Hesam Talebiyan, PhD — Curriculum Vitae

San Jose – California – United States
+1 (832) 207-8668 • hesam.talebiyan AT moodys.com
hesamtalebiyan.com

Education

Rice University **Houston, TX**
Doctor of Philosophy in Civil Engineering, *Aug 2016–Aug 2021*
- Thesis: Interdependent restoration of infrastructure networks with humans in the loop
- Advisor: Prof. Leonardo Duenas-Osorio
- GPA = 3.85, Honor: 2020 Robert P. and Eleanor Warden Shubinski Award

Sharif University of Technology **Tehran, Iran**
Master of Science in Earthquake Engineering, *Sep 2013–Jan 2016*
- Thesis: Optimal seismic risk mitigation by prioritization of structures for retrofit
- GPA = 89.3%, Advisor: Dr. Mojtaba Mahsuli

Sharif University of Technology **Tehran, Iran**
Bachelor of Science in Civil Engineering, *Sep 2008–July 2013*
- Project: Study of maximum acceleration in regular steel frames using endurance time method
- GPA = 86.1%

Research and Professional Experience

Moody's **Newark, CA**
Assistant Director (Data Science/Emerging Risks Modeling) *Sep 2022–Present*
- Regularly assigned across multiple product teams to support urgent modeling needs—including validation, final QA and product calibration to meet industry benchmarks, and new feature development—demonstrating fast learning, adaptability, and effective cross-team collaboration.
- Developed ML models (Random Forest, GBRT) for various insurance loss estimation products, including correlation analysis across industry sectors to support client portfolio diversification and risk exposure management.
- Designed and implemented Bayesian hierarchical models to generate agent attributes for agent-based simulations, supported by large-scale data extraction and preprocessing using SQL; optimized campaign generation code for 70% improvement in runtime and memory efficiency.
- Conducted time-series analyses to estimate outage durations and financial losses following the CrowdStrike incident, contributing to a high-priority industry report delivered under tight deadlines.
- Supported model deployment workflows by validating Docker containers in Kubernetes environments.

Rice University, NIST CoE for Community Resilience **Houston, TX**
Postdoctoral Associate *Sep 2021–Sep 2022*
- Led an interdisciplinary team of engineers, social scientists, and economists to develop decision-support algorithms for retrofitting/restoring interdependent networks—utilized by civil infrastructure authorities in Lumberton, NC, and Seaside, OR
- Employing XGBoost to predict household dislocation based on socioeconomic indicators
- Implementation: NIST's IN-CORE (Python)

Rice University **Houston, TX**
Research Assistant *Aug 2016–Aug 2021*

- Developed a multi-method modeling framework for decentralized decision-making for real-world interdependent infrastructure networks: mixed-integer programming to optimize retrofit/restoration decisions under budget and operational constraints, and hierarchical Bayesian models to forecast infrastructure operator decisions across space and time
- Designed and implemented game-theoretic models (Auctions and Bayesian games) to simulate decentralized decision-making behavior among interdependent network agents with conflicting objectives and bounded rationality
- Modeling congestion and observability in cyber-physical systems under external disruption applied to electricity and telecommunication systems in the aftermath of earthquakes
- Developed neural nets to approximate optimal graph restoration timelines across 280,000+ simulated recovery scenarios for data-driven resource allocation.
- Databases of synthetic and realistic infrastructure networks
- Funded by ARL's MURI and NSF's CRISP 2.0, and NIST CoE Community Resilience

Sharif University of Technology — **Tehran, Iran**
Research Assistant — *Sep 2014–Jan 2016*
- Models for prediction of damage cost and retrofit cost of masonry structures
- Risk analysis on schools of Iran and prioritized them based on optimal mitigation of risk
- Novel sensitivity method based on Monte Carlo sampling to prioritize buildings
- Database of retrofit plans for schools in Iran, including structural properties of retrofit plans
- Implementation: Rtx (C++, Qt)

Kasra Consulting Enginees — **Tehran, Iran**
Structural Design Engineer — *Apr 2013–Dec 2013*
- Design of commercial and residential structure of various steel and concrete buildings

Software Developments

- **Rtx: Reliability — Risk — Resilience tools [link]**
  Contribution: reliability sensitivity analysis using sampling and masonry damage and retrofit cost models
- **Interdependent Networked Community Resilience Modeling Environment (IN-CORE) [link]**
  Contribution: optimization-based centralized and decentralized decision support tools

Other Projects

- **Risk-based Prioritization of School Buildings for Seismic Retrofit**
  Collaboration with Research and Technical Department of National Organization for School Development, Renovation and Equipping, Tehran, Iran
- **Pluvial Flood Modeling and risk communication**
  NSF grant proposal in collaboration with researchers from computer science and political science at Rice University, Houston, Tx

Teaching Experience

Rice University — **Houston, TX**
Co-lecturer — *Aug 2021–Dec 2021*
- Graduate: Modeling and Analysis of Networked Systems

Rice University — **Houston, TX**
Teaching Assistant — *Jan 2020–May 2020*
- Undergraduate: Uncertainty and Risk-Based Decisions for Infrastructure Systems

Sharif University of Technology — **Tehran, Iran**
Teaching Assistant — *Sep 2013–Dec 2014*
- Graduate: Dynamic of Structure, Earthquake Engineering Seminar
- Undergraduate: Mechanics of Material, Statics

Self-employed — **Tehran, Iran**
Private Tutor — *Jan 2014–July 2015*
- Undergraduate: Statics, Mechanics of Material, Analysis of Structure I & II

Publications

Refereed journal articles

[1] A. Beck, **H. Talebiyan**, E. J. Cha, and L. Duenas-Osorio, "Socially-aware retrofit prioritization for electric power networks: integrating network performance and social impact considerations," *Sustainable and Resilient Infrastructure*, 2025.

[2] **H. Talebiyan** and L. Duenas-Osorio, "Interdependent network restoration games with incomplete information and bounded rationality," *Risk Analysis*, 2024.

[3] **H. Talebiyan** and Dueñas-Osorio, "Auctions for resource allocation and decentralized restoration of interdependent networks," *Reliability Engineering & System Safety*, p. 109301, Sep 2023.

[4] **H. Talebiyan**, K. Leelardcharoen, L. Dueñas-Osorio, B. J. Goodno, and J. I. Craig, "Congestion and observability across interdependent power and telecommunication networks under seismic hazard," *Earthquake Spectra*, p. 875529302110266, aug 2021.

[5] **H. Talebiyan** and L. Duenas-Osorio, "Decentralized Decision Making for the Restoration of Interdependent Networks," *ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part A: Civil Engineering*, vol. 6, no. 2, p. 04020012, 2020.

[6] **H. Talebiyan** and M. Mahsuli, "Sampling-Based Reliability Sensitivity Analysis Using Direct Differentiation," *ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part A: Civil Engineering*, vol. 6, no. 2, 2020.

[7] **H. Talebiyan** and M. Mahsuli, "Risk-Based Prioritization of a Building Portfolio for Retrofit," *Journal of Structural Engineering*, vol. 144, no. 1, p. 04017181, 2018.

[8] H. Nasrazadani, M. Mahsuli, **H. Talebiyan**, and H. Kashani, "Probabilistic Modeling Framework for Prediction of Seismic Retrofit Cost of Buildings," *Journal of Construction Engineering and Management*, vol. 143, no. 8, p. 04017055, 2017.

Conference proceedings

[9] **H. Talebiyan** and L. Dueñas-Osorio, "Accelerating Utility Restoration Planning with Ensemble Statistical Models," in *13th International Conference on Structural Safety & Reliability* (*ICOSSAR 2021-2022*), (Shanghai, China), 2022.

[10] A. Beck, **H. Talebiyan**, E. J. Cha, and L. Duenas-Osorio, "Comparative Retrofit Prioritization Schemes for Electric Power Networks: Application to the community in Seaside, OR," in *8th International Symposium on Reliability Engineering and Risk Management* (*ISRERM*), (Hannover, Germany), 2022.

[11] R. Paredes, **H. Talebiyan**, and L. Dueñas-Osorio, "Path-Dependent Reliability and Resiliency of Critical Infrastructure via Particle Integration Methods," in *13th International Conference on Structural Safety & Reliability* (*ICOSSAR 2021-2022*), (Shanghai, China), 2022.

[12] S. Alemzadeh, **H. Talebiyan**, S. Talebi, L. Duenas-Osorio, and M. Mesbahi, "Resource Allocation for Infrastructure Resilience using Artificial Neural Networks," in *2020 IEEE 32nd International Conference on Tools with Artificial Intelligence* (*ICTAI*), (virtual), pp. 617–624, IEEE, nov 2020.

[13] **H. Talebiyan** and L. Duenas-Osorio, "Probabilistic Assessment of Decentralized Decision-making for Interdependent Network Restoration," in *13th International Conference on Applications of Statistics and Probability in Civil Engineering, ICASP13* (J. Song, ed.), (Seoul, South Korea), 2019.

[14] **H. Talebiyan**, H. Nasrazadani, and M. Mahsuli, "Probabilistic Prediction of Retrofit Cost of Masonry Buildings," in *7th International Conference of Seismology and Earthquake Engineering* (*SEE7*), (Tehran, Iran), 2015.

Working papers

[15] **H. Talebiyan**, A. D. González, L. Dueñas-Osorio, J. Wu, and J. W. Baker, "Interdependent Infrastructure Network of Shelby County, TN: A Restoration-oriented Database." 2022.

[16] **H. Talebiyan** et al., "A Building and Utility Intervention Decision Support Model with Socio-economic Constraints: Application to Lumberton, NC." 2022.

Other publications

[17] **H. Talebiyan**, *Interdependent Restoration of Infrastructure Networks with Humans in the Loop: decentralized and strategic decision processes*. Phd dissertation, Rice University, 2021.

[18] S. Alemzadeh, **H. Talebiyan**, S. Talebi, L. Duenas-Osorio, M. Mesbahi, L. Dueñas-Osorio, and M. Mesbahi, "Deep Learning-based Resource Allocation for Infrastructure Resilience," *Arxiv*, pp. 1–14, 2020.

[19] **H. Talebiyan**, *Optimal seismic risk mitigation by prioritization of structures for retrofit*. Ms thesis, Sharif University of Technology, Tehran, Iran, 2016.

Oral Presentations

1. **H. Talebiyan** & L. Duenas-Osorio (2022), "Accelerating Utility Restoration Planning with Ensemble Statistical Models," Presented at *ICOSSAR 2021-2022*, virtual.
2. S. Alemzadeh, **H. Talebiyan**, S. Talebi, L. Duenas-Osorio, & M. Mesbahi (2020), "Resource Allocation for Infrastructure Resilience using Artificial Neural Networks," Presented at *ICTAI 2020*, virtual.
3. **H. Talebiyan**, A. Gonzalez, & L. Duenas-Osorio (2020), "Interdependent Infrastructure Network of Shelby County, TN: A Recovery-oriented Database," Presented at *INFORMS 2020*, virtual.
4. **H. Talebiyan** & L. Duenas-Osorio (2019), "Probabilistic Assessment of Decentralized Decision-making for Interdependent Network Restoration," Presented at *ICASP13*, Seoul, South Korea.
5. **H. Talebiyan** & L. Duenas-Osorio (2019), "Auction-based Resource Allocation for Interdependent Network Restoration," Presented at *INFORMS 2019*, Seattle, WA.
6. **H. Talebiyan** & L. Duenas-Osorio (2018), "Bayesian Hierarchical Models for Decentralized Decision-making across Interdependent Network Restoration," Presented at *INFORMS* 2018, Phoenix, AZ.
7. **H. Talebiyan** & L. Duenas-Osorio (2018), "Multi-agent decision-making for interdependent network restoration via decentralized optimization," Presented at *IISE Annual Conference & Expo*, Orlando, FL.
8. **H. Talebiyan**, S. Alemzadeh, L. Duenas-Osorio, & M. Mesbahi (2018), "Optimization and Control of Restoration Strategies across Interdependent Networks," Presented at *NSF CRISP/RIPS Workshop*, Washington, D.C.

Poster Presentations

1. **H. Talebiyan**, S. Perry, J. Patil, K. Shepherd, J. Wheeler, D. Subramanian, R. Stein, R. Wilson, L. Duenas-Osorio, & G. Woods, (2019), "Flood-Radar: A user-informed local pluvial flood forecasting tool," Presented at *SSPEED Conference*, Houston, TX.
2. **H. Talebiyan** & L. Duenas-Osorio, (2018), "Decentralized decision-making for Interdependent Infrastructure Resilience," Presented at *Lloyd's day at Houston*, Houston, TX.
3. **H. Talebiyan** & L. Duenas-Osorio, (2018), "Decentralized Decision-making for the Restoration of Real-world Interdependent Networks," *Rice Data Science Conference*, Houston, TX.
4. S. Alemzadeh, **H. Talebiyan**, M. Mesbahi & L. Duenas-Osorio, (2018), "Optimization and Control of Restoration Strategies Across Interdependent Networks," Presented at *NSF CRISP/RIPS Workshop*, Washington, D.C.
5. **H. Talebiyan**, H. Nasrazadani & M. Mahsuli, (2015), "Probabilistic prediction of retrofit cost for masonry structures," Presented at *SEE7*, Tehran, Iran.

Service

- **Journals**
  Reviewer *Jul 2019–Present*
  - Structures (Elsevier)
  - Journal of Infrastructure Systems (ASCE)
  - Environment Systems and Decisions (Springer)
  - Natural Hazards Review (ASCE)
- **Academic and Professional Institutions**
  Member
  - Earthquake Engineering Research Institute
  - American Society of Civil Engineers
  - The Institute for Operations Research and the Management Sciences
  - Institute of Industrial and Systems Engineers
- **Educational Research and Improvement Working Group** **Tehran, Iran**
  Chief Secretary *Jul 2013–Oct 2013*
  - Researched on different accreditation organizations for universities in the world such as ABET
  - The working group is affiliated with Sharif University of Technology