

# Amirali Aghazadeh

School of Electrical and Computer Engineering  
Georgia Institute of Technology  
Coda Tech Square, S1209  
Atlanta, GA, 30308, USA

amirali-aghazadeh.com  
amiralia@gatech.edu  
+1-713-257-5758

## ACADEMIC POSITIONS

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### Georgia Institute of Technology

*Assistant Professor* School of Electrical and Computer Engineering  
*Affiliated Faculty* Institute for Data Science and Engineering  
*Program Faculty* Machine Learning PhD Program  
*Program Faculty* Bioinformatics Graduate Program  
*Program Faculty* Bioengineering Interdisciplinary PhD Program

Georgia, GA  
Aug 2022 - Present

## EDUCATION AND POSTDOCTORAL TRAINING

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### University of California, Berkeley

*Postdoctoral Associate*  
Advisor: **Kannan Ramchandran**  
Collaborator: **Jennifer Listgarten**  
Affiliations: EECS, BASICS, BLISS, BAIR

Berkeley, CA  
2019 - 2022

### Stanford University

*Postdoctoral Associate*  
Advisor: **David Tse**  
Affiliations: EE, ISL, Bio-X, Chan Zuckerberg Biohub

Stanford, CA  
2017 - 2019

### Rice University

*Doctor of Philosophy in Electrical and Computer Engineering*  
*Master of Science in Electrical and Computer Engineering*  
Advisor: **Richard Baraniuk**

Houston, TX  
2014 - 2017  
2010 - 2014

### Sharif University of Technology

*Bachelor of Science in Electrical Engineering*

Tehran, Iran  
2006 - 2010

## PUBLICATIONS (\* SIGN DENOTES EQUAL CONTRIBUTIONS)

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19. Nick Sapoval\*, **Amirali Aghazadeh\***, Michael Nute, Dinler Antunes, Advait Balaji, Richard Baraniuk, CJ Barberan, Ruth Dannenfeler, Chen Dun, Mohammadamin Edrisi, Leo Elworth, Bryce Kille, Anastasios Kyriillidis, 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).
18. 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).
17. **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).
16. **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.
15. 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).
14. Farzan Farnia, **Amirali Aghazadeh**, James Zou, David Tse, “Group Structured Adversarial Learning”, *arXiv:2106.10324*, June 2021

13. **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).
12. **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.
11. 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).
10. 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).
9. 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).
8. **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.
7. **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.
6. **Amirali Aghazadeh**, Mohammad Golbabaee, Andrew Lan, and Richard Baraniuk, “Insense: Incoherent sensor selection for sparse signals”, *Signal Processing* 150, 57-65 (2018).
5. **Amirali Aghazadeh**, Andrew Lan, Anshumali Shrivastava, and Richard Baraniuk, “RHash: Robust hashing via  $\ell_\infty$ -norm Distortion”, *International Joint Conferences on Artificial Intelligence (IJCAI)*, Aug. 2017.
4. **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).
3. **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.

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#### WORKS UNDER REVIEW / IN PROGRESS

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2. **Amirali Aghazadeh**, Nived Rajaraman, Tony Tu, and Kannan Ramchandran, “Spectral Regularization Allows Data-frugal Learning over Combinatorial Spaces”, *work in progress*.
1. **Amirali Aghazadeh**, Chris Metzler, Aditya Desai, Gautam Dasarathy, Anshumali Shrivastava, and Richard Baraniuk, “Sublinear Algorithms for Signal Processing”, *work in progress*.

#### PATENTS

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“Universal microbial diagnostics using random DNA probes”: US20180355411A1

#### PRESS

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**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

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**Technical program committee:** Intl. Conf. Machin. Learn. Research (ICML), Conf. Neural Info. Process. Sys. (NeuRIPS), Intl. Conf. Learning Representations (ICLR), AAAI Conf. Artif. Intell. (AAAI), Intl. Joint Conf. Artif. Intell. (IJCAI), Intl. Conf. Acoust. Speech Signal Process. (ICASSP), Europ. Signal Process. Conf. (EUSIPCO), ACS Synthetic Biology, Journal of Theoretical Biology.

**Member:** Institute of Electrical and Electronics Engineers (IEEE), Society for Biological Engineering (SBE), International Society for Computational Biology (*iSCB*).

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

**Organizer:** Stanford Disease Trajectory Hackathon (2018).

## FELLOWSHIPS AND AWARDS

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**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)

## TEACHING AND MENTORING EXPERIENCES

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**Information Theory and Coding (EE 229A):** UC Berkeley *Teaching Assistant*

**Fundamentals of Electrical Engineering (ELEC 241):** Rice University *Teaching Assistant*

**Computer System Architecture (ELEC 425):** Rice University *Teaching Assistant*

**Advanced DSP (ELEC 544):** Rice University *Teaching Assistant*

**Seminar Course on Topics in Advanced Signal Processing (ELEC 631):** Rice University *Teaching Assistant*

**Undergraduate Mentoring:** Alex DeWeese (EECS Undergrad at UC Berkeley: now PhD student at CMU), EJ Huang (EECS Undergrad at UC Berkeley: now at Nvidia), Tony Tu (EECS Undergrad at UC Berkeley, MS student at Georgia Tech), Karna Mendonca Kamath (EECS Undergrad at UC Berkeley)

## TALKS AND PRESENTATIONS

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1. “*Trusted AI for biomolecular inference: the role of sparsity*”, invited talk at Northwestern, CMU, NYU, BU, PSU, UCSC, USC, GTech, and UWaterloo, Spring 2022.
2. “*BEAR: Sketching BFGS Algorithm for Ultra-High Dimensional Feature Selection in Sublinear Memory*”, talk at **MSML21: Mathematical and Scientific Machine Learning Conference**, EPFL (virtual), Lausanne, Switzerland, Aug 2021.
3. “*Black-Box Interpretation of Neural Networks using Sparse-Fourier Algorithms*”, talk at **Berkeley Artificial Intelligence Research (BAIR) Workshop**, University of California, Berkeley, CA, USA, Aug 2020.
4. “*CRISPRLand: Interpretable Large-Scale Inference of DNA Repair Landscape Based on a Spectral Approach*”, talk at **Intelligent Systems for Molecular Biology (ISMB)**, Virtual Conference, Aug 2020.
5. “*Sensing and Learning at Scale: On the Power of Randomized Algorithms*”, invited talk at **Berkeley Laboratory for Information and System Sciences (BLISS)**, University of California, Berkeley, CA, USA, May 2019.
6. “*From CRISPR Gene Editing to Group Structured Adversarial Learning*”, invited talk at **Conference on Information Sciences and Systems (CISS)**, Johns Hopkins University, Baltimore, MA, USA, March 2019.
7. “*Machine Learning Prediction of DNA Repair Outcomes*”, poster at **Stanford Compression Workshop**, Stanford, CA, USA, February 2019.
8. “*From CRISPR Gene Editing to Group Structured Adversarial Learning*”, invited talk at **Information Theory and Applications Workshop (ITA)**, University of California, San Diego, CA, USA, February 2019.

9. “*Machine Learning meets CRISPR Gene Editing*”, invited talk at Electrical and Computer Engineering Department, **Rice University**, Houston, TX, USA, October 2018.
10. “*MISSION: Ultra Large-Scale Feature Selection using Count Sketches*”, talk at **International Conference on Machine Learning (ICML)**, Stockholm, Sweden, July 2018.
11. “*Insense: Incoherent Sensor Selection for Sparse Signals*”, poster at **International Conference on Acoustics, Speech and Signal Processing (ICASSP)**, Calgary, Canada, April 2018.
12. “*RHash: Robust hashing via  $\ell_\infty$ -norm Distortion*”, talk at **International Joint Conference on Artificial Intelligence (IJCAI)**, Melbourne, Australia, August 2017.
13. “*Machine Learning in Large-scale Genomic: Sensing, Processing, and Analysis*”, invited talk at Electrical Engineering Department, **Stanford University**, Stanford, CA, USA, May 2017.
14. “*Universal microbial diagnostics using random DNA probes*”, invited talk at Computer Science and Artificial Intelligence Laboratory (CSAIL), **MIT**, Cambridge, MA, USA, March 2017.
15. “*Universal microbial diagnostics using random DNA probes*”, invited talk at **The Broad Institute**, Cambridge, MA, USA, March 2017.
16. “*Machine Learning in Large-scale Genomics: Sensing, Processing, and Analysis*”, talk at School of Public Health, **Harvard University**, Cambridge, MA, USA, February 2017.
17. “*Universal Microbial Diagnostics using random DNA probes*”, poster at Biological Data Science Meeting, **Cold Spring Harbor Lab**, Cold Spring Harbor, NY, USA, October 2016.