

Salar Fattahi

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RESEARCH **Overview:** My research focuses on developing *data-driven* and *large-scale optimization techniques* for
INTERESTS *physical* and *societal* problems. My goal is to identify, study, and exploit the underlying hidden-but-useful
structures of these high-dimensional and real-world problems with the goal of designing more tractable
algorithms with *certifiable guarantees* that, at the same time, can be easily implemented and used in
practice.
Scope: I make use of cutting-edge theoretical techniques in graph theory, optimization, machine learning,
and data analytics to solve massive-scale problems that stem from real-life applications, with a special
focus on energy systems, dynamical networks, and artificial intelligence.

EDUCATION **University of California, Berkeley**, Berkeley, CA. USA May 2016 – present
PhD Candidate in Industrial Engineering and Operations Research
Minor in Statistics
Advisors: Prof. Javad Lavaei and Prof. Somayeh Sojoudi

University of California, Berkeley, Berkeley, CA. USA August 2015 – May 2016
Master of Science in Industrial Engineering and Operations Research
Advisor: Prof. Javad Lavaei

Columbia University, New York City, NY. USA September 2014 – August 2015
Master of Science in Electrical Engineering
Advisor: Prof. Javad Lavaei

Sharif University of Technology, Tehran, Iran August 2009 – July 2014
B.Sc. in Electrical Engineering
Minor in Computer Science
Advisor: Prof. Farokh Marvasti

HONORS **IEOR Faculty Fellowship Award** 2019
UC Berkeley

Winner of INFORMS Data Mining Best Paper Award - Applied Track 2018
“Graphical Lasso and Thresholding: Equivalence and Closed-Form Solutions”

Finalist for American Control Conference Best Paper Award 2018
“Closed-Form Solution and Sparsity Path for Inverse Covariance Estimation Problem”

Winner of Katta G. Murty Best Paper Award 2018
“Graphical Lasso and Thresholding: Equivalence and Closed-Form Solutions”

Travel Grant 2018
Conference on Decision and Control

Travel Grant 2018
American Control Conference

Outstanding Graduate Student Instructor Award UC Berkeley	2017
Marshall-Oliver-Rosenberger Fellowship Award UC Berkeley	2017
Best Reviewer Award IEEE Transactions on Smart Grid	2016
Armstrong fellowship Award Columbia University	2014

PUBLICATIONS

Preprints:

- [P1] [S. Fattahi](#), N. Matni, S. Sojoudi, “On Learning of Distributed Linear-Quadratic Regulators”, under preparation, 2019.
- [P2] [S. Fattahi](#), C. Jozs, R. Mohammadi, J. Lavaei, S. Sojoudi, “Absence of Spurious Local Trajectories in Time-varying Optimization”, submitted for conference publication, 2019.
- [P3] [S. Fattahi](#), S. Sojoudi, “Exact Gurantees on the Absence of Spurious Local Minima for Non-negative Robust Principal Component Analysis”, submitted to **Journal of Machine Learning Research (JMLR)**, 2019.
- [P4] [S. Fattahi](#), S. Sojoudi, “Sample Complexity of Sparse System Identification Problem for Linear Time-Invariant Systems”, submitted to **IEEE Transactions on Automatic Control**, 2018.

Journal Papers:

- [J1] [S. Fattahi](#), S. Sojoudi, “Graphical Lasso and Thresholding: Equivalence and Closed-Form Solutions”, **Journal of Machine Learning Research (JMLR)**, vol. 20, pp. 364–407, 2019.
- **INFORMS Data Mining Best Paper Award, 2018**
- **Katta G. Murty Best Paper Award, 2018.**
- [J2] [S. Fattahi](#), R. Y. Zhang, S. Sojoudi, “Linear-Time Algorithm for Learning Large-Scale Sparse Graphical Models”, **IEEE Access**, vol. 7, pp. 12658–12672, 2019.
- [J3] [S. Fattahi](#), J. Lavaei, A. Atamtürk, “A Bound Strengthening Method for Optimal Transmission Switching in Power Systems with Fixed Connected Subgraph”, **IEEE Transactions on Power Systems**, vol. 34, pp. 280–291, 2019.
- [J4] [S. Fattahi](#), G. Fazelnia, J. Lavaei, M. Arcak, “Transformation of Optimal Centralized Controllers Into Near-Global Static Distributed Controllers”, **IEEE Transactions on Automatic Control**, vol. 64, pp. 63–77, 2019.
- [J5] S. Sojoudi, [S. Fattahi](#), J. Lavaei, “Convexification of Generalized Network Flow Problem”, **Mathematical Programming**, vol. 173, pp. 353–391, 2019.
- [J6] [S. Fattahi](#), M. Ashraphijou, J. Lavaei, A. Atamtürk, “Conic Relaxation of the Unit Commitment Problem”, **Energy**, vol. 134, pp. 1079–1095, 2017.

Conference Papers:

- [C1] [S. Fattahi](#), N. Matni, S. Sojoudi, “Learning Sparse Dynamical Systems from a Single Sample Trajectory”, to appear in **Conference on Decision and Control (CDC)**, 2019.

- [C2] [S. Fattahi](#), S. Sojoudi, “Data-Driven Sparse System Identification”, **Proceedings of 56th Annual Allerton Conference on Communication, Control, and Computing**, pp. 462–469, 2018.
- [C3] [S. Fattahi](#), S. Sojoudi, “Non-Asymptotic Analysis of Block-Regularized Regression Problem”, **Proceedings of Conference on Decision and Control (CDC)**, pp. 27–34, 2018.
- [C4] R. Y. Zhang, [S. Fattahi](#), S. Sojoudi, “Large-Scale Sparse Inverse Covariance Estimation via Thresholding and Max-Det Matrix Completion”, **Proceedings of International Conference on Machine Learning (ICML)**, pp. 5761-5770, 2018.
- [C5] [S. Fattahi](#), R.Y. Zhang, S. Sojoudi, “Sparse Inverse Covariance Estimation for Chordal Structures”, to appear in **Proceedings of European Control Conference (ECC)**, 2018.
- [C6] [S. Fattahi](#), S. Sojoudi “Closed-Form Solution and Sparsity Path for Inverse Covariance Estimation Problem”, **Proceedings of American Control Conference (ACC)**, pp. 410–417, 2018.
- **Best Student Paper Award-Finalist**
- [C7] G. Darivianakis, [S. Fattahi](#), J. Lavaei, J. Lygeros, “High-Performance Cooperative Distributed Model Predictive Control for Linear Systems”, **Proceedings of American Control Conference (ACC)**, pp. 2318–2325, 2018.
- [C8] [S. Fattahi](#), J. Lavaei, A. Atamtürk “Promises of Conic Relaxations in Optimal Transmission Switching of Power Systems”, **Proceedings of 56th IEEE Conference on Decision and Control (CDC)**, pp. 3238-3245, 2017.
- [C9] [S. Fattahi](#), J. Lavaei, M. Arcak “A Scalable Method for Designing Distributed Controllers for Systems with Unknown Initial State”, **Proceedings of 56th IEEE Conference on Decision and Control (CDC)**, pp. 4739-4749, 2017.
- [C10] [S. Fattahi](#), J. Lavaei, “On the Convexity of Optimal Decentralized Control Problem and Sparsity Path”, **Proceedings of American Control Conference (ACC)**, pp. 3359-3366, 2017.
- [C11] [S. Fattahi](#), J. Lavaei, “Theoretical Guarantees for the Design of Near Globally Optimal Static”, **Proceedings of 54th Annual Allerton Conference on Communication, Control, and Computing**, pp. 582-589, 2016.
- [C12] M. Ashraphijou, [S. Fattahi](#), J. Lavaei, A. Atamtürk, “A Strong Semidefinite Programming Relaxation of the Unit Commitment Problem”, **Proceedings of 55th IEEE Conference on Decision and Control (CDC)**, pp. 694-701, 2016.
- [C13] [S. Fattahi](#), J. Lavaei, “Convex Analysis of Generalized Flow Networks”, **Proceedings of 54th IEEE Conference on Decision and Control (CDC)**, pp. 1569-1576, 2015.
- [C14] [S. Fattahi](#), G. Fazelnia, J. Lavaei, “Transformation of Optimal Centralized Controllers Into Near-Global Static Distributed Controllers”, **Proceedings of 54th IEEE Conference on Decision and Control (CDC)**, pp. 4915-4922, 2015.
- [C15] [S. Fattahi](#), M. Azghani, F. Marvasti, “An Algorithm for Detecting Exact Regions of Moving Objects in Video Frames”, **Proceedings of 7th IEEE International Symposium on Telecommunications**, pp. 332-336, 2014.

INVITED TALKS

- [P1] **INFORMS Annual Meeting**, Seattle, WA, October, 2019,
 “Exact Guarantees On the Absence of Spurious Local Minima For Non-negative Robust Principal Component Analysis”

- [P2] **INFORMS Annual Meeting**, Seattle, WA, October, 2019,
 “Learning Large-scale Sparse Graphical Models: Theory and Algorithm”
- [P3] **SIAM Conference on Computational Science and Engineering (CSE19)**, Spokane, WA,
 February, 2019,
 ”Learning Large-Scale Sparse Graphical Models: Theory, Algorithm”
- [P4] **13th Data Mining & Decision Analytics Workshop**, Phoenix, AZ, November, 2018,
 “Graphical Lasso and Thresholding: Equivalence and Closed-form Solutions”
- [P5] **INFORMS Annual Meeting**, Phoenix, AZ, November, 2018,
 “A Bound Strengthening Method for Optimal Transmission Switching in Power Systems”
- [P6] **INFORMS Annual Meeting**, Phoenix, AZ, November, 2018,
 “Data Driven Sparse System Identification”
- [P7] **Federal Energy Regulatory Commission (FERC)**, Washington, DC, July, 2017,
 “Convex Formulation of the Optimal Transmission Switching Problem”
- [P8] **Tsinghua-Berkeley Shenzhen Institute**, Berkeley, CA, November, 2017,
 “Structural Optimization: From Power Systems to Machine Learning”
 - **Best Poster Presentation Award - Second Place**
- [P9] **INFORMS Annual Meeting**, Houston, TX, October, 2017,
 “Promises of Conic Relaxations in Optimal Transmission Switching of Power Systems”
- [P10] **INFORMS Annual Meeting**, Houston, TX, October, 2017,
 “Power System State Estimation Problem: Optimal Sensor Placement”
- [P11] **INFORMS Annual Meeting**, Houston, TX, October, 2017,
 “Data-driven Methods for Learning Graphical Models”
- [P12] **Defense Advanced Research Projects Agency (DARPA)**, Young Faculty Award Meeting,
 Arlington, VA, October, 2016,
 “Near-Global Solutions of Non-convex Problems”
- [P13] **Modeling and Optimization: Theory and Applications (MOPTA)**, Lehigh, PA, August
 2016,
 “On the Convexity of Optimal Decentralized Control Problem and Sparsity Path”
- [P14] **INFORMS Annual Meeting**, Nashville, TN, November, 2016,
 “On the Convexity of Optimal Decentralized Control Problem and Sparsity Path”
- [P15] **INFORMS Annual Meeting**, Nashville, TN, November, 2016,
 “Optimal Distributed Control Of Power Systems With A High Level Of Renewable Energy”

LEADERSHIP	Graduate Mentor	2018
	Summer Undergraduate Program in Engineering Research at Berkeley (SUPERB)	
	Mentor	2018
	Engineers for a Sustainable World (ESW)	
	Berkeley Representative	2017
	Federal Energy Regulatory Commission (FERC)	

Berkeley Representative 2017
Defense Advanced Research Projects Agency (DARPA)

PROFESSIONAL **Session Organizer** 2019
ACTIVITIES IFORMS annual meeting, Seattle, WA

Technical Program Committee 2018
International Conference on Applied Energy

Reviewer:

- Journal of Machine Learning Research 2019
 - Automatica 2018
 - Journal of Optimization Theory and Applications 2018
 - IEEE Transactions on Smart Grid 2015, 2016, and 2017
 - IEEE Transactions on Power Systems 2018
 - IEEE Transactions on Control of Network Systems 2018
 - IEEE Control System Letters 2018
 - IEEE Access 2018
 - Conference on Decision and Control 2015, 2016, and 2017
 - American Control Conference 2016, 2017, and 2018
 - Systems & Control Letters 2017
 - International Journal of Electrical Power and Energy Systems 2017
 - European Control Conference 2015, 2016, and 2018
 - IEEE SmartGridComm15 Symposium 2015
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TEACHING **Guest Lecturer:**
EXPERIENCE

- Applied Dynamic Programming UC Berkeley, Spring 2018
- Nonlinear and Discrete Optimization UC Berkeley, Fall 2016
- Nonlinear and Discrete Optimization UC Berkeley, Fall 2015

Teaching Assistant:

- Applied Dynamic Programming UC Berkeley, Spring 2018
- Nonlinear and Discrete Optimization UC Berkeley, Fall 2015 and Fall 2016
- Convex Optimization Columbia University, Fall 2014
- Data Transfer and Networks SUT, Fall 2013
- Digital Signal Processing SUT, Fall 2013
- Computer Architecture and Microprocessors SUT, Fall 2013
- Probability and Statistics SUT, Spring 2012
- Analog Circuits SUT, Spring 2012
- Logic Circuits and Digital Systems SUT, Fall 2012

TECHNICAL **Programming Languages:** C++, Java, Python, MATLAB, AMPL
SKILLS **Tools:** LATEX, TikZ, MS Office and Adobe Photoshop.
Engineering Softwares: MATLAB, Mathematica

REFERENCES **Javad Lavaei**
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Industrial Engineering and Operations Research,
University of California, Berkeley
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Somayeh Sojoudi

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Electrical Engineering and Computer Science and Mechanical Engineering,
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University of California, Berkeley
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Shmuel Oren

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University of California, Berkeley
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Additional references are available upon request