Amirali Aghazadeh

School of Electrical and Computer Engineering
Georgia Institute of Technology
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Academic Positions

Georgia Institute of Technology — Georgia, GA
Assistant Professor School of Electrical and Computer Engineering — *Aug 2022 - Present*
Affiliated Faculty Institute for Data Science and Engineering (IDEaS)
Affiliated Faculty Petit Institute for Bioengineering and Bioscience (IBB)
Program Faculty Machine Learning PhD Program
Program Faculty Bioengineering Interdisciplinary PhD Program

Education and Postdoctoral Training

University of California, Berkeley — Berkeley, CA
Postdoctoral Associate — *2019 - 2022*
Advisor: **Kannan Ramchandran**
Collaborator: **Jennifer Listgarten**
Affiliations: EECS, BASICS, BLISS, BAIR

Stanford University — Stanford, CA
Postdoctoral Associate — *2017 - 2019*
Advisor: **David Tse**
Affiliations: EE, ISL, Bio-X, Chan Zuckerberg Biohub

Rice University — Houston, TX
Doctor of Philosophy in Electrical and Computer Engineering — *2014 – 2017*
Master of Science in Electrical and Computer Engineering — *2010 – 2014*
Advisor: **Richard Baraniuk**

Sharif University of Technology — Tehran, Iran
Bachelor of Science in Electrical Engineering — *2006 – 2010*

Peer-reviewed Publications (*equal contributions, †corresponding author)

29. Daniel Saeedi, Denise Buckner, Thomas Walton, José C Aponte, and **Amirali Aghazadeh**, "Discriminating Abiotic and Biotic Organics in Meteorite and Terrestrial Samples Using Machine Learning on Mass Spectrometry Data", *Accepted PNAS Nexus* xx, xx (2025).

28. Thomas Walton, Darin Tsui, Aryan Musharaf, and **Amirali Aghazadeh**, "SpecMER: Fast Protein Generation with K-mer Guided Speculative Decoding", *Conference on Neural Information Processing Systems (NeurIPS) Spotlight*, Dec 2025.

27. Darin Tsui, Aryan Musharaf, Yigit Efe Erginbas, and Justin Singh Kang, and **Amirali Aghazadeh**, "SHAP zero Explains Biological Sequence Models with Near-zero Marginal Cost for Future Queries", *Conference on Neural Information Processing Systems (NeurIPS)*, Dec 2025.

26. Darin Tsui, Kunal Talreja and **Amirali Aghazadeh**, "Sparse Autoencoders for Low-N Protein Function Prediction and Design", *Conference on Neural Information Processing Systems (NeurIPS) Workshop AI4Science*, Dec 2025.

25. Thomas Walton, Darin Tsui, Lauren Fogel, Dustin Huard, Rafael Chagas, Raquel L Lieberman, and **Amirali Aghazadeh**†, "GOLF: A Generative AI Framework for Pathogenicity Prediction of Myocilin OLF Variants", *20th Machine Learning in Computational Biology (MLCB)*, Sep 2025.

24. José C Aponte, Hannah L McLain, Daniel Saeedi, **Amirali Aghazadeh**, Jamie E Elsila, Daniel P Glavin, and Jason P Dworkin, "Challenges and Opportunities in Using Amino Acids to Decode Carbonaceous Chondrite and Asteroid Parent Body Processes", *Astrobiology* 25, 6 (2025).

23. Daniel Saeedi, Denise Buckner, Jose C Aponte, **Amirali Aghazadeh**†, "AstroAgents: A Multi-Agent AI for Hypothesis Generation from Mass Spectrometry Data", *International Conference on Learning Representations (ICLR) 2025 Workshop on Towards Agentic AI for Science: Hypothesis Generation, Comprehension, Quantification, and Validation*, March 2025.

22. Darin Tsui, Kunal Talreja, **Amirali Aghazadeh**†, "Efficient Algorithm for Sparse Fourier Transform of Generalized q-ary Functions", *IEEE Information Theory Workshop (ITW)*, Oct 2025.

21. Darin Tsui, **Amirali Aghazadeh**†, "On recovering higher-order interactions from protein language models", *International Conference on Learning Representation Workshop on Generative and Experimental perspectives in bioMolecular design (GEM)*, May 2024.

20. Tony Tu, Gautham Krishna, **Amirali Aghazadeh**†, "ProtiGeno: a prokaryotic short gene finder using protein language models", *International Conference on Machine Learning Workshop on Computational Biology*, July 2023.

19. Yigit Efe Erginbas, Justin Singh Kang, **Amirali Aghazadeh**, Kannan Ramchandran, "Efficiently Computing Sparse Fourier Transforms of q-ary Functions", *International Symposium on Information Theory (ISIT)*, June 2023.

18. **Amirali Aghazadeh**, Nived Rajaraman, Tony Tu, and Kannan Ramchandran, "Spectral Regularization Allows Data-frugal Learning over Combinatorial Spaces", *Transactions on Machine Learning Research* 1, 1 (2023).

17. Nick Sapoval*, **Amirali Aghazadeh***, Michael Nute, Dinler Antunes, Advait Balaji, Richard Baraniuk, CJ Barberan, Ruth Dannenfelser, Chen Dun, Mohammadamin Edrisi, Leo Elworth, Bryce Kille, Anastasios Kyrillidis, Luay Nakhleh, Cameron Wolfe, Zhi Yan, Vicky Yao, and Todd Treangen, "Current progress and open challenges for applying deep learning across the biosciences", *Nature Communications* 13, 1728 (2022).

16. David H. Brookes, **Amirali Aghazadeh**, and Jennifer Listgarten, "On the sparsity of fitness functions and implications for learning", *Proceedings of the National Academy of Sciences (PNAS)* 119, 1 (2022).

15. **Amirali Aghazadeh**, Hunter Nisonoff, Orhan Ocal, D. Brookes, Yijie Huang, Ozan Koyluoglu, Jennifer Listgarten, and Kannan Ramchandran, "Epistatic Net allows the sparse spectral regularization of deep neural networks for inferring fitness functions", *Nature Communications* 12, 5225 (2021).

14. **Amirali Aghazadeh**, Vipul Gupta, Alex DeWeese, Ozan Koyluoglu, and Kannan Ramchandran, "BEAR: Sketching BFGS Algorithm for Ultra-High Dimensional Feature Selection with Sublinear Memory", *Proceedings of Machine Learning Research*, Mathematical and Scientific Machine Learning (MSML) Conference, Aug. 2021.

13. Vida Jamali, Cory Hargus, Assaf Ben Moshe, **Amirali Aghazadeh**, Hyun Dong Ha, Kranthi K Mandadapu, and Paul Alivisatos, "Anomalous Nanoparticle Surface Diffusion in Liquid Cell TEM is Revealed by Deep Learning-Assisted Analysis", *Proceedings of the National Academy of Sciences (PNAS)* 118, 10 (2021).

12. Farzan Farnia, **Amirali Aghazadeh**, James Zou, David Tse, "Group Structured Adversarial Learning", *arXiv:2106.10324*, June 2021

11. **Amirali Aghazadeh**, Orhan Ocal, and Kannan Ramchandran, "CRISPRLand: Interpretable Large-Scale Inference of DNA Repair Outcome Based on a Spectral Approach", *Bioinformatics* 36, i560–i568 (2020).

10. **Amirali Aghazadeh**, Orhan Ocal, and Kannan Ramchandran, "CRISPRLand: Interpretable Large-Scale Inference of DNA Repair Outcome Based on a Spectral Approach", *Intelligent Systems for Molecular Biology (ISMB)*, July 2020.

9. Ryan Leenay*, **Amirali Aghazadeh***, Joseph Hiatt*, David Tse, Theodore Roth, Ryan Apathy, Eric Shifrut, Judd Hulquist, Nevan Krogan, Zhenqin Wu, Alexander Marson, Andrew May, and James Zou, "Large dataset enables prediction of repair after CRISPR–Cas9 editing in primary T cells", *Nature Biotechnology* 36, 1 (2019).

8. Debarshi Sen, **Amirali Aghazadeh**, Ali Mousavi, Satish Nagarajaiah, Richard Baraniuk, and Anand Dabak, "Data-driven approaches to structural health monitoring of steel pipes", *Mechanical Systems and Signal Processing (MSSP)* 131, 524-537 (2019).

7. Debarshi Sen, **Amirali Aghazadeh**, Ali Mousavi, Satish Nagarajaiah, and Richard Baraniuk, "Sparsity-based data-driven approaches for damage detection in plates", *Mechanical Systems and Signal Processing (MSSP)* 117, 333-346 (2019).

6. **Amirali Aghazadeh**, Mohammad Golbabaee, Andrew Lan, and Richard Baraniuk, "Insense: Incoherent sensor selection for sparse signals", *International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, April 2018.

5. **Amirali Aghazadeh***, Ryan Spring*, Daniel LeJeune, Gautham Dasarathy, Anshumali Shrivastava, and Richard Baraniuk, "MISSION: Ultra Large-Scale Feature Selection using Count Sketches", *International Conference on Machine Learning (ICML)*, July 2018.

4. **Amirali Aghazadeh**, Mohammad Golbabaee, Andrew Lan, and Richard Baraniuk, "Insense: Incoherent sensor selection for sparse signals", *Signal Processing* 150, 57-65 (2018).

3. **Amirali Aghazadeh**, Andrew Lan, Anshumali Shrivastava, and Richard Baraniuk, "RHash: Robust hashing via ℓ_∞-norm Distortion", *International Joint Conferences on Artificial Intelligence (IJCAI)*, Aug 2017.

2. **Amirali Aghazadeh***, Adam Lin*, Mona Sheikh*, Allen Chen, Lisa Atkins, Coreen Johnson, Joseph Petrosino, Rebekah Drezek, and Richard Baraniuk, "Universal microbial diagnostics using random DNA probes", *Science Advances* 2, e1600025 (2016).

1. **Amirali Aghazadeh**, Ali Ayremlou, Dan Calderón, Tom Goldstein, Raj Patel, Divianshi Vats, and Richard Baraniuk, "Adaptive step size selection using ski rental problem", *International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, May 2013.

Patents

"Universal microbial diagnostics using random DNA probes": US20180355411A1

Press

Nature: AI scientist 'team' joins the search for extraterrestrial life, 5/2/25.

Georgia Tech: How Agentic AI is Rethinking the Origins of Life on Earth, 6/24/25.

Stanford University: CRISPR algorithm predicts how well gene editing will work, 7/29/19.

The Pharmaceutical Journal: Scientists Create Universal Microbial Screening Method, 11/1/16.

BioCentury Innovations: Random Math, 10/27/16.

Labroots: New Technology Easily Identifies Bacterial Pathogens, 9/30/16.

Phys.org: Researchers find way to ID many pathogens with few DNA probes, 9/29/16.

Rice University: Random DNA + high-tech math = "universal microbial diagnostic", 9/28/16.

Houston Chronicle: Rice and Baylor team to slow the spread of "superbugs", 9/28/16.

GenomeWeb: Universal Microbial Diagnostics Promises Rapid Pathogen ID, 9/28/16.

Professional Activities

Panelist: International Conference on Learning Representations (ICLR), GEMBio Workshop 2024

Panelist: Visiting Scholar and Postdoc Affairs Faculty Job Session at UC Berkeley 2023

Faculty mentor: NextProf workshop at Georgia Tech 2023.

Program committee: EECS Rising Stars Workshop Georgia Tech 2023.

Technical program committe: International Conference on Machine Learning (ICML).

Technical program committe: Conference on Neural Information Processing Systems (NeuRIPS).

Technical program committe: International Conference on Learning Representations (ICLR).

Member: Institute of Electrical and Electronics Engineers (IEEE).

Member: International Society for Computational Biology (*i*SCB).

Administrator: Rice compressive sensing website http://dsp.rice.edu/cs/ (2012-2016).

Organizer: Stanford Disease Trajectory Hackathon (2018).

Fellowships and Awards

Thank-a-Teacher, Georiga Tech 2023 (2023,2024)
Packard Fellowship Fanalist 2023 (2023)
ICML Top 33% Reviewer Award (2020)
Berkeley Postdoctoral Association Professional Development Award (2020)
ICASSP Travel Grant (2018)
Hershel M. Rich Invention Award (2017)
Schlumberger Best PhD Presenter Award (2017)
Biological Data Science Meeting Travel Grant (2016)
NASA Space Health Innovation Challenge Hackathon Finalist (2013)
Texas Instruments Fellowship (2010)