

Reza Mohammadi Ghazi

Ph.D.

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Current Position

11/2017–now **Postdoctoral Associate**, *Department of IEOR, UC Berkeley, CA, USA.*

Educational Background

- 11/2017 **PhD: Massachusetts Institute of Technology (MIT)**, Cambridge, MA, USA.
- *Dissertation title:* Inference and Uncertainty Quantification for Unsupervised Structural Monitoring Problems
 - *Committee members:* Profs. D. Veneziano (Chair), O. Buyukozturk (Advisor), Y.M. Marzouk, and R.E. Welsch
- 09/2011 **M.S. in Civil Engineering**, *University of Tehran, Tehran, Iran.*
- *Dissertation title:* Whirling Adaptive Configuration Tuned Mass Damper
- 02/2009 **B.S. in Civil Engineering**, *University of Tehran, Tehran, Iran.*

Research Interest

My research interest is mainly on statistical learning and inference, uncertainty quantification, and optimization methods for developing smart environments, reliable cyber-physical systems, intelligent and sustainable infrastructure systems and cities. My research interests encompass the following interconnected areas:

- Statistical learning: theory and applications
- Inference, computational inverse problems, and uncertainty quantification
- Nonlinear optimization, numerical algorithms
- Power systems and energy infrastructures
- Stochastic modeling, control, and health monitoring of dynamic systems

Honors, Scholarships and Awards

- 06/2017 Best paper award for probabilistic methods at the Engineering Mechanics Institute international conference 2017 (EMI 2017)
- 09/2011 Straightforward PhD admission award at the university of Tehran, Iran, *awarded by University of Tehran, Iran.*
- 09/2011 Exemption from the nationwide PhD program exam as an outstanding graduate student, *awarded by University of Tehran, Iran.*
- 08/2011 Exceptionally talented graduate student title, *awarded by University of Tehran, Iran.*

Journal Publications

Papers in review/submission (corresponding author)*

- [J11] M. Jin, I. Molybog, **R. Mohammadi-Ghazi**, J. Lavaei*. [Scalable and Robust State Estimation from Abundant but Untrusted Data.](#) (in review)

- [J10] **R. Mohammadi-Ghazi**, J. Lavaei*. [Empirical Study of Robust State Estimation for Power Systems](#) . *Energy, Elsevier* (in review)
- [J9] S. Park, **R. Mohammadi-Ghazi**, J. Lavaei*. [Topology Error Detection and Robust State Estimation Using Nonlinear Least Absolute Value](#) . (in review)
- [J8] **R. Mohammadi-Ghazi**, R.E. Welsch, and O. Buyukozturk*. [Kernel dependence analysis for novelty detection with high dimensional, small size data sets](#). *Journal of Mechanical Systems and Signal Processing* (in review)

Published and Accepted Papers

- [J7] **R. Mohammadi-Ghazi**, Y.M. Marzouk, and O. Buyukozturk*. [Conditional classifiers and boosted conditional Gaussian mixture model for novelty detection](#). *Pattern Recognition*, 2018, Vol. 81: 601-614
- [J6] **R. Mohammadi-Ghazi**, and O. Buyukozturk*. [Pairwise graphical models for structural health monitoring with dense sensor arrays](#). *Mechanical Systems and Signal Processing*, 2017, Vol. 93: 578-592
- [J5] **R. Mohammadi-Ghazi**, and O. Buyukozturk*. [Damage detection with small data set using energy-based nonlinear features](#). *Structural Control and Health Monitoring*, 2015, 23(2): 333-348
- [J4] M. H. Rafieipour *, A. K. Ghorbani-Tanha, M. Rahimian, and **R. Mohammadi-Ghazi**. [A novel semi-active TMD with folding variable stiffness spring](#). *Earthquake Engineering and Engineering Vibration* 2014, 13(3): 509-518
- [J3] **R. Mohammadi-Ghazi**, A. K. Ghorbani-Tanha*, and M. Rahimian. [Adaptive Configuration Tuned Mass Damper for Mitigation of Rotational Vibrations](#). *Journal of Engineering Mechanics*, ASCE, 2012, 138(8): 934-944
- [J2] M. Mohammadi* **R. Mohammadi-Ghazi**. [A new infilled steel frame with engineering properties](#). *Proceedings of the Institution of Civil Engineers - Structures and Buildings*, ICE, 2012, 165(1): 15-25
- [J1] M. Mohammadi*, V. Akrami, **R. Mohammadi-Ghazi**. [Methods to improve infilled frame ductility](#). *Journal of Structural Engineering*, ASCE, 2011, 137(6): 646-653

Conference Proceeding Publications

Proceedings (* corresponding author)

- [C10] M. Jin, I. Molybog, **R. Mohammadi-Ghazi**, J. Lavaei*. [Towards Robust and Scalable Power System State Estimation](#). *2019 IEEE Conference on Decision and Control (CDC 2019)* , Nice, France,(in review).
- [C9] S. Park, **R. Mohammadi-Ghazi**, J. Lavaei*. [Joint State Estimation and Sparse Topology Error Detection for Nonlinear Power Systems](#) . *American Control Conference (ACC 2019)* , Philadelphia, USA, July 10-12, 2019.
- [C8] **R. Mohammadi-Ghazi**, O. Buyukozturk*. [Kernel dependence analysis for structural health monitoring with high-dimensional, small size data sets](#). *11th International Workshop on Structural Health Monitoring, IWSHM 2017*, Stanford University, CA, USA, September 12-14, 2017.
- [C7] **R. Mohammadi-Ghazi**, O. Buyukozturk*. [Conditional classifiers for novelty detection: application to structural health monitoring](#). *ASCE Engineering Mechanics Institute Conference, EMI 2017*, San Diego, CA, United States, June 2017.

- [C6] **R. Mohammadi-Ghazi**, O. Buyukozturk*. [Sparse generalized pencil of function and its application to system identification and structural health monitoring](#). *SPIE Smart Structures and Materials - Nondestructive Evaluation and Health Monitoring*, Las Vegas, Nevada, United States, March 20, 2016.
- [C5] **R. Mohammadi-Ghazi**, O. Buyukozturk*. [Non-planar Ising Graphical Model for Efficient Inference in Structural Health Monitoring](#). *10th IWSHM: 10th International Workshop on Structural Health Monitoring*, Stanford University, CA, USA, September 2015.
- [C4] O. Buyukozturk*, J. Long, **R. Mohammadi-Ghazi**, Y. Cha, J.G. Chen, D. Smit. [Structural Health Monitoring: A Quest towards the Use of Combined Approaches](#). *EWSHM - 7th European Workshop on Structural Health Monitoring*, Nantes, France, Jul 2014.
- [C3] B. Klingensmith, T. Campbell, M.Y. Feng, **R. Mohammadi-Ghazi**, O. Buyukozturk*. [Highly synchronized, simultaneous, high-speed 24-bit data acquisition of triaxial MEMS accelerometers for monitoring a real world civil structure](#). *AUTOTESTCON, 2014 IEEE*, 2014.
- [C2] **R. Mohammadi-Ghazi**, O. Buyukozturk*. [Assessment and Localization of Active Discontinuities Using Energy Distribution Between Intrinsic Modes](#). *IMAC XXXII, Conference Proceedings of the Society for Experimental Mechanics*, Orlando, FL, USA, February 2014.
- [C1] **R. Mohammadi-Ghazi**, J. Long, O. Buyukozturk*. [Structural Damage Detection Based on Energy Transfer Between Intrinsic Modes](#). *SMASIS: ASME 2013 Conference on Smart Materials, Adaptive Structures and Intelligent Systems*, Snowbird, Utah, USA, September 16–18, 2013.

Conference Posters

- [P1] **R. Mohammadi-Ghazi***, O. Buyukozturk. Adaptive hierarchical monitoring systems: a novel approach for developing smart infrastructures. *Infrastructure Innovation in a Changing Environment Conference, MIT Industrial Liaisons Program (ILP)*, MIT, MA, USA, November 20, 2015.

Invited Seminars and Talks

- [S2] Inference and uncertainty quantification for health monitoring of infrastructures. *Smart City X: Workshop on Smart Systems and Sensors for Monitoring of Infrastructure, Water Resources, and Public Health*, Concordia University, Montreal, Canada, September 2017.
- [S1] Motion sensing and damage detection of facilities using wireless sensor networks. *MIT Society for Industrial and Applied Mathematics (SIAM)*, MIT, MA, USA, December 2013.

Patents

- [T2] Motion sensing WI-FI sensor networks for continuous 3D modeling and Prediction of facility responses to disturbances, 0050.2289-000 (18174J). (**Inventors:** William T. Freeman, Oral Buyukozturk, John William Fisher III, Frederic Durand, Hossein Mobahi, Neal Wadhwa, Zoran Dzunic, Justin Gejune Chen, James Long, **Reza Mohammadi Ghazi Mahalleh**, Theodericks Johannes Smit and Sergio Daniel Kapusta)
- [T1] Semi-active Whirling Mass Vibration Absorber, Patent ID: 390050095, Patent No.: 71488. **Inventor:** **Reza Mohammadi-Ghazi**, Registered in Iran.

Professional Experience

Research Experience

11/2017–now **Postdoctoral Associate**, *IEOR, University of California Berkeley.*

Topic: Optimization methods for energy infrastructures

- Parallel programming on Amazon cloud for solving large scale optimization problems with applications to power grids;
- Developing advanced algorithms for detecting the topological errors in power systems;
- Developing the local search techniques for the ARPA-E grid optimization competition;
- Analysis of robust state estimation for real world applications in power systems;

09/2012– **Research Assistant**, *CEE, Massachusetts Institute of Technology.*

11/2017 Topic: Inference and uncertainty quantification in data driven structural health monitoring

- Develop *Conditional Classifiers* and *Boosted Conditional Gaussian Mixture Models* for considering the statistical dependencies of random variables in novelty detection problems;
- Develop algorithms based on pairwise graphical models for analyzing dense sensor arrays and processing camera-based measurements with high spatial resolution;
- Develop *kernel-based novelty detection* techniques for solving problems with high-dimensional and small size data sets where no prior information is available about the statistical dependencies of random variables;
- Develop various statistical signal processing techniques such as the sparse generalized pencil of function method for systems identification;
- Develop energy-based feature extraction techniques based on nonlinear, non-stationary signal processing methods;
- Extensive experimental tests for verifying the efficacy of the developed techniques.
- Advanced programming skills in MATLAB and Python.

04/2009– **Research Assistant**, *International Institute of Earthquake Engineering and Seismology (IIEES)*, Tehran, Iran.

Topic: The effect of vertical loading and top gap on the behavior of engineered infilled frame with sliding fuses

- Experimental study of the effect of top gap and vertical on the behavior and ductility of infilled frames with sliding fuses;
- Develop finite element models and verifying them with the experiments;
- Propose formulations for damping, in-plane and out-of-plane strength of such infilled frames.

Teaching Experience

02/2013– **Teaching Assistant**, *Department of CEE, MIT.*

05/2013 ○ 1.036 Structural and Geotechnical Engineering Design, Spring 2013;

06/2013 **MIT Teaching Certificate**, *Completion of the “Graduate Student Teaching Certificate Program” by MIT Teaching & Learning Laboratory (TLL).*

Coursework

Core Coursework

- Statistical Learning Theory and Applications (9.520)
- Algorithms for Inference (6.438 - graphical models)
- Statistical Learning and Data Mining (15.077)
- Probability and Statistics in Engineering (1.151)
- Advanced System Dynamics and Control (2.151)
- Structural Analysis and Control (1.571)
- Nonlinear Dynamics and waves (1.685-2.034-18.337)
- Structural Mechanics (1.573)

- Finite Element Analysis I (2.093)
- Microeconomic Theory and Public Policy (14.003)

Other courses

- Machine Learning (6.867)
- Inference and Information (6.437)
- Numerical Methods for Stochastic Modeling and Inference (16.940)

■ **Programming**

Python and MATLAB

■ **Immigration Status**

U.S. Permanent Resident

■ **Languages**

- **Persian:** Native or bilingual proficiency
- **English:** Native or bilingual proficiency
- **Arabic:** Intermediate

■ **References (Upon Request)**

- **Oral Buyukozturk** (PhD Supervisor)
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