Hesameddin Mohammadi

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Research Interests

Design and analysis of optimization algorithms for data sciences and decision making
Data-driven control of large-scale systems and model-free reinforcement learning
LMI-based methods for robust and nonlinear control systems

Education

University of Southern California, Los Angeles, CA, USA — August 2017 - December 2022
Ph.D., Electrical Engineering
Advisor: Professor Mihailo R. Jovanović
GPA: 4.0/4.0

Arizona State University, Tempe, AZ, USA — August 2015 - May 2017
M.Sc., Mechanical Engineering
Advisor: Professor Matthew M. Peet
GPA: 3.96/4.00

Sharif University of Technology, Tehran, Iran — September 2010 - July 2015
B.Sc., Mechanical Engineering
Minor: Pure Mathematics
Advisor: Professor Hamed Moradi
GPA: 17.81/20, **Minor GPA:** 19.07/20

Professional Experience

Software Intern in Autonomous Vehicles, NVIDIA — May 2022 - August 2022
Description: Verification and validation of autonomous vehicles; Development of algorithms for requirement-based testing of lane change maneuvers.

Research Associate at Cybernetic Systems and Controls Lab — August 2015 - May 2017
Arizona State University
Description: Developing algorithms for polynomial optimization problems; Designing distributed parallel algorithms for constructing Lyapunov functions for large-scale nonlinear systems.

Undergraduate Research Assistant at Controls Lab — Summer 2013
Sharif University of Technology
Description: Design and fabrication of an educational instrument for the manual tuning of PID controllers for servo mechanisms.

Honors and Awards

- Ming Hsieh Institute PhD Scholar, USC — Fall 2020- Summer 2021
- Annenberg Fellowship, USC — Fall 2017 - Spring 2021
- Best Poster – Honorable Mention, Research Festival, ECE Dept., USC — Fall 2017
- Graduate Research Assistantship, ASU — Fall 2015 - Spring 2017
- **First Rank Gold Medal** — Summer 2009
  National Mathematical Olympiad of Iran
- **Silver Medal** — Summer 2008
  National Mathematical Olympiad of Iran
- Member of **Iran's National Elites Foundation** — Summer 2008 - Present

Journal Publications

1. I. K. Ozaslan, H. Mohammadi, and M. R. Jovanović, "Computing stabilizing feedback gains via a model-free policy gradient," *IEEE Control Syst. Lett.*, pp. 407–412, 2022
2. H. Mohammadi, S. Samuelson, and M. R. Jovanović, "Transient growth of accelerated optimization algorithms," *IEEE Trans. Automat. Control (doi:10.1109/TAC.2022.3162154)*, 2022
3. H. Mohammadi, M. Soltanolkotabi, and M. R. Jovanović, "On the linear convergence of random search for discrete-time LQR," *IEEE Control Syst. Lett.*, vol. 5, pp. 989–994, July 2021
4. H. Mohammadi, A. Zare, M. Soltanolkotabi, and M. R. Jovanović, "Convergence and sample complexity of gradient methods for the model-free linear-quadratic regulator problem," *IEEE Trans. Automat. Control*, vol. 67, pp. 2435–2450, May 2022
5. H. Mohammadi, M. Razaviyayn, and M. R. Jovanović, "Robustness of accelerated first-order algorithms for strongly convex optimization problems," *IEEE Trans. Automat. Control*, vol. 66, pp. 2480–2495, June 2021
6. A. Zare, H. Mohammadi, N. K. Dhingra, T. T. Georgiou, and M. R. Jovanović, "Proximal algorithms for large-scale statistical modeling and sensor/actuator selection," *IEEE Trans. Automat. Control*, vol. 65, pp. 3441–3456, August 2020

– H. Mohammadi, M. Razaviyayn, and M. R. Jovanović, "Tradeoffs between convergence rate and noise amplification for momentum-based accelerated optimization algorithms," *IEEE Trans. Automat. Control*, 2022. (UNDER REVIEW)

Conference Publications

1. H. Mohammadi and M. R. Jovanović, "On the noise amplification of primal-dual gradient flow dynamics based on proximal augmented Lagrangian," in *Proceedings of the 2022 American Control Conference*, Atlanta, GA, pp. 926–931, 2022
2. H. Mohammadi, M. Soltanolkotabi, and M. R. Jovanović, "On the lack of gradient domination for linear quadratic gaussian problems with incomplete state information," in *Proceedings of the 60th IEEE Conference on Decision and Control*, Austin, TX, pp. 1120–1124, 2021
3. S. Samuelson, H. Mohammadi, and M. R. Jovanović, "On the transient growth of Nesterov's accelerated method for strongly convex optimization problems," in *Proceedings of the 59th IEEE Conference on Decision and Control*, Jeju Island, Republic of Korea, pp. 5911–5916, 2020
4. H. Mohammadi, M. Soltanolkotabi, and M. R. Jovanović, "Learning the model-free linear quadratic regulator via random search," in *Proceedings of Machine Learning Research, 2nd Annual Conference on Learning for Dynamics and Control*, vol. 120, Berkeley, CA, pp. 1–9, 2020
5. H. Mohammadi, M. Soltanolkotabi, and M. R. Jovanović, "Random search for learning the linear quadratic regulator," in *Proceedings of the 2020 American Control Conference*, Denver, CO, pp. 4798–4803, 2020
6. S. Samuelson, H. Mohammadi, and M. R. Jovanović, "Transient growth of accelerated first-order methods," in *Proceedings of the 2020 American Control Conference*, Denver, CO, pp. 2858–2863, 2020
7. H. Mohammadi, A. Zare, M. Soltanolkotabi, and M. R. Jovanović, "Global exponential convergence of gradient methods over the nonconvex landscape of the linear quadratic regulator," in *Proceedings of the 58th IEEE Conference on Decision and Control*, Nice, France, pp. 7474–7479, 2019
8. H. Mohammadi, M. Razaviyayn, and M. R. Jovanović, "Performance of noisy Nesterov's accelerated method for strongly convex optimization problems," in *Proceedings of the 2019 American Control Conference*, Philadelphia, PA, pp. 3426–3431, 2019
9. H. Mohammadi, M. Razaviyayn, and M. R. Jovanović, "Variance amplification of accelerated first-order algorithms for strongly convex quadratic optimization problems," in *Proceedings of the 57th IEEE Conference on Decision and Control*, Miami, FL, pp. 5753–5758, 2018
10. H. Mohammadi, M. Razaviyayn, and M. R. Jovanović, "On the stability of gradient flow dynamics for a rank-one matrix approximation problem," in *Proceedings of the 2018 American Control Conference*, Milwaukee, WI, pp. 4533–4538, 2018
11. B. Colbert, H. Mohammadi, and M. M. Peet, "Combining sos with branch and bound to isolate global solutions of polynomial optimization problems," in *Proceedings of the 2018 American Control Conference*, Milwaukee, WI, pp. 2190–2197, 2018

12. M. Jones, H. Mohammadi, and M. M. Peet, "Estimating the region of attraction using polynomial optimization: A converse lyapunov result," in *Proceedings of the 56th IEEE Conference on Decision and Control*, Melbourne, Australia, pp. 1796–1802, 2017

– H. Mohammadi, M. Razaviyayn, and M. R. Jovanović, "Noise amplification of momentum-based optimization algorithms," in *Proceedings of the 2023 American Control Conference (SUBMITTED)*, San Diego, CA, 2023

– S. Samuelson, H. Mohammadi, and M. R. Jovanović, "Performance of noisy higher-order accelerated gradient flow dynamics for strongly convex quadratic optimization problems," in *Proceedings of the 2023 American Control Conference (SUBMITTED)*, San Diego, CA, 2023

Book Chapters

1. H. Mohammadi, M. Soltanolkotabi, and M. R. Jovanović, "Model-free linear quadratic regulator," in *Handbook on RL and Control*, pp. 173–185, Springer Studies in Systems, Decision and Control, 2020

Teaching Experience

- ◇ Substitute lecturer for **Linear Systems Theory** — Fall 2019, Fall 2022
- ◇ Teaching assistant for **Linear Control Systems Lab** — Summer, Fall 2021
- ◇ Substitute lecturer for **Linear Algebra** — Spring 2019
- ◇ Teaching assistant for **Linear Systems Theory** — Fall 2019
- ◇ Teacher for **Math Olympiad** preparation — Summer 2009 - 2015
  Topics including Combinatorics, Number theory, Algebra, and Geometry

Technical Reviews

- ◇ SIAM Journal on Control and Optimization
- ◇ IEEE Control Systems Letters
- ◇ IEEE Transactions on Control of Network Systems
- ◇ IEEE Transactions on Automatic Control
- ◇ Mathematical Programming
- ◇ 2016, 2019-2022 IEEE Conference on Decision and Control
- ◇ 2017, 2020 International Federation of Automatic Control
- ◇ 2018-2022 American Control Conference
- ◇ Annual Conference on Learning for Dynamics and Control, 2022

Programming skills

- ◇ **Languages**: C, C++ (STL), MATLAB, Python

References

- ◇ **Professor Mihailo Jovanović** — Email: mihailo@usc.edu
  Ming Hsieh Department of Electrical and Computer Engineering
  University of Southern California
- ◇ **Professor Urbashi Mitra** — Email: ubli@usc.edu
  Ming Hsieh Department of Electrical and Computer Engineering
  University of Southern California
- ◇ **Professor Mahdi Soltanolkotabi** — Email: soltanol@usc.edu
  Ming Hsieh Department of Electrical and Computer Engineering
  University of Southern California
- ◇ **Professor Meisam Razaviyayn** — Email: razaviya@usc.edu
  Daniel J. Epstein Department of Industrial and Systems Engineering
  University of Southern California