Andrew H. Song, Ph.D.

asong2@mdanderson.org - Website - Linkedin - Scholar

EDUCATION

Massachusetts Institute of Technology Boston, MA, USA
Ph.D. in Electrical Engineering and Computer Science *Sept. 2016 - Feb. 2022*
- *Thesis*: Generative models for neural time series with structured domain priors
- *Thesis Advisors*: Professors Emery N. Brown, Demba Ba

Massachusetts Institute of Technology Boston, MA, USA
B.S. & M.Eng. in Electrical Engineering and Computer Science (Co-terminal) *Sept. 2009 - Jun. 2016*
- Took two years of voluntary leave for military service in South Korean military and UN peacekeeping force (2011 - 2012).

WORK EXPERIENCE

Assistant Professor
Department of Translational Molecular Pathology, MD Anderson Cancer Center *Jan. 2026 -*

Adjunct Professor
Department of Computer Science, Rice University *Jan. 2026 -*

Postdoctoral Fellow
Brigham and Women's Hospital/Harvard Medical School *Jan. 2022 - Dec. 2025*
- Current research projects include (1) 3D computational pathology and (2) Multimodal deep learning in computational pathology
- *Mentor*: Professor Faisal Mahmood

Applied Scientist Intern
Amazon - AWS Audio Machine Learning/Digital Signal Processing team *June 2019 - Aug. 2019*
- Worked on designing/implementing a neural network architecture to denoise noisy multi-channel audio data, inspired by classical beamforming application.

Communication Specialist, English Interpreter, Sergeant
UN Peacekeeping force in Lebanon & South Korean Military *Jan. 2011 - Oct. 2012*
- Helped maintain peace and suppress terrorist attacks in unstable areas of Lebanon.
- Worked as an interpreter between the United Nations HQ and the Korean army HQ.

PUBLICATIONS

(*): Co-first authorship (+): Co-second authorship (†): Co-senior authorship
Selected Publications

- Tong Ding*, Sophia Wagner*, **Andrew H. Song***, Richard J. Chen*, ..., Long Phi Le[†], and Faisal Mahmood[†], **Multimodal Whole Slide Foundation Model for Pathology**, *Nature Medicine*, 2025

- Anurag Vaidya*, Andrew Zhang*, Guillaume Jaume*, **Andrew H. Song**+, ..., Long Phi Le[†], and Faisal Mahmood[†], **Molecular-driven Foundation Model for Oncologic Pathology**, *Nature Cancer (In Press)*, 2025

- **Andrew H. Song**, Mane Williams[+], Drew F.K. Williamson[+], Sarah S.L. Chow, ..., Lawrence D. True, Anil V. Parwani, Jonathan T.C. Liu[†], and Faisal Mahmood[†], **Analysis of 3D pathology samples using weakly supervised AI**, *Cell*, 2024

  [NIH / NIBIB science highlight] [MGB press release] [Video] [Blog]

- **Andrew H. Song**, Richard Chen, Guillaume Jaume, Anurag Vaidya, Alexander S. Baras, and Faisal Mahmood, **Multimodal Prototyping for cancer survival prediction**, *ICML*, 2024

- **Andrew H. Song***, Richard Chen*, Tong Ding, Drew F.K. Williamson, Guillaume Jaume, and Faisal Mahmood, **Morphological Prototyping for Unsupervised Slide Representation Learning in Computational Pathology**, *CVPR*, 2024

Journal

- Tong Ding*, Sophia Wagner*, **Andrew H. Song***, Richard J. Chen*, ..., Long Phi Le[†], and Faisal Mahmood[†], **Multimodal Whole Slide Foundation Model for Pathology**, *Nature Medicine*, 2025

- Anurag Vaidya*, Andrew Zhang*, Guillaume Jaume*, **Andrew H. Song**+, ..., Long Phi Le[†], and Faisal Mahmood[†], **Molecular-driven Foundation Model for Oncologic Pathology**, *Nature Cancer (In Press)*, 2025

- Victor Brodsky*, Ehsan Ullah*, Andrey Bychkov, **Andrew H. Song**, ..., Marilyn M. Bui[†], and Anil V. Parwani[†], **Generative artificial intelligence in anatomical pathology**, *Archives of Pathology & Laboratory Medicine*, 2025

- **Andrew H. Song**, Mane Williams[+], Drew F.K. Williamson[+], Sarah S.L. Chow, ..., Lawrence D. True, Anil V. Parwani, Jonathan T.C. Liu[†], and Faisal Mahmood[†], **Analysis of 3D pathology samples using weakly supervised AI**, *Cell*, 2024

  [NIH / NIBIB science highlight] [MGB press release] [Video] [Blog]

- Anurag Vaidya*, Richard Chen*, Drew F.K. Williamson*, **Andrew H. Song**, ..., and Faisal Mahmood, **Demographic bias in misdiagnosis by computational pathology models**, *Nature Medicine*, 2024

- Richard Chen*, Tong Ding*, Ming Y. Lu*, Drew F.K. Williamson*, Guillaume Jaume, **Andrew H. Song**, ..., and Faisal Mahmood, **Towards a general-purpose foundation model for computational pathology**, *Nature Medicine*, 2024

- **Andrew H. Song***, Guillaume Jaume*, Drew F.K. Williamson, Ming Y. Liu, Anurag Vaidya, Tiffany R. Miller, and Faisal Mahmood, **Artificial intelligence for digital and computational pathology**, *Nature Reviews Bioengineering*, 2023

- Alexander Lin, **Andrew H. Song**, Berkin Bilgic, and Demba Ba, **Covariance-Free Sparse Bayesian Learning**, *IEEE Transactions on Signal Processing*, 2022

- **Andrew H. Song***, Seong-eun Kim*, and Emery N. Brown, **Adaptive State-space Multitaper Spectral Estimation**, *IEEE Signal Processing Letters*, 2022

- **Andrew H. Song**, Bahareh Tolooshams, and Demba Ba, **Gaussian Process Convolutional Dictionary Learning**, *IEEE Signal Processing Letters*, 2022

- **Andrew H. Song**, Francisco Flores, and Demba Ba, **Convolutional dictionary learning with grid refinement**, *IEEE Transactions on Signal Processing*, 2020

- **Andrew H. Song**, Aaron Kucyi, Vitaly Napadow, Emery N. Brown, Marco L. Loggia, and Oluwaseun Akeju, **Pharmacological Modulation of Noradrenergic Arousal Circuitry Disrupts Functional Connectivity of Locus Ceruleus in Humans**, *Journal of Neuroscience*, 2017

- Oluwaseun Akeju, Allison E. Hamilos, **Andrew H. Song**, Kara J. Pavone, Patrick L. Purdon, and Emery N. Brown, **GABAA circuit mechanisms are associated with ether anesthesia-induced unconsciousness**, *Clinical Neurophysiology*, 2016

- Oluwaseun Akeju, **Andrew H. Song**, Allison E. Hamilos, Kara J. Pavone, Francisco J. Flores, Emery N. Brown, and Patrick L. Purdon, **Electroencephalogram signatures of ketamine anesthesia-induced unconsciousness**, *Clinical Neurophysiology*, 2016

- Ignacio Arnaldo, Kalyan Veeramachaneni, **Andrew H. Song**, Una-May O'Reilly, **Bring your own learner: A cloud-based, data-parallel commons for machine learning**, *IEEE Computational Intelligence Magazine*, 2015

Conference

- Daniel Shao, Richard Chen, **Andrew H. Song**, Joel Runevic, Ming Y. Lu, Tong Ding, and Faisal Mahmood, **Do Multiple Instance Learning Models Transfer?**, *ICML*, 2025

- **Andrew H. Song**, Richard Chen, Guillaume Jaume, Anurag Vaidya, Alexander S. Baras, and Faisal Mahmood, **Multimodal Prototyping for cancer survival prediction**, *ICML*, 2024

- **Andrew H. Song***, Richard Chen*, Tong Ding, Drew F.K. Williamson, Guillaume Jaume, and Faisal Mahmood, **Morphological Prototyping for Unsupervised Slide Representation Learning in Computational Pathology**, *CVPR*, 2024

- Gan Gao*, **Andrew H Song***, ..., Faisal Mahmood, and Jonathan T.C Liu, **Triage of 3D pathology data via 2.5D multiple-instance learning to guide pathologist assessments**, *CVPR CVMI workshop*, 2024

- Guillaume Jaume*, Paul Doucet*, **Andrew H. Song**, ..., and Faisal Mahmood, **HEST-1k: A Dataset for Spatial Transcriptomics and Histology Image Analysis**, *NeurIPS*, 2024

- Guillaume Jaume*, Anurag Vaidya*, Andrew Zhang+, **Andrew H. Song**+, ..., Long Phi Le, and Faisal Mahmood, **Multistain Pretraining for Slide Representation Learning in Pathology**, *ECCV*, 2024

- Guillaume Jaume*, Lukas Oldenburg*, Anurag Vaidya, Richard J. Chen, Drew F.K. Williamson, Thomas Peeters, **Andrew H. Song**, and Faisal Mahmood, **Transcriptomics-guided Slide Representation Learning in Computational Pathology**, *CVPR*, 2024

- Iain Carmichael*, **Andrew H. Song***, Richard Chen, Drew F.K. Williamson, Tiffany Chen, and Faisal Mahmood, **Incorporating intratumoral heterogeneity into weakly-supervised deep learning models via variance pooling**, *MICCAI*, 2022

- Alexander Lin, **Andrew H. Song**, Berkin Bilgic, and Demba Ba, **High-dimensional Sparse Bayesian Learning without Covariance Matrices**, *IEEE ICASSP*, 2022

- Alexander Lin, **Andrew H. Song**, and Demba Ba, **Mixture Model Auto-encoders : Deep Clustering through Dictionary Learning**, *IEEE ICASSP*, 2022

- **Andrew H. Song**, Demba Ba, and Emery N. Brown, **PLSO: A generative framework for decomposing nonstationary timeseries into piecewise stationary oscillatory components**, *UAI*, 2021

- Bahareh Tolooshams*, **Andrew H. Song***, Simona Temereanca, and Demba Ba, **Convolutional dictionary learning based auto-encoders for natural exponential-family distributions**, *ICML*, 2020

- Bahareh Tolooshams, Ritwik Giri, **Andrew H. Song**, Umut Isik, and Arvindh Krishnaswamy, **Channel-attention dense u-net for multichannel speech enhancement**, *ICASSP*, 2020

- **Andrew H Song***, Leon Chlon*, Hugo Soulat, John Tauber, Sandya Subramanian, Demba Ba, and Michael J Prerau, **Multitaper Infinite Hidden Markov Model for EEG**, *IEEE EMBC*, 2019

- **Andrew H. Song***, Sourish Chakravarty*, and Emery N. Brown, **A smoother state space multitaper spectrogram**, *IEEE EMBC*, 2018

Comments & Workshops

- Guillaume Jaume*, **Andrew H. Song***, and Faisal Mahmood, **Integrating Context for Superior Cancer Prognosis**, *Nature Biomedical Engineering*, 2022

- **Andrew H. Song**, Drew F.K. Williamson, and Faisal Mahmood, **Investigating Morphologic Correlates of Driver Gene Mutation Heterogeneity via Deep Learning**, *Cancer Research*, 2022

In preparation & Submitted

- Gan Gao, Renao Yan+, **Andrew H. Song**+, Huai-Ching Hsieh, ..., Jonathan T.C. Liu, **Deep-learning triage of 3D pathology datasets for comprehensive and efficient pathologist assessments**, *Submitted*, 2025

- Muhammad Shaban*, Yuzhou Chang*, Huaying Qiu+, Yao Yu Yeo+, **Andrew H. Song**+, Guillaume Jaume+, ..., Sizun Jiang[†], Faisal Mahmood[†], **A Foundation Model for Spatial Proteomics**, *Submitted*, 2025

- Cristina Almagro-Pérez*, **Andrew H. Song***, ..., and Faisal Mahmood, **AI-driven 3D Spatial Transcriptomics**, *Submitted*, 2025

- Luca L. Weishaupt*, Sharifa Sahai*, Andrew Zhang, **Andrew H. Song**, ..., Faisal Mahmood, **Real-time human-in-the-loop AI-driven measurement of the glomerular basement membrane**, *Submitted*, 2025

- Daniel Shao*, Sahar Hosseini*, **Andrew H. Song**, ..., Deepa T. Patil[†] and Faisal Mahmood[†], **Multistain Transformer Predicts Progression to Advanced Barrett's Esophagus-Related Neoplasia**, *Submitted*, 2025

- Guillaume Jaume, Simone De Brot, **Andrew H. Song**, ..., and Faisal Mahmood, **Towards a Foundation Model for Preclinical Drug Safety Assessment**, *In Revision at Nature Biomedical Engineering*, 2024

- Guillaume Jaume*, Thomas Peeters*, **Andrew H. Song**, ..., and Faisal Mahmood, **AI-driven Discovery of Morphomolecular Signatures in Toxicology**, *Submitted*, 2024

PATENTS

- Muhammad Shaban, Andrew H. Song, Guillaume Jaume, Sizun Jiang, and Faisal Mahmood, **Foundation models for spatial proteomics**, *patent pending*, 2025

- Cristina Almagro-Pérez, Andrew H. Song and Faisal Mahmood, **AI-driven 3D spatial transcriptomics**, *patent pending*, 2025

- Andrew H. Song and Faisal Mahmood, **Deep learning-based assessment of 3D pathology volumes at scale**, *US20250349415A1*, 2024

INVITED TALKS

AI-driven multimodal and multidimensional pathology   S. Korea
LG AI Research   Nov. 2025

Deep dive into AI revolution in pathology   S. Korea
IFEZ × K-BioX AI Biohelathcare Drug Discovery Summit 2025   Nov. 2025

AI-driven 3D Multimodal Computational Pathology   S. Korea
International Conference of the Genetics Society of Korea 2025   Nov. 2025

3D multimodal computational pathology   USA
Vanderbilt Symposium on AI, Spatial & Systems Biology 2025   Oct. 2025

Exploring the landscape of AI-driven computational pathology   USA
Yale School of Medicine   Sept. 2025

The AI revolution in pathology for patient prognosis   S.Korea
Yonsei University College of Medicine Department of Pathology Seminar   Aug. 2025

Harnessing large-scale multi-dimensional pathology data for clinical outcome prediction S.Korea
Seoul National University Institute of New Media and Communications Seminar   Aug. 2025

Integration of 3D pathology into oncologic workflow   S.Korea
Yonsei University College of Medicine Radiation Oncology seminar   Aug. 2025

Multi-dimensional pathology for personalized treatment   S.Korea
22nd Avison Biomedical Symposium   Aug. 2025

AI-driven multimodal pathology   USA
MD Anderson Imaging Physics & Translational Molecular Pathology Seminar   June 2025

Multi-dimensional and multi-modal pathology for improving patient prognosis   USA
MGH Molecular Pathology Seminar   May 2025

AI-enabled 3D pathology for improved patient prognosis   USA
Massachusetts Society of Pathologists & New England Society of Pathologists Joint Meeting Apr. 2025

Dinner with Data: The AI Revolution in 2D and 3D Pathology   USA
United States and Canadian Academy of Pathology & Alpenglow dinner presentation   Mar. 2025

AI-driven clinical outcome prediction with multi-dimensional human tissue images   USA
Penn Medicine Research Seminar   Mar. 2025

When AI meets pathology – Harnessing AI for improved patient care   USA
MGH Clinical & Translational Epidemiology Unit Research Seminar   Mar. 2025

Unsupervised whole slide representation learning in pathology   USA
Abbvie CVRT Imaging Seminar   Mar. 2025

Taming large-scale pathology data for cancer clinical outcome prediction   USA
Johns Hopkins University Electrical and Computer Engineering Department Seminar   Nov. 2024

3D computational pathology	**S.Korea**
1st Annual Congress of the Asian Society of Digital Pathology	*Oct. 2024*
AI-driven 3D computational pathology	**USA**
3D Spatial Summit @ Alpenglow Biosciences	*Oct. 2024*
3D computational pathology	**USA**
The NRG Oncology Summer meeting 2024	*Jul. 2024*
A Tour of 2D and 3D computational pathology	**USA**
AI×Med Seminar @ Center for Advanced Medical Computing and Analysis, MGH	*Jul. 2024*
3D computational pathology: The present and the future	**USA**
Charles River Laboratories	*Jun. 2024*
AI-driven efficient patient prognosis based on 3D pathology samples	**USA**
AI in Pathology seminar @ University of California	*May 2024*
3D computational pathology: Towards enhanced patient prognostication	**USA**
Advanced Biomedical Computation (ABC) seminar @ Harvard Medical School	*Mar. 2024*
A Tour of 2D and 3D computational pathology	**S.Korea**
Electrical Engineering Colloquium @ KAIST	*Mar. 2024*
A Tour of 2D and 3D computational pathology	**S.Korea**
Emerging Technology in Electrical and Computer Engineering Talks @ Seoul National University	*Mar. 2024*
AI-driven efficient patient prognosis based on 3D pathology samples	**UK**
Computational Pathology journal club @ AstraZeneca	*Dec. 2023*
AI-driven efficient patient prognosis based on 3D pathology samples	**UK**
TIA Centre seminar series @ Tissue Imaging Analysis Centre, University of Warwick	*Dec. 2023*
AI-driven efficient patient prognosis based on 3D pathology samples	**USA**
NCI Cancer Systems Biology Consortium @ National Cancer Institute	*Nov. 2023*
Capturing 3D histology from tissue samples for 3D computational analysis	**UK**
X-ray in Microscopy in Life Sciences Hybrid Meeting @ ZEISS	*Oct. 2023*
AI-driven efficient patient prognosis based on 3D pathology samples	**USA**
3D Spatial Summit @ Alpenglow Biosciences	*Sept. 2023*
AI-driven efficient patient prognosis based on 3D pathology samples	**USA**
AI seminar @ PathAI	*Aug. 2023*
Generative models for structured neural time series	**S.Korea**
Data science seminar @ Seoul National University	*Aug. 2021*
Neural signal processing with domain constraints	**S.Korea**
AI Symposium @ KAIST	*Aug. 2020*
Neural signal processing with domain constraints	**S.Korea**
EE seminar @ KAIST	*Mar. 2020*

SERVICE

Conference reviewer: **NeurIPS** 2024, 2025, **ICLR** 2024, 2025, **ICML** 2025, **UAI** 2023, IEEE **EMBC**, **COSYNE**

Journal reviewer: **Nature Biomedical Engineering**, **Communications Medicine**, **NPJ Digital Medicine**, **Genome Medicine**, **Cell Reports Methods**, **Modern Pathology**, **Scientific Reports**, IEEE **Transactions on Biomedical Engineering**, IEEE **Signal Processing Letters**

CITIZENSHIP

United States and South Korea (dual citizenship)

REFERENCES

Faisal Mahmood, Ph.D.
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Edward Hood Taplin Professor of Medical Engineering Professor, MIT, Boston   enb@neurostat.mit.edu

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