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Education

Ph.D., Medical Engineering and Medical Physics

2017 - 2023

Harvard-MIT Division of Health Sciences and Technology
Concentration: Computer Science
Advisor: Polina Golland

S.B., Electrical Engineering and Computer Science

2013 - 2017

Massachusetts Institute of Technology

Experience

UC Berkeley, Berkeley, CA

Nov 2023 - Present

Postdoctoral Associate, Computational Imaging Group

- Developing machine learning methods for reconstructing atomic electron tomography (AET) data, enabling direct and robust atomic structure identification of nanoparticles.
- Optimizing a data-driven design of a structured illumination mask for X-ray ptychography, enabling reconstruction from low-dose X-ray that is less damaging to the sample.
- Mentoring six graduate and undergraduate students on computational imaging projects ranging from electron tomography to live-embryo fluorescence imaging to lensless and astronomical imaging.

MIT Computer Science & Artificial Intelligence Laboratory, Cambridge, MA

Sep 2017 - Aug 2023

Graduate Research Assistant, Medical Vision Group

- Developed machine learning methods for correcting corrupted Fourier space data, enabling faster acquisition and motion correction in MRI.
- Mentored two undergraduate students on machine learning projects for correcting undersampled MRI data.

Google, Inc., Mountain View, CA

Jun 2018 - Dec 2019

Software Engineering Intern/Student Researcher, Google Brain/Google Health

Quantified agreement between neural network prediction explanations and human-labeled interest regions for skin condition classification, identifying potential classifier failure modes.

Google, Inc., Sunnyvale, CA

Jun 2017 - Aug 2017

Software Engineering Intern, Google Station

Implemented software feature to increase use of public wi-fi at international rail stops; project launched externally at 15 Google Stations in November 2017.

Nihon Kohden Innovation Center, Cambridge, MA

Jun 2016 - Jun 2017

Research Intern

Developed classifiers predicting bedside alarm relevance as a step toward reduced alarm fatigue in neonatal intensive care units.

Charles Stark Draper Laboratory, Cambridge, MA

Jun 2015 - Aug 2015

Signal Processing, Algorithms, and Software Intern

Developed and implemented computer vision methods for GPS-free parafoil localization, enabling supply delivery to remote regions.

MIT Media Lab, Cambridge, MA

Apr 2014 - Jun 2017

Undergraduate Researcher, Biomechatronics Group

Developed biomimetic prosthesis control systems to enable amputee walking across varied terrains.

Awards

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| MIDL Best Oral Paper (top 0.5% of submissions) | 2023 |
| ISMRM AMPC Selected Abstract (2% of submissions) | 2023 |
| ICLR Honorable Reviewer | 2022 |
| CVPR Outstanding Reviewer | 2021 |
| Google PhD Fellowship | 2021 |
| National Science Foundation Graduate Fellowship | 2018 |
| National Institutes of Health Neuroimaging Training Program Fellowship | 2017 |
| Business Insider's 15 Impressive Students at MIT | 2015 |
| Intel Science Talent Search Semifinalist | 2013 |

Publications

Full-Length Conference and Journal Publications

Weiser, P., Langs, G., Bogner, W., Motyka, S., Strasser, B., Golland, P., **Singh, N.**, Dietrich, J., Uhlmann, E., Batchelor, T. and Cahill, D. "Deep-ER: Deep Learning ECCENTRIC Reconstruction for Fast High-Resolution Neurometabolic Imaging." *NeuroImage* (2025).

Singh, N., Chien, T., McCray, A.R.C., Ophus, C., Waller, L. "A Gaussian Parameterization for Direct Atomic Structure Identification in Electron Tomography." *International Conference on Computational Photography* (2025).

Boiarsky, R., **Singh, N.**, Buendia, A., Amini, A., Getz, G., Sontag, D. "Deeper Evaluation of a Single-Cell Foundation Model." *Nature Machine Intelligence* (2024).

[Best Oral Paper (0.5% acceptance), Oral Presentation] **Singh, N.**, Dey, N., Hoffmann, M., Fischl, B., Adalsteinsson, E., Frost, R.*, Dalca, A.* , Golland, P.* "Data Consistent Deep Rigid MRI Motion Correction." *Medical Imaging with Deep Learning* (2023).

Vasconcelos, F.*, He, B.* , **Singh, N.**, Teh, Y. "UncertaINR: Uncertainty Quantification of End-to-End Implicit Neural Representations for Computed Tomography." *Transactions on Machine Learning Research* (2023).

Singh, N., Iglesias, J., Adalsteinsson, E., Dalca, A., Golland, P. "Joint Frequency and Image Space Learning for MRI Reconstruction and Analysis." *The Journal of Machine Learning for Biomedical Imaging* (2022).

Singh, N., Harrod, J., Subramanian, S., Robinson, M., Chang, K., Cetin-Karayumak, S., Dalca, A., Eickhoff, S., Fox, M., Franke, L., Golland, P., Haehn, D., Iglesias, E., O'Donnell, L., Ou, Y., Rathi, Y., Siddiqi, S., Sun, H., Westover, M., Whitfield-Gabrieli, S., Gollub, R. "How Machine Learning is Powering Neuroimaging to Improve Brain Health." *Neuroinformatics* (2022).

Liu, Y., Jain, A., Eng, C., Way, D. H., Lee, K., Bui, P., Kanada, K., de Oliveira Marinho, G., Gallegos, J., Gabriele, S., Gupta, V., **Singh, N.**, et al. "A Deep Learning System for Differential Diagnosis of Skin Diseases." *Nature Medicine* (2020).

Clites, T., Arnold-Rife, A., **Singh, N.**, Kline, E., Chen, H., Tugman, C., Billadeau, B., Biewener, A., and Herr, H. "Goats Decrease Leg Stiffness When Walking Over Compliant Surfaces." *Journal of Experimental Biology* (2019).

Luo, H., Fokoue-Nkoutche, A., **Singh, N.**, Yang, L., Hu, J., and Zhang, P. "Molecular Docking for Prediction and Interpretation of Adverse Drug Reactions." *Combinatorial Chemistry & High Throughput Screening* (2018), 21(5), 314-322.

Dever, C., Dyer, T., Hamilton, L., Lommel, P., Mohiuddin, S., Reiter, A., **Singh, N.**, Truax, R., Wholey, L., Bergeron, K. and Noetscher, G. "Guided-Airdrop Vision-Based Navigation." *24th AIAA Aerodynamic Decelerator Systems Technology Conference* (2017).

Peer-Reviewed Workshop Publications

Singh, N., Lee, K., Coz, D., Angermueller, C., Huang, S., and Liu, Y. "Agreement Between Saliency Maps and Human-Labeled Regions of Interest: Applications to Skin Disease Classification." *CVPR ISIC Workshop on Skin Image Analysis* (2020).

Peer-Reviewed Abstracts

Kabuli, L., **Singh, N.**, Pinkard, H. and Waller, L., "Information-Theoretic Bayesian Optimization of Imaging Systems." *Computational Optical Sensing and Imaging* (2025).

Mani, K., **Singh, N.**, Chien, T., Ophus, C. and Waller, L. "AnyAtom: Domain-Randomized Atomic Priors for Electron Tomography." *Computational Optical Sensing and Imaging* (2025).

Kabuli, L., **Singh, N.**, Waller, L. "Estimation-Theoretic Analysis of Lensless Imaging." *SPIE Photonics West*. (2025)

[AMPC Selected Abstract (2% acceptance), Oral Presentation] **Singh, N.**, Hoffmann, M., Adalsteinsson, E., Fischl, B., Golland, P.*; Dalca, A.*; Frost, R.* "Motion-Aware Neural Networks Improve Rigid Motion Correction of Accelerated Segmented Multislice MRI." *International Society for Magnetic Resonance in Medicine Annual Meeting* (2023).

Jang, I., Hoffmann, M., **Singh, N.**, Balbastre, Y., Chen, L., Rockenbach, M.A.B.C., Dalca, A., Aganj, I., Kalpathy-Cramer, J., Fischl, B. and Frost, R., "Clinical Evaluation of k-Space Correlation Informed Motion Artifact Detection in Segmented Multi-slice MRI." *International Society for Magnetic Resonance in Medicine Annual Meeting* (2023).

[Oral Presentation] Hoffmann, M., **Singh, N.**, Dalca, A., Fischl, B., Frost, R. "Can we predict motion artifacts in clinical MRI before the scan completes?" *International Society for Magnetic Resonance in Medicine Annual Meeting* (2023).

Singh, N., Hoffmann, M., Moyer, D.C., Jang, I., Chen, L., Bezerra Cavalcanti Rockenbach, M., Guidon, A., Aganj, I., Kalpathy-Cramer, J., Adalsteinsson, E., Fischl, B., Dalca, A., Golland, P.*; Frost, R.* "Joint Neural Network for Fast Retrospective Rigid Motion Correction of Accelerated Segmented Multislice MRI." *International Society for Magnetic Resonance in Medicine Annual Meeting* (2022).

Jang, I., Frost, R., Hoffmann, M., **Singh, N.**, Chen, L., Guidon, A., Bezerra Cavalcanti Rockenbach, M., Comeau, D., Bizzo, B., Chang, K., Witham, S., Rettmann, D., Banerjee, S., Brau, A., Reese, T., Aganj, I., Dalca, A., Fischl, B.*; Kalpathy-Cramer, J.* "Automated MRI k-space Motion Artifact Detection in Segmented Multi-Slice Sequences." *International Society for Magnetic Resonance in Medicine Annual Meeting* (2022).

Singh, N., Iglesias, J., Adalsteinsson, E., Dalca, A., and Golland, P. "A Deep-Learning Framework for Image Reconstruction of Undersampled and Motion-Corrupted k-space Data." *International Society for Magnetic Resonance in Medicine Annual Meeting* (2021).

[Oral Presentation] Lala, S., **Singh, N.**, Gagoski, B., Abaci-Turk, E., Grant, P.E., Golland, P., and Adalsteinsson, E. "A Deep Learning Approach for Image Quality Assessment of Fetal Brain MRI." *International Society for Magnetic Resonance in Medicine Annual Meeting* (2019).

In Submission

Markley, E., Pinkard, H., Kabuli, L., **Singh, N.** and Waller, L., "Computationally Efficient Information-Driven Optical Design with Interchanging Optimization." *arXiv preprint arXiv:2507.07789* (2025).

Invited Talks

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| STROBE NSF Science and Technology Center Seminar Series | Dec 2025 |
| Rice Nanosystems Imaging Conference | Nov 2025 |
| San Francisco Computer Vision Meetup | May 2023 |
| UC Berkeley Computational Imaging Seminar Series | Mar 2023 |
| Boston Medical Imaging Workshop | Dec 2022 |
| Closing the Gap Between Research & Clinical Application: Neuroimaging Indicators of Brain Structure and Function | Feb 2021 |

Patents

Singh, N., Hoffmann, M., Frost, S. R., Dalca, A. V., Fischl, B. R., Golland, P., and Adalsteinsson, E. "System and Method for Rigid Motion Correction in Magnetic Resonance Imaging." U.S. Patent App. No. 18/770,330, *pending*.

Press

MIT News, featuring MIDL 2023 MRI motion correction paper

2023

Teaching

Computational Imaging, Berkeley, CA

Nov 2024, Oct 2025

Guest Lecturer

Created and taught “Introduction to Deep Learning” lecture.

6.011: Signals, Systems, and Inference, Cambridge, MA

Feb 2017 - May 2017

Teaching Assistant

Taught three weekly tutorial sections; assisted students in office hours and electronically. Rating: 6.8/7.0.

Mentorship

Mingxuan Cai, EECS PhD, UC Berkeley

07/2025 - Present

Alma Halgren, Bioengineering PhD, UC Berkeley

05/2025 - Present

Leyla Kabuli, EECS PhD, UC Berkeley

06/2024 - Present

Tiffany Chien, EECS PhD, UC Berkeley

05/2024 - Present

David Martinez, EECS Undergrad, UC Berkeley

01/2025 - Present

Krishna Mani, EECS Undergrad, UC Berkeley

09/2024 - Present

Alyssa Unell, EECS Undergrad, MIT

09/2022 - 06/2023

H Savoldy, EECS Undergrad, MIT

04/2021 - 12/2021

Service

Journal Reviewer:

Transactions on Computational Imaging

2025

Nature Scientific Reports

2021

The Journal of Machine Learning for Biomedical Imaging (MELBA)

2021

Conference Reviewer:

NeurIPS

2021, 2022, 2023, 2025

CVPR

2021, 2022, 2023

ICML

2020, 2021, 2024

ICLR

2022, 2024

MIDL

2022, 2023

MEMP Application Assistance Program Organizer

Sep 2021 - May 2023

Coordinated department program to provide 1-on-1 graduate school application advice to students from underrepresented backgrounds.

MIT Eta Kappa President

Sep 2016 - Jun 2017

Organized department-wide service initiatives, including a free 1-on-1 tutoring program, detailed course evaluation service, social and professional development events, and the construction of a new undergraduate lounge.

Blueprint Lead Organizer

Oct 2013 - March 2014

Led a team to organize the first Blueprint, a Boston-area workshop for 300 high school students to learn to code.