

Computer Science and Artificial Intelligence Lab
Department of Health Sciences and Technology
Massachusetts Institute of Technology
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Education

Ph.D., Medical Engineering and Medical Physics 2017 - Present

Harvard-MIT Division of Health Sciences and Technology; Advisor: Polina Golland

S.B., Electrical Engineering and Computer Science 2013 - 2017

Massachusetts Institute of Technology

Experience

MIT Computer Science & Artificial Intelligence Laboratory, Cambridge, MA Sep 2017 - Present

Graduate Research Assistant, Medical Vision Group

Developing machine learning methods for correcting corrupted Fourier space data, enabling faster acquisition and motion correction in MRI.

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.

IBM Research, Cambridge, MA Jan 2017

Research Intern, Healthcare Analytics Group

Designed and conducted feature analyses to predict proteins involved in adverse drug reactions (ADRs), suggesting future experimental studies to understand ADR mechanisms.

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.

Publications

Preprints

Vasconcelos, F.* , He, B.* , **Singh, N.**, Teh, Y. "UncertaINR: Uncertainty Quantification of End-to-End Implicit Neural Representations for Computed Tomography." [arXiv:2202.10847](https://arxiv.org/abs/2202.10847) (2022).

Journal Publications

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.

Conference Publications

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, to appear).

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

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). **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). **Oral Presentation.**

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).

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). **Oral Presentation.**

Teaching

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.

Service

Journal Reviewer: Nature Scientific Reports, The Journal of Machine Learning for Biomedical Imaging (MELBA)

Conference Reviewer: NeurIPS, CVPR, ICML, ICLR, MIDL

Invited Talks

San Francisco Computer Vision Meetup

May 2023

Boston Medical Imaging Workshop

Dec 2022

Closing the Gap Between Research & Clinical Application:

Feb 2021

Neuroimaging Indicators of Brain Structure and Function (Virtual)

Awards and Honors

Funding

Google PhD Fellowship

2021

National Science Foundation Graduate Fellowship

2018

National Institutes of Health Neuroimaging Training Program Fellowship

2017

Reviewing

ICLR Honorable Reviewer

2022

CVPR Outstanding Reviewer

2021

Miscellaneous

Business Insider's 15 Impressive Students at MIT

2015

Intel Science Talent Search Semifinalist

2013