

# Amirali Aghazadeh

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## RESEARCH INTEREST

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Machine Learning, Signal Processing, Algorithms, Optimization, Combinatorics, Deep Learning  
Applications: Computational Biology, Chemistry, Science

## ACADEMIC POSITIONS

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### University of California, Berkeley

*Postdoctoral Associate*

Berkeley, CA

June 2019 - Present

Advisor: **Prof. Kannan Ramchandran**

Affiliations: EECS, BASICS, BLISS, RISELab, BAIR

Stanford, CA

2017 - 2019

### Stanford University

*Postdoctoral Associate*

Advisor: **Prof. David Tse**

Affiliations: EE, ISL, Bio-X, Chan Zuckerberg Biohub

## EDUCATION

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### Rice University

Houston, TX

2014 – 2017

*Doctor of Philosophy in Electrical and Computer Engineering*

2010 – 2014

*Master of Science in Electrical and Computer Engineering*

Advisor: **Prof. Richard Baraniuk**

### Sharif University of Technology

Tehran, Iran

2006 – 2010

*Bachelor of Science in Electrical Engineering*

## 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)

## PUBLICATIONS (\* SIGN DENOTES EQUAL CONTRIBUTIONS)

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1. **Amirali Aghazadeh**, Vipul Gupta, Alex DeWeese, Ozan Koayluoglu, Kannan Ramchandran, “BEAR: Sketching BFGS Algorithm for Feature Selection with Sublinear Memory”, *submitted to Annual Conference on Neural Information Processing Systems (NEURIPS-2020)*.
2. **Amirali Aghazadeh**, Orhan Ocal, Kannan Ramchandran, “CRISPRLand: Interpretable Large-Scale Inference of DNA Repair Outcome Based on a Spectral Approach”, *Bioinformatics* **36**, i560–i568 (2020).
3. **Amirali Aghazadeh**, Orhan Ocal, Kannan Ramchandran, “CRISPRLand: Interpretable Large-Scale Inference of DNA Repair Outcome Based on a Spectral Approach”, *Intell. Syst. Molecul. Bio. (ISMB-2020)*, July 2020.
4. Ryan Leenay\*, **Amirali Aghazadeh\***, Joseph Hiatt\*, David Tse, Theodore Roth, Ryan Apothy, 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).

5. D. Sen, **A. Aghazadeh**, A. Mousavi, S. Nagarajaiah, R. G. Baraniuk, and Anand Dabak, “Data-driven approaches to structural health monitoring of steel pipes”, *Mech. Syst. Signal Process.* **131**, 524-537 (2019).
6. D. Sen, **A. Aghazadeh**, A. Mousavi, S. Nagarajaiah, and R. G. Baraniuk, “Sparsity-based data-driven approaches for damage detection in plates”, *Mech. Syst. Signal Process.* **117**, 333-346 (2019).
7. **A. Aghazadeh**, M. Golbabaei, A. S. Lan, and R. G. Baraniuk, “Insense: Incoherent sensor selection for sparse signals”, *Proc. Intl. Conf. Acoust. Speech Signal Process. (ICASSP)*, April 2018.
8. **A. Aghazadeh\***, R. Spring\*, D. LeJeune, G. Dasarathy, A. Shrivastava and R. G. Baraniuk, “MISSION: Ultra Large-Scale Feature Selection using Count Sketches”, *Proc. Intl. Conf. Machin. Learning (ICML)*, July 2018.
9. **A. Aghazadeh**, M. Golbabaei, A. S. Lan, and R. G. Baraniuk, “Insense: Incoherent sensor selection for sparse signals”, *Signal Processing* **150**, 57-65 (2018).
10. **A. Aghazadeh**, A. S. Lan, A. Shrivastava and R. G. Baraniuk, “RHash: Robust hashing via  $\ell_\infty$ -norm Distortion”, *Proc. Intl. Joint Conf. Artif. Intell. (IJCAI)*, Aug. 2017.
11. **A. Aghazadeh\***, A. Y. Lin\*, M. A. Sheikh\*, A. L. Chen, L. M. Atkins, C. L. Johnson, J. F. Petrosino, R. A. Drezek, and R. G. Baraniuk, “Universal microbial diagnostics using random DNA probes”, *Science Advances* **2**, e1600025 (2016).
12. **A. Aghazadeh**, A. Ayremlou, D. Calderón, T. Goldstein, R. Patel, D. Vats, and R. G. Baraniuk, “Adaptive step size selection using ski rental problem”, *Proc. Intl. Conf. Acoust. Speech Signal Process. (ICASSP)*, May 2013.

## PATENTS

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“Universal microbial diagnostics using random DNA probes”: US20180355411A1

“A feature selection algorithm for subset selection in ultra-high dimensions”: Ref No. 17500/095001

## GRANT PROPOSAL WRITING EXPERIENCE

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**NSF-CIF: Small (\$500k): Foundations of Serverless Computing: Optimizing Latency and Utility.**  
Cowriter. PI: Kannan Ramchandran, Co-PI: Thomas Courtade.

**ONR-DURIP (\$400k): Randomized Numerical Algebra for Large-Scale, Efficient Matrix Computations.**  
Cowriter. PIs: Anshumali Shrivastava, Richard Baraniuk, and Micheal Mahoney.

**DoD-VBFF (\$3M): New Theory and Methods for Low-Dimensional Signal Modeling, Sensing, and Processing.**  
Cowriter. PI: Richard Baraniuk.

## TALKS AND PRESENTATIONS

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1. “Black-Box Interpretation of Neural Networks using Sparse-Fourier Algorithms”, talk at **Berkeley Artificial Intelligence Research (BAIR)/BDD Workshop**, University of California, Berkeley, CA, USA, Aug 2020.
2. “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.
3. “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.
4. “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.
5. “Machine Learning Prediction of DNA Repair Outcomes”, poster at **Stanford Compression Workshop**, Stanford, CA, USA, February 2019.
6. “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.
7. “Machine Learning meets CRISPR Gene Editing”, invited talk at Electrical and Computer Engineering Department, **Rice University**, Houston, TX, USA, October 2018.
8. “MISSION: Ultra Large-Scale Feature Selection using Count Sketches”, talk at **International Conference on Machine Learning (ICML)**, Stockholm, Sweden, July 2018.

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

## PROFESSIONAL ACTIVITIES

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**Reviewer:** 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).

**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).

## TEACHING AND MENTORING EXPERIENCES

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**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 (Undergrad at UC Berkeley)

## 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.

**WeeklyHotNews:** Random DNA + high-tech math = “universal microbial diagnostic”, 9/30/16.

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

**Science360:** Random DNA + high-tech math = “universal microbial diagnostic”, 9/29/16.

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

**HealthCanal:** Random DNA + high-tech math = “universal microbial diagnostic”, 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.

## REFERENCES

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**Richard Baraniuk:** Victor E. Cameron Professor of ECE at Rice University.

**Kannan Ramchandran:** Professor of EECS at University of California, Berkeley.

**Anshumali Shrivastava:** Assistant Professor of CS at Rice University.

**Jennifer Listgarten:** Professor of EECS at University of California, Berkeley.

**David Tse:** Thomas Kailath and Guanghan Xu Professor of EE at Stanford University.