Brandon Y. Feng

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Research Interests

My research integrates artificial intelligence and physics to extend current limits of human and machine vision. I aim to accelerate scientific discoveries by revealing valuable phenomena hidden in data captured under challenging conditions—from biological processes behind scattering tissues to faint exoplanets far away in the cosmos. My objectives are twofold: (1) to build AI-powered vision systems that can uncover new insights and accelerate discoveries in diverse disciplines such as medicine and astronomy, and (2) to create unprecedented datasets that fuel next-generation AI systems capable of addressing grand challenges in science and healthcare.

Experience

2023 – Now **Massachusetts Institute of Technology** – Cambridge, MA
Postdoctoral Associate at MIT CSAIL
Advisor: William T. Freeman

2024 – Now **Harvard–Smithsonian Center for Astrophysics** – Cambridge, MA
Visiting Scientist at AstroAI

2022 – 2023 **Google** – San Francisco, CA
Research Scientist Intern

Education

2019 – 2023 **University of Maryland** – College Park, MD
Ph.D. in Computer Science
Advisor: Amitabh Varshney

2018 – 2019 **University of Virginia** – Charlottesville, VA
M.S. in Statistics

2015 – 2018 **University of Virginia** – Charlottesville, VA
B.A. in Computer Science
B.A. in Statistics

Journal Publications

J7 **Exoplanet Imaging via Differentiable Rendering**
B. Y. Feng, R. Ferrer-Chávez, A. Levis, J. Wang, K. Bouman, W. T. Freeman
IEEE Transactions on Computational Imaging, 2024

J6 **HoloCamera: Advanced Volumetric Capture for Cinematic-Quality VR Applications**
J. Heagerty, S. Li, E. Lee, S. Bhattacharyya, S. Bista, B. Brawn, B. Y. Feng, S. Jabbireddy, J. F. JaJa, H. Kacorri, D. Li, D. T. Yarnell, M. Zwicker, A. Varshney
IEEE Transactions on Visualization and Computer Graphics, 2024

J5 **FPM-INR: Fourier ptychographic microscopy image stack reconstruction using implicit neural representations**
H. Zhou*, B. Y. Feng*, H. Guo, S. Lin, M. Liang, C. A. Metzler, C. Yang
Optica, 2023

J4 **NeuWS: Neural Wavefront Shaping for Guidestar-Free Imaging Through Static and Dynamic Scattering Media**
B. Y. Feng*, H. Guo*, M. Xie, V. Boominathan, M. K. Sharma, A. Veeraraghavan, C. A. Metzler
Science Advances, 2023

J3 **Neural Subspaces for Light Fields**
B. Y. Feng, A. Varshney
IEEE Transactions on Visualization and Computer Graphics, 2022

J2 **TurbuGAN: An Adversarial Learning Approach to Spatially-Varying Multiframe Blind Deconvolution with Applications to Imaging Through Turbulence**
B. Y. Feng*, M. Xie*, C. A. Metzler
IEEE Journal on Selected Areas in Information Theory, 2022

J1 **Benchmarking AlphaFold for Protein Complex Modeling Reveals Accuracy Determinants**
R. Yin, B. Y. Feng, A. Varshney, B. G. Pierce
Protein Science, 31 (8)

Conference Publications

C18 **Temporally Consistent Atmospheric Turbulence Mitigation with Neural Representations**
H. Cai*, J. Chen*, B. Y. Feng, W. Jiang, M. Xie, K. Zhang, C. Fermuller, Y. Aloimonos, A. Veeraraghavan, C. A. Metzler
The Thirty-eighth Annual Conference on Neural Information Processing Systems (NeurIPS), 2024

C17 **Physics-Based Interaction with 3D Objects via Video Generation**
T. Zhang, H. Yu, R. Wu, B. Y. Feng, C. Zheng, N. Snavely, J. Wu, W. T. Freeman
European Conference on Computer Vision (ECCV), 2024

C16 **Flash-Splat: 3D Reflection Removal with Flash Cues and Gaussian Splats**
M. Xie, H. Cai, S. Shah, Y. Xu, B. Y. Feng, J. Huang, C. A. Metzler
European Conference on Computer Vision (ECCV), 2024

C15 **EndoSparse: Real-Time Sparse View Synthesis of Endoscopic Scenes using Gaussian Splatting**
C. Li, B. Y. Feng, Y. Liu, H. Liu, C. Wang, W. Yu, Y. Yuan
Medical Image Computing and Computer Assisted Intervention (MICCAI), 2024

C14 **Endora: Video Generation Models as Endoscopy Simulators**
C. Li*, H. Liu*, Y. Liu*, B. Y. Feng, W. Li, X. Liu, Z. Chen, J. Shao, Y. Yuan
Medical Image Computing and Computer Assisted Intervention (MICCAI), 2024

C13 **Seeing the World Through Your Eyes**
H. Alzayer*, K. Zhang* B. Y. Feng, C. A. Metzler, J. Huang
IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2024

C12 **WaveMo: Learning Wavefront Modulations to See Through Scattering**
M. Xie*, H. Guo* B. Y. Feng, L. Jin, A. Veeraraghavan, C. A. Metzler
IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2024

C11 **Learning to Estimate 6DoF Pose from Limited Data: A Few-Shot, Generalizable Approach using RGB Images**
P. Pan*, Z. Fan*, B. Y. Feng*, P. Wang, C. Li, Z. Wang
International Conference on 3D Vision (3DV), 2024

C10 **Visualizing Subtle Motions from Time-Varying Radiance Fields**
B. Y. Feng*, H. Alzayer*, M. Rubinstein, W. T. Freeman, J. Huang
International Conference on Computer Vision (ICCV), 2023

C9 **StegaNeRF: Embedding Invisible Information within Neural Radiance Fields**
C. Li*, B. Y. Feng*, Z. Fan*, P. Pan, Z. Wang
International Conference on Computer Vision (ICCV), 2023

C8 **Continuous Levels of Detail for Light Field Networks**
D. Li, B. Y. Feng, A. Varshney
British Machine Vision Conference (BMVC), 2023

C7 **VIINTER: View Interpolation With Implicit Neural Representations of Images**
B. Y. Feng, S. Jabbireddy, A. Varshney
SIGGRAPH Asia, 2022

C6 **PRIF: Primary Ray-based Implicit Function**
B. Y. Feng, Y. Zhang, D. Tang, R. Du, A. Varshney
European Conference on Computer Vision (ECCV), 2022

C5 **SIGNET: Efficient Neural Representation for Light Fields**
B. Y. Feng, A. Varshney
International Conference on Computer Vision (ICCV), 2021

C4 **GazeChat: Enhancing Virtual Conferences with Gaze-aware 3D Photos**
Z. He, K. Wang, B. Y. Feng, R. Du, K. Perlin
ACM Symposium on User Interface Software and Technology (UIST), 2021

C3 **Deep Depth Estimation on 360° Images with a Double Quaternion Loss**
B. Y. Feng, W. Yao, Z. Liu, A. Varshney
International Conference on 3D Vision (3DV), 2020

C2 **Prostate Segmentation from 3D MRI Using a Two-stage Model and Variable-input Based Uncertainty Measure**
H. Pan, B. Y. Feng, C. Meyer, X. Feng
2019 IEEE 16th International Symposium on Biomedical Imaging (ISBI), 2019

C1 **A Self-adaptive Network for Multiple Sclerosis Lesion Segmentation from Multi-contrast MRI with Various Imaging Sequences**
B. Y. Feng, H. Pan, C. Meyer, X. Feng
2019 IEEE 16th International Symposium on Biomedical Imaging (ISBI), 2019

Media Coverage

2023 **Science.org**
Neural Wavefront Shaping

2023 **Maryland Today**
UMD Researchers Develop New Imaging Technology That Can 'See' Hidden Objects

2023 **Photonics.com**
Video Tech Enables Imaging Through Scattering Media

2023 **ScienceDaily**
NeuWS camera answers 'holy grail problem' in optical imaging

2023 **Phys.org**
Neural wavefront shaping camera overcomes light scattering problem in optical imaging

2023 **New Scientist**
Eyeball reflections can reveal a 3D model of what you are looking at

2023 **Gizmodo**
Computer, Enhance: Scientists Reconstruct Rooms From Eye Reflections

2023 **TechSpot**
Researchers construct 3D scenes using reflections from eyes

2023 **Tech Xplore**
Rendering three-dimensional images from eye reflections with NeRF

2023 **PetaPixel**
Scientists Can Now Reconstruct Rooms from Eye Reflections in Photos

2023 **Futurism**
Scientists Reconstruct What You're Looking At By Enhancing Reflection In Your Eye

2023 **New Atlas**
Researchers can now 3D-model a room just from your eye reflections

2022 **ITmedia News**
Technology to animate profile picture in video conference

Invited Talks

2025/02 **Machine Learning and Scientific Imaging Conference**
AI as a Lens: Expanding Scientific Vision in Biomedical and Astronomical Imaging

2025/01 **Annual Meeting of the American Astronomical Society**
AI-Driven Imaging and Inference with Differentiable Computing

2024/05 **California Institute of Technology** Computational Cameras
Neural Fields to Solve Inverse Problems in Imaging

2024/05 **SIAM** Imaging Science
Ray-based Implicit Function for Neural Surface and Scene Representation

2023/09 **Massachusetts Institute of Technology** Signals, Information, and Algorithms Laboratory
Rethinking Machine Learning to Solve Inverse Problems in Imaging with Undetermined Forward Operators

2022/12 **Massachusetts Institute of Technology** Scene Representation Group
Designing Neural Fields of Rays and Pixels

2022/10 **Rice University** Computational Imaging Lab
Implicit Neural Representations for Graphics and Vision

2022/09 **University of Maryland** Vision and Learning Lab
Implicit Neural Representations for Graphics and Vision

2022/08 **University of Texas at Austin** Visual Informatics Group
Efficient Implicit Neural Representation for 3D Shapes

2022/07 **Optica Imaging Congress** COSI
Adversarial Sensing for Sub-Diffraction Imaging

2022/06 **Google** AR
Primary Ray-based Implicit Function

Honors and Awards

2024 **Oral Presentation**
European Conference on Computer Vision (ECCV) 2024
Selection Rate: 200/8585 = 2.32%

2024 **Oral Presentation**
IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) 2024
Selection Rate: 90/11532 = 0.78%

2023 **Best Poster**
International Conference on Computational Photography (ICCP) 2023

2022 **Runner-Up**
CVPR 2022 UG2+ Challenge

2021 **Oral Presentation**
International Conference on Computer Vision (ICCV) 2021
Selection Rate: 210/6236 = 3.36%

2019-2021 **Dean's Fellowship**
University of Maryland Graduate School

2015-2018 **Dean's List of Distinguished Students**
University of Virginia College of Arts and Sciences

Service

Journal Reviewer
Nature Communications
IEEE Transactions on Pattern Analysis and Machine Intelligence
IEEE Transactions on Image Processing
IEEE Transactions on Computational Imaging
IEEE Transactions on Circuits and Systems for Video Technology
ACM Transactions on Graphics
Photonics Research
Optics Express
Biomedical Optics Express

Conference Reviewer
IEEE/CVF Computer Vision and Pattern Recognition Conference (CVPR)
International Conference on Computer Vision (ICCV)
European Conference on Computer Vision (ECCV)
ACM SIGGRAPH
International Conference on Learning Representations (ICLR)
Conference on Neural Information Processing Systems (NeurIPS)
International Conference on Computational Photography (ICCP)
AAAI Conference on Artificial Intelligence (AAAI)

University Service
Organizer: University of Maryland Computer Vision Seminar
Organizer: Computational Imaging Workshop at Technica (largest hackathon for underrepresented genders)
Reviewer: University of Maryland Computer Science Graduate Program Application