Hongyi Pan, Ph.D.

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https://www.scholar.google.com/citations?user=23I1CMYAAAAJ hongyi-pan-67a2b1181 phy710

Education

University of Illinois Chicago *Aug 2019 – Aug 2023*
PhD in Electrical and Computer Engineering *Chicago, IL, USA*

- GPA: 4.0/4.0, Advisor: Ahment Enis Cetin.
- Concentration in AI-based wildfire detection, anomaly detection, and efficient neural networks.
- Dissertation: Orthogonal Transform Domain Based Neural Network Layers.

University of Illinois Chicago *Aug 2017 – May 2019*
MS in Electrical and Computer Engineering *Chicago, IL, USA*

- GPA: 4.0/4.0.
- Concentration in signal, image processing, and machine learning.

Chang'an University *Sep 2014 – July 2018*
BS in Automation *Xi'an, Shaanxi, China*

- GPA: 85.3/100 (3.6/4.0).
- Concentration in control theory, circuit, and image processing.

Experience

Postdoctoral Research Fellow *June 2023 – Present*
Northwestern University, Advisor: Ulas Bagci *Chicago, IL, USA*

- Lead researcher on federated foundation models for medical image analysis.
- Lead researcher on Cyst-X: a multicenter AI pipeline for pancreatic MRI cyst malignancy risk prediction.
- Designed domain generalization frameworks using wavelet-regularized Fourier transforms.

Engineering Intern *May 2022 – Aug 2022*
InnoPeak Technology (OPPO US) *Bellevue, WA, USA*

- Developed attention-based variable rate super-sampling (VRSS) models for graphics rendering
- Contributed to efficient deep learning models for real-time visual processing.

Research Assistant *Aug 2019 – May 2023*
University of Illinois Chicago *Chicago, IL, USA*

- Designed neural layers based on orthogonal transforms (DFT, DCT, Hadamard) for edge-efficient AI.
- Developed real-time wildfire detection systems deployed on NVIDIA Jetson Nano.

Selected Projects

Cyst-X: Federated AI for Pancreatic Cancer Risk Prediction

- Created and led the first large-scale, publicly available, multicenter MRI dataset project for pancreatic cystic lesion analysis, involving 7 hospitals.
- Achieved state-of-the-art performance in identifying high-risk IPMNs under privacy constraints.

Federated Domain Generalization for Medical Image Analysis

- Developed federated domain generalization methods based on the Fourier Transform for medical image analysis tasks.
- Improved the performance on various datasets, including breast ultrasound, mammography, polyp, and retina fundus.

Orthogonal Transform-Based Deep Learning Layers

- Implemented a series of efficient neural network layers based on biorthogonal block wavelet transform, discrete cosine transform, and Hadamard transform.

- Improved deep neural networks' performance on various datasets such as ImageNet-1K.

L1-Norm Kernel PCA for Sensor and Signal Applications
- Developed a multiplication-free kernel PCA method using L1-norm for robust feature extraction.
- Applied to anomaly detection in chemical sensors and robust signal processing for array data.

Wildfire Detection on Edge Devices *Demo*
- Developed a MobileNetV3-based real-time wildfire detection model optimized for edge deployment.
- Successfully deployed the system on Nvidia Jetson Nano using HPWREN surveillance data.

Selected Publications

Published 17 peer-reviewed journals and 26 peer-reviewed conferences.
Google Scholar citation: 600+; h-index: 15; i10-index: 16.

H. Pan, et al. Cyst-X: AI-Powered Pancreatic Cancer Risk Prediction from Multicenter MRI in Centralized and Federated Learning. ***Nature Communications****, under review.*
H. Pan, et al. Frequency-Based Federated Domain Generalization for Polyp Segmentation. *IEEE International Conference on Acoustics, Speech and Signal Processing (**ICASSP**), 2025.*
H. Pan, et al. Adaptive Aggregation Weights for Federated Segmentation of Pancreas MRI. *IEEE International Symposium on Biomedical Imaging (**ISBI**), 2025.*
H. Pan, et al. IPMN Risk Assessment under Federated Learning Paradigm. *IEEE International Symposium on Biomedical Imaging (**ISBI**), 2025.*
Z. Zhang, M. Dou, L. Peng, **H. Pan**, U. Bagci, B. Gong. VideoAds for Fast-Paced Video Understanding: Where Opensource Foundation Models Beat GPT-4o & Gemini-1.5 Pro. *International Conference on Computer Vision (**ICCV**), 2025.*
H. Pan, et al. Multichannel Orthogonal Transform-Based Perceptron Layers for Efficient ResNets. *IEEE Transactions on Neural Networks and Learning Systems (**TNNLS**), 2024.*
H. Pan, et al. Domain Generalization with Fourier Transform and Soft Thresholding. *IEEE International Conference on Acoustics, Speech and Signal Processing (**ICASSP**), 2024.*
B. Wang, **H. Pan**, et al. GazeGNN: A Gaze-Guided Graph Neural Network for Chest X-Ray Classification. *IEEE/CVF Winter Conference on Applications of Computer Vision (**WACV**), 2024.*
H. Pan, et al. A hybrid quantum-classical approach based on the Hadamard transform for the convolutional layer. *International Conference on Machine Learning (**ICML**), 2023.*
H. Pan, et al. Real-time wireless ecg-derived respiration rate estimation using an autoencoder with a dct layer. *IEEE International Conference on Acoustics, Speech and Signal Processing (**ICASSP**), 2023.*
M. Yang, Z. Ye, **H. Pan**, M. Farhat, A.E. Cetin, P.Y. Chen. Electromagnetically unclonable functions generated by non-Hermitian absorber-emitter. ***Science Advances****, 2023.*

Full publication list: https://www.scholar.google.com/citations?user=23I1CMYAAAAJ

Editorial Services

- Associate Editor, Signal, Image and Video Processing (SIVP), 2023–Present

Honors& Award

- IEEE TMI Distinguished Reviewer, 2024
- UIC Graduate Student Award for Exceptional Research Promise, 2022

Skills

Programming Languages: Python, MATLAB, C, C++, LaTex.

Scientific Tools/Software: PyTorch, TensorFlow, MATLAB, Docker, Microsoft Office, Photoshop, ...

Operating Systems: Windows, Linux, Mac OS.

Microcontrollers: Raspberry Pi, Nvidia Jetson Nano, Arduino, STM32, MSP430, 80C51.

Language: Mandarin Chinese (native), English (fluent).