

# Sevin Mohammadi

Columbia University  
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U.S. Permanent Resident  
(Green Card Holder)

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## EXPERTISE

**Data Science | Applied Machine Learning | Predictive Analytics | Bayesian Learning | Reinforcement Learning | Sequential Data Modeling**

## EDUCATION

**Ph.D. in Engineering**, GPA 4.06/4.00

**Columbia University**, NY

(Jan '20 to Dec '24)

*Thesis:* Data analytics and machine learning enabled mobility & operation solutions in urban road networks.

**M.S. in Engineering**, GPA 3.9/4.0

**University of Tennessee Knoxville (UTK)**, TN

(Aug '17 to Dec '19)

*Project:* "Study of Driving Volatility in Connected and Cooperative Vehicle Systems" funded by NSF.

## WORK

### EXPERIENCE

- **Center for Smart Streetscapes**, *Researcher & Student Leadership Council* (Aug '23 to present)

#### **Research Area: Geospatial Data Science & Deep Learning**

- Engineered a Transformer-based surrogate model with a Sequence-to-Sequence architecture, inspired by LLMs, to match noisy GPS trajectories to digital road maps. Delivered an 85% accuracy, surpassing 77% accuracy of state-of-the-art rule-based models.

#### **Leadership: Institution Representative**

- Promoted Center for Smart Streetscapes by organizing events & communicating its mission to public.

- **Smart Cities Research Center**, *Researcher* (Jan '20 to Aug '23)

#### **Research Area: Optimizing Emergency Response with Data Analytics & Simulation**

- Developed and deployed a data-driven methodology with uncertainty quantification, substantially reducing ambulance response times by 1:13 to 2:13 across varying care needs within **New York City's response system**.
- Developed predictive models for ambulance travel time using Bayesian Neural Networks and Hierarchical Bayesian learning, achieving superior accuracy and interpretability, outperforming NGBoost and Random Forest models.
- Designed a dynamic heuristic-based ambulance dispatching policy, integrating simulation with reinforcement learning, and obtained superior performance over classic greedy policy.

- **Center for Transportation Research**, *Researcher* (Aug '18 to Dec '19)

#### **Research Area: Data-driven Analysis of Human Driving Behavior**

- Discovered empirical evidence of social interactions among drivers affecting microscopic driving behavior through the analysis of 151 million rows of time series data.
- Identified correlations of environmental factors with such behavior using a random parameter binary logit model.

## SKILLS

**Programming:** Python, SQL, R | **Data Science Libraries:** NumPy, Pandas, GeoPandas, Scikit-learn, TensorFlow, Pytorch, PyMC3 | **Others:** Git, Shell

## COURSEWORK

Bayesian Machine Learning | Causal Inference for Data Science | Statistical Inference | Uncertainty & Risk | Data Analysis & Modeling | Signal Processing & Noise | Deep Learning | Reinforcement Learning | Infrastructure Systems Optimization | Transportation Analytics & Logistics | Big Data in Transportation

JOURNAL  
PUBLICATIONS

- [1] **S. Mohammadi**, A. Smyth, "Surrogate Modeling of Trajectory Map-matching in Urban Road Networks using Transformer Seq2seq Model," IEEE Intelligent Transportation Systems, *revision submitted*, 2024.
- [2] **S. Mohammadi**, A. Olivier, A. Smyth, "Dynamic Penalty-based Dispatching for Optimal EMS Response Times: A Heuristic Approach," Sustainable Cities and Society, *under review*, 2024.
- [3] **S. Mohammadi**, A. Olivier, A. Smyth, "Probabilistic Prediction of Trip Travel Time and its variability using Hierarchical Bayesian Learning," Journal of Risk and Uncertainty in Engineering Systems, 2023.
- [4] A. Olivier, **S. Mohammadi**, A. Smyth, "Bayesian Neural Networks with Physics-Aware Regularization For Travel Time Modeling from Imbalanced Data," Computer-Aided Civil Infrastructure Engineering, 2023.
- [5] A. Olivier, M. Adams, **S. Mohammadi**, A. Smyth, "Data Analytics for Improved Closest Hospital Suggestion for EMS Operations in NYC," Sustainable Cities and Society, 2022.
- [6] E. L. de Larrea, H. Lam, E. Sanabria, J. Sethuraman, **S. Mohammadi**, A. Olivier, A. Smyth et al., "Simulating NYC Hospital Load Balancing During COVID-19," IEEE: Winter Simulation Conference, 2021.
- [7] E. Sanabria, H. Lam, E. L. de Larrea, J. Sethuraman, **S. Mohammadi**, A. Olivier, A. Smyth et al., "Short-term Adaptive Emergency Call Volume Prediction," IEEE: Winter Simulation Conference, 2021.
- [8] **S. Mohammadi**, R. Arvin, et al., "The Role of Drivers' Social Interactions in their Driving Behavior: Empirical Evidence and Implication for Traffic Flow," Transportation Research Part F: Traffic Psychology & Behavior, 2021.
- [9] A. Khattak, I. Mahdinia, **S. Mohammadi**, A. Mohammadnazar, B. Wali, "Big Data Generated by Connected and Automated Vehicles for Safety Monitoring, Assessment and Improvement," arXiv: Computers and Society, 2019.

PRESENTATIONS

- [1] "Dynamic Penalty-based Dispatching for Optimal EMS Response Times: A Heuristic Approach," INFORMS Annual Meeting, Washington, Seattle, 2024.
- [2] "Enhancing Smart City Mobility on Urban Road Networks with Neural Network-Based Map-Matching of GPS Trajectory Data," Columbia University Data Science Day, New York City, 2023.
- [3] "Optimizing Ambulances Hospital Transports in New York City," Columbia University Data Science Day, New York City, 2021.
- [4] "Social Influence on Driver Decisions Using Modeling and Gossip Algorithms," Transportation Research Board Annual Meeting, Washington, DC, 2019.

AWARDS

- INFORMS Doing Good with Good O.R. Student Paper Competition **Finalist**, 2021
- Recipient of the New York Women in Transportation Leonard Braun Memorial Scholarship (\$5000), 2022
- Selected for the Morgan Stanley Quantitative Finance Women's Ph.D. Mentorship Program, 2022
- Multiple NSF Conference Travel Awards

MENTORSHIP

- Mentor of MY Streetscape 2023 Summer School for high school students:
  - Eunice Yanes, will be majoring in Engineering Physics at Fordham University
  - Christopher Grullon, currently a freshman at Columbia University Engineering  
Project title: Designing Safe Urban Traffic Intersections for Cyclists.
- Mentor of Columbia University 2023 Summer Undergraduate Research Experience Fellow:
  - Marylyn Carrillo, currently a senior student at the University of California, Los Angeles  
Project title: **Manhattan in Motion: Visualizing Delivery Vehicle Crash Density for Safer Urban Mobility.**

OUTREACH,  
VOLUNTEERING  
& SERVICES

- Student Leadership Council for the Center for Smart Streetscapes, year 2023-24
- Girls' Science Day Volunteer at Columbia University, Spring 2023
- Vice President of Women's Transportation Seminar at UTK, Fall 2019
- Social Director of the Institute of Transportation Engineers at UTK, Spring 2019