Shirin Saeedi Bidokhti

Curriculum Vitae, March 2023

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Education

- *Ph.D.*, Swiss Federal Institute of Technology (EPFL), Switzerland 2012
- *M.Sc.*, Swiss Federal Institute of Technology (EPFL), Switzerland 2007
- *B.Sc.*, University of Tehran, Iran 2005

Academic Positions Held

- University of Pennsylvania, Dept. Electrical and Systems Engineering (ESE) and secondary appointment in Dept. Computer and Information Science (CIS)
  - *Assistant Professor* 2019 - present
  - *Research Assistant Professor* 2017 - 2019
- Penn State University, Dept. Electrical Engineering, *Visiting Researcher* Apr 2017 - Jun 2017
- Stanford University, Dept. Electrical Engineering, *Postdoctoral Scholar* 2015 - 2017
- Technical University of Munich, Dept. Electrical and Computer Engineering, *Postdoctoral Scholar* 2013 - 2015

Honors and Awards

- Goldsmith Lecturer Award 2021
- *NSF CAREER* award 2021
- NSF CISE Research Initiative (*NSF-CRII*) award 2018
- *Prospective & Advanced Researcher Fellowships*, Swiss National Science Foundation 2013-2016

Publications

Book Chapters

1. **Shirin Saeedi Bidokhti**, Roy Timo, Michele Wigger, "Rate Distortion Theory for Caching," chapter in *Edge Caching for Mobile Networks*, IET, 2021.

Journals

J1. H. Nikpey, J. Kim, X. Chen, S. Sarkar, **S. Saeedi Bidokhti**, "Group Testing with Correlation under Edge-Faulty Graphs," *IEEE Trans. Inf. Theory*, submitted, 2023 [ArXiv]

J2. M. Dikshtein, **S. Saeedi Bidokhti**, S. Shamai, "Duality and Bounds on the Capacity of the Diamond Channel with Cooperating Relays," *IEEE Trans. Inf. Theory*, submitted, 2023

J3. J. Kim, **S. Saeedi Bidokhti**, S. Sarkar, "Capturing COVID-19 Spread and Interplay with Multihop Contact Tracing Intervention, *PLOS ONE*, submitted, 2022

J4. X. Chen, H. Nikpey, J. Kim, S. Sarkar, **S. Saeedi Bidokhti**, "Containing a spread through sequential learning: to exploit or to explore?", *Transactions on Machine Learning Research (TMLR)*, accepted, Feb 2023

J5. E. Lei, H. Hassani, **S. Saeedi Bidokhti**, "Neural Estimation of the Rate-Distortion Function With Applications to Operational Source Coding," *J. Selected Areas in Inf. Theory*, accepted, 2023 [ArXiv]

J6. J. Kim, X. Chen, H. Nikpey, H. Rubin, **S. Saeedi Bidokhti**, S. Sarkar, "Tracing and testing multiple generations of contacts for COVID-19: cost-benefit tradeoffs," *Journal of the Royal Society Interface*, Oct 2022 [RSOS]

J7. X. Chen, K. Gatsis, H. Hassani, **S. Saeedi Bidokhti**, "Age of information in random access channels", *IEEE Trans. Inf. Theory* , vol. 68, no. 10, pp. 6548-6568, Oct 2022 [IEEE Xplore]

J8. **S. Saeedi Bidokhti**, M. Wigger, A. Yener, "Benefits of cache assignment on degraded broadcast channels," *IEEE Trans. Inf. Theory*, vol. 65, no. 11, pp. 6999-7019, Jul 2019 [IEEE Xplore]

J9. C-Y. Wang, **S. Saeedi Bidokhti**, M. Wigger, "Improved converses and gap-results for coded caching", *IEEE Trans. Inf. Theory* Vol. 64, no. 11, pp. 7051-7062, Nov. 2018, Nov 2018 [IEEE Xplore]

J10. M. Heindelmair, **S. Saeedi Bidokhti**, "Capacity regions of two-user broadcast erasure channels with feedback and memory," *IEEE Trans. Inf. Theory*, vol. 64, no. 7, pp. 5042 - 5069, Jul 2018 [IEEE Xplore]

J11. **S. Saeedi Bidokhti**, M. Wigger, R. Timo, "Noisy broadcast networks with receiver caching," *IEEE Trans. Inf. Theory* vol. 64, no. 11, pp. 6996 - 7016, May 2018 [IEEE Xplore]

J12. R. Timo, **S. Saeedi Bidokhti**, M. Wigger, B. Geiger, "A rate-distortion approach to caching," *IEEE Trans. Inf. Theory*, vol. 64, no. 3, pp. 1957 - 1976, Mar 2018 [IEEE Xplore]

J13. **S. Saeedi Bidokhti**, G. Kramer, S. Shamai, "Capacity bounds on the downlink of symmetric, multi-relay, single receiver C-RAN networks", *Entropy (special issue on Network Information Theory)*, vol. 19(11), no. 610, Nov 2017 [MDPI] **(Feature Paper)**

J14. **S. Saeedi Bidokhti**, G. Kramer, "Capacity bounds for diamond networks with an orthogonal broadcast channel," *IEEE Trans. Inf. Theory*, vol. 62(12), pp. 7103 - 7122, Dec 2016 [IEEE Xplore]

J15. **S. Saeedi Bidokhti**, V. M. Prabhakaran and S. Diggavi, "Capacity results for multicasting nested message sets over combination networks," *IEEE Trans. Inf. Theory*, vol. 62, no. 9, pp. 4968 - 4992, Sept 2016 [IEEE Xplore]

J16. **S. Saeedi Bidokhti**, V. M. Prabhakaran, "Is non-unique decoding necessary?" *IEEE Trans. Inf. Theory*, vol. 60, no. 5, pp. 2594-2610, May 2014 [IEEE Xplore]

Conferences

C1. R. Arghal, **S. Saeedi Bidokhti**, S. Sarkar, "Optimal Capacity-Constrained COVID-19 Vaccination for Heterogeneous Populations," *IEEE Conference on Decision and Control*, Mexico, 2022 [IEEE Xplore]

C2. E. Liu, H. Hassani, **S. Saeedi Bidokhti**, "Neural Estimation of the Rate-Distortion Function for Massive Datasets," *IEEE Int. Symp. Inf. Theory*, Finland, 2022 [IEEE Xplore]

C3. H. Nikpey, J. Kim, X. Chen, S. Sarkar, **S. Saeedi Bidokhti**, "Group Testing With Correlation via Edge-FaultyGraphs," *IEEE Int. Symp. Inf. Theory*, Finland, 2022 [IEEE Xplore]

C4. M. Dikshtein, **S. Saeedi Bidokhti**, S. Shamai, "Bounds on the Capacity of the Multiple Access Diamond Channel With Cooperating Base-Stations," *IEEE Int. Symp. Inf. Theory*, Finland, 2022 [IEEE Xplore]

C5. R. Arghal, E. Lei, **S. Saeedi Bidokhti**, "Robust Graph Neural Networks via Probabilistic Lipschitz Constraints," accepted in *Conference on Learning for Dynamics and Control (L4DC)*, USA, 2022 [PMLR]

C6. E. Liu, H. Hassani, **S. Saeedi Bidokhti**, "Out-of-distribution robustness in deep learning compression," *ICML Workshop on Information-Theoretic Methods for Rigorous, Responsible, and Reliable Machine Learning*, Jul 2021 [ArXiv] **(selected as one of the four contributed talks)**

C7. **S. Saeedi Bidokhti**, Aylin Yener, " On the timeliness of arithmetic coding," *IEEE Int. Symp. Inf. Theory*, Australia, 2021 [IEEE Xplore]

C8. X. Chen, R. Liu, S. Wang, **S. Saeedi Bidokhti**, "Timely broadcasting in erasure networks: age-rate tradeoffs," *IEEE Int. Symp. Inf. Theory*, Australia, 2021 [IEEE Xplore]

C9. X. Chen, X. Liao, **S. Saeedi Bidokhti**, "Real-time sampling and estimation on random access channels: Age of Information and Beyond", *INFOCOM*, 2021 [IEEE Xplore]

C10. X. Chen, Konstantinos Gatsis, Hamed Hassani, **S. Saeedi Bidokhti**, "Age of information in random access channels", *IEEE Int. Symp. Inf. Theory*, USA, 2020 [IEEE Xplore]

C11. X. Chen, **S. Saeedi Bidokhti**, "Benefits of coding on age of information in broadcast networks," *IEEE Inf. Theory Workshop*, Sweden, 2019 [IEEE Xplore]

C12. M. Fereydounian, X. Chen, H. Hassani, **S. Saeedi Bidokhti**, "Non-asymptotic coded slotted ALOHA", *IEEE Int. Symp. Inf. Theory*, France, 2019 [IEEE Xplore]

C13. K. Tatwawadi, **S. Saeedi Bidokhti**, T. Weissman, "On universal compression with random access," *IEEE Int. Symp. Inf. Theory*, USA, 2018 [IEEE Xplore]

C14. **S. Saeedi Bidokhti**, M. Wigger, Aylin Yener, A. El Gamal, "State-adaptive caching for symmetric broadcast channels," *Asilomar*, USA, 2017 **(Invited)** [IEEE Xplore]

C15. A. Lapidoth, **S. Saeedi Bidokhti**, M. Wigger, "Dependence balance in multiple access channels with correlated sources," *IEEE Int. Symp. Inf. Theory*, Germany, 2017 [IEEE Xplore]

C16. **S. Saeedi Bidokhti**, G. Kramer, S. Shamai, "Capacity bounds on the downlink of symmetric multi-relay, single receiver C-RAN networks," *IEEE Int. Symp. Inf. Theory*, Germany, 2017 [IEEE Xplore]

C17. C-Y Wang, **S. Saeedi Bidokhti**, M. Wigger, "Improved converses and gap-results for coded caching," *IEEE Int. Symp. Inf. Theory*, Germany, 2017 [IEEE Xplore]

C18. **S. Saeedi Bidokhti**, M. Wigger, A. Yener, "Benefits of cache-assignment on degraded broadcast channels," *IEEE Int. Symp. Inf. Theory*, Germany, 2017 [IEEE Xplore]

C19. **S. Saeedi Bidokhti**, M. Wigger, A. Yener, "Gaussian broadcast channels with receiver cache assignment," *Int. Conf. Communications*, France, 2017 [IEEE Xplore]

C20. **S. Saeedi Bidokhti**, M. Wigger, R. Timo, "An upper bound on the capacity-memory tradeoff of degraded broadcast channels," *Int. Symp. Turbo Codes & Iterative Inf. Processing*, France, 2016 [IEEE Xplore]

C21. **S. Saeedi Bidokhti**, R. Timo, M. Wigger, "Erasure broadcast networks with receiver caching," *IEEE Int. Symp. Inf. Theory*, Spain, 2016

C22. **S. Saeedi Bidokhti**, G. Kramer, "Capacity of two-relay diamond networks with rate-limited links to the relays and a binary adder multiple access channel," *IEEE Int. Symp. Inf. Theory*, Spain, 2016 [IEEE Xplore]

C23. R. Timo, **S. Saeedi Bidokhti**, M. Wigger, B. Geiger, "A rate-distortion approach to caching," *Int. Zurich Seminar on Comm.*, Switzerland, 2016 [ETH E-collection]

C24. M. Heindelmair, **S. Saeedi Bidokhti**, "Capacity regions of two-user broadcast erasure channels with feedback and hidden memory," *IEEE Int. Symp. Inf. Theory*, Hong Kong, 2015 [IEEE Xplore]

C25. M. Heindelmair, N. Reyhanian, **S. Saeedi Bidokhti**, "On the capacity region of the two-user broadcast packet erasure channel with feedback and memory," *Allerton Conf. Comm. Control and Computing*, USA, 2014 [IEEE Xplore]

C26. **S. Saeedi Bidokhti**, G. Kramer, "Capacity bounds for a class of diamond networks," *IEEE Int. Symp. Inf. Theory*, USA, 2014 [IEEE Xplore]

C27. **S. Saeedi Bidokhti**, G. Kramer, "An application of a wringing lemma to the multiple access channel with cooperative encoders," *Iran Workshop on Comm. and Inf. Theory*, Iran, 2014 [IEEE Xplore]

C28. **S. Saeedi Bidokhti**, V. M. Prabhakaran and S. Diggavi, "A block Markov encoding scheme for broadcasting nested message sets," *IEEE Int. Symp. Inf. Theory*, Turkey, 2013 [IEEE Xplore]

C29. **S. Saeedi Bidokhti**, V. M. Prabhakaran and S. Diggavi, "On multicasting nested message sets over combination networks," *IEEE Inf. Theory Workshop*, Switzerland, 2012 [IEEE Xplore]

C30. M. Gatzianas, **S. Saeedi Bidokhti**, C. Fragouli, "Feedback-based coding algorithms for broadcast erasure channels with degraded message sets," *IEEE Int. Symp. Network Coding*, USA, 2012 [IEEE Xplore]

C31. **S. Saeedi Bidokhti**, V. M. Prabhakaran, S. Diggavi, "Is non-unique decoding necessary?" *IEEE Int. Symp. Inf. Theory*, USA, 2012 [IEEE Xplore]

C32. S. Gheorghiu, **S. Saeedi Bidokhti**, C. Fragouli, A. Toledo, "Degraded multicasting with network coding over the combination network," *IEEE Int. Symp. Network Coding*, China, 2011 [IEEE Xplore]

C33. **S. Saeedi Bidokhti**, C. Fragouli, "Degraded two-message multicast over graphs," *IEEE Int. Symp. Inf. Theory*, Russia, 2011 [IEEE Xplore]

C34. **S. Saeedi Bidokhti**, S. Diggavi, C. Fragouli, V. M. Prabhakaran, "On degraded two-message set broadcast," *IEEE Inf. Theory Workshop*, Italy, 2009 [IEEE Xplore]

C35. M. Felegyhazi, M. Cagalj, **S. Saeedi Bidokhti**, J.-P. Hubaux, "Non-cooperative multi-radio channel allocation in wireless networks," *INFOCOM*, USA, 2007 [IEEE Xplore]

Theses

- **S. Saeedi Bidokhti**, Broadcasting and Multicasting Nested Message Sets. Ph.D thesis. EPFL, Dec 2012
- **S. Saeedi Bidokhti**, Quantum Information Theory. M.Sc. thesis. EPFL, Oct 2007
- **S. Saeedi Bidokhti**, Joint Routing and Compression in Sensor Networks. B.Sc. thesis. University of Tehran, Sept 2005

Fellowships and Grants

- NSF proposal 2047482, "CCF: CAREER: Real-Time Sampling, Estimation, and Inference in Networked Systems" (PI: Shirin Saeedi Bidokhti, Amount: $466,350, 2021 - 2026)
- NSF proposal 1910594, "CNS Core: Small: Collaborative Research: Attaining the New Frontier of Spectral Efficiency with Tradeoffs in Computation Through Cloud Radio Access Networks" (PI: Shirin Saeedi Bidokhti, Co/PIs: Saswati Sarkar, Wade Trappe, Amount: $500k, 2019 - 2022)
- NSF proposal CCF-1850356, "CRII: CIF: Practical and Timely Coded Caching for Dynamic and Volatile Networks" (PI: Shirin Saeedi Bidokhti, Amount: $175k, 2019 - 2021)
- Advanced PostDoc.Mobility Fellowship, Swiss National Science Foundation (Project-158487), "Information Theoretic Models and Codes for Cooperation in Networks" ($60k, 2015 - 2016)
- Prospective Researcher Fellowship, Swiss National Science Foundation (Project-14661), "Contrasting Demands over Multi-user Communication Systems" ($68k, 2013 - 2014)

Invited Talks

T1. Neural Estimation of Rate-Distortion Function

- *London Symposium of Information Theory*, UK, May 2023
- *ECE Seminar*, University of Delaware, USA, May 2023

T2. Real-time sampling and estimation: from IoT Markov processes to disease spread processes.

- *Signal and Information Processing Seminar Series*, Rutgers University, USA, Apr 2022
- *TILOS Seminar Series*, USA, Jan 2022
- *Advanced Networking Colloquium lecture series*, University of Maryland, USA, Dec 2021

T3. Real-time sampling and estimation in random access channels: Age of Information and Beyond, *University of Notre Dame*, USA, Dec 2020

T4. Information Freshness in Random Access Channels.

- *DLR-MIT-TUM Workshop on Coding and Random Access*, Germany, Feb 2020
- *Information Theory and Applications (ITA) Workshop*, USA, Feb 2020
- *University of British Columbia*, Canada, Dec 2019
- *University of Delaware*, USA, Nov 2019

T5. Caching and Coding in Networks: Rate-Efficiency, Age-Efficiency.

- *Georgia Institute of Technology*, USA, May 2019
- *University of Pennsylvania*, USA, Apr 2019

T6. Dependence balance in multiple access channels with correlated sources. *Information Theory and Applications (ITA) Workshop*, USA, Feb 2018

T7. Centralized processing and caching: architectures for future networks.

- *University of Notre Dame*, USA, Jul 2017
- *University of Maryland*, USA, Apr 2017
- *New Jersey Institute of Technology*, USA, Mar 2017
- *University of Pennsylvania*, USA, Feb 2017

T8. Caching in broadcast networks: cache assignment, coding schemes, and converse results.

- *Information Theory and Applications (ITA) Workshop*, USA, Feb 2017
- *Bell Labs, Murray Hill*, USA, Mar 2017

T9. Capacity bounds for diamond networks with an orthogonal broadcast channel.

- *Information Theory and Applications (ITA) Workshop*, USA, Feb 2016
- *Stanford University*, USA, Dec 2015
- *New York University*, USA, Nov 2015
- *Princeton University*, USA, Nov 2016

T10. Capacity regions of two-receiver broadcast packet erasure channels with feedback and memory.

- *Eurecom*, France, Sep 2015
- *Information Theory and Applications (ITA) Workshop*, USA, Feb 2015

Professional Service

- *Organizer of the 2023 North American Information Theory School*, IEEE Information Theory Society
- *Seminar Organizing Committee*, The Institute for Learning-Enabled Optimization at Scale (TILOS) 2021
- *Technical Program Committee (TPC) member*
  - IEEE International Symposium on Information Theory (ISIT) 2019, 2022,2023
  - IEEE Information Theory Workshop (ITW) 2022
  - IEEE International Conference on Communications (ICC) 2018, 2019, 2021
  - IEEE International Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOpt) 2021, 2022
  - IEEE Wireless Communications and Networking Conference (WCNC)2016, 2019, 2022,2023
- *Panelist* for NSF 2019, 2021
- University of Pennsylvania, ESE Department
  - *Curriculum Committee* 2021-2022
  - *Colloquium Committee* 2020, 2021
  - *PhD Admissions Committee* 2019, 2020
  - *Best Dissertation Committee* 2020

Teaching Experience

- ESE303: Stochastic Systems Analysis and Simulations Fall 2020, 2021, Spring 2023
- ESE674: Information Theory Fall 2018, Spring 2020, 2022
- ESE680: Information Freshness in Networks Fall 2019

Supervision

Dissertations/Theses Supervised

- Berkay Uslu (ESE, PhD student) Aug. 2022- 2026
- Xiaohan Zheng (ESE, PhD student) Aug. 2021- 2025
- Eric Lei (ESE, PhD student) Aug. 2020 - 2024
- Raghu Arghal (ESE, PhD student) Aug. 2020 - 2024
- Hesam Nikpey (CIS, PhD student) Aug. 2020 - 2024
- Xingran Chen (ESE, PhD student) Aug. 2018 - May 2023
- Vraj Shroff (ESE, Master student) Feb 2020- Jun 2021

Independent Studies and Summer Research Projects

- Michael Deng, Independet Study Spring 2019
- Yijie Zhao, Summer Research Project Summer 2019