

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

- J6 **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.
- J5 **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.
- J4 **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.
- J3 **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.
- J2 **Neural Subspaces for Light Fields.**
B. Y. Feng, A. Varshney.
IEEE Transactions on Visualization and Computer Graphics, 2022.
- J1 **TurbuGAN: An Adversarial Learning Approach to Spatially-Varying Multi-frame 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.

Conference Publications

- C19 **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.
- C18 **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.
- C17 **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.

- C16 **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.
- C15 **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.
- C14 **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.
- C13 **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.
- C12 **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.
- C11 **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.
- C10 **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), 2023.
- C9 **Continuous Levels of Detail for Light Field Networks.**
D. Li, B. Y. Feng, A. Varshney.
British Machine Vision Conference (BMVC), 2023.
- C8 **VIINTER: View Interpolation With Implicit Neural Representations of Images.**
B. Y. Feng, S. Jabbireddy, A. Varshney.
SIGGRAPH Asia, 2022.
- C7 **PRIF: Primary Ray-based Implicit Function.**
B. Y. Feng, Y. Zhang, D. Tang, R. Du, A. Varshney.
European Conference on Computer Vision (ECCV), 2022.
- C6 **SIGNET: Efficient Neural Representation for Light Fields.**
B. Y. Feng, A. Varshney.
International Conference on Computer Vision (ICCV), 2021.
- C5 **Benchmarking AlphaFold for Protein Complex Modeling Reveals Accuracy Determinants.**
R. Yin, B. Y. Feng, A. Varshney, R. G. Pierce.
Protein Science, 31 (8).

- 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 <i>Selection Rate: 210/6236 = 3.36%</i>
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

Mentored Students

Ph.D.	David Forman (MIT) Kaylie Hausknecht (MIT) Rodrigo Ferrer-Chávez (Northwestern) Chenxin Li (CUHK) Haiyun Guo (Rice) Jingxi Chen (UMD) Haoming Cai (UMD) Ji-Ze Jang (UMD) Haowen Liu (UMD) Mingyang Xie (UMD)
Undergrad	Brandon Yang (UVA) Zixuan Guo (Brown) Andrew Wang (UMD) Wangjue Yao (UMD)

Service

Journal	Nature Communications
Reviewer	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	IEEE/CVF Computer Vision and Pattern Recognition Conference (CVPR)
Reviewer	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	Organizer: University of Maryland Computer Vision Seminar
Service	Organizer: Computational Imaging Workshop at Technica (largest hackathon for underrepresented genders)
	Reviewer: University of Maryland Computer Science Graduate Program Application

References

William T. Freeman

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