FARZAD HASSANZADEH FARNOUD

Associate Professor
Department of Electrical & Computer Engineering
Department of Computer Science
University of Virginia

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a. Experience

Associate Professor August 2023–present
Assistant Professor August 2016–2023
Department of Electrical & Computer Engineering
Department of Computer Science (since 2017)
University of Virginia

b. Education

California Institute of Technology, Pasadena, CA 2013–2016
Postdoctoral Training in Electrical Engineering
Advisor: Prof. Jehoshua Bruck

University of Illinois at Urbana-Champaign, Urbana, IL May 2013
Ph.D. in Electrical and Computer Engineering
Thesis Title: *Distances on Rankings: from Social Choice to Flash Memories*

University of Illinois at Urbana-Champaign, Urbana, IL Dec. 2012
M.Sc. in Mathematics

University of Toronto, Toronto, ON, Canada Aug. 2008
M.Sc. in Electrical and Computer Engineering
Thesis Title: *Reliable Broadcast of Safety Messages in Vehicular Ad hoc Networks*

Sharif University of Technology, Tehran, Iran July 2006
B.Sc. in Electrical Engineering

c. Awards & Honors

- ◇ CAREER Award, National Science Foundation 2022
- ◇ Outstanding Teacher Award, University of Virginia, Electrical and Computer Engineering Department 2018
- ◇ IEEE Data Storage Best Student Paper Award 2014
- ◇ Robert T. Chien Memorial Award, 2013
  presented by UIUC to one Ph.D. candidate in ECE for *demonstrating excellence in research*.
- ◇ Member of Phi-Kappa-Phi honor society 2009
- ◇ Rogers Graduate Scholar, University of Toronto 2007
- ◇ Granted Admission to Graduate Program of EE Dept. at Sharif University 2005
  without Entrance Exam (Through Exceptional Talents Admissions Office)
- ◇ Ranked 14 among over 300,000 contestants in Iran's National Universities Entrance Exam 2002
  Ranked 1 in the Province of Khorasan
- ◇ Silver Medalist in Iran's National Physics Olympiad 2001

d. Publications

My advisees are underlined. Submitted work is denoted by $*$.

Peer-Reviewed Journal Publications

27. ($*$) S. Wang, Y. Tang, J. Sima, R. Gabrys, and **F. Farnoud**, "Non-binary Codes for Correcting a Burst of at Most t Deletions," Submitted to *IEEE Trans. Information Theory*, Available: https://doi.org/10.48550/arXiv.2210.11818, Oct. 2022.

26. Y. Tang, S. Wang, H. Lou, R. Gabrys, and **F. Farnoud**, "Low-Redundancy Codes for Correcting Multiple Short-Duplication and Edit Errors," *IEEE Trans. Information Theory*, Available: https://doi.org/10.1109/TIT.2022.3233733, Jan. 2023 (early access).

25. H. Lou and **F. Farnoud**, "Data Deduplication with Random Substitutions," *IEEE Trans. Information Theory*, Available: https://doi.org/10.1109/TIT.2022.3176778, May 2022.

24. Y. Tang and **F. Farnoud**, "Error-Correcting Codes for Short Tandem Duplication and Edit Errors," *IEEE Trans. Information Theory*, Available: https://doi.org/10.1109/TIT.2021.3125724, Feb. 2022.

23. L.J. Dunphy, G.L. Kolling, M.L. Jenior, J. Carroll, A.E. Attai, **F. Farnoud**, A.J. Mathers, M.A. Hughes, J.A. Papin, "Multidimensional Clinical Surveillance of Pseudomonas aeruginosa Reveals Complex Relationships between Isolate Source, Morphology, and Antimicrobial Resistance," *mSphere*, Available: https://doi.org/10.1128/mSphere.00393-21, July 2021.

22. Y. Tang and **F. Farnoud**, "Error-correcting Codes for Noisy Duplication Channels," *IEEE Trans. Information Theory*, Available: https://doi.org/10.1109/TIT.2021.3059095, Feb. 2021.

21. Y. Tang, Y. Yehezkeally, M. Schwartz, and **F. Farnoud**, "Single-Error Detection and Correction for Duplication and Substitution Channels," *IEEE Trans. Information Theory*, Available: https://doi.org/10.1109/TIT.2020.3006228, Nov. 2020.

20. H. Lou, **F. Farnoud**, M. Schwartz, and J. Bruck, "Evolution of k-mer Frequencies and Entropy in Duplication and Substitution Mutation Systems," *IEEE Trans. Information Theory*, Available: https://doi.org/10.1109/TIT.2019.2946846, May, 2020.

19. O. Elishco, **F. Farnoud**, M. Schwartz, and J. Bruck, "The Entropy Rate of Some Pólya String Models," *IEEE Trans. Information Theory*, Available: https://doi.org/10.1109/TIT.2019.2936556, Dec. 2019.

18. R. Gabrys, **F. Farnoud**, "Reconciling Similar Sets of Data," *IEEE Trans. Communications*, Available: https://doi.org/10.1109/TCOMM.2019.2910578, Aug. 2019.

17. **F. Farnoud**, M. Schwartz, and J. Bruck, "Estimation of Duplication History under a Stochastic Model for Tandem Repeats," *BMC Bioinformatics*, Available: https://doi.org/10.1186/s12859-019-2603-1, Feb. 2019.

16. N. Alon, J. Bruck, **F. Farnoud**, and S. Jain, "Duplication Distance to the Root for Binary Sequences," *IEEE Trans. Information Theory*, vol. 63, Dec. 2017.

15. **F. Farnoud**, O. Milenkovic, G. J. Puleo, and L. Su, "Computing Similarity Distances Between Rankings," *Discrete Applied Mathematics*, vol. 232., Dec. 2017.

14. S. Jain, **F. Farnoud**, and J. Bruck, "Capacity and Expressiveness of Genomic Tandem Duplication" *IEEE Trans. Information Theory*, vol. 63, Oct. 2017.

13. S. Jain, **F. Farnoud**, M. Schwartz, and J. Bruck, "Duplication-Correcting Codes for Data Storage in the DNA of Living Organisms," *IEEE Trans. Information Theory*, vol. 63, Aug. 2017.

12. **F. Farnoud**, E. Yaakobi, and J. Bruck, "Approximate Sorting of Data Streams with Limited Storage," *J. Combinatorial Optimization*, 32(4), Nov. 2016.

11. **F. Farnoud**, M. Schwartz, and J. Bruck, "The Capacity of String-Duplication Systems," *IEEE Trans. Information Theory*, vol. 62, Feb. 2016.

10. **F. Farnoud**, M. Schwartz, and J. Bruck, "Bounds for Permutation Rate-Distortion," *IEEE Trans. Information Theory*, vol. 62, Feb. 2016.

9. R. Gabrys, E. Yaakobi, **F. Farnoud**, F. Sala, J. Bruck, and L. Dolecek, "Codes Correcting Erasures and Deletions for Rank Modulation," *IEEE Trans. Information Theory*, vol. 62, Jan. 2016.

8. M. Kim, X. Zhang, J.G. Ligo, **F. Farnoud**, V.V. Veeravalli, and O. Milenkovic, "MetaCRAM: An Integrated Pipeline for Metagenomic Data Processing and Compression," *BMC Bioinformatics*, Feb. 2016.

7. M. Kim, **F. Farnoud**, and O. Milenkovic, "HyDRA: Gene Prioritization via Hybrid Distance-Score Rank Aggregation," *Bioinformatics*, 31(7):1034–1043, 2015.

6. **F. Farnoud**, and O. Milenkovic, "An Axiomatic Approach to Constructing Distances for Rank Comparison and Aggregation," *IEEE Trans. Information Theory*, vol. 60, Oct. 2014.

5. **F. Farnoud** and O. Milenkovic, "Multipermutation Codes in the Ulam Metric for Nonvolatile Memories," *IEEE J. Selected Areas in Communications*, vol. 32, May 2014, ***IEEE Data Storage Best Student Paper Award for 2014***.

4. **F. Farnoud**, V. Skachek, and O. Milenkovic, "Error-Correction in Flash Memories via Codes in the Ulam Metric," *IEEE Trans. Information Theory*, vol. 59, May 2013.

3. **F. Farnoud** and O. Milenkovic, "Sorting of Permutations by Cost-Constrained Transpositions," *IEEE Trans. Information Theory*, vol. 58, Jan. 2012.

2. S.M.S.T. Yazdi, S.A. Savari, G. Kramer, K. Carlson, and **F. Farnoud**, "On the Multimessage Capacity Region for Undirected Ring Networks," *IEEE Trans. Information Theory*, vol. 56, Apr. 2010.

1. **F. Farnoud**, M. Ibrahimi, and J. Salehi, "A Packet-Based Photonic Label Switching Router for a Multirate All-Optical CDMA-Based GMPLS Switch," *IEEE J. Selected Topics in Quantum Electronics*, vol. 13, May 2007.

Selected Conference Publications

4. H. Lou, T. Jin, Y. Wu, P. Xu, Q. Gu, **F. Farnoud**, "Active Ranking without Strong Stochastic Transitivity," *Conference on Neural Information Processing Systems (NeurIPS)*, Available: https://openreview.net/pdf?id=Vhd-jh9B8Hc, New Orleans, Louisiana, Nov. 2022, Acceptance Rate: **25.6%**.

3. Y. Wu, T. Jin, H. Lou, **F. Farnoud**, Q. Gu, "Adaptive Sampling for Heterogeneous Rank Aggregation from Noisy Pairwise Comparisons," In *Proc. Artificial Intelligence and Statistics (AISTATS)*, Available: https://arxiv.org/abs/2110.04136, Virtual, Mar. 2022, Acceptance Rate: **29.2%** (492/1685).

2. T. Jin, P. Xu, Q. Gu, **F. Farnoud**, "Rank Aggregation via Heterogeneous Thurstone Preference Models," In *Proc. AAAI Conference on Artificial Intelligence*, Available: https://arxiv.org/abs/1912.01211, New York, NY, Feb. 2020, Acceptance Rate: 20.6%, **Oral est. 4.5%** (348/7737).

1. **F. Farnoud** and S. Valaee, "Reliable Broadcast of Safety Messages in Vehicular Ad Hoc Networks," In *Proc. IEEE INFOCOM*, Rio de Janeiro, Brazil, Apr. 2009, Acceptance Rate: **19.7%**.

Complete List of Peer-Reviewed Conference Publications

Acceptance rate is given when available. ISIT does not provide an acceptance rate, but it is the flagship conference in Information Theory.

49. H. Lou, T. Jin, Y. Wu, P. Xu, Q. Gu, **F. Farnoud**, "Active Ranking without Strong Stochastic Transitivity," *Conference on Neural Information Processing Systems (NeurIPS)*, Available: https://openreview.net/pdf?id=Vhd-jh9B8Hc, New Orleans, Louisiana, Nov. 2022, Acceptance Rate: 25.6%.

48. S. Wang, Y. Tang, R. Gabrys and **F. Farnoud**, "Permutation Codes for Correcting a Burst of at Most t Deletions," In Proc. *58th Allerton Conf. Communication, Control, and Computing*, Monticello, Illinois, Sep. 2022.

47. H. Lou, **F. Farnoud**, "Universal Compression of Large Alphabets With Constrained Compressors," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Espoo, Finland, June 2022.

46. Y. Tang, S. Wang, R. Gabrys and **F. Farnoud**, "Correcting Multiple Short Duplication and Substitution Errors," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Espoo, Finland, June 2022.

45. Y. Wu, T. Jin, H. Lou, **F. Farnoud**, Q. Gu, "Adaptive Sampling for Heterogeneous Rank Aggregation from Noisy Pairwise Comparisons," In *Proc. Artificial Intelligence and Statistics (AISTATS)*, Available: https://arxiv.org/abs/2110.04136, Virtual, Mar. 2022, Acceptance Rate: 29.2% (492/1685).

44. Y. Tang, H. Lou and **F. Farnoud**, "Correcting Deletion Errors in DNA Data Storage with Enzymatic Synthesis," In *Proc. IEEE Information Theory Workshop (ITW)*, Melbourne, Australia, July 2021.

43. Y. Tang, **F. Farnoud**, "Error-correcting Codes for Short Tandem Duplications and At Most p Substitutions," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Kanazawa, Japan, Oct. 2021.

42. H. Lou and **F. Farnoud**, "Asymptotic Analysis of Data Deduplication with a Constant Number of Substitutions," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Melbourne, Australia, July 2021.

41. S. Wang, J. Sima and **F. Farnoud**, "Non-binary Codes for Correcting a Burst of at Most 2 Deletions," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Melbourne, Australia, July 2021.

40. Y. Wang, H. Lou, P. Kumar, A. Dutta and **F. Farnoud**, "Efficient Search of Circular Repeats and MicroDNA Reintegration in DNA Sequences," In *Proc. IEEE 20th Int. Conf. Bioinformatics and Bioengineering (BIBE)*, Cincinnati, OH, Oct. 2020, Acceptance Rate: 32%.

39. Y. Tang and **F. Farnoud**, "Error-correcting Codes for Short Tandem Duplication and Substitution Errors," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Los Angeles, CA, June 2020.

38. H. Lou and **F. Farnoud**, "Data Deduplication with Random Substitutions," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Los Angeles, CA, June 2020.

37. S. Jain, **F. Farnoud**, M. Schwartz, and J. Bruck, "Coding for Optimized Writing Rate in DNA Storage," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Los Angeles, CA, June 2020.

36. T. Jin, P. Xu, Q. Gu, **F. Farnoud**, "Rank Aggregation via Heterogeneous Thurstone Preference Models," In *Proc. AAAI Conference on Artificial Intelligence*, Available: https://arxiv.org/abs/1912.01211, New York, NY, Feb. 2020, Acceptance Rate: 20.6%, **Oral est. 4.5%** (348/7737).

35. H. Lou, **F. Farnoud**, "Finite-Time Behavior of k-mer Frequencies and Waiting Times in Noisy-Duplication Systems," In *Proc. Asilomar Conference on Signals, Systems, and Computers*, Monterey, CA, Nov. 2019.

34. Y. Tang, **F. Farnoud**, "Error-correcting Codes for Noisy Duplication Channels," In *Proc. Allerton Conference on Communication, Control, and Computing*, Monticello, IL, Sep. 2019.

33. Y. Tang, Y. Yehezkeally, M. Schwartz, **F. Farnoud**, "Single-Error Detection and Correction for Duplication and Substitution Channels," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Paris, France, July 2019.

32. H. Lou, M. Schwartz, **F. Farnoud**, "Evolution of N-gram frequencies under duplication and substitution mutations," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, pp. 2246–2250, Vail, Colorado, June 2018.

31. R. Gabrys, **F. Farnoud**, "Reconciling Similar Sets," In *Proc. 55th Annual Allerton Conference on Communication, Control, and Computing (Allerton)*, Monticello, IL, Oct. 2017.

30. S. Jain, **F. Farnoud**, M. Schwartz, and J. Bruck, "Noise and Uncertainty in String-Duplication Systems," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Aachen, Germany, June 2017.

29. N. Alon, J. Bruck, **F. Farnoud**, and S. Jain, "On the Duplication Distance of Binary Strings," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Barcelona, Spain, July 2016.

28. S. Jain, **F. Farnoud**, M. Schwartz, and J. Bruck, "Duplication-Correcting Codes for Data Storage in the DNA of Living Organisms," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Barcelona, Spain, July 2016.

27. O. Elishco, **F. Farnoud**, M. Schwartz, and J. Bruck, "The Capacity of Some Polya String Models," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Barcelona, Spain, July 2016.

26. **F. Farnoud**, M. Schwartz, and J. Bruck, "A Stochastic Model for Genomic Interspersed Duplication," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Hong Kong, China, June 2015.

25. S. Jain, **F. Farnoud**, and J. Bruck, "Capacity and Expressiveness of Genomic Tandem Duplication," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Hong Kong, China, June 2015.

24. R. Gabrys, and **F. Farnoud**, "Reconciling Similar Sets of Data," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Hong Kong, China, June 2015.

23. **F. Farnoud**, E. Yaakobi, and J. Bruck, "Approximate Sorting of Data Streams with Limited Storage," In *Proc. Computing and Combinatorics Conf. (COCOON)*, Atlanta, GA, Aug. 2014, Acceptance Rate: 41.6%.

22. **F. Farnoud**, M. Schwartz, and J. Bruck, "The Capacity of String-Duplication Systems," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Honolulu, HI, June 2014.

21. **F. Farnoud**, M. Schwartz, and J. Bruck, "Bounds for Permutation Rate-Distortion," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Honolulu, HI, June 2014.

20. **F. Farnoud** and O. Milenkovic, "Multipermutation Codes in the Ulam Metric," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Honolulu, HI, June 2014.

19. L. Su, **F. Farnoud**, and O. Milenkovic, "Similarity Distances between Permutations," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Honolulu, HI, June 2014.

18. R. Gabrys, E. Yaakobi, **F. Farnoud**, F. Sala, J. Bruck, and L. Dolecek, "Single-Deletion-Correcting Codes over Permutations," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Honolulu, HI, June 2014.

17. R. Gabrys, E. Yaakobi, **F. Farnoud**, and J. Bruck, "Codes Correcting Erasures and Deletions for Rank Modulation," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Honolulu, HI, June 2014.

16. M. Kim, F. Raisali, **F. Farnoud**, and O. Milenkovic, "Gene Prioritization via Weighted Kendall Rank Aggregation," In *Proc. IEEE Int. Workshop on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP)*, Dec. 2013.

15. M. Kim, J.G. Ligo, A. Emad, **F. Farnoud**, O. Milenkovic, and V.V. Veeravalli, "MetaPar: Metagenomic Sequence Assembly via Iterative Reclassification," In *Proc. IEEE Global Conf. Signal and Information Processing (GlobalSIP)*, Dec. 2013.

14. **F. Farnoud**, O. Milenkovic, "Aggregating Rankings with Positional Constraints," In *Proc. IEEE Information Theory Workshop (ITW)*, Seville, Spain, Sep. 2013.

13. **F. Farnoud**, E. Yaakobi, O. Milenkovic, and J. Bruck, "Building Consensus via Iterative Voting," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Istanbul, Turkey, Jul. 2013.

12. F. Raisali, **F. Farnoud**, and O. Milenkovic, "Weighted Rank Aggregation via Relaxed Integer Programming," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Istanbul, Turkey, Jul. 2013.

11. B. Touri, **F. Farnoud**, A. Nedich, and O. Milenkovic, "A General Framework for Distributed Vote Aggregation," In *Proc. American Control Conf.*, Washington, DC, Jun. 2013.

10. **F. Farnoud**, N.P. Santhanam, and O. Milenkovic, "Alternating Markov Chains for Distribution Estimation in the Presence of Errors," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Boston, MA, Jul. 2012.

9. **F. Farnoud**, V. Skachek, and O. Milenkovic, "Rank Modulation for Translocation Error Correction," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Boston, MA, Jul. 2012.

8. **F. Farnoud**, B. Touri, and O. Milenkovic, "Nonuniform Vote Aggregation Algorithms," In *Proc. IEEE Int. Conf. Signal Processing and Communications (SPCOM)*, Bangalore, India, Jul. 2012.

7. **F. Farnoud** and O. Milenkovic, "Decomposing Permutations via Cost-Constrained Transpositions," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Saint Petersburg, Russia, Jul./Aug. 2011.

6. **F. Farnoud**, C.-Y. Chen, O. Milenkovic, and N. Kashyap, "A Graphical Model for Computing the Minimum Cost Transposition Distance," In *Proc. IEEE Information Theory Workshop (ITW)*, Dublin, Ireland, Aug./Sep. 2010.

5. **F. Farnoud**, O. Milenkovic, and N. Santhanam, "Small-Sample Distribution Estimation over Sticky Channels," In *Proc. IEEE Int. Symp. Information Theory (ISIT)*, Jun./Jul. 2009.

4. **F. Farnoud** and S. Valaee, "Reliable Broadcast of Safety Messages in Vehicular Ad Hoc Networks," In *Proc. IEEE INFOCOM*, Rio de Janeiro, Brazil, Apr. 2009, Acceptance Rate: 19.7%.

3. **F. Farnoud** and S. Valaee, "Repetition-Based Broadcast in Vehicular Ad Hoc Networks in Rician Channel with Capture," In *Proc. IEEE INFOCOM Workshops*, Phoenix, AZ, Apr. 2008.

2. **F. Farnoud**, B. Hassanabadi, and S. Valaee, "Message Broadcast Using Optical Orthogonal Codes in Vehicular Communication Systems," In *Proc. ACM Int. Workshop on Wireless Networking for Intelligent Transportation Systems*, Vancouver, BC, Aug. 2007.

1. S. Yazdi, S. Savari, **F. Farnoud**, and G. Kramer, "A Multimessage Capacity Region for Undirected Ring Networks," In *Proc. IEEE Int. Symp. Information Theory*, Nice, France, June 2007.

e. Graduate Students

Doctoral Students:

- ◇ Hao Lou, Graduate Research Assistant, ECE, UVA, Joined Aug. 2017, Qual exam passed in Fall 2018, Proposal exam passed in Fall 2021, *Defense exam passed* in Fall 2022, Awarded UVA's *Teaching Fellowship* in Fall 2022, Expected graduation: Spring 2023.
- ◇ Yuanyuan Tang, Graduate Research Assistant, ECE, UVA, Joined Aug. 2018, Qual exam passed in Spring 2019, Proposal exam passed in Summer 2022, Expected graduation: Summer 2023.
- ◇ Kallie Whritenour, Graduate Research Assistant, CS, UVA, Joined July 2019, Qual exam passed in Summer 2022, Expected graduation: Summer 2024.
- ◇ Tao Jin, Graduate Research Assistant, CS, UVA, Joined Jan. 2018, First phase of Qual exam passed in Summer 2022, Expected graduation: Summer 2024.
- ◇ Sarvin Motamen, Graduate Research Assistant, ECE, UVA, Joined Aug. 2022, Expected graduation: Spring 2027.

f. External Research Grants

- ○ Organization: National Science Foundation. Award number: 2144974. Period of support: 10/1/2022–9/30/2027. Role: PI; Title: *CAREER: Model-based compression and probabilistic analysis of non-Markovian sequences*. Amount: $559,477.00 (Sole PI).
- ◇ Organization: National Science Foundation. Award number: 1908544. Period of support: 10/1/2019–9/30/2023. Role: CoPI. Title: *CIF: Small: Collaborative Research: Rank Aggregation with Heterogeneous Information Sources: Efficient Algorithms and Fundamental Limits*. Amount: $500,000 (Share: $250,000);

- ◇ Organization: National Science Foundation. Award number: 1816409; Period of support: 10/1/2018–9/30/2023. Role: PI. Title: *CIF: NSF-BSF: Small: Collaborative Research: Characterization and Mitigation of Noise in a Live DNA Storage Channel*. Amount: $499,999 (Share: $284,272);

- ◇ Organization: National Science Foundation. Award number: 1755773. Period of support: 3/15/2018–2/28/2022. Role: PI. Title: *CRII: CIF: Model-based Compression of Biological Sequences*. Amount: $175,000 (Sole PI).

In addition, I have received *two SEAS Research Innovation Awards* as PI (Total: 3 semesters of GRA support and 1.5 months of salary), two *SEAS Research Innovation Awards* as CoPI (1.5 semester GRA and 1 month of salary), and a *UVA Global Infectious Diseases Institute Award* as PI ($70,000).

g. Invited Talks

23. *Active ranking without strong stochastic transitivity*
Information Theory and Applications Workshop (ITA), San Diego, CA, Feb. 2023.

22. *Low-redundancy codes for correcting short-duplication and edit errors*
Information Theory and Applications Workshop (ITA), San Diego, CA, May 2022.

21. *Data compression and sequence analysis for two non-Markovian sources*
University of Minnesota, Minneapolis, Nov. 2021.

20. *Simultaneous correction of duplication and substitution errors in DNA storage*
Information Theory and Applications Workshop (ITA), San Diego, CA, Feb. 2020.

19. *On the entropy of biological sequences*
52nd Asilomar Conference on Signals, Systems and Computers, Pacific Grove, CA, Oct. 2018.

18. *Evolution of k-mer frequencies in stochastic mutation systems*
Information Theory and Applications Workshop (ITA), San Diego, CA, Feb. 2018.

17. *Duplication-Correcting Codes for Data Storage in DNA of Living Organisms*
Allerton Conf. on Communications Control and Computing, Allerton Retreat Center, Monticello, IL, Sep. 29, 2016.

16. *Stochastic and Information-theoretic Approaches to Analysis of Biological Data*

    - ◇ ECE, University of Virginia, Charlottesville, VA, May 2016
    - ◇ EE, University of Hawaii at Manoa, Honolulu, HI, Apr. 2016
    - ◇ EECS, University of Michigan, Ann Arbor, MI, Mar. 2016.
    - ◇ EE, University of Southern California, Los Angeles, CA, Mar. 2016.
    - ◇ ECEE, Arizona State University, Tempe, AZ, Mar. 2016.

15. *On Estimation of DNA Repeat Mutation Rates*
Information Theory and Applications Workshop (ITA), San Diego, CA, Feb. 2016.

14. *Stochastic Models for DNA Tandem Duplication*
Molecular Programming Project Workshop, University of Washington, WA, Jan. 2016.

13. *Diversity of biologically-inspired duplication systems*
Information Theory and Applications Workshop (ITA), San Diego, CA, Feb. 2015.

12. *Biological Diversity through Duplication: Combinatorial and Stochastic Models*

    - ◇ SEAS, Harvard University, Cambridge, MA, Jan. 23, 2015.
    - ◇ ECE, University of Houston, Houston, TX, Jan. 28, 2015.

11. *Biological Diversity through Duplication*
Molecular Programming Project Workshop, San Francisco, CA, Jan. 2015.

10. *On the Capacity of String-Duplication Systems and Genomic Duplication*
Asilomar Conf. on Signals, Systems, and Computers, Pacific Grove, CA, Nov. 2014.

9. *Approximate Sorting for Streams and Preference Rankings with Limited Storage*
Allerton Conf. on Communications, Control, & Computing, Monticello, IL, Oct. 2014.

8. *Sorting Big Data with Small Memory*
Information Theory and Applications Workshop (ITA), San Diego, CA, Feb. 2014.

7. *Approximate Sorting of Data Streams with Limited Storage*
   - ◇ Conf. in Information Sciences & Systems (CISS), Princeton University, NJ, Mar. 2014
   - ◇ Comm. Seminars, CSL, University of Illinois at Urbana-Champaign, IL, May 2014.

6. *Fewer Axioms for a More Flexible Distance between Rankings*
NIPS Workshop on Social Choice: Theory and Practice, Lake Tahoe, NV, Dec. 2012.

5. *A Constrained Distance-based Approach to Social Choice*
Psychology Department, University of Illinois at Urbana-Champaign, IL, Nov. 2012.

4. *Rank Modulation Codes for Translocation Errors*
   - ◇ EE, Caltech, Pasadena, CA, Apr. 2012.
   - ◇ EE, UCLA, Los Angeles, CA, Apr. 2012.

3. *A Novel Distance Measure for Rank Aggregation*
CommNetS Seminars, USC, CA, Apr. 2012

2. *Novel Measures for Rank Aggregation*
Information Theory and Applications Workshop (ITA), San Diego, CA, Feb. 2012.

1. *Sorting of Permutations by Cost-Constrained Transposition*
AFOSR Complex Networks Review, Arlington, VA, Dec. 2010.

h. Professional Service

Conference Organization

- ◇ IEEE Information Theory Workshop (ITW), Mumbai, India, Nov. 2022, Technical Program Committee Member
- ◇ IEEE Global Communications Conference: Selected Areas in Communications: Cloud Computing, Networking and Storage (Globecom SAC CLOUD), Rio De Janeiro, Brazil, Dec. 2022, Technical Program Committee Member
- ◇ IEEE Global Communications Conference: Selected Areas in Communications: Cloud & Fog/Edge Computing, Networking and Storage (Globecom SAC CCNS), Madrid, Spain, Dec. 2021, Technical Program Committee Member
- ◇ IEEE Information Theory Workshop (ITW), Riva del Garda, Italy, Sep. 2020, Technical Program Committee Member
- ◇ IEEE Global Communications Conference: Selected Areas in Communications: Cloud & Fog/Edge Computing, Networking and Storage (Globecom SAC CCNS), Taiwan, Dec. 2020, Technical Program Committee Member
- ◇ IEEE Global Communications Conference: Selected Areas in Communications: Cloud & Fog/Edge Computing, Networking and Storage (Globecom SAC CCNS), Puako, HI, 2019, Technical Program Committee Member

◇ International Symposium on Information Theory (ISIT), Paris, 2019, Technical Program Committee Member

◇ Non-volatile Memories Workshop (NVMW), UC San Diego, 2019, Technical Program Committee Member

◇ Asilomar Conf. on Signals, Systems, and Computers 2014, Co-organizer and chair of the session "Bioinformatics and DNA Computing"

◇ Allerton 2014, Co-organizer and chair of the session "Topics in Machine Learning"

◇ Conference on Information Sciences and Systems (CISS) 2014, Co-organizer of the session "Ordinal and Social Science Data Processing"

◇ Allerton 2013, Co-organizer and chair of the session "Information Aggregation Over Social Networks"

Journal and Conference Reviewer

◇ IEEE Transactions on Information Theory, 2014–2022

◇ IEEE Transactions on Communications, 2017, 2019

◇ PLOS One, 2019

◇ Transactions on Algorithms, 2018

◇ Gene 2017

◇ IEEE Transactions on Emerging Topics in Computing 2016

◇ IEEE Transactions on Molecular, Biological, and Multi-Scale Communications 2015

◇ Journal of Mathematical Psychology 2015

◇ IEEE Trans. Emerging Topics in Computing, special issue on Approximate & Stochastic Computing Circuits, Systems and Algorithms 2015

◇ Journal of Combinatorial Optimization 2014

◇ IEEE Transactions on Vehicular Technology 2013

◇ IEEE Communication Letters 2011, 2018

◇ Conferences: ISIT' 22, ISIT '21, ISCA '20, ISIT '20, ISIT '19, ISIT'18, ISIT'17, ISIT'16, ITW'15, ISIT'14, ISIT'13, ITW'13, ISIT'12, ISIT'11, ISIT'09, ICC'09, CCNC'09, ICC'08, LCN'07, Globecom'07

Review Panels

- Jeffress Trust Awards Program in Interdisciplinary Research, Richmond, Virginia, Spring 2017–2021
- National Science Foundation, CISE, CRII-CIF, Dec. 2020