XIAOJUN ZHANG

Computational Imaging Scientist
Boston, MA | +1 (617) 378-5825 | xzhang2365@gmail.com
LinkedIn | GitHub| Website

PROFESSIONAL SUMMARY

Computational imaging scientist with expertise in 3D reconstruction algorithms, physics-informed machine learning, and large-scale image processing. Developed novel framework achieving sub-angstrom accuracy, validated on 50,000+ images in automated production pipeline. Strong background in inverse problems, iterative optimization, and translating research algorithms to practical applications.

EDUCATION

Ph.D., Computational Science Sep 2019 – Sep 2025

City University of Hong Kong

- **Focus**: Computational imaging, inverse problems, reconstruction algorithms, statistical modeling
- **Thesis**: "3D Atomic Structure Reconstruction and Dynamic Analysis of Graphene using High-speed Low-dose TEM Imaging"

M.S., Mechanical Engineering Sep 2016 – Jul 2019

Xi'an Jiaotong University

- **Focus**: Micro-nano Manufacturing, Experimental Design, Flexible Electronics
- **Thesis**: "Nanoscale Transfer Printing of Functional Materials for Flexible Electronic Devices "

B.S., Mechanical Engineering Sep 2012 – Jul 2016

Northwest A&F University

- **Major**: Mechanism Design, Manufacturing and Automatization
- **GPA**: 3.65/4.0
- **Thesis**: "Nanostructured Flexible Piezoelectric Sensor Manufacturing and Performance Testing", recognized as an excellent paper at the university level

PROFESSIONAL EXPERIENCE

PhD Researcher – Computational Imaging & Algorithm Development

City University of Hong Kong | Hong Kong *Sep 2019 – Sep 2025*

Developed physics-informed 3D reconstruction framework for low-dose imaging applications

- **Developed novel computational framework**
- Formulated and solved ill-posed inverse problem: 3D reconstruction from single 2D projection
- Developed iterative optimization framework incorporating forward physical model and domain constraints
- Achieved 0.45Å accuracy (sub-angstrom precision) where conventional methods fail
- **Large-Scale Data Processing:**
- Built automated pipeline processing 50,000+ experimental images
- Implemented statistical outlier detection across 200+ billion pixel values using robust methods (MAD)
- Optimized parallel processing for 24-core workstation
- Developed comprehensive quality control with automated validation at each pipeline stage
- **Advanced Image Processing:**
- Systematically compared three denoising methods: BM3D, Dictionary Learning (K-SVD), CNN (U-Net)
- Implemented custom U-Net architecture for image enhancement
- Selected optimal method for production deployment based on quantitative metrics (PSNR, SSIM, speed)
- Achieved effective noise reduction in extreme SNR scenarios (SNR < 3)
- **Real-Time Dynamics Capture:**
- First demonstration of millisecond-scale 3D dynamics from single projections

- Revealed structural evolution and defect formation mechanisms

- **Computational Validation:**

- Integrated Molecular Dynamics (LAMMPS) for physical plausibility validation
- Performed DFT calculations (VASP) correlating 3D structure with electronic properties
- Implemented forward modeling for projection physics simulation

Research Assistant (Master's Program)

Xi'an Jiaotong University | Xi'an *Sep 2016 – Sep 2019*

Micro-nano Manufacturing & Flexible Electronics

- Designed and fabricated micro-nanostructured flexible sensors achieving 2-3× performance improvement
- Developed novel liquid-bridge transfer printing method for high-precision device fabrication
- Engineered multi-functional sensors (force-heat integrated) for 3D curved surfaces
- Characterized devices using electrochemical testing (CV, GCD, EIS) and statistical analysis
- Expertise in cleanroom fabrication, electron microscopy (SEM, TEM), materials characterization

SKILLS

Computing Imaging:
Image Reconstruction, 3D Reconstruction, Inverse Problems, Low-Dose Imaging, Physics-Informed Optimization

Image Processing & Computer Vision
Advanced Denoising (BM3D, Dictionary Learning, CNN), Feature Extraction, Artifact Correction, Quality Assessment

Machine Learning & Deep Learning:
Physics-Informed ML, PyTorch, TensorFlow, Sparse Coding (K-SVD), Statistical Learning

Statistical & Optimization Methods:
Bayesian Inference, Maximum Likelihood Estimation, Monte Carlo Methods, Simulated Annealing

Simulation & Modeling
Molecular Dynamics (LAMMPS), DFT (VASP), TEM Simulation (Tempas), Visualization (PyMOL, VESTA), AutoCAD, SolidWorks, CloudCompare

Programming:
Python, MATLAB, R, Git, Linux/HPC

PUBLICATION & PORTFOLIO

- **X. Zhang,** et al. "Revealing 3D Atomic Dynamics of Graphene via High-Speed Low-Dose TEM Imaging" *(Manuscript in preparation)*
- **Complete Research Portfolio**: https://github.com/xjzhang2365/3D-Reconstruction-Low-Dose-Imaging

TEACHING EXPERIENCE

Teaching Assistant | *City University of Hong Kong*

- MNE3007: CAD/CAM *2022/2023 Sem A*
- MNE6125 & MNE8108: Engineering Methods *2022/2023 Sem A*

HONORS & AWARDS

- **President Scholarship**, Northwest A&F University (2014)
- **National Scholarship**, China (2013)
- **Merit Student**, Northwest A&F University (2013-2016)
- **Professional First-Class Scholarships,** Northwest A&F University (2013-2016)

ADDITIONAL INFORMATION

- **Language**: English (Fluent), Mandarin (Native)
- **Interests**: Reading, Jogging, Tennis, Piano, Hiking