Peter (Pedram) Beigi, PhD Candidate

AV Researcher and ML Engineer

Based in Santa Clara, CA & Washington, DC
Open to Relocate

beigi@gwu.edu | LinkedIn | GitHub | Scholar | Personal Website

PROFESSIONAL SUMMARY

Autonomous Vehicle Researcher and Machine Learning Engineer specializing in autonomous systems, with strong expertise in machine learning, robotics, and large-scale data-driven modeling. Experienced in developing perception, prediction, planning, and decision-making pipelines. Worked on multiple federal and private research projects to prototype and scale ML models in simulation and real-world environments, leveraging large datasets to improve system performance.

RESEARCH EXPERIENCE

Visiting Scholar
Expected: Sep 2026 - Dec 2026

University of Illinois Urbana-Champaign — Urbana-Champaign, IL

- Will work with *Prof. Talebpour* on developing advanced approaches including foundation models, vision-language architectures, diffusion models, imitation learning, and reinforcement learning, leveraging large-scale real-world driving data.

Autonomous Vehicle & Machine Learning Researcher
Sep 2022 - Present

FHWA Turner-Fairbank Research Center (Saxton Lab) — McLean, VA

- Leading development of trajectory generation models for ADAS (using physics-based, DL-based and RL-based frameworks), and integrating AV behavior models into large-scale microsimulation (SUMO) tools (*Repos are private for now*).
- Developed and validated perception (sensor fusion, detection, segmentation) and planning (map generalization, localization) algorithms using LiDAR, radar, and video data for enhanced AV situational awareness and mixed-traffic simulation (*Some repos are public here*).
- Developed computer vision pipelines (OpenCV, PyTorch) to collect large-scale trajectory data (11,000+ vehicle-kilometers) for AV–human interactions, enabling trajectory extraction and motion prediction for AV research (*Data is published by USDOT*).

Graduate Researcher
Sep 2021 - Present

The George Washington University — Washington, DC

- Developed multi-agent reinforcement learning (MARL) frameworks for AV coordination and negotiation in dynamic partially observable environments using CTDE framework with multi-agent PPO actor-critic models. Applied Bayesian optimization and genetic algorithms for the models' calibration.
- Engineered model observability and traceability by developing Logsim DAGs to capture closed-loop metrics, improving experiment reproducibility for the autonomous stack.
- Led creation of an integrated simulation-AI pipeline combining SUMO, CARLA, and Python APIs for closed-loop decision-making experiments using real-time data (trajectory) streaming using twelve 5G-connected cameras.

WORK EXPERIENCE

Autonomous Vehicle Researcher Intern
Sep 2024 - Dec 2024

moment.ai — Washington, DC

- Developed multi-modal deep learning time-series models (LSTM/GRU) integrating smartphone and AV sensor data to detect driver behavior and health incident risks, outperforming traditional methods by 9%.
- Developed a real-time NVIDIA Jetson/mobile driver monitoring system using AWS IoT pipelines and Alexa integration for in-vehicle alerts and control.

Data Analyst Intern
May 2025 - Aug 2025

Mead & Hunt — Washington, DC & Columbia, MD

- Built data-driven corridor simulation for WVDOT & BCDOT, and supporting operational scenario testing and optimization studies for smart mobility planning.

Data Analyst Intern
May 2024 - Aug 2024

Arcadis — Atlanta, GA

- Performed geospatial data analysis (MySQL, ArcGIS) and simulation-oriented corridor evaluation (VISSIM) for GDOT projects, translating large datasets into actionable operational and planning insights.

SELECTED PUBLICATIONS

h-index: 6 / citation: 219

"Diffusion Process-Based Model for Network Trajectory Propagation"	IEEE T-ITS (2025)
"Percolation-Based Cloud Computing Framework for Network Reliability Assessment"	IEEE ICMI (2025)
"Motion Modeling in Unstructured Non-Lane-Based Traffic: A Comparative Study of Deterministic, Stochastic, and Multi-Agent Learning Approaches"	IEEE ICRA (under review)
"Deep Reinforcement Learning Under Partial Observability: Co-Simulation and Penetration-Aware Policy Learning for Traffic Control"	IEEE VTC (under review)
"A Hybrid Genetic Algorithm and Reinforcement Learning Approach for Vulnerable Road User Modeling"	TRR (under review)
"A Deep Reinforcement Learning Control to Explore Impact of V2X Connectivity on Intersection Performance"	TRR (2025)
"Third Generation Simulation Dataset"	TRR (2024)

TECHNICAL SKILLS

Programming: Python, ROS, MySQL, Git

Libraries: PyTorch, Diffusers, Transformers, Scikit-learn, Keras, OpenCV, Ultralytics, RLlib, Gym

Tools: CARLA, Unity, Power BI, Tableau, SUMO, VISSIM, Synchro, SIDRA

EDUCATION

The George Washington University
Sep 2021 - Exp: Dec 2026
PhD in Transportation Engineering (AV Systems & AI) - GPA: 3.91/4.00

Sharif University of Technology
Sep 2016 - Feb 2021
Bachelor of Science in Transportation Engineering - GPA: 3.80/4.00

PROFESSIONAL CERTIFICATIONS

Social and Behavioral Research Certification
Issued by: Collaborative Institutional Training Initiative (CITI Program)
Credential ID: 71300833 | Aug 2021 - Aug 2027

RELEVANT COURSEWORK

- UMD: CMSC 422 Machine Learning (audited)
- UMD: CMSC 472 Deep Learning (audited)
- GW: MAE 6292 Robotics Vision and Perception (4/4)
- GW: SEAS 6520 Autonomous Systems and Robotics (audited)
- Stanford: CS231n DL for Computer Vision (Online)
- GW: CE 6609 Numerical Methods in Engineering (4/4)
- GW: CE 6800 Data Science (4/4)
- GW: ECE 6130 Big Data and Cloud Computing (4/4)
- UMD: CMSC 426 Computer Vision (audited)
- UMD: CMSC 828 Visual Learning and Recognition (audited)
- Google DeepMind: Introduction to RL (Online)

WORK AUTHORIZATION

No sponsorship needed.