

# Bin Duan

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## EXPERIENCE

- 2025– Michigan Medicine, University of Michigan, Ann Arbor  
**Postdoc Research Fellow**, Department of Cell & Developmental Biology
- 2024 Michigan Medicine, University of Michigan, Ann Arbor
- 2022–23 **Visiting Scholar**, Department of Cell & Developmental Biology
- 2019 Texas State University, San Marcos  
**Visiting Scholar**, Department of Computer Science

## EDUCATION

- Ph.D. Computer Science, Illinois Institute of Technology, Chicago, 2024
- B.Eng. Electrical Engineering, Lanzhou University, China, 2017

## RESEARCH AREAS

**Biomedical Image Analysis:** Large-scale segmentation, compression, tracing, and registration for neuroscience and medical imaging

**Scalable Infrastructure and Toolkit Development:** Brain registration frameworks, compression tools, petabyte-scale image data management, visualization, and analysis platforms

**Computer Vision and Machine Learning:** Multimodal representation learning, image registration, efficient AI models, generative modeling, optical flow estimation

## PUBLICATIONS

### Preprint Journal Articles

- 2025 H. Jiang, L.A. Walker, Y. Li, **B. Duan**, X. Niu, J.C. Hsieh, M.C. Cheng, H. Su, et al. “A Parallely Distributed Microscope and Software System for Scalable High-Throughput Multispectral 3D Imaging.” *Nature Methods*, *Major Revision*.
- 2024 **B. Duan**, L.A. Walker, B. Xie, W.J. Lee, A. Lin, Y. Yan, and D. Cai. “Artifact-Minimized High-Ratio Image Compression with Preserved Analysis Fidelity.” *Nature Communications*, *Under Review*.
- 2024 L.A. Walker\*, W.J. Lee\*, **B. Duan\***, M. Weatherspoon, Y. Li, F. Shen, M. Cheng, X. Niu, et al. “A browser-based platform for storage, visualization, and analysis of large-scale 3D images in HPC environments.” *Nature Methods*, *Major Revision*.

## Conference Proceedings

- 2025 F. Wang\*, J. Tao\*, J. Wu\*, **B. Duan**, K. Wang, Z. Yang, and Y. Yan. "X-Field: A Physically Grounded Representation for 3D X-ray Reconstruction." *Annual Conference on Neural Information Processing Systems (NeurIPS)*.
- 2025 B. Xie, H. Tang, **B. Duan**, D. Cai, Y. Yan, G. Agam. "MaskSAM: Towards Auto-prompt SAM with Mask Classification for Volumetric Medical Image Segmentation." *IEEE/CVF International Conference on Computer Vision (ICCV)*.
- 2025 **B. Duan**, Y. Shang, D. Cai, and Y. Yan. "Online Multi-Spectral Neuron Tracing." *IEEE International Symposium on Biomedical Imaging (ISBI)*.
- 2025 J. Cao, **B. Duan**, and H. Yan. "Reconstruct Dense Live-Cell Microscopy Images via Learning Continuous Fluorescence Field." *IEEE International Symposium on Biomedical Imaging (ISBI)*.
- 2025 F. Wang, **B. Duan**, J. Tao, N. Sharma, D. Cai, and Y. Yan. "ZECO: ZeroFusion Guided 3D MRI Conditional Generation." *International Conference on Machine Vision and Applications (MVA)*.
- 2024 J. Wu, **B. Duan**, W. Kang, H. Tang, and Y. Yan. "Token Transformation Matters: Towards Faithful Post-Hoc Explanation for Vision Transformer." *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*.
- 2024 J. Ni, H. Tang, Y. Shang, **B. Duan**, and Y. Yan. "Adaptive Cross-Architecture Mutual Knowledge Distillation." *IEEE International Conference on Automatic Face and Gesture Recognition (FG)*.
- 2024 C. Sun, **B. Duan**, H. Latapie, G. Liu, and Y. Yan. "DCT: Divide-and-Conquer Transformer Network with Knowledge Transfer for Query-Driven HOI Detection." *ACM International Conference on Multimedia Retrieval (ICMR)*.
- 2024 **B. Duan**, H. Tang, C. Sun, Y. Zhu, and Y. Yan. "Mining and Unifying Heterogeneous Contrastive Relations for Weakly-Supervised Actor-Action Segmentation." *IEEE/CVF Winter Conference on Applications of Computer Vision (WACV)*.
- 2023 **B. Duan**, M. Zhong, and Y. Yan. "Towards Saner Deep Image Registration." *IEEE/CVF International Conference on Computer Vision (ICCV)*.
- 2023 B. Xie, H. Tang, **B. Duan**, D. Cai, and Y. Yan. "MLP-GAN for Brain Vessel Image Segmentation." *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*.
- 2023 **B. Duan**, J. Cao, W. Wang, D. Cai, and Y. Yan. "Cell Instance Segmentation via Multi-Scale Non-Local Correlation." *IEEE International Symposium on Biomedical Imaging (ISBI)*.
- 2022 Y. Shang, D. Xu, **B. Duan**, Z. Zong, L. Nie, and Y. Yan. "Lipschitz Continuity Retained Binary Neural Network." *European Conference on Computer Vision (ECCV)*.
- 2022 K. Bhandari, **B. Duan**, G. Liu, H. Latapie, Z. Zong, and Y. Yan. "Learning Omnidirectional Flow in 360° Video via Siamese Representation." *European Conference on Computer Vision (ECCV)*.
- 2022 Y. Shang, **B. Duan**, Z. Zong, L. Nie, and Y. Yan. "Win the Lottery Ticket via Fourier Analysis: Frequencies Guided Network Pruning." *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*.
- 2021 **B. Duan**, H. Tang, W. Wang, Z. Zong, G. Yang, and Y. Yan. "Audio-Visual Event Localization via Recursive Fusion by Joint Co-Attention." *IEEE/CVF Winter Conference on Applications of Computer Vision (WACV)*.
- 2021 Y. Shang\*, **B. Duan**\*, Z. Zong, L. Nie, and Y. Yan. "Lipschitz Continuity Guided Knowledge Distillation." *IEEE/CVF International Conference on Computer Vision (ICCV)*.

- 2021 **B. Duan**, L.A. Walker, D.H. Roossien, F.Y. Shen, D. Cai, and Y. Yan. “Unsupervised Neural Tracing in Densely Labeled Multi-Spectral Brainbow Images.” *IEEE International Symposium on Biomedical Imaging (ISBI)*.
- 2021 **B. Duan**, W. Wang, H. Tang, H. Latapie, and Y. Yan. “Cascade Attention Guided Residue Learning GAN for Cross-Modal Translation.” *International Conference on Pattern Recognition (ICPR)*.

#### Other Publications

- 2024 **B. Duan**. “Developing Practical Tools and Algorithms for Biomedical Image Compression and Analysis.” *Ph.D. thesis*.
- 2024 K. Wen, B. Xie, **B. Duan**, and Y. Yan. “MambaReg: Mamba-Based Disentangled Convolutional Sparse Coding for Unsupervised Deformable Multi-Modal Image Registration.” *Arxiv*.
- 2023 **B. Duan**, K. Bhandari, G. Liu, Y. Yan. “Optical flow estimation in 360 videos: dataset, model and application.” *Arxiv*.

## GRANTS

#### Key Personnel

- 2025–27 NIH 4UC2AR082197-02: “Neural Architecture of the Murine and Human Temporomandibular Joint.” Role: Core Software architect, Key Computational specialist.
- 2025–26 NIH 1P41EB035084-01A1: “Microsystems-Based Imaging Systems.” Role: Key Computational specialist.
- 2024–25 NSF 1RF1MH124611-01: “A Unified Framework for Unsupervised Sparse-to-dense Brain Image Generation and Neural Circuit Reconstruction.” Role: Lead Algorithm developer.
- 2023–26 NIH 1RF1MH133764-01: “Continuous development of nTracer2 and its deployment at NIH image repositories.” Role: Core Software architect.
- 2020–24 NIH 1RF1MH124611-01: “Development of a scalable strategy for reconstructing cell-type determined connectome of the mammalian brain.” Role: Lead Algorithm developer.

## TEACHING AND MENTORSHIP

#### Teaching Experience

- 2025 Lecture. “Biomedical Image Registration.” Illinois Institute of Technology CS 577 – 2023 and Math 569 – 2024, Texas State University CS4347 – 2025.
- 2020 Teaching Assistant for CS4347 Machine Learning, Texas State University
- 2020 Teaching Assistant for CS7312 Advanced Data Mining, Texas State University

#### Collaborative Mentorship

Yuzhang Shang, Ph.D., IIT, Efficient AI, 4 publications

Bin Xie, Ph.D. candidate, IIT, Medical Image Segmentation, 3 publications

Feiran Wang, Ph.D. student, IIT, Biomedical Image Learning, 2 publications

Junyi Wu, Ph.D. student, UIC, Machine Learning, 2 publications

Yilin Chen, Undergrad researcher, Umich, Scalable Platform Development  
Samuel Dibelardino, UROP student, Umich, 3D Image Segmentation  
Meklit Sitotaw, REU student, Vanderbilt, Neuron Matching

## PROFESSIONAL ACTIVITY

2025      **B. Duan**, L.A. Walker, and D. Cai. “RE-JOIN Portal - a centralized platform for interactive large-scale joint image visualization and annotation.” 3rd Annual RE-JOIN Meeting. Houston, Texas. Oct 2–3.

## SERVICE

### Outreach and Academic Service

2023–      Neurons Can Fly research program at University of Michigan, Ann Arbor, Michigan

### Professional Reviewer Service

*Nature Computational Science*

*IEEE Transactions on Medical Imaging (TMI)*

*IEEE Transactions on Image Processing (TIP)*

*IEEE Transactions on Multimedia (TMM)*

*Computer Vision and Image Understanding (CVIU)*

*Machine Vision and Applications (MVA)*

*Image and Vision Computing (IMAVIS)*

*Visual Intelligence*

*Neurocomputing*

*IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*

*IEEE/CVF International Conference on Computer Vision (ICCV)*

*European Conference on Computer Vision (ECCV)*

*International Conference on Learning Representations (ICLR)*

*Conference on Neural Information Processing Systems (NeurIPS)*

*International Conference on Machine Learning (ICML)*

*International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI)*

*IEEE/CVF Winter Conference on Applications of Computer Vision (WACV)*

*International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*

*International Conference on Pattern Recognition (ICPR)*

*IEEE International Symposium on Biomedical Imaging (ISBI)*

## REFERENCES

### **Dawen Cai, Ph.D.**

Crosby-Kahn Collegiate Professor of Cell & Developmental Biology; Associate Professor of Cell & Developmental Biology; Associate Professor of Biophysics; Principal Investigator, Michigan Neuroscience Institute, University of Michigan, Ann Arbor.

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### **Yan Yan, Ph.D.**

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### **Ming Zhong, Ph.D.**

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