Shirin Saeedi Bidokhti

Curriculum Vitae, August 2024

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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

- IEEE Communications Society & Information Theory Society Joint Paper Award 2023
- Goldsmith Lecturer Award 2021
- *NSF CAREER* award 2020
- NSF CISE Research Initiative (*NSF-CRII*) award 2018
- *Prospective & Advanced Researcher Fellowships*, Swiss National Science Foundation 2013-2016

Grants

- NSF grant 2112665, "AI Institute for Learning-Enabled Optimization at Scale (TILOS)" (Role: co-investigator in the networks team, Amount: 0.5 PhD student per year, 2021 - 2026)
- NSF grant 2047482, "CCF: CAREER: Real-Time Sampling, Estimation, and Inference in Networked Systems" (PI: Shirin Saeedi Bidokhti, Amount: $466,350, 2021 - 2026)
- NSF grant 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 grant 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)

Publications

Book Chapters

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

Submitted/In Preparation

1. Berkay Uslu, Samar Elaraby, **Shirin Saeedi Bidokhti**, Alejandro Ribeiro, "Learning Stochastic Wireless Policies via Generative Modeling," in preparation, September 2024
2. X. Zhang, S. Sarkar, **S. Saeedi Bidokhti**, "Sequential Testing for Network Cascade Estimation: When Social Opinions Matter", in preparation, 2024
3. R. Arghal, K. He, **S. Saeedi Bidokhti**, S. Sarkar, "Optimal Signal Precision Investment in Sequential Social Learning," in Preparation, 2024
4. H. Nikpey, S. Sarkar, **S. Saeedi Bidokhti**, "Group Testing with General Correlation," submitted, 2024
5. E. Liu, H. Hassani, **S. Saeedi Bidokhti**, "Approaching Rate-Distortion Limits in Neural Compression with Lattice Transform Coding," submitted, 2024 [ArXiv]
6. X. Chen, N. NaderiAlizadeh, A. Ribeiro, **S. Saeedi Bidokhti**, "Decentralized Learning Strategies for Estimation Error Minimization with Graph Neural Networks," submitted, 2024 [ArXiv]
7. M. Dikshtein, **S. Saeedi Bidokhti**, S. Shamai, "Duality and Bounds on the Capacity of the Diamond Channel with Cooperating Relays," submitted, 2023 [ArXiv]

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*, accepted, Sept 2024 [ArXiv]

J2. R. Arghal, Harvey Rubin, **S. Saeedi Bidokhti**, S. Sarkar, "Protect or prevent? A practicable framework for the dilemmas of COVID-19 vaccine prioritization," *PLOS ONE*, accepted, Sept 2024

J3. J. Kim, **S. Saeedi Bidokhti**, S. Sarkar, "Capturing COVID-19 Spread and Interplay with Multi-hop Contact Tracing Intervention, *PLOS ONE*, July 2023 [PLOS]

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)*, March 2023 [Open Review]

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*, December 2022 [IEEE Xplore]

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]
(IEEE Communications Society & Information Theory Society Joint Paper Award)

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. H. Nikpey, S. Sarkar, **S. Saeedi Bidokhti**, "Group Testing with General Correlation Using Hypergraphs," *IEEE Int. Symp. Inf. Theory*, 2024 [IEEEXplore]

C2. E. Liu, Y. Uslu, H. Hassani, **S. Saeedi Bidokhti**, "Text + Sketch: Image Compression at Ultra Low Rates," *ICML Workshop on Neural Compression*, USA, 2023 [Open Review]

C3. E. Lei, H. Hassani, **S. Saeedi Bidokhti**, "On a Relation Between the Rate-Distortion Function and Optimal Transport," *Tiny Papers @ICLR*, 2023 [Open Review]

C4. E. Lei, H. Hassani, **S. Saeedi Bidokhti**, "Federated Neural Compression Under Heterogeneous Data," *IEEE Int. Symp. Inf. Theory*, Taiwan, 2023 [IEEE Xplore]

C5. H. Nikpey, S. Sarkar, **S. Saeedi Bidokhti**, "Compression with Unlabeled Graph Side Information," *IEEE Int. Symp. Inf. Theory*, Taiwan, 2023 [IEEE Xplore]

C6. E. Lei, H. Hassani, **S. Saeedi Bidokhti**, "Neural Estimation of the Rate-Distortion Function for Massive Datasets," *IEEE Int. Symp. Inf. Theory*, Finland, 2022 [IEEE Xplore]

C7. 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]

C8. 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]

C9. 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]

C10. 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]

C11. 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)

C12. **S. Saeedi Bidokhti**, Aylin Yener, " On the timeliness of arithmetic coding," *IEEE Int. Symp. Inf. Theory*, Australia, 2021 [IEEE Xplore]

C13. 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]

C14. 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]

C15. 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]

C16. X. Chen, **S. Saeedi Bidokhti**, "Benefits of coding on age of information in broadcast networks," *IEEE Inf. Theory Workshop*, Sweden, 2019 [IEEE Xplore]

C17. M. Fereydounian, X. Chen, H. Hassani, **S. Saeedi Bidokhti**, "Non-asymptotic coded slotted ALOHA", *IEEE Int. Symp. Inf. Theory*, France, 2019 [IEEE Xplore]

C18. K. Tatwawadi, **S. Saeedi Bidokhti**, T. Weissman, "On universal compression with random access," *IEEE Int. Symp. Inf. Theory*, USA, 2018 [IEEE Xplore]

C19. **S. Saeedi Bidokhti**, M. Wigger, Aylin Yener, A. El Gamal, "State-adaptive caching for symmetric broadcast channels," *Asilomar*, USA, 2017 **(Invited)** [IEEE Xplore]

C20. 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]

C21. **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]

C22. 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]

C23. **S. Saeedi Bidokhti**, M. Wigger, A. Yener, "Benefits of cache-assignment on degraded broadcast channels," *IEEE Int. Symp. Inf. Theory*, Germany, 2017 [IEEE Xplore]

C24. **S. Saeedi Bidokhti**, M. Wigger, A. Yener, "Gaussian broadcast channels with receiver cache assignment," *Int. Conf. Communications*, France, 2017 [IEEE Xplore]

C25. **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]

C26. **S. Saeedi Bidokhti**, R. Timo, M. Wigger, "Erasure broadcast networks with receiver caching," *IEEE Int. Symp. Inf. Theory*, Spain, 2016

C27. **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]

C28. 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]

C29. 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]

C30. 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]

C31. **S. Saeedi Bidokhti**, G. Kramer, "Capacity bounds for a class of diamond networks," *IEEE Int. Symp. Inf. Theory*, USA, 2014 [IEEE Xplore]

C32. **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]

C33. **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]

C34. **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]

C35. 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]

C36. **S. Saeedi Bidokhti**, V. M. Prabhakaran, S. Diggavi, "Is non-unique decoding necessary?" *IEEE Int. Symp. Inf. Theory*, USA, 2012 [IEEE Xplore]

C37. 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]

C38. **S. Saeedi Bidokhti**, C. Fragouli, "Degraded two-message multicast over graphs," *IEEE Int. Symp. Inf. Theory*, Russia, 2011 [IEEE Xplore]

C39. **S. Saeedi Bidokhti**, S. Diggavi, C. Fragouli, V. M. Prabhakaran, "On degraded two-message set broadcast," *IEEE Inf. Theory Workshop*, Italy, 2009 [IEEE Xplore]

C40. 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

Invited Talks

T1. Neural Compression with Lattice Transform Coding
- *Communication Theory Workshop*, Canada, May 2024
- *Conference on Information Sciences and Systems (CISS)*, Princeton, March 2023
- *International Zurich Seminar (IZS)*, ETH Zurich, Switzerland, March 2023
- *Information Theory and Applications (ITA) Workshop*, USA, Feb 2023

T2. Age of Information in Random Access Channels, (semi-plenary) award session, ITA 2024

T3. Learning-Based Data Compression: Fundamental limits and Algorithms
- Rutgers University, ECE Colloquium, Sept 2024
- *IWCIT*, Iran, May 2024
- Stanford's IT Forum, Nov 2023

T4. Neural Estimation of Rate-Distortion Function
- *London Symposium of Information Theory*, UK, May 2023
- *ECE Seminar*, University of Delaware, USA, May 2023

T5. 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

T6. Real-time sampling and estimation in random access channels: Age of Information and Beyond, *University of Notre Dame*, USA, Dec 2020

T7. 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

T8. Caching and Coding in Networks: Rate-Efficiency, Age-Efficiency.
- *Georgia Institute of Technology*, USA, May 2019
- *University of Pennsylvania*, USA, Apr 2019

T9. Dependence balance in multiple access channels with correlated sources. *Information Theory and Applications (ITA) Workshop*, USA, Feb 2018

T10. 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

T11. 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

T12. 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

T13. 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

- *Co-organizer of the 2023 North American Information Theory School*, IEEE Information Theory Society 2023
- *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, 2022,2023,2024
  - INFOCOM ASoI 2024
  - 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, 2024
  - IEEE Wireless Communications and Networking Conference (WCNC) 2016, 2019, 2022,2023
- *Panelist* for NSF 2019, 2021, 2022
- University of Pennsylvania, ESE Department
  - *Curriculum Committee* 2021-2022
  - *Colloquium Committee* 2020, 2021
  - *PhD Admissions Committee* 2019, 2020
  - *Best Dissertation Committee* 2020
- Dissertation Committee Member/Chair/Examiner
  - Vinicius Lima (UPenn) April 2023
  - Mohammad Hatami (University of Oulu, Finlind) April 2023
  - Jungyeol Kim (UPenn) Nov 2022
  - Mohammad Moltafet (University of Oulu,Finlind) March 2021

Teaching Experience

- ESE303: Stochastic Systems Analysis and Simulations Fall 2020, 2021, Spring 2023, Fall 2023
- ESE674: Information Theory Fall 2018, Spring 2020, 2022, 2024
- ESE680: Information Freshness in Networks Fall 2019
- EAS 0027: Engineering Complex Networks Summer 2023, 2024

Supervision

PhD Students

- Jinheng Zhang — Aug 2024- 2029
- Berkay Uslu (ESE, PhD student) — Aug 2022- 2027
- Xiaohan Zheng (ESE, PhD student) — Aug 2021- 2026
- Raghu Arghal (ESE, PhD student) — Aug 2020 - 2025
- Eric Lei (ESE, PhD student) — Aug 2020 - 2025
  - Recipient of an NSF Graduate Research Fellowship — 2020-2024
  - Recognized as one of the four contributed talks at ICML Workshop on Information-Theoretic MEthods for Rigorous, Responsible, and Reliable Machine Learning — 2021
- Hesam Nikpey (CIS, PhD student) — Aug. 2020 - 2025
- Xingran Chen (ESE, PhD student) — Aug. 2018 - Jun 2023
  - Joined University of Electronic Science and Technology in China as an Assistant Professor
  - Recipient of IEEE Communications Society & Information Theory Society Joint Paper Award 2023
  - Recipient of an IEEE INFOCOM Student Conference Award — 2021
  - Recipient of an IEEE ISIT Student Travel Grant — 2019

Undergraduate/Graduate Research

- Dominic Olaguera-Delogu, Undergraduate Research — Jan 2024- present
- Noah Schwab, Undergraduate Research — Jan 2024- Jun 2024
- Enzo Bergamo, Undergraduate Research — May 2023- Oct 2023
- Renpu Liu, Master's Research Project — Mar 2021-Aug 2021
- Shaochong Wang, Master's Research Project — Mar 2021-Aug 2021
- Vraj Shroff, Master's Research Project — Feb 2020- Jun 2020
- Michael Deng, Independent Study — Spring 2019
- Yijie Zhao, Summer Research Project — Summer 2019