

KAMIAR KHAYAMBASHI

Ph.D. Candidate in Civil and Environmental Engineering, University of Virginia

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📍 Charlottesville, VA - USA

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🎓 Google Scholar

EDUCATION

Ph.D. in Civil and Environmental Engineering
University of Virginia

📅 Jun 2022 – Aug 2026 (anticipated)

- **GPA:** 3.9/4.0.
- **Research topic:** Efficient Uncertainty-aware Power System Operation and Planning with Machine-learning Surrogates
- **Advisor:** Prof. Negin Alemazkoor
- **Relevant coursework:** Statistical Modeling, Machine Learning, Deep Learning, Uncertainty Quantification

M.Sc. in Civil and Environmental Engineering
Sharif University of Technology

📅 Sep 2018 – Mar 2021

- **GPA:** 4.0/4.0.
- **Research topic:** Probabilistic Modeling of Water Distribution Infrastructure and Its Inter-dependencies in Community Resilience Analysis
- **Advisor:** Prof. Mojtaba Mahsuli
- **Program:** Structural Engineering
- **Relevant coursework:** Reliability Analysis and Probabilistic Modeling, Infrastructure Resilience, Graph Theory, Operations Research in Transportation

B.Sc. in Civil and Environmental Engineering
Isfahan University of Technology

📅 Sep 2014 – Jul 2018

- **GPA:** 3.91/4.0.

AWARDS AND HONORS

- Science Synthesis Prize Winner, **U.S. Department of Energy and National Renewable Energy Laboratory (2025)** - Awarded \$10,000 for a research paper identifying key barriers and opportunities in renewable energy integration.
- SEAS Endowed Graduate Fellowship – **Copenhaver Charitable Trust Bicentennial Fellowship**, University of Virginia (2025–2026) - Awarded for academic excellence and research productivity.
- Environmental Futures Fellowship, **University of Virginia Environmental Institute (2025)** - *Interdisciplinary Graduate Fellowship*.
- Honorary scholarship and direct admission to Sharif University of Technology, Civil Engineering M.Sc. Program (2018) - Awarded for exceptional undergraduate performance (non-monetary recognition).
- Graduated Magna Cum Laude from Civil Engineering M.Sc. program at Sharif University of Technology (2021) - Top 15% of the class.
- Graduated Summa Cum Laude from Civil Engineering B.Sc. program at Isfahan University of Technology (2018) - Top 5% of the class.

PUBLICATIONS

Published

- **Khayambashi, K.,** Clarens, A. F., Shobe, W. M., & Alemazkoor, N. (2025). Identifying key uncertainties in energy transitions: A Puerto Rico case study. *Nature Communications*, 16(1), 9064. [GitHub](#)
- **Khayambashi, K.,** Hasnat, M. A., & Alemazkoor, N. (2024). Hybrid chance-constrained optimal power flow under load and renewable generation uncertainty using enhanced multi-fidelity graph neural networks. *Journal of Machine Learning for Modeling and Computing*, 5(4). [GitHub](#)
- **Khayambashi, K.,** & Alemazkoor, N. (2024). Graph neural networks for precision-guaranteed compression of large-scale data. *Proc. IEEE International Conference on Big Data*. [GitHub](#)
- Taghizadeh, M., **Khayambashi, K.,** Hasnat, M. A., & Alemazkoor, N. (2024). Multi-fidelity graph neural networks for efficient power flow analysis. *Electric Power Systems Research*, 237, 111014. [GitHub](#)
- Khorshidi, M., Goli, A., Orešković, M., **Khayambashi, K.,** & Ameri, M. (2023). Performance evaluation of asphalt mixtures. *Sustainability*, 15(18), 13314.

In Press

- **Khayambashi, K.,** Anand, H., Asadi, S., & Alemazkoor, N. (2024). Long-term power grid planning: Navigating climate change and energy transition challenges. In *Advancing the Resilience of the Power Grid under a Changing Climate*. IEEE & Wiley.

Under Review

- **Khayambashi, K.,** Hasnat, M. A., & Alemazkoor, N. (2025). GNN-based multi-agent reinforcement learning for power distribution recovery. *Reliability Engineering and System Safety*. [GitHub](#)
- **Khayambashi, K.,** Kaufman, M., DeCarolis, J., Shobe, W., Wade, C., McCollum, D., Alemazkoor, N., & Clarens, A. F. (2025). *Interactions Between Data Center Load Growth, Building Heat Pump Adoption, and Energy Affordability*. [GitHub](#)
- Anand, H., **Khayambashi, K.,** Zandsalimi, Z., Taghizadeh, M., Hasnat, M. A., & Alemazkoor, N. (2025). GNN applications in civil infrastructures. *Engineering Applications of Artificial Intelligence*.

In Preparation

- **Khayambashi, K.,** Fuhrman, J., Javadi, P., Clarens, A., & Alemazkoor, N. (2025). Uncertainties in Virginia decarbonization pathways. [GitHub](#)
- **Khayambashi, K.,** Su, J., Asadi, S., Yan, S., & Alemazkoor, N. (2025). Temporal graph neural networks for failure and cause prediction in power grids.
- **Khayambashi, K.** & Alemazkoor, N. (2025). *Power Distribution Restoration with Data Center Anchors via Graph-Based Reinforcement Learning*.

RESEARCH EXPERIENCE

Research Collaborator

Pacific Gas and Electric Company (PG&E)

- 📅 Summer 2025 – present 📍 University of Virginia
 - Developed temporal GNN models for multi-scale risk prediction in power grids, enabling real-time system-to-structure assessment.
 - Built models to predict likely failure causes at the structure level, supporting early warning and proactive risk mitigation.

Research Intern

Maryland Department of Transportation – State Highway Administration (MDOT SHA)

- 📅 Summer 2025 📍 Baltimore, MD, USA
 - Integrated environmental, structural, geotechnical, and climate datasets into a comprehensive asset database and conducted geospatial risk analysis
 - Built decision-support tools with multi-objective optimization to rank drainage assets and produce statewide risk maps for proactive maintenance planning

Research Assistant

Computational Analytics for Smart Systems Lab

- 📅 June 2022 – present 📍 University of Virginia
 - Built deep learning surrogate and sensitivity analysis framework to identify key uncertainties in Puerto Rico's energy transition, supporting robust decarbonization planning.
 - Proposed graph neural network-based compression for sensor networks, reducing communication and storage costs while preserving monitoring accuracy.
 - Designed multi-fidelity GNNs for probabilistic power flow and a hybrid chance-constrained OPF model to improve grid efficiency under renewable uncertainty.
 - Assessed Virginia's decarbonization pathways, including carbon removal and data center growth, to inform sustainable long-term electricity planning.
 - Quantified interactions between data center load growth and residential heat pump electrification using capacity-expansion modeling, evaluating impacts on system costs, infrastructure utilization, and energy affordability in Virginia.
 - Analyzed barriers to renewable integration in U.S. grids, highlighting technical and socio-political challenges for climate-resilient energy systems.
 - Developed GNN-based multi-agent reinforcement learning for power distribution restoration after hurricanes, enabling scalable crew coordination.
 - Synthesized graph neural network applications across transportation, power, water, and structural infrastructure systems, identifying methodological advances and key research directions for resilient infrastructure analytics.
 - Created temporal GNNs for failure and cause prediction in power grids, providing early-warning insights for operators.
 - Developed a GNN-reinforcement learning framework to evaluate data centers as restoration anchors in post-disaster grid recovery, quantifying resilience and outage-cost impacts under uncertainty.

Research Assistant & Software Developer

Infrastructure Sustainability and Resilience Research (INSURER) Center

- 📅 Sep 2019 - Mar 2022 📍 Sharif University of Technology
 - Developed and integrated the water infrastructure risk and recovery models to Rtx resilience assessment software.
 - Consultation for risk analysis project for water distribution infrastructure of Tehran.

PRESENTATIONS

- Kamiar Khayambashi**, *Analyzing Key Uncertainties in Virginia's Decarbonization Pathway Using Integrated Assessment Models: The Case of Virginia*, Poster presentation at the Environmental Futures Forum 2025, Charlottesville, VA, October 6-7 2025.
- Kamiar Khayambashi**, *A multi-agent graph neural network-proximal policy optimization model for efficient power distribution system recovery after hurricanes*, International Conference on Structural Safety and Reliability (ICOSSAR'25), Los Angeles, CA, 2025.
- Kamiar Khayambashi**, *A multi-agent graph neural network-proximal policy optimization model for efficient power distribution system recovery after hurricanes*, ASCE Engineering Mechanics Institute (EMI) Conference, Anaheim, CA, 2025.
- Kamiar Khayambashi**, *Graph neural networks for precision-guaranteed compression of large-scale data*, 2024 IEEE International Conference on Big Data, Washington, D.C., 2024.
- Kamiar Khayambashi**, *Hybrid Chance-Constrained Optimal Power Flow under Uncertainty using Multi-Fidelity Graph Neural Networks*, ASCE Engineering Mechanics Institute and Probabilistic Mechanics & Reliability Conference (EMI/PMC), Chicago, IL, 2024.
- Kamiar Khayambashi**, *Data Transmission and Storage Reduction in Wireless Sensor Networks via Local and Global Deep Learning Models* (Poster), University of Virginia Engineering Research Symposium (UVERS), Charlottesville, VA, 2023.
- Kamiar Khayambashi**, *Graph Neural Networks Applications in Smart Cities* (Poster + Oral), UVA Link Lab 2023 Research Day, Charlottesville, VA, 2023.
- Kamiar Khayambashi**, *Deep Learning-Based Integrated Probabilistic Cost Analysis for Future Decarbonized Hurricane-Prone Power Systems*, ASCE Engineering Mechanics Institute (EMI) Conference, Atlanta, GA, 2023.
- Kamiar Khayambashi**, *Assuring Trust in CHEST Devices with Near-Optimal Data Collection and Distributed Sensors*, NSF CHEST I/UCRC Semiannual Meeting, Online, 2022.

RESEARCH COVERAGE

- Puerto Rico energy transition study** – press and science coverage and policy dissemination (2025):
EurekAlert · OurEnergyPolicy · Scienmag · Bioengineer
- AI-based power grid reliability study** – press and science news coverage (2024):
EurekAlert · ScienceDaily · TechXplore
- Institutional coverage**: UVA Engineering News · UVA Environmental Institute

GRANT WRITING

ReDDDoT Phase 2: Bridging AI Advances in Cancer Research with Clinical Decisions: A Focus on End-of-Life

Participated in internal reviewing

Submitted to Smart Health and Biomedical Research in the Era of Artificial Intelligence and Advanced Data Science (SCH) program of NSF.

LEADERSHIP AND SERVICE

Organizer:

- *K-12 Outreach Workshop – Starr Hill Pathways Program, Summer 2022*
Designed interactive games for middle school students to learn and engage with the concepts of probability.
- *Sustainable and Resilient Communities Workshop, December 11, 2019*
Organized a one-day seminar at Sharif University of Technology on sustainable and resilient communities featuring leading experts and specialists in the field.

Voluntary Service:

- *Graduate Engineering Student Council (GESOC), Fall 2022 - Summer 2024*
Volunteered regularly to support council events, contributing to logistics, setup, and operational needs that ensured events ran effectively.
- *Engineering School Recruitment Weekend, Winter 2023*
Assisted with event setup and logistics, guided prospective students between sessions, and helped create a welcoming environment during recruitment activities.
- *Link Lab-Charlottesville High School Engineering Mentorship, 2026*
Mentoring CHS capstone teams on semester-long engineering projects, providing technical and project management guidance and participating in kickoff events, lab visits, and final project presentations.

Reviewer:

- Nature Communications
- IEEE International Conference on Intelligent Transportation Systems (ITSC)
- Journal of Construction Engineering and Management
- Engineering, Construction and Architectural Management
- Journal of Machine Learning for Modeling and Computing
- Research Software Engineering Conference (RSEcon)

Member of:

- American Society of Civil Engineers (ASCE)
- Engineering Mechanics Institute (EMI)
- Institute of Transportation Engineers (ITE)
- Iranian Students Associations at UVA (IRSA)

TECHNICAL SKILLS

Programming & Tools

Python, C++, VBA, MATLAB, SQL, \LaTeX , PyTorch, Tensorflow, CUDA Programming, Microsoft Office, ArcGIS, AutoCAD, Civil3D, AnyLogic

Data Science & Machine Learning

Supervised/Unsupervised Learning, Deep Learning (CNNs, RNNs, GNNs, GANs), Large Language Models, Reinforcement Learning, Dimensionality Reduction, Clustering, Sensitivity Analysis, Multi-Fidelity Modeling, Time Series Forecasting, Physics-Informed Modeling

Optimization

Numerical Optimization, Linear Programming, Kalman Filters

Risk & Resilience Analysis

Resilience Analysis, Uncertainty Quantification, Reliability Analysis, Risk-Based Decision Making, Agent-Based Modeling, Discrete Event Simulation, Global Sensitivity Analysis

Energy & Systems Modeling

Energy System Modeling, Integrated Assessment Modeling, Power System Analysis, Long-Term Energy Planning, Intermittency Management,

TEACHING / MENTORSHIP EXPERIENCE

Graduate Teaching Assistant

University of Virginia

- 📅 Fall 2025 – Spring 2026 📍 Charlottesville, VA, USA
 - Assisted Dr. Lindsay Ivey-Burden with CE 4991: Civil Engineering Design and Practice (Capstone Design).
 - Assisted Dr. Gomez with CE 2310: Strength of Materials (Spring 2026).
 - Assisted Dr. Negin Alemazkoo with CE 4600: Adapting Civil Infrastructure Systems for Climate Change (Spring 2026).

Undergraduate Research Mentor

University of Virginia

- 📅 2024 – Spring 2026 📍 Charlottesville, VA, USA
 - Mentored undergraduate student Molly Peters Kenney Kaufman (Fall 2025 – Spring 2026) on a project examining data center load growth and building electrification, supporting technical skill development and contributions to modeling and analysis.
 - Mentored undergraduate student Max Benningfield (Summer 2024), providing technical guidance, feedback, and research independence while contributing to a project on data center growth and electrification.

Graduate Teaching Assistant

Sharif University of Technology

- 📅 Spring 2021 📍 Tehran, Iran
 - Supported Dr. Mojtaba Mahsuli in teaching Reliability, Risk, and Resilience, contributing to preparation of course material.

REFERENCES

- **Dr. Negin Alemazkoo**
Assistant Professor - Civil and Environmental Engineering
University of Virginia
Email: na7fp@virginia.edu
- **Dr. Somayeh Asadi**
Professor - Civil and Environmental Engineering
University of Virginia
Email: rkn3gr@virginia.edu
- **Dr. Andres F. Clarens**
Professor - Civil and Environmental Engineering
University of Virginia
Email: afc7r@virginia.edu
- **Dr. Leo Liu**
Associate Professor - Civil and Environmental Engineering
University of Virginia
Email: leoliu@virginia.edu
- **Dr. Ferdinando Fioretto**
Assistant Professor - Computer Science
University of Virginia
Email: spq7wp@virginia.edu
- **Dr. Mojtaba Mahsuli**
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