Mohammad Amin Nabian

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Interests

Infrastructure Engineering, Machine Learning and Deep Learning, Computational Fluid Dynamics, Uncertainty Quantification.

Education

2015 → Present **Ph.D. in Civil Engineering**, *University of Illinois at Urbana-Champaign*.
Area: Sustainable & Resilient Infrastructure Systems; GPA: 3.90
Minor 1: Computational Science and Engineering; Minor 2: Statistics

2013 → 2015 **M.Sc. in Civil Engineering**, *The George Washington University*.
Area: Water Resources Engineering; GPA: 3.96

2009 → 2013 **B.Sc. in Civil Engineering**, *Sharif University of Technology*.
Area: Civil Engineering; GPA: 16.0

Research Experience

Aug 2015 → Present **University of Illinois at Urbana-Champaign**, Research and Teaching Assistant.
Research theme: Infrastructure Engineering, Scientific Machine Learning, Data Science, Uncertainty Quantification, Computational Mechanics.

Sep 2013 → May 2015 **The George Washington University**, Research and Teaching Assistant.
Research theme: Numerical Anaysis, Computational Fluid Dynamics.

Awards

2020 **Problem Solving Competition First Prize Award**, *Data Challenge on Urban Travel Time, Speed, and Reliability, Sponsored by Iteris & Transportation Research Board*.

2019 **Dissertation Completion Fellowship**, *UIUC Graduate College*.

2019 **Mavis Future Faculty Fellowship**, *UIUC College of Engineering*.

2018 **Travel Award**, *UC Berkeley Computational Modeling and Simulation Center*.

2018 **Problem Solving Competition Runner-Up Award**, *Advanced Analytical Approaches Applied to Real-World Rail Problems, INFORMS Railway Application Section*.

2018 **Travel Award**, *Natural Hazards Engineering Research Infrastructure*.

2018 **Ranked as Excellent (top 10%) by the center for teaching excellence for three semesters**, *UIUC*.

2017 **Travel Award**, *Natural Hazards Engineering Research Infrastructure*.

2015 **ASME FED Scholarship Award**, *American Society of Mechanical Engineers*.

2015 **Illinois Distinguished Fellowship**, *UIUC Graduate College*.

2015 **Award of Excellence for Outstanding Paper**, *American Society of Mechanical Engineers*.

Multiple Yrs **Graduate Research and Teaching Assistantship Award**, *UIUC*.

2014 **Graduate Scholar of the Year Award**, *American Society of Mechanical Engineers*.

Multiple Yrs **Graduate Research and Teaching Assistantship Award**, *The George Washington University*.

2009 **Certificate of Recognition for Exceptional Talent**, *Iran's National Organization for Educational Testing*.

Publications

Journal Papers

ML 1 Deep Learning for Accelerated Seismic Reliability Analysis of Transportation Networks
***M. A. Nabian**, H. Meidani*, Computer-Aided Civil and Infrastructure Engineering (2018). Recognized as one of the top 20 most downloaded articles published in this journal in 2017 and 2018 + Recognized as one of the top cited articles published in this journal in 2018 and 2019.

ML 2 A Deep Learning Solution Approach for High-Dimensional Random Differential Equations
***M. A. Nabian**, H. Meidani*, Probabilistic Engineering Mechanics (2019).

ML 3 Physics-Informed Regularization of Deep Neural Networks for Enhanced Engineering Design and Analysis
***M. A. Nabian**, H. Meidani*, Journal of Computing and Information Science in Engineering (2019).

ML 4 Predicting Near-Term Train Schedule Performance and Delay Using Bi-Level Random Forests
***M. A. Nabian**, N. Alemazkoor, H. Meidani*, Transportation Research Record (2019).

ML 5 Efficient Training of Physics-Informed Neural Networks via Importance Sampling
***M. A. Nabian**, H. Meidani*, Under Review.

CFD 1 Multiphase Mesh-Free Particle Method for Simulating Granular Flows and Sediment Transport
***M. A. Nabian**, L. Farhadi*, Journal of Hydraulic Engineering (2016).

CFD 2 MR-WC-MPS: A Multi-Resolution WC-MPS Method for Simulation of Free-Surface Flows
***M. A. Nabian**, L. Farhadi*, Water (2019).

Peer-Reviewed Conference Papers

ML 6 Accelerating Stochastic Assessment of Post-Earthquake Transportation Network Connectivity via Machine-Learning-Based Surrogates
***M. A. Nabian**, H. Meidani*, Transportation Research Board (2018).

ML 7 Uncertainty Quantification and PCA-Based Model Reduction for Parallel Monte Carlo Analysis of Infrastructure System Reliability
***M. A. Nabian**, H. Meidani*, Transportation Research Board (2017).

CFD 3 Stable moving particle semi implicit method for modeling waves generated by submarine landslides
***M. A. Nabian**, L. Farhadi*, ASME 2014 International Mechanical Engineering Congress and Exposition.

CFD 4 Numerical Simulation of Solitary Wave Using the Fully Lagrangian Method of Moving Particle Semi Implicit
***M. A. Nabian**, L. Farhadi*, ASME 2014 4th Joint US-European Fluids Engineering Division Summer Meeting.

CFD 5 Simulating Water Waves Generated by Underwater Landslide with MPS and WC-MPS
***M. A. Nabian**, L. Farhadi*, 11th International Conference on Hydrodynamics (2014).

Thesis

CFD 6 An Efficient Mesh-Free Particle Method for Modeling of Free Surface and Multiphase Flows
M. A. Nabian, George Washington University (2015).

Presentations

TRB 2020 A Multi-Level Extreme Gradient Boosting Model for Vehicle Crash Type Prediction in Virginia
X. Li, ***M. A. Nabian**, H. Meidani*, Transportation Research Board 99th Annual Meeting.

EMI 2019 Robust Topology Optimization Using Image-Based Deep Learning
***M. A. Nabian**, V. Keshavarzzadeh, H. Meidani*, Engineering Mechanics Institute Conference 2019.

TRB 2019 Predicting Near-Term Train Schedule Performance and Delay Using Bi-Level Random Forests
***M. A. Nabian**, N. Alemazkoor, H. Meidani*, Transportation Research Board 98th Annual Meeting.

TES 2019 Traffic Flow Prediction with Big Data: Tackling Post-disaster Conditions and Missing Data
***M. A. Nabian**, N. Alemazkoor, H. Meidani*, Traffic Engineering and Safety Conference.

TES 2019 A Machine Learning Model for Vehicle Crash Type Prediction
X. Li, ***M. A. Nabian**, H. Meidani*, Traffic Engineering and Safety Conference.

Invited Talk 2018 Deep Learning for Accelerated Seismic Reliability Analysis of Transportation Networks
M. A. Nabian, Brown Bag Seminars, UIUC.

EMI 2018 An Efficient Solution Approach for High-Dimensional Random PDEs Using SGD and Neural Networks
***M. A. Nabian**, H. Meidani*, Engineering Mechanics Institute Conference 2018.

INFORMS 2018 Predicting Near-Term Train Schedule Performance and Delay Using Bi-Level Random Forests
***M. A. Nabian**, N. Alemazkoor, H. Meidani*, 2018 INFORMS annual meeting.

TRB 2018 Deep Learning for Accelerated Reliability Assessment of Transportation Networks
***M. A. Nabian**, H. Meidani*, Transportation Research Board 97th Annual Meeting.

CSL 2018 Deep-Learning-Based Surrogates for Fast Prediction of Stochastic Civil Engineering Systems
***M. A. Nabian**, H. Meidani*, 13th Coordinated Science Lab (CSL) Conference.

Invited Talk 2017 — Deep Learning for Accelerating Infrastructure System Reliability Analysis
M. A. Nabian, Kent Seminars, Illinois Center for Transportation.

TRB 2017 — Uncertainty Quantification and PCA-Based Model Reduction for Parallel Monte Carlo Analysis of Infrastructure System Reliability
M. A. Nabian, *H. Meidani*, Transportation Research Board 67th Annual Meeting.

HealthCare 2017 — Uncertainty Quantification in Patient-Specific Cardiovascular Simulation for Enhanced Health Monitoring
M. A. Nabian, *H. Meidani*, 4th Health Care Engineering Systems Symposium.

GW 2015 — A Mesh-Free Particle Model for Simulation of Free-Surface Multiphase Flows
M. A. Nabian, *L. Farhadi*, GWU SEAS Student Research and Development Showcase.

ASME 2014 — Numerical Simulation of Solitary Wave Using the Fully Lagrangian Method of Moving Particle Semi Implicit
M. A. Nabian, *L. Farhadi*, ASME 4th Joint US-European Fluids Engineering Division Summer Meeting.

ASME 2014 — Stable Moving Particle Semi Implicit Method for Modeling Waves Generated by Submarine Landslides
M. A. Nabian, *L. Farhadi*, ASME 2014 International Mechanical Engineering Congress and Exposition.

GW 2014 — Numerical Simulation of Complex Free Surface Flows Using a Stable Mesh-Free Lagrangian Method
M. A. Nabian, *L. Farhadi*, GWU SEAS Student Research and Development Showcase.

Services

2019 — Reviewer for the Transactions on Intelligent Transportation Systems.

2017 → 2019 — Reviewer for the Transportation Research Records.

2015 → 2019 — Reviewer for the ASME Fluids Engineering Division Conferences.

2019 — Reviewer for the Road Safety & Simulation Conference.

Mentoring Experience

2019 → Present — **Rini Gladstone**, *Ph.D. Student in Civil Engineering at UIUC.*
Project 1: The NASA Langley Uncertainty Quantification Challenge on Optimization under Uncertainty
Project 2: Machine Learning for Efficient and Robust Topology Optimization.

2019 → Present — **Xiyue Li**, *M.Sc. Student in Civil Engineering at UIUC.*
Project: Student Data Challenge on Urban Travel Time, Speed, and Reliability (Sponsored by Iteris & TRB).
Winner of the first prize award.

2019 → Present — **Clara Wei**, *B.Sc. Student in Computer Science at UIUC.*
Project: Random Differential Equation Neural Networks.

2017 — **Jameel Kaddo**, *B.Sc. Student in Civil Engineering at UIUC.*
Project: Machine Learning for Reliability Analysis of Infrastructure Systems.

2016 — **Alia Taha**, *B.Sc. Student in Civil Engineering at UIUC.*
Project: Accelerated Infrastructure System Reliability Analysis Using Dimension Reduction.

Teaching Experience

TA — **Systems Engineering**, *UIUC*, Fall 2017, Spring 2018, Fall 2018 & Fall 2019 (Head TA).
Cited in the List of Teachers Ranked as Excellent (top 10%, three time winner).

Distinguished TA — **Probability & Statistics**, *UIUC*, Spring 2017, Fall 2017 (Head TA) & Spring 2019.

TA — **Uncertainty Quantification**, *UIUC*, Fall 2018, Summer 2018, & Spring 2020.

TA — **Hydraulic Lab**, *The George Washington University*, Fall 2014 & Spring 2015.

TA — **Hydraulics**, *The George Washington University*, Spring 2014 & Fall 2014.

TA — **Differential Equations**, *The George Washington University*, Fall 2013.

Head TA — **Numerical Analysis**, *K.N Toosi University of Technology*, Spring 2013.

TA — **Mechanics of Materials**, *Sharif University of Technology*, Spring 2013.

Head TA — **Loading of Structures**, *Sharif University of Technology*, Fall 2012.

Instructor — **Engineering Design**, *Sharif University of Technology*, Fall 2011 & Spring 2012.