# Kiarash Farzad, PhD Candidate

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## PROFESSIONAL SUMMARY

Atmospheric Scientist and PhD Candidate with 6 years of research experience in numerical modeling, Chemical Transport Modeling (CTM), statistical and machine learning methods, and high-performance computing for environmental and sustainability challenges. In addition, I bring 2+ years of industry experience in ISO standards and quality management systems, ensuring rigor, compliance, and efficiency in complex projects. Proven ability to lead cross-institutional collaborations with national institutes and deliver actionable insights for air quality management, health risk assessment, and climate resilience.

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## EDUCATION

**PhD, Interdisciplinary Engineering**
Northeastern University, Boston, MA, Expected December 2025
**MS, Civil and Environmental Engineering**
Amirkabir University of Technology (Tehran Polytechnic), Tehran, Iran, February 2020
**BS, Civil Engineering**
Islamic Azad University Central Tehran Branch, Tehran, Iran, June 2017

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## RESEARCH EXPERIENCES

**Doctoral Researcher**, Northeastern University, Boston, MA, September 2021 - Present

- **Developed a machine learning-enhanced Air Quality Model (AQM)** that reduced forecast error by 20%, delivering a nationwide 1-km air quality dataset for decision-makers.
- **Simulated** air quality using three numerical AQMs and **evaluated** the results through **statistical**, **spatial**, and **time-series** analyses of **large** surface, airborne, and satellite observation **datasets** stored in **SQL** database, **NetCDF** files, or generic data frames.
- **Developed a custom health impact assessment tool** that replicates BenMAP functionality for high-resolution (1 km), nationwide coverage across the U.S. (+20M grid cells).
- **Developed a multithreaded computation method** to perform millions of regressions for projecting future aerosol optical depth data, significantly increasing processing speed and scalability.
- **Improved the National Air Quality Forecast Capability (NAQFC)** by upgrading the chemical model to the latest version in the forecasting system, increasing accuracy by 2%.
- **Integrated the dust module from the NOAA NAQFC package** into the latest CMAQ model.
- **Conducted air pollution source apportionment** across Greater Boston, identifying top contributing sources to inform regional emission control strategies.
- **Managed and executed the installation of the NOAA NAQFC system** and two AQMs on Northeastern University's **high-performance computing (HPC) infrastructure**, optimizing system performance and stability.
- **Designed and implemented a post-processing framework** for CAMx and source apportionment on the Discovery HPC cluster, reducing manual user interaction with model outputs by 50%, enhancing efficiency in analysis and reporting, and demonstrating commitment to process improvement and automation.

**Graduate Researcher**, Tehran Polytechnic, Tehran, Iran, September 2018 - February 2020

- **Analyzed** the relationship between **air pollution and mortality** in Tehran, identifying a roughly 1.5- to 2-day lag between high pollution events and increased death rates.
- **Applied health impact assessment tools** (i.e., BenMAP) to quantify air pollution effects, estimating approximately 11,000 annual premature deaths in Tehran attributable to black carbon.

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## PROFESSIONAL EXPERIENCES

**Quality Assurance Coordinator (Part-time)**, Pion Parto Biomedical Engineering Ltd., Tehran, Iran, October 2016 - July 2021

- Contributed to the initial design and implementation of the Quality Management System (QMS), aligning with ISO 9001 and ISO 13485, working cross-functionally to ensure ongoing compliance.
- Contributed to designing an internal communication framework by mapping the flow of information among departmental staff, mid-level management, and executive leadership.
- Led audit preparation and oversight, ensuring compliance with ISO 9001 and ISO 13485 standards.
- Served as the firm's representative during external audits, acting as the main contact for auditors, coordinating documentation, and ensuring smooth communication between auditors and internal departments.

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## SKILLS

**Programming:** R, Python (NumPy, pandas, scikit-learn, TensorFlow), SQL, MATLAB, Fortran, Bash, csh
**Modeling and Analysis:** CMAQ, CAMx, WRF, BenMAP, AERMOD, GCAM/GLIMPS, Time Series (ARIMA, GARCH)
**Data Science:** Machine Learning (Linear Regression, GAM, RNN/LSTM), Statistical Analysis, High-performance Computing (HPC)
**Visualization:** Matplotlib, Seaborn, ArcGIS, QGIS
**Productivity:** Git, LaTeX, AutoCAD, FreeCAD, Photoshop, Microsoft Office
**Core Competencies:** Analytical Problem Solving, Data-Driven Decision Making, Independent and Team-Based Research, Adaptability in Dynamic Environments, Clear Technical Communication, Project Management and Leadership, Self-Motivation and Continuous Learning, Resilience Under Pressure

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## RELEVANT COURSES

**Leadership:** Leading Self and Others
**Climate and Sustainability:** Climate and Atmospheric Change, Sustainable Development and Environmental Engineering Management, Environmental Assessment of Civil Engineering Projects
**Data Science:** Time Series and Geospatial Data Sciences, Remote Sensing (RS) and GIS Applications in Civil Engineering
**Health:** Tools and Techniques of Environmental Health

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## SELECTED PUBLICATIONS

**Journal Papers (1 of 7)**

**Farzad, K.**, Zhang, Y., Wang, K., Chen, X., Goldberg, D. L., Lyapustin, A., Wang, Y., & Bell, M. L. (2025). Statistical downscaling of coarse-resolution fine particulate matter predictions over the contiguous United States: model development, evaluation, and implication in health impact assessment. Science of The Total Environment, 999, 180302. https://doi.org/10.1016/j.scitotenv.2025.180302