

Mojtaba Jafarian Abyaneh

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SUMMARY

PhD Candidate and Graduate Research Assistant at Florida Atlantic University specializing in AI and Machine Learning for transportation engineering. Experienced in developing Transformer-based deep learning models for Multi-Agent trajectory prediction using LiDAR data to enhance urban transportation safety. Research funded by NIH and NSF. Proficient in Python, TensorFlow, PyTorch, and deep learning frameworks, with expertise in Spatial Graph Neural Networks, computer vision, and predictive modeling. First-author in *IEEE OJ-ITS* (IF: 6.007); one paper under review at *IEEE T-ITS* and one preprint on SSRN.

EDUCATION

Florida Atlantic University <i>Ph.D. in Transportation and Environmental Engineering</i> GPA: 4.0/4.0 • <i>Research Focus: Deep learning for trajectory prediction and spatiotemporal mobility modeling</i> • <i>Advisor: Dr. Jinwoo Jang</i>	Boca Raton, FL 2024 – Present
University of New Brunswick <i>M.Sc. in Civil Engineering</i> • <i>Thesis: Vibration testing of cracked reinforced concrete beams under sustained load</i>	Fredericton, NB, Canada 2018 – 2020
Iran University of Science and Technology <i>M.Sc. in Civil/Earthquake Engineering</i> • <i>Thesis: Detection and estimation of structural damage using finite element model updating by means of damage-sensitive dynamic parameters</i>	Tehran, Iran 2014 – 2017
Iran University of Science and Technology <i>B.Sc. in Civil Engineering</i>	Tehran, Iran 2010 – 2014

RESEARCH INTERESTS

- Deep Learning for Intelligent Transportation Systems
- Multi-Agent Trajectory Prediction
- Spatial Graph Neural Networks
- Computer Vision & LiDAR Data Processing
- Urban Transportation Safety Modeling
- Urban Digital Twins & Computational Simulation
- Spatiotemporal Flow Prediction

EXPERIENCE

Doctoral Research Assistant Florida Atlantic University (I-SENSE Lab) • Developed SIPT (Spatial Interaction Pooling Transformer) for Multi-Agent trajectory prediction: ADE 0.76 m — 26.2% better than Social LSTM , 13.6% better than Standard Transformer, on 64,000+ trajectories (COSMOS dataset); under review at <i>IEEE T-ITS</i> . • Developed Transformer model for real-world LiDAR-based trajectory prediction: 15.24%/13.88% ADE improvement over LSTM (single-/Multi-Agent) on 12,390+ trajectories at a West Palm Beach intersection; published in <i>IEEE OJ-ITS</i> , Vol. 7 (2026). • Managing the longitudinal NIH dataset (R01AG068472, <i>In-Vehicle Sensors to Detect Cognitive Change in Older Drivers</i>): multi-sensor data and cognitive assessments from 750 older drivers, 12 time points over 3 years. • Co-mentoring an NSF CS3 REU student on GPS-based driver behavior analysis (road network enrichment, FMM map matching). • Running OpenFOAM CFD simulations on HPC for hurricane wind-load analysis of Miami downtown, assessing pedestrian comfort and street-level wind conditions.	Aug. 2024 – Present Boca Raton, FL
Graduate Research Mentor Vertically Integrated Projects (VIP) Program, Florida Atlantic University • Overseeing 12 undergraduates across two VIP groups (Environment & Sustainability, Safety & Security) on AI-driven smart sensor applications for coastal resilience — computer vision, sentiment analysis, multi-modal sensor analytics.	Jan. 2026 – Present Boca Raton, FL

Data Analyst

Nov. 2022 – Jul. 2024

Freelance

Fredericton, NB, Canada

- Analyzed import/export data for trade compliance, customs duty/tariff classification, and logistics optimization for small and medium-sized businesses.
- Built import-volume forecasting models and Tableau dashboards (shipment performance, cost trends, supplier metrics) using Excel, Google Sheets, and statistical methods.

Graduate Research Assistant

Sep. 2018 – Oct. 2020

University of New Brunswick

Fredericton, NB, Canada

- Modeled reinforced concrete beams under sustained/cyclic loading in ABAQUS (concrete damage plasticity model); conducted vibration testing with accelerometers.
- Evaluated long-term deflection, natural frequencies, and mode shapes via ACI 318-19 / CSA A23.3 effective moment of inertia formulations.

Graduate Teaching Assistant

Jan. 2019 – Apr. 2020

University of New Brunswick

Fredericton, NB, Canada

- **Mechanics of Materials Experimental Lab** (Jan. – Apr. 2019, Sep. – Dec. 2019): Supervised undergraduates in material testing (tensile, compression, torsion), ensuring lab safety and accurate data collection.
- **Statics Computational Lab** (Jan. – Apr. 2020): Taught computational methods and statics, including force analysis, moment calculations, and structural equilibrium concepts.

Graduate Research Assistant

Sep. 2014 – Apr. 2017

Iran University of Science and Technology

Tehran, Iran

- Investigated structural health monitoring and damage detection via optimization-based algorithms (grey wolf optimization, genetic algorithm) for civil infrastructure assessment, improving detection accuracy.

PUBLICATIONS

Full list, metrics, and citations: [Google Scholar](#)

1. **Jafarian Abyaneh, M.** and Jang, J. (2026) "Transformer-Based Trajectory Prediction Using LiDAR Data for Situational Awareness in Complex Urban Environments." *IEEE Open Journal of Intelligent Transportation Systems*, Vol. 7, pp. 16–28. [doi:10.1109/OJITS.2025.3640002](https://doi.org/10.1109/OJITS.2025.3640002) (Impact Factor: 6.007)
2. Zare Hosseinzadeh, A., Ghodrati Amiri, G., **Jafarian Abyaneh, M.**, and Ghadimi Hamzehkolaei, A. (2020) "Baseline updating method for structural damage identification using modal residual force and grey wolf optimization." *Engineering Optimization*, Vol. 52, No. 4.
3. **Jafarian Abyaneh, M.** (2020) "Vibration testing of cracked reinforced concrete beams under sustained load." Master's thesis, University of New Brunswick.
4. Ghodrati Amiri, G., **Jafarian Abyaneh, M.**, and Zare Hosseinzadeh, A. (2016) "Model Updating-Based Approach for Damage Prognosis in Frames via Modal Residual Force." *International Journal of Civil, Environmental, Structural, Construction and Architectural Engineering*, Vol. 10, No. 8.
5. Ghodrati Amiri, G., Zare Hosseinzadeh, A., **Jafarian Abyaneh, M.** (2015) "A new two-stage method for damage identification in linear-shaped structures via Grey System Theory and optimization algorithm." *Journal of Rehabilitation in Civil Engineering*, Vol. 3, No. 2, pp. 36–50.

WORKING PAPERS & UNDER REVIEW

1. **Jafarian Abyaneh, M.**, Jang, J., Smyth, A. W., and Turkcan, M. K. (2026) "Spatial Interaction Pooling Transformer (SIPT) for Multi-Agent Trajectory Prediction in Urban Streetscapes." *IEEE Transactions on Intelligent Transportation Systems*. [Under Review]
2. **Jafarian Abyaneh, M.**, Jang, J., and Kaiser, E. I. (2025) "Spatial Graph Convolutional Network for Predicting Bike-Sharing Origin-Destination Spatiotemporal Flows." SSRN Working Paper No. 5801889. [Preprint]
3. **Jafarian Abyaneh, M.** and Jang, J. (2026) "What Simplified City Models Miss: Hurricane Pedestrian Wind Hazard from Voxelized Photorealistic Urban Geometry." [In Preparation]

CONFERENCE PRESENTATIONS

1. **Jafarian Abyaneh, M.**, Jang, J., and Kaiser, E. I. (Jan. 2026) "Spatial Graph Convolutional Network for Predicting Bike-Sharing Origin-Destination Spatiotemporal Flows." *105th Transportation Research Board (TRB) Annual Meeting*, Washington, DC. Poster presentation.

WORKSHOP PRESENTATIONS

1. **Jafarian Abyaneh, M.** and Jang, J. (May 2026) “Predicting the Crowd: Spatially-Informed Transformers for Urban Traffic Agents.” *CS3 NSF Renewal Site Visit, Columbia Engineering Innovation Hub — CS3 HQ, New York, NY*. Poster presentation.
2. Smith, D. K., **Jafarian Abyaneh, M.**, and Jang, J. (May 2026) “Voxelized High-Fidelity 3D Models for City-scale Wind Simulations.” *CS3 NSF Renewal Site Visit, Columbia Engineering Innovation Hub — CS3 HQ, New York, NY*. Poster presentation.
3. **Jafarian Abyaneh, M.** and Jang, J. (Mar. 2026) “Context-Aware Deep Learning for Predicting Pedestrian and Vehicle Movement Patterns in Urban Traffic Scenarios.” *8th Annual Celebration of Academic Excellence, College of Engineering and Computer Science, Florida Atlantic University, Boca Raton, FL*. Poster presentation.
4. Smith, D. K., **Jafarian Abyaneh, M.**, and Jang, J. (Mar. 2026) “Testing the Accuracy of Urban 3D Models With Airflow Simulations.” *Florida Undergraduate Research Conference (FURC), University of North Florida, Jacksonville, FL*. Poster presentation.
5. **Jafarian Abyaneh, M.** and Jang, J. (Feb. 2026) “Spatial Interaction Pooling Transformer (SIPT) for Multi-Agent Trajectory Prediction.” *CS3 Innovation Summit, Columbia University, New York, NY*. **Perfect Pitch Competition** (90-second research presentation) and **Poster Presentation**.
6. Smith, D. K., Lalla, J., **Jafarian Abyaneh, M.**, and Jang, J. (Feb. 2026) “Automated Voxelization Pipeline for High-Fidelity Urban Digital Twins.” *CS3 Innovation Summit, Columbia University, New York, NY*. Poster presentation.

RESEARCH FUNDING

- **NSF** Engineering Research Center for Smart Streetscapes (CS3), Award No. EEC-2133516 — Graduate Researcher
- **NIH** In-Vehicle Sensors to Detect Cognitive Change in Older Drivers, Award No. 1R01AG068472-01 — Graduate Researcher
- **FAU** Vertically Integrated Projects (VIP): Smart Sensors and AI for Coastal Destination Resilience — Graduate Research Mentor

UNDERGRADUATE RESEARCH MENTORING

NSF CS3 (EEC-2133516) — Digital Twins for Smart Streetscapes, FAU Jan. 2026 – Present

- **Dana K. Smith** (Civil Eng., FAU) — voxelization & CFD-ready digital twin pipelines
- **Jonathan Lalla** (CS, FAU) — voxelization & CFD-ready digital twin pipelines
- **Cyrus Khan** (CS, UC Riverside; Summer REU) — GPS-to-behavior-metric pipeline, Fast Map Matching (FMM)
- **Vedant Sundriyal** (CS, Lehman College; Summer REU) — QuASAR: watertight 3D city reconstruction ([GitHub](#))

FAU VIP Program — Smart Sensors and AI for Coastal Destination Resilience Jan. 2026 – Present

- **Environment & Sustainability:** Dana K. Smith, Iris York, Felicia Phan, James Kane, Dana Urbano Prieto, Sammie Chamberlain (FAU)
- **Safety & Security:** Jonathan Lalla, Mykyta Garkusha, Mohammed Mered, Howard Lowe, Nicolette Madrazo (FAU)

HONORS AND AWARDS

- **ASCE Palm Beach Branch Scholarship** (2026) — \$1,000 competitive award
- **New Brunswick Innovation Foundation (NBIF) Graduate Award** (2018–2019)
- **Esterbauer Civil Engineering Graduate Award**, University of New Brunswick (2018–2020)

PROFESSIONAL AFFILIATIONS

- Institute of Electrical and Electronics Engineers (IEEE), Member
- American Society of Civil Engineers (ASCE), Member

TECHNICAL SKILLS

- **Programming & Tools:** Python, MATLAB, LaTeX, Git, Tableau
- **AI & Machine Learning:** TensorFlow, Keras, PyTorch, Deep Learning, Neural Networks, Transformer Models, Computer Vision, LiDAR Data Processing, Spatial Graph Neural Networks, Multi-Agent Trajectory Prediction
- **Data Science:** Pandas, NumPy, Scikit-learn, ArcGIS, Geopandas, Data Preprocessing, Statistical Analysis, Predictive Modeling
- **Engineering Software:** ABAQUS, SAP2000, ETABS, SAFE, AutoCAD, MicroStation, Civil 3D, Synchro, OpenFOAM (HPC), TinkerCAD, ParaView, Finite Element Analysis, Computational Fluid Dynamics (RANS/DES)