National Lab June 2025

- Poster Presenter: "Field Testing and Data-Driven Modeling of VRF Systems in Buildings" Berkeley, CA
- Selected participant (top 35% of 500+ applicants), awarded registration fee waiver and accommodation support by Lawrence Berkeley National Lab

Climate Tech Hackathon — Maryland Energy Innovation Accelerator (MEIA) May 2025

- Developed and pitched the concept "Next-generation Smart HVAC System in Household" Largo, MD

2nd International Conference on Battery & Fuel Cell Technology July 2017

- Oral Presenter: "Magnetically driven piezoelectric PEMFC stack with built-in manifold" Rome, Italy
- Awarded full sponsorship (airfare and registration fee) by Taiwan's National Science and Technology Council

AWARDS

- **ASHRAE-National Capital Chapter Endowed Scholarship**, University of Maryland Dec. 2025
- **Jacob K. Goldhaber Travel Grant**, University of Maryland May 2025
- **Distinguished Graduate Endowed Fellowship for Energy Innovation**, University of Maryland Mar. 2023
- **Best Undergraduate Capstone Project Award,** TSHRAE Apr. 2015
- **Hitachi Air Conditioning Scholarship**, Hitachi Air Conditioning Taiwan Co., Ltd. May 2014

PROFESSIONAL ACTIVITIES

- Student Member, ASHRAE
- Paper Reviewer, 2026 ASHRAE Winter Conference, Las Vegas, NV, USA
- Paper Reviewer, 15th IEA Heat Pump Conference 2026, Vienna, Austria
- Paper Reviewer, 2025 IIR Conference on Thermophysical Properties and Transfer Processes of Refrigerants, College Park, Maryland, USA
- EPA Certified Universal Technician, Section 608 of the Clean Air Act

RELEVANT GRADUATE COURSES

University of Maryland: Electronics Thermal Management (A+), CFD (A), Engineering Optimization (A), Machine Learning (A), Optimal Control (A+), Thermo-Fluid Measurements & Data Analysis (A)
National Taiwan University: Advanced Heat Transfer (A), Viscous Flow (A), Numerical Methods (A-)

ADDITIONAL INFORMATION

- **Featured in Time magazine article: "How AI Is Making Buildings More Energy-Efficient"** (Dec. 11, 2024), for my research on leveraging AI to reduce energy consumption in building HVAC systems