Xinxu Wei

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EDUCATION

- **Lehigh University** *2023.08 - 2027.01 (Expected)*
  Ph.D. in Computer Science. Advisor: Prof. Yu Zhang and Prof. Lifang He Bethlehem PA, USA
- **McGill University (Dual Master Degree)** *2021.08 - 2023.05*
  M.Sc. in Biomedical Engineering. Advisor: Prof. Danilo Bzdok Montreal QC, Canada
- **University of Electronic Science and Technology of China (UESTC)** *2020.08 - 2023.05*
  M.Eng. in Biomedical Engineering. Advisor: Prof. Yongjie Li Chengdu, China
- **University of Electronic Science and Technology of China (UESTC)** *2016.08 - 2020.05*
  B.Eng. in Computer Engineering Chengdu, China

RESEARCH INTERESTS & DIRECTIONS

Graph Pre-Training & Foundation Models: Graph Foundation Model, Graph with LLMs, Graph Neural Networks (GNNs), Hyper-Graphs, Graph Pre-training, Graph Prompts, Graph/HyperGraph Augmentation, GraphCL, GraphMAE, MoCo, CLIP, Graph Prompt-tuning, Graph Contrastive Learning, Masked Autoencoders (MAE)

AI & Machine Learning: Pre-training & Fine-tuning, Contrastive Learning, Self-supervised Learning, Meta Learning, Multi-task Learning, Zero-shot Learning, Transfer Learning, Knowledge Distillation, SimCLR, BYOL

LLMs Fine-tuning & NLP: Large Language Models (LLMs), LLM Agents, Graph Agents, Masked Modeling, Prefix-Tuning, LoRA, HuggingFace, Retrieval-Augmented Generation (RAG), Mixture of Experts (MoE)

Medical Image Analysis & AI for Neuroscience: Brain Graph Modeling, Brain Foundation Models, fMRI/EEG Representation Learning, Multi-modal Brain Fusion, Brain Graph Pre-training, EEG Graph

Neural Networks: CNN, RNN, LSTM, GRU, GCN, GAT, Capsule Networks, Siamese Networks, Autoencoders, Variational Autoencoders (VAE)

Computer Vision: Vision-Language Models (VLMs), Image Segmentation, Object Detection (YOLO, SSD), Image Denoising and Enhancement

TECHNICAL SKILLS

Programming Languages: Python, C/C++, Java, Bash, Matlab
Libraries: Numpy, Scikit-Learn, Pandas, Matplotlib, Seaborn, OpenCV, Scipy, Transformers, HuggingFace
Dev Tools: VScode, Git, Github, Docker, Linux Shell, Jupyter Notebook, Conda, Vim
Frameworks: PyTorch, TensorFlow, Keras, DGL, PyG, PyGame
Soft Skills: Problem Solving, Self-learning, Technical Writing, Presentation, Collaboration, Project Management
Personal Interests: Playing Basketball, Hiking, Gaming, Watching Movies, Traveling, Sunbathing

PUBLICATIONS

- 🏆 **X. Wei**, K. Zhao, Y. Jiao, H. Xie, L. He, and Y. Zhang. **Pre-Training Graph Contrastive Masked Autoencoders Are Strong Distillers For EEG.** In Proceedings of the International Conference on Machine Learning (ICML), 2025, Accepted. (CCF A, Core A*) [OpenReview] [Paper] [Code]
- 🏆 **X. Wei**, K. Zhao, Y. Jiao, H. Zhu, L. He, and Y. Zhang. **A Brain Graph Foundation Model: Pre-Training And Prompt-Tuning For Any Atlas And Disorder.** Submitted to ICLR 2026, Former NeurIPS 2025 Submission (Rating: 5443 Three accept/One borderline reject), [Paper] [Code]
- **X. Wei**, K. Zhao, Y. Jiao, N. B. Carlisle, H. Xie, G. A. Fonzo, and Y. Zhang. **Multi-Modal Cross-Domain Self-Supervised Pre-Training For fMRI And EEG Fusion.** Neural Networks, 2025. (JCR Q1, CCF B, IF=6.4) [Paper]
- **X. Wei**, K. Yang, D. Bzdok, and Y. Li. **Orientation And Context Entangled Network For Retinal Vessel Segmentation.** Expert Systems with Applications, 2023. (JCR Q1, IF=7.5) [Paper] [Code]
- **X. Wei**, X. Zhang, and Y. Li. **DA-DRN: Degradation-Aware Deep Retinex Network For Low-Light Image Enhancement.** Digital Signal Processing, 2024. (JCR Q2, IF=3.0) [Paper]
- **X. Wei**, X. Niu, X. Zhang, and Y. Li. **Deep Pneumonia: Attention-Based Contrastive Learning For Class-Imbalanced Pneumonia Lesion Recognition In Chest X-Rays.** In Proceedings of the IEEE International Conference on Big Data (BigData), 2022. (Core B) [Paper]
- **X. Wei**, X. Zhang, and Y. Li. **TSN-CA: A Two-Stage Network With Channel Attention For Low-Light Image Enhancement.** In Proceedings of the International Conference on Artificial Neural Networks (ICANN), 2022. (Core B) [Paper]
- **X. Wei**, X. Zhang, and Y. Li. **SARN: A Lightweight Stacked Attention Residual Network For Low-Light Image Enhancement.** In Proceedings of the International Conference on Robotics and Automation Engineering (ICRAE), 2021. [Paper] [Code]
- **X. Wei**, X. Lin, and Y. Li. **Retinal Vessel Segmentation With Deep Graph And Capsule Reasoning.** Submitted to IEEE Transactions on Artificial Intelligence (TAI), under review, 2024. [Paper]

- X. Lin, **X. Wei**, S. Zhao, and Y. Li. **Vascular Skeleton Deformation Evaluation Based On The Metric Of Sinkhorn Distance.** In Proceedings of the IEEE International Symposium on Biomedical Imaging (ISBI), 2024. (Core B) **[Paper] [Code]**
- Y. Jiao, K. Zhao, **X. Wei**, N. Carlisle, C. Keller, D. Oathes, G. Fonzo, and Y. Zhang. **Deep Graph Learning Of Multimodal Brain Networks Defines Treatment-Predictive Signatures In Major Depression.** Molecular Psychiatry, 2025. (JCR Q1, IF=9.6) **[Paper] [Code]**
- Y. Jiao, **X. Wei**, L. He, and Y. Zhang. **A Functional System-Informed Graph Neural Network Framework To Quantify Interpretable Brain Dysfunction In ASD.** Submitted to Neural Networks, under minor revision, 2025.
- X. Lin, **X. Wei**, A. Shmuel, and Y. Li. **VPBSD: Vessel-Pattern-Based Semi-Supervised Distillation For Efficient 3D Microscopic Cerebrovascular Segmentation.** Submitted to Pattern Recognition, 2024. **[Paper]**

💼 EXPERIENCE & PROJECTS

•Lehigh University
2023.08 - Present

*Research Assistant (Completed **5** research papers, including **3** as the first author and **2** as a co-author)*   Bethlehem PA, USA
- (**Diffusion Improves Graph/Hyper-Graph Foundation Model Pre-Training:** Investigated the role of diffusion processes in enhancing graph and hyper-graph pre-training for brain foundation models. Designed large-scale fMRI brain graph/hyper-graph datasets and incorporated diffusion-based kernels to capture long-range and higher-order dependencies. [Preparing for ICML 2026 Submission].
- (**Large-Scale Brain fMRI Foundation Model/Graph Foundation Model/Graph&Hyper-Graph Pre-training/Graph Prompt/Fine-tuning/Few-shot and Zero-shot):** Worked on brain foundation model projects by constructing large-scale fMRI brain graphs and developing pre-training strategies using graph neural networks. Integrated graph prompts, language prompts, and meta-learning to enable few-shot and zero-shot transfer across brain disorders and parcellations [ICLR 2026 Submission, NeurIPS 2025 Rating: 5443 Rejection].
- (**EEG Graph Foundation Model/Graph Pre-training/Graph Fine-tuning/Knowledge Distillation):** Conducted brain data mining projects and proposed a novel pre-training method for EEG graph data, incorporating knowledge distillation to transfer representations from high-density to low-density EEG [ICML 2025 Accepted].
- (**Multi-modal Fusion/Self-supervised Learning/Pre-training/Knowledge Distillation/Contrastive Learning):** Conducted multi-modal analysis, focusing on brain modality fusion [MP 2025 Accepted], cross-modal self-supervised contrastive pre-training & fine-tuning, knowledge distillation and transfer learning [NN 2025 Accepted].

•Mila - Quebec AI Institute
2022.01-2022.08

*Research Assistant (Completed **5** research papers, including **3** as the first author and **2** as a co-author)* Montreal QC, Canada
- (**Medical Image Analysis/Retinal Fundus Image Segmentation/Dynamic Convolution/Self-attention/Graph Neural Networks/Capsule Neural Networks):** Conducted medical image analysis projects on retinal vessel segmentation from fundus images. Designed an orientation-aware dynamic convolution module and an imbalance-aware attention module [ESWA 2023 Accepted]. Further incorporated graph convolutional networks and capsule convolution to capture the spatial structure and continuity of vessels [IEEE TAI Submission]. Additionally, developed a novel evaluation metric tailored for assessing vessel segmentation performance [ISBI 2025 Accepted]. And designed a codebook for vessels to improve vascular segmentation performance [PR 2025 Submission].
- Performed pneumonia image recognition using a self-supervised contrastive learning pretraining strategy to initialize the image recognition model.[IEEE BigData 2022 Accepted].

•UESTC
2020.08-2023.05

*Research Assistant (Completed **3** first-author research papers and **2** patents)* Chengdu, China
- Conducted projects on low-light image denoising and enhancement. Proposed a fast and plug-and-play low-light image enhancement model suitable for real-world applications [IEEE ICRAE 2021 Accepted]. Improved the RetinexNet by accelerating the processing speed and addressing color distortion issues [DSP 2024 Accepted]. Leveraged the characteristics of RGB channels and the HSV color space to design a low-light enhancement model capable of perceiving channel-specific features [ICANN 2022 Accepted].
- Conducted face detection and localization, as well as facial feature-based emotion analysis, to train a lightweight deep learning model. Developed a driver fatigue detection software and obtained a patent [Granted Patent 1]. Developed a deep learning software for facial emotion recognition, and obtained a patent [Granted Patent 2].

🖥 ACADEMIC SERVICES

- **Conference Reviewer**: , NeurIPS 2025, ICML 2025, ICLR 2025-2026, AAAI 2024, ISBI 2023, ICPR 2022
- **Journal Reviewer**: IEEE Transactions on Neural Networks and Learning Systems (TNNLS), IEEE Transactions on Circuits and Systems for Video Technology (TCSVT), IEEE Transactions on Artificial Intelligence (TAI), Pattern Recognition (PR), Neural Networks (NN), Expert Systems with Applications (ESWA), Engineering Applications of Artificial Intelligence (EAAI)

🏆 HONORS AND AWARDS

- 2023.08 Lehigh University Fellowship
- 2023.05 National Scholarship of China
- 2022.05 First-Class Scholarship of UESTC
- 2022.04 Suzhou Industrial Scholarship