

# Amirali Aghazadeh

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## RESEARCH INTEREST

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Machine Learning, Statistical Signal Processing, Large-scale Optimization, Deep Learning  
Applications: Genomics, Health, and Medicine

## ACADEMIC POSITIONS

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### University of California, Berkeley

*Postdoctoral Associate*

Advisor: **Prof. Kannan Ramchandran**

Affiliations: EECS, BASICS, BLISS, RISELab, BAIR

Berkeley, CA

June 2019 - Present

### Stanford University

*Postdoctoral Associate*

Advisor: **Prof. David Tse**

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

Stanford, CA

2017 - 2019

## EDUCATION

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### Rice University

*Doctor of Philosophy in Electrical and Computer Engineering*

Houston, TX

2014 – 2017

*Master of Science in Electrical and Computer Engineering*

2010 – 2014

Advisor: **Prof. Richard Baraniuk**

### Sharif University of Technology

*Bachelor of Science in Electrical Engineering*

Tehran, Iran

2006 – 2010

## FELLOWSHIPS AND AWARDS

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**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

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1. **Amirali Aghazadeh**, Orhan Ochal, Kannan Ramchandran, “Interpretable Large-Scale Inference of DNA Repair Outcome Based on a Spectral Approach”, *submitted to Intl. Conf. Machin. Learning (ICML-2020)*.
2. **Amirali Aghazadeh**, Vipul Gupta, Alex DeWeese, Ozan Koyluoglu, Kannan Ramchandran, “BEAR: Sketching BFGS Algorithm for Feature Selection with Sublinear Memory”, *submitted to Intl. Conf. Machin. Learning (ICML-2020)*.
3. **Amirali Aghazadeh**, Orhan Ochal, Kannan Ramchandran, “CRISPRLand: Interpretable Large-Scale Inference of DNA Repair Outcome Based on a Spectral Approach”, *submitted to Intell. Syst. Molecul. Bio. (ISMB-2020)*.
4. Farzan Farnia, **Amirali Aghazadeh**, James Zou, David Tse, “Group Structured Adversarial Learning”, *submitted to Intl. Conf. Machin. Learning (ICML-2020)*.
5. CJ Barberan, **A. Aghazadeh**, and R. G. Baraniuk, “GEM: Incorporating Context into Massive Genomic Distance Estimation”, *submitted to Intell. Syst. Molecul. Bio. (ISMB-2020)*.

6. 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). (\*equal contributions)
7. 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).
8. 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).
9. **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.
10. **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.
11. **A. Aghazadeh**, M. Golbabaei, A. S. Lan, and R. G. Baraniuk, “Insense: Incoherent sensor selection for sparse signals”, *Signal Processing* **150**, 57-65 (2018).
12. **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.
13. **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).
14. **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

## TALKS AND PRESENTATIONS

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1. “Sensing and Learning at Scale: On the Power of Randomized Algorithms”, **invited talk** at BLISS, **University of California**, Berkeley, CA, USA, May 2019.
2. “From CRISPR Gene Editing to Group Structured Adversarial Learning”, **invited talk** at Conference on Information Sciences and Systems (CISS 2019), **Johns Hopkins University**, Baltimore, MA, USA, March 2019.
3. “Machine Learning Prediction of DNA Repair Outcomes”, poster at **Stanford Compression Workshop**, Stanford, CA, USA, February 2019.
4. “From CRISPR Gene Editing to Group Structured Adversarial Learning”, **invited talk** at ITA, **University of California**, San Diego, CA, USA, February 2019.
5. “Machine Learning meets CRISPR Gene Editing”, **invited talk** at Electrical and Computer Engineering Department, **Rice University**, Houston, TX, USA, October 2018.
6. “MISSION: Ultra Large-Scale Feature Selection using Count Sketches”, talk at The Thirty-fifth International Conference on Machine Learning (**ICML**), Stockholm, Sweden, July 2018.
7. “Insense: Incoherent Sensor Selection for Sparse Signals”, poster at International Conference on Acoustics, Speech and Signal Processing (**ICASSP**), Calgary, Canada, April 2018.
8. “RHash: Robust hashing via  $\ell_\infty$ -norm Distortion”, talk at The Twenty-Sixth International Joint Conference on Artificial Intelligence (**IJCAI**), Melbourne, Australia, August 2017.
9. “Machine Learning in Large-scale Genomic: Sensing, Processing, and Analysis”, **invited talk** at Electrical Engineering Department, **Stanford University**, Stanford, CA, USA, May 2017.
10. “Universal microbial diagnostics using random DNA probes”, **invited talk** at Computer Science and Artificial Intelligence Laboratory (CSAIL), **MIT**, Cambridge, MA, USA, March 2017.

11. "Universal microbial diagnostics using random DNA probes", invited talk at **The Broad Institute**, Cambridge, MA, USA, March 2017.
12. "Machine Learning in Large-scale Genomics: Sensing, Processing, and Analysis", talk at School of Public Health, **Harvard University**, Cambridge, MA, USA, February 2017.
13. "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. (NIPS), 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*

**Mentoring:** Alex DeWeese (Undergrad at UC Berkeley), Farzan Farnia (Graduate Student at Stanford University), CJ Barberan (Graduate Student at Rice University)

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

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

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

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

**Rebekah Drezek:** Professor of BioE at Rice University.