

# Reza Mohammadi

Ph.D.

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## Current Position

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

## Educational Background

10/2017 **PhD in Civil Engineering**, *Massachusetts Institute of Technology (MIT)*, 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

06/2009 **B.S. in Civil Engineering**, *University of Tehran*, Tehran, Iran.

## Research Interest

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

- Statistical learning, theory and applications
- Inference, computational inverse problems, and uncertainty quantification
- Intelligent environments, infrastructures, and buildings
- Stochastic modeling, control, and health monitoring of dynamic systems

## Professional Experience

### Research Experience

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

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.

04/2009- **Research Assistant**, *International Institute of Earthquake Engineering and Seismology*  
09/2011 (*IIEES*), Tehran, Iran.

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

- o Experimental study of the effect of top gap and vertical on the behavior and ductility of infilled frames with sliding fuses;
- o Develop finite element models and verifying them with the experiments;
- o 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 o 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)*.

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## **Honors, Scholarships and Awards**

06/2017 Best paper award for probabilistic methods at the Engineering Mechanics Institute international conference 2017 (EMI 2017)

2012–2017 Graduate Research Assistantship, *awarded by MIT*.

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*.

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## **Journal Publications**

### ***Papers in review/submission (\* corresponding author)***

- [J8] **R. Mohammadi-Ghazi**, and O. Buyukozturk\*. [Kernel dependence analysis for novelty detection with high dimensional, small size data sets](#). (in submission)
- [J7] **R. Mohammadi-Ghazi**, Y.M. Marzouk, and O. Buyukozturk\*. [Conditional classifiers and boosted conditional Gaussian mixture model for novelty detection](#). *Pattern Recognition*, (in review)

### ***Published and Accepted Papers***

- [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)*

- [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

- [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.

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## 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 Dzumic, 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.

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## 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)

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## References (Upon Request)

- **Oral Buyukozturk, Ph.D.** (PhD Supervisor)  
Professor  
Department of Civil & Environmental Engineering  
Massachusetts Institute of Technology  
Email: obuyuk@mit.edu  
Tel: +1 617-253-7186
- **Youssef M. Marzouk, Ph.D.** (Committee Member for Ph.D. Dissertation)  
Associate Professor  
Department of Aeronautics and Astronautics  
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