Farhad Shirani Chaharsooghi

Contact Information

ECE Department,
North Dakota State University,
1411 Centennial Blvd,
Fargo, ND 58102

Cell. Phone: (+1) 775-233-9238
E-mail: f.shiranichaharsoogh@ndsu.edu
Homepage: `https://pi-colab.github.io/`

Current Appointment

North Dakota State University, Fargo, ND

- Assistant Professor — Aug. 2020 - Present

Previous Appointments

New York University, New York, NY

- Research Assistant Professor — Sep. 2017 - Aug. 2020

University of Michigan, Ann Arbor, MI

- Lecturer/ Postdoctoral Research Fellow — Jan 2017- Aug 2017

Education

University of Michigan, Ann Arbor, MI

- Ph.D., Electrical Engineering: Systems, 2012-2017
  Advisor: S. Sandeep Pradhan
  Ph.D. Thesis: Structural Results for Coding Over Communication Networks
  GPA: 4.00
- M.Sc., Mathematics, 2014-2016
  Major: Applied Mathematics
  GPA: 4.00
- M.Sc., Electrical Engineering: Systems, 2011-2012
  Major: Communications
  GPA: 4.00

Sharif University of Technology, Tehran, Iran

- B.Sc., Electrical Engineering, 2007-2011
  B.Sc., Thesis: A New Method for Variable Elimination for Systems of Inequations
  Advisor: M. R. Aref

Research Interests

Privacy and Security, Wireless Communications, Information Theory, Learning Theory

Research Experience

North Dakota State University, Fargo, ND

- Assistant Professor, Aug. 2020- Persent
  Director at II-CoLab: Privacy, Inference, and Communications Laboratory

New York University, Brooklyn, NY

- Research Assistant Professor, Sep. 2017- Aug. 2020
  Member at NYU WIRELESS

University of Michigan, Ann Arbor, MI

- Postdoctoral Research Fellow, Jan 2017-Aug 2017
- Graduate Student Research Assistant, 2012-2016
  Advisor: Sandeep Pradhan

Sharif University of Technology, Tehran, Iran

- Member of Information Science and Security Lab 2010-2012
  Advisor: Mohammadreza Aref

Research Support

Collaborative Research: CIF: Small: A New Paradigm for Distributed Information Processing, Simulation and Inference in Networks: The Promise of Law of Small Numbers, 2021-2024
Investigators: **F. Shirani Chaharsooghi**
NSF: Communications and Information Foundations,
Total Awarded: $500,000 (NDSU share $250,000)

CIF: Small: An Information Theoretic Framework for Web Privacy, 2018-2021
Investigators: E. Erkip, **F. Shirani Chaharsooghi**, S. Garg,
NSF: Communications and Information Foundations,
Amount Awarded: $487,000

Large Deviation Methods for Learning Network Alignment: Fundamental Limits and Efficient Algorithms, 2020
Investigator: **F. Shirani Chaharsooghi**,
ND EPSCoR: Established Program to Stimulate Competitive Research,
Amount Awarded: $10,000

Teaching Experience

North Dakota State University, Fargo, ND

- Course Instructor, Spring 2022
  ECE 443: Communications I
- Course Instructor, Fall 2020, Fall 2021
  ECE 341: Random Processes
- Course Instructor, Fall 2020
  ECE 748: Introduction to Information Theory

New York University, Brooklyn, NY

- Course Instructor, Spring 2018, Spring 2019
  EL-GY 6063: Information Theory
- Course Instructor, Spring 2020
  EL-GY 9113: Statistical Learning Theory

University of Michigan, Ann Arbor, MI

- Course Instructor Winter 2017
  EECS:501 Probability and Random Processes
- Graduate Student Instructor Fall 2014, Winter 2015
  EECS:501 Probability and Random Processes

Sharif University of Technology, Tehran, Iran

- Teaching Assistant, Winter 2009
  Introduction to Logic Circuits

Awards and Honors

- **Finalist of Towner Award for Outstanding Engineering GSIs,** Winter 2015
  This is an engineering school-wide award for graduate teaching instructors (GSI).
- **Technical Session Award,** Systems Engineering and Communication, Fall 2015
  Engineering Graduate Symposium,
  This is a college-wide annual poster competition at the University of Michigan.
- **EECS Department Graduate Fellowship,** University of Michigan 2013
  This fellowship is awarded to students with outstanding academic background.
  It includes tuition and stipend for one year.
- **EECS Guaranteed Graduate Funding,** University of Michigan 2012-2016
  This award includes guaranteed tuition and stipend for five years in forms of research or teaching assistantships, or departmental fellowships.
- **Ranked** 27^{th}, National university entrance exam among more than 150,000 contestants, Fall 2007
- **Iran's National Elites Foundation Scholarship** 2007-2010
  Members of INEF include students and faculty who have been recipients of scientific prizes in national competitions.
- **President's Honorary Award**
  Presented by president of Sharif University of Technology Fall 2007

Publications, Submissions and Preprints

Journals Publications

[J1] **F. Shirani Chaharsooghi**, S. Pradhan, *On the Sub-optimality of Single-Letter Coding in Networks*, IEEE Transactions on Information Theory, vol. 65, no. 10, pp. 6115-6135, Oct. 2019.

[J2] H. Heidari, **F. Shirani Chaharsooghi**, S. Pradhan, *Quasi Structured Codes for Multi-Terminal Communications*, IEEE Transactions on Information Theory, vol. 65, no. 10, pp. 6263-6289, Oct. 2019.

[J3] S. Shahsavari, **F. Shirani Chaharsooghi**, E. Erkip, *A General Framework for Temporal Fair User Scheduling in NOMA Systems*, IEEE Journal on Selected Topics on Signal Processing, vol. 13, no. 3, pp. 408-422, 2019.

[J4] **F. Shirani Chaharsooghi**, S. Pradhan, *An achievable rate-distortion region for multiple descriptions source coding based on coset codes*, IEEE Transactions on Information Theory, vol. 64, no. 5, pp. 3781-3809, 2018.

[J5] **F. Shirani Chaharsooghi**, S. Pradhan, *A new achievable rate-distortion region for distributed source coding*, IEEE Transactions on Information Theory, pp.1-1 (Early Access), 2021.

[J6] **F. Shirani Chaharsooghi**, S. Garg, E. Erkip, *A Concentration of Measure Approach to Correlated Graph Matching*, IEEE Journal on Selected Areas in Information Theory, pp. 338-351, 2021

[J7] A. Khalili, **F. Shirani Chaharsooghi**, E. Erkip, Y. C. Eldar, *MIMO Networks with One-Bit ADCs: Receiver Design and Communication Strategies*, IEEE Transactions on Communications, pp.1-1 (Early Access), 2021.

[J8] M. Shariatnasab, **F. Shirani Chaharsooghi**, E. Erkip, *Fundamental Privacy Limits in Bipartite Networks under Active Attacks*, Accepted in IEEE Journal on Special Areas in Communications (JSAC), 2021.

[J9] S. Shahsavari, **F. Shirani Chaharsooghi**, E. Erkip, *Opportunistic Temporal Fair Mode Selection and User Scheduling in Full-duplex Systems*, Accepted in IEEE Journal on Special Areas in Communications (JSAC), 2021.

Book Publications

[B1] Pradhan, S. Sandeep, Arun Padakandla, and **F. Shirani Chaharsooghi**, *An algebraic and probabilistic framework for network information theory*, Foundations and Trends in Communications and Information Theory 18.2 (2020): 173-379

Conference Publications

[C1] M. Shariatnasab, **F. Shirani Chaharsooghi**, S. Garg, E. Erkip, *On Graph Matching Using Generalized Seed Side-Information*, IEEE International Symposium on Information Theory (ISIT), Accepted in June 2021.

[C2] S. Shahsavari, **F. Shirani Chaharsooghi**, A. Khojastepour, E. Erkip, *Opportunistic Temporal Fair Mode Selection and User Scheduling for Full-duplex Systems*, 2019 IEEE 30th Annual International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC), pp. 1-7, 2019.

[C3] **F. Shirani Chaharsooghi**, S. Garg, E. Erkip, *A Concentration of Measure Approach to Database De-anonymization*, 2019 IEEE International Symposium on Information Theory (ISIT), pp. 2748-2752, 2019.

[C4] A. Khalili, **F. Shirani Chaharsooghi**, E. Erkip, Y. C. Eldar, *Tradeoff Between Delay and High SNR Capacity in Quantized MIMO Systems*, 2019 IEEE International Symposium on Information Theory (ISIT), pp. 597-601, 2019.

[C5] A. Khalili, **F. Shirani Chaharsooghi**, E. Erkip, Y. C. Eldar, *On Multiterminal Communication over MIMO Channels with One-bit ADCs at the Receivers*, 2019 IEEE International Symposium on Information Theory (ISIT), pp. 602-606, 2019.

[C6] S. Shahsavari, **F. Shirani Chaharsooghi**, E. Erkip, *On the Fundamental Limits of Multi-user Scheduling under Short-term Fairness Constraints*, 2019 IEEE International Symposium on Information Theory (ISIT), pp. 408-422, 2019.

[C7] **F. Shirani Chaharsooghi**, S. Garg, E. Erkip, *Matching graphs with community structure: a concentration of measure approach*, 56th IEEE Annual Allerton Conference on Communication, Control, and Computing, pp. 1028-1035, 2018

[C8] S. Shahsavari, **F. Shirani Chaharsooghi**, E. Erkip, *Opportunistic temporal fair scheduling for non-orthogonal multiple access*, 56th IEEE Annual Allerton Conference on Communication, Control, and Computing, pp. 391-398, 2018

[C9] **F. Shirani Chaharsooghi**, S. Pradhan, *Lattices from linear codes and fine quantization: general continuous sources and channels*, IEEE International Symposium on Information Theory (ISIT), pp. 2356-2360, 2018.

[C10] **F. Shirani Chaharsooghi**, S. Garg, E. Erkip, *Typicality matching for pairs of correlated graphs*, IEEE International Symposium on Information Theory (ISIT), pp. 221-225, 2018.

[C11] M. Heidari, **F. Shirani Chaharsooghi**, S. Pradhan, *Bounds on the effective-length of optimal codes for interference channel with feedback*, IEEE International Symposium on Information Theory (ISIT), pp. 1126-1130, 2018.

[C12] **F. Shirani Chaharsooghi**, S. Garg, E. Erkip, *Optimal active social network de-anonymization using information thresholds*, IEEE International Symposium on Information Theory (ISIT), pp. 1445-1449, 2018.

[C13] **F. Shirani Chaharsooghi**, S. Garg, E. Erkip, *Seeded graph matching: efficient algorithms and theoretical guarantees*, 51st Asilomar Conference on Signals, Systems, and Computers, pp. 253-257, 2017.

[C14] **F. Shirani Chaharsooghi**, S. Garg, E. Erkip, *An information theoretic framework for active de-anonymization in social networks based on group memberships*, 55th Annual Allerton Conference on Communication, Control, and Computing, pp. 470-477, 2017.

[C15] **F. Shirani Chaharsooghi**, S. Pradhan, *On the sub-optimality of single-letter coding in multi-termianl communications*, IEEE International Symposium on Information Theory (ISIT), pp. 1823-1827, 2017.

[C16] **F. Shirani Chaharsooghi**, S. Pradhan, *On the correlation between boolean functions of random variables*, IEEE International Symposium on Information Theory (ISIT), pp. 1301-1305, 2017.

[C17] M. Heidari, **F. Shirani Chaharsooghi** , S. Pradhan, *A new achievable rate region for the multiple-access channel with states*, IEEE International Symposium on Information Theory (ISIT), pp. 36-40, 2017.

[C18] M. Heidari, **F. Shirani Chaharsooghi** , S. Pradhan, *On the necessity of structured codes for communication over MAC with feedback*, IEEE International Symposium on Information Theory (ISIT), pp. 2298-2302, 2017.

[C19] **F. Shirani Chaharsooghi** , S. Pradhan, *Trade-off between communication and cooperation in the interference channel*, IEEE International Symposium on Information Theory (ISIT), pp. 2214-2218, 2016.

[C20] **F. Shirani Chaharsooghi** , M. Heidari, S. Pradhan, *Quasi linear codes: application to point-to-point and multi-terminal source coding*, IEEE International Symposium on Information Theory (ISIT), pp. 730-734, 2016.

[C21] M. Heidari, **F. Shirani Chaharsooghi** , S. Pradhan, *New sufficient conditions for multiple-access channel with correlated sources*, IEEE International Symposium on Information Theory (ISIT), pp. 2019-2023, 2016.

[C22] M. Heidari, **F. Shirani Chaharsooghi** , S. Pradhan, *Beyond group capacity in multi-terminal communications*, IEEE International Symposium on Information Theory (ISIT), pp. 2081-2085, 2015.

[C23] **F. Shirani Chaharsooghi** , M. Heidari, S. Pradhan, *New lattices for multiple-descriptions*, IEEE International Symposium on Information Theory (ISIT), pp. 1580-1584, 2015.

[C24] **F. Shirani Chaharsooghi**, S. Pradhan, *Finite-length gains in distributed source coding*, IEEE International Symposium on Information Theory (ISIT), pp. 1702-1706, 2014.

[C25] **F. Shirani Chaharsooghi** , S. Pradhan, *An achievable rate-distortion region for the multiple-descriptions problem*, IEEE International Symposium on Information Theory (ISIT), pp. 576-580, 2014.

[C26] **F. Shirani Chaharsooghi** , A. Ghasemian Sahebi, S. Pradhan, *Distributed source coding in absence of common components*, IEEE International Symposium on Information Theory (ISIT), pp. 1362-1366, 2013.

[C27] **F. Shirani Chaharsooghi** , M. Emadi, M. Zamanighomi and M. R. Aref, *A new method for variable elimination in systems of inequations*, IEEE International Symposium on Information theory (ISIT), pp. 1215-1219, 2011.

[C28] M. Zamanighomi, M. Emadi, **F. Shirani Chaharsooghi**, M. R. Aref, *Achievable rate region for multiple access channel with correlated channel states and cooperating encoders*, IEEE Information Theory Workshop (ITW), pp. 628-632, 2011.

Service

- **Technical Program Committee:** International Symposium on Information Theory (ISIT), 2021, Information Theory Workshop (ITW), 2022
- **Outreach Committee Member:** Information Theory Society, 2018-2021
- **Outreach Committee Chair:** Information Theory Society, 2021-2023
- **Membership Committee Member:** Information Theory Society, 2021-2023
- **Reviewer**: IEEE Transactions on Information Theory, IEEE Transactions on Communications, IEEE Communication Letters, IEEE Transactions on Forensics and Security,, International Symposium on Information Theory.
- **Organizer:** IEEE International Symposium on Information Theory (ISIT) carrier mentorship event 2021
- **Co-Chair** Multiple Access Channels, Multiuser Information Theory, and Network Information Theory, ITA 2015

Invited Talks

- "Fundamental Limits of Privacy in Social Networks", iLunch Seminar Series, University of Maine, 2020
- "Fundamental Limits and Matching Algorithms for Online Fingerprinting and Database Alignment", GRAND Workshop in Maynooth University, Ireland, 2019
- "Social network de-anonymization based on group memberships: An information theoretic approach", ITA Workshop in UCSD, 2018
- "On the Structure of Optimality Achieving Codes in Multi-terminal Communications", ITA Graduation Day Talk, Nominated by the University of Michigan to present during "Graduation Day", ITA Workshop in UCSD, 2017
- "Preserving Common Information", SPeecs Seminars Series, University of Michigan, 2016
- "Distributed Source Coding in Absence of Common Components", Stanford University, Feb. 2014
- "Distributed Source Coding in Absence of Common Components", DSSD, Menlo Park, CA, 2014

Tutorial Presentations

- "An Information Theoretic Framework for Web Privacy", 2019 IEEE 30th Annual International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC)
- "A Communication Theoretic Framework for Web Privacy", 2019 IEEE Global Communications Conference (Globecom)

Workshops and Poster Presentations

- "Finite Block-Length Codes Trump Random Coding over Infinite Length Blocks", (poster), Shannon Centennial Symposium, University of Michigan, Sep 2016
- "Finite Block-length Gains in Distributed Source Coding", (poster), North American School of Information theory (NASIT) San Diego, CA, Aug 2015