Amirhossein Taghvaei

CONTACT INFO

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PROFESSIONAL EXPERIENCE

University of California, Irvine, Irvine, USA
Postdoctoral Scholar in Mechanical and Aerospace Engineering — September 2019-
Supervisor: Prof. Tryphon Georgiou

EDUCATION

University of Illinois at Urbana-Champaign, Illinois, USA
Ph.D in Mechanical Engineering (Advisor: Prashant G. Mehta) — 2013-2019
M.S in Mathematics — 2013-2017
Overall GPA: **3.98/4.0**

Sharif University of Technology, Tehran, Iran
B.Sc. in Mechanical Engineering — 2008-2013
B.Sc. in Physics (Dual Major)
Overall GPA: **18.39/20**

PUBLICATIONS

Journal publications:

- **A. Taghvaei**, T. T. Georgiou, L. Norton, A. R. Tannenbaum. *Fractional SIR Epidemiological Models*, To appear at Scientific Reports, 2020
- R. Fu, **A. Taghvaei**, Y. Chen, T. T. Georgiou. *Maximal power output of a stochastic thermodynamic engine*, To appear at Automatica, 2020
- **A. Taghvaei**, P. G. Mehta. *An optimal transport formulation of the ensemble Kalman filter*, Transactions of Automatic Control (TAC), 2020
- **A. Taghvaei**, P. G. Mehta, S. P. Meyn. *Diffusion map-based algorithm for gain function approximation in the feedback particle filter*, SIAM Journal of Uncertainty Quantificatioin, 2019
- C. Zhang, **A. Taghvaei**, P. G. Mehta. *A mean-field optimal control formulation for global optimization*, IEEE Transactions on Automatic Control (TAC), 2018
- **A. Taghvaei**, J de Wiljes, P. G. Mehta, and S. Reich. *Kalman filter and its modern extensions for the continuous-time nonlinear filtering problem*, ASME Journal of Dynamic Systems, Measurement, and Control, 2017
- C. Zhang, **A. Taghvaei**, P. G. Mehta. *Feedback Particle Filter on Riemannian Manifolds and Matrix Lie groups*, IEEE Transactions on Automatic Control (TAC), Nov, 2017

Machine Learning Conferences:

- **A. Taghvaei**, A Makkuva, S. Oh, J. Lee. *Optimal transport mapping via input-convex neural networks*, International Conference on Machine Learning **(ICML)**, 2019
- **A. Taghvaei**, P. G. Mehta, *Accelerated flow for probability distributions*, International Conference on Machine Learning **(ICML)**, Long Beach, 2018
- **A. Taghvaei**, J. Kim, P. G. Mehta, *How regularization effects the critical points in linear neural networks*, Advances in Neural Information Processing Systems **(NeurIPS)**, Long Beach, 2017

Control Conferences:

- A. Dong, **A. Taghvaei**, Tryphon T. Georgiou. *Lasso formulation of the shortest path problem*, IEEE Conference on Decision and Control (CDC), 2020
- R. Fu, O. Movilla, **A. Taghvaei**, Yongxin Chen, Tryphon T. Georgiou. *Harvesting energy from a periodic heat bath*, IEEE Conference on Decision and Control (CDC), 2020
- S. Y. Olmez, **A. Taghvaei**, Prashant G. Mehta. *Deep FPF: Gain function approximation in high-dimensions*, IEEE Conference on Decision and Control (CDC), May, 2020

- T. Wang, **A. Taghvaei**, P. G. Mehta. *Bio-inspired Learning of Sensorimotor Control for Locomotion*, IEEE American Control Conference (ACC), July, 2020
- T. Wang, **A. Taghvaei**, P. G. Mehta. *Q-learning for POMDP: An application to learning locomotion gaits*, IEEE Conference on Decision and Control (CDC), Dec, 2019
- J. W. Kim, **A. Taghvaei**, P. G. Mehta, S. P. Meyn. *An approach to duality in nonlinear filtering*, IEEE American Control Conference (ACC), July, 2019
- **A. Taghvaei**, P. G. Mehta. *Error analysis of the stochastic linear feedback particle filter*, IEEE Conference on Decision and Control (CDC), Miami Beach, December 2018.
- J. Kim, **A. Taghvaei**, P. G. Mehta. *Derivation and Extensions of the Linear Feedback Particle Filter based on Duality Formalisms*, IEEE Conference on Decision and Control (CDC), Miami Beach, December 2018
- **A. Taghvaei**, P. G. Mehta. *Error analysis of the linear feedback article filter*, In Proc. of the 2018 American control conference (ACC), Milwaukee, June, 2018
- **A. Taghvaei**, P. G. Mehta. S. P. Meyn, *Error Estimates for the Kernel Gain Function Approximation in the Feedback Particle Filter*, IEEE American Control Conference (ACC), Seattle, May, 2017.
- C. Zhang, **A. Taghvaei**, P. G. Mehta. *Attitude Estimation of a Wearable Motion Sensor*, IEEE American Control Conference (ACC), Seattle, May, 2017
- **A. Taghvaei**, P. G. Mehta. *Gain Function Approximation in the Feedback Particle Filter*, IEEE Conference on Decision and Control (CDC), Las Vegas, December, 2016.
- C. Zhang, **A. Taghvaei**, P. G. Mehta. *Attitude Estimation with Feedback Particle Filter*, IEEE Conference on Decision and Control (CDC), Las Vegas, December, 2016
- **A. Taghvaei**, P. G. Mehta. *An Optimal Transport Formulation of Linear Feedback Particle Filter*, In Proc. of the 2016 American Control Conference (ACC), Boston, June, 2016.
- **A. Taghvaei**, S. A. Hutchinson, and P. G. Mehta. *A Coupled Oscillator-based Control Architecture for Locomotory Gaits*, IEEE Conference on Decision and Control, Los Angeles, December, 2014
- C. Zhang, **A. Taghvaei**, P. G. Mehta. *Feedback Particle Filter on Matrix Lie group*, In Proc. of the 2016 American Control Conference (ACC), Boston, June, 2016.

Internship Experience

AI Researcher, with Dr. Amin Jalali, Technicolor AI Research Lab, Palo Alto, Summer, 2018
- Restricted Convex Potentials for Approximating the Wasserstein Metric and the Optimal Transport Mapping

Algorithm developer, with university start-up company, Rithmio, 2014-2015
- Project: Development of algorithms and software for real time classification of physical activities, based on wearable inertial sensors

Honours and Awards

CSE Fellow[1], Computational Science and Engineering, UIUC, 2016-2017,

Ranked 9th in **National University Entrance Exam**, Iran, 2008

Teaching Experience

Teaching Assistant (TA) in **Statistical Learning** with Prof. Bruce Hajek, Department of Electrical and Computer Enginerring, University of Illinois at Urbana-Champaign, Fall 2017

Teaching Assistant (TA) in *Mathematical Methods in Engineering II* with Prof. Prashant Mehta, Department of Mechanical Science and Enginerring, University of Illinois at Urbana-Champaign, Fall 2016

Teaching Assistant (TA) in *Analytical Mechanics I* with Professor Akhavan, Department of Physics, Sharif University of Technology, Fall Semester 2012, Tehran, Iran

Teaching Assistant (TA) in *Mechanics of Material III (Advanced)* with Professor Noseir, Department of Mechanical Engineering, Sharif University of Technology, Fall Semester 2012, Tehran, Iran

[1] Annual award to outstanding graduate students with interdisciplinary and computationally oriented research.

Conference and workshop presentations

- *(Invited talk)* Feedback Particle Filter: Design, Estimation, and Eror Analysis. University of California Los Angeles, Nov, 2019
- *(Conference presentation)* Accelerated flow for probability distributions , International Conference on Machine Learning (ICML), Long Beach, June, 2019
- *(Invited talk)* Feedback Particle Filter: Design, Estimation, Analysis. University of California Irvine, June, 2019
- *(Invited talk)* Poisson equation, its approximation, and error analysis. Mathematical Analysis Seminar Series. University of Illinois at Urbana-Champaign, February, 2019
- *(Conference presentation)* Error analysis of the stochastic linear feedback particle filter, IEEE Conference on Decision and Control (CDC), Miami Beach, December 2018.
- *(Conference presentation)* Error analysis of the linear feedback article filter, IEEE American control conference (ACC), Milwaukee, June, 2018
- *(Conference presentation)* How regularization effects the critical points in linear neural networks, Advances in Neural Information Processing Systems **(NIPS)**, Long Beach, December, 2017
- *(poster presentation)* Mean-field optimal control formulation for global optimization, IPAM Workshop on mean-field games, Los Angeles, August, 2017
- *(poster presentation)* Optimization in linear neural networks, Midwest Machine Learning Symposium, Chicago, June, 2017
- *(Conference presentation)* Error Estimates for the Kernel Gain Function Approximation in the Feedback Particle Filter, IEEE American Control Conference (ACC), Seattle, May, 2017.
- *(poster presentation) (Best poster award) Numerical methods to solve the weighted Poisson equation*, Coordinated Science Laboratory Student Conference, University of Illinois at Urbana-Champaign, February, 2017
- *(invited talk) Bias-Variance Tradeoff in solution to the Poisson Equation*, 5th Workshop on Cognition and Control, University of Florida, Gainesville, January, 2017
- *(Conference presentation)* Gain Function Approximation in the Feedback Particle Filter, IEEE Conference on Decision and Control (CDC), Las Vegas, December, 2016.
- *(Conference presentation)* An Optimal Transport Formulation of Linear Feedback Particle Filter, In Proc. of the 2016 American Control Conference (ACC), Boston, June, 2016.
- *(invited talk) Gain Function Approximation in the Feedback Particle Filter*, 5th Workshop on Control and Game Theory, Purdue University, Purdue, April, 2016
- *(invited talk) Poisson Equation in Learning and Classification*, 4th Workshop on Cognition and Control, University of Florida, Gainesville, January, 2016
- *(Conference presentation)* A Coupled Oscillator-based Control Architecture for Locomotory Gaits, IEEE Conference on Decision and Control, Los Angeles, December, 2014

Professional Service

Mentorship of Ph.D., Master's, and undergraduate students:
Rui Fu, Olga Movilla, and Anqi Dong at UC Irvine
Tixian Wang, Ayano Hiranaka, Kumar Gandhi, Peter Ivanov, and Ulzee An at UIUC

Invited Reviewer of TAC, JCOMP, ASME, NeurIPS, ICML, ICLR, CDC, ACC

Organizer of the of the Coordinated Science Laboratory Student Conference, 2015-2018

Organizer of the Coordinated Science Laboratory (CSL) Social Hour, 2015-2017

Participation in Engineering Volunteering In Stem Education (ENVISION), University of Illinois at Urbana-Champaign, Spring and Fall 2017

Participation in the Mentoring Undergraduates in Science and Engineering (MUSE) program, University of Illinois at Urbana-Champaign, 2015-2016