

MUSTAFA FARDIN

State College, PA, USA | fardin97@gmail.com | 814-665-2195 | linkedin.com/in/fardin97

EDUCATION

Ph.D. in Civil Engineering (Transportation Engineering) The Pennsylvania State University	Expected Dec 2026 University Park, PA
M.S. in Civil Engineering (Transportation Engineering) The Pennsylvania State University	Dec 2025 University Park, PA
B.Sc. in Civil Engineering, Major: Transportation Engineering Bangladesh University of Engineering & Technology (BUET)	May 2022 Dhaka, Bangladesh

RESEARCH AND PROFESSIONAL EXPERIENCE

Graduate Research and Teaching Assistant <i>The Pennsylvania State University</i>	Aug 2023 - Present University Park, PA
---	--

- Set and executed independent research agendas at the intersection of machine learning, simulation, and real-world logistics, building reproducible Python, Java, R, AnyLogic, MATSim, and GIS pipelines from raw operational, behavioral, network, and spatial data.
- Designed high-fidelity decision environments for pricing, routing, and capacity allocation, combining agent-based simulation with contextual-bandit and surrogate-assisted reinforcement-learning formulations.
- Built rigorous evaluation harnesses using six statistical and machine-learning model families, grouped cross-validation, geographic holdouts, rare-event metrics, leakage controls, matched experiments, sensitivity tests, and interpretable diagnostics.
- Created a 38,650-agent local-commerce simulation and automated 60 marketplace scenarios; identified network and capacity strategies reducing total VMT by about 33% and van NOx/PM10 by about 30-40%.
- Produced three TRB 2026 papers (two first-authored) and one peer-reviewed journal article; presented to mixed technical audiences, reviewed code and model outputs, and mentored researchers from scoping through publication.

Curbside Management Intern <i>D.C. Department of Transportation (DDOT)</i>	Jun 2025 - Aug 2025 Washington, DC
--	--

- Owned the evaluation design for the Greater U Street Performance Parking Program, defining baselines and decision rules across occupancy, revenue, compliance, travel time, residential access, and mode shift.
- Integrated parking transactions, 15-minute field observations, curb inventories, travel-time indicators, and bikeshare activity to diagnose demand, pricing response, and data-quality gaps at block level.
- Converted results into variable-pricing, curb-allocation, and monitoring recommendations aligned with the program's 85% occupancy target; outcomes included 15% year-over-year revenue growth and 20% lower fourth-quarter violations.
- Communicated findings through maps, technical memos, and public-facing materials, coordinating with planning, operations, enforcement, and communications teams.

Lecturer <i>Dept. of Civil Engineering, Prime University</i>	Oct 2022 - Jul 2023 Dhaka, Bangladesh
--	---

- Designed and delivered three transportation engineering courses and established a Highway Design Laboratory; taught modeling, simulation, data interpretation, and technical communication.
- Supervised three theses and two capstone teams from research question through analysis, validation, code and output review, technical writing, and presentation.

SELECTED AI RESEARCH AND MARKETPLACE SYSTEMS

RL Environment and Contextual-Bandit Pricing for Freight-on-Transit <i>The Pennsylvania State University PI: Dr. Andisheh Ranjbari</i>	2026 - Present
--	-----------------------

- Designed a MATSim-assisted operational environment in which pricing and capacity policies act on ridership, spare capacity, freight demand, backlog, dwell time, schedule reliability, and budget.
- Prototyped contextual-bandit actions spanning tariffs, discounts, capacity-based charges, and passenger credits; benchmarked policies against six fixed and rule-based baselines using revenue, acceptance, utilization, delay, reliability, missed-movement, and backlog KPIs.

Agent-Based Last-Mile Marketplace Environment

2024 - 2026

The Pennsylvania State University | PI: Dr. Andisheh Ranjbari

- Built a 38,650-agent AnyLogic environment integrating consumer availability and choice, delivery and pickup modes, depot clustering, vehicle tours, capacity constraints, and speed-dependent emissions using Python and GIS preprocessing.
- Automated 60 controlled experiments across five adoption levels, three vehicle capacities, and four facility-network sizes; used matched seeds and sensitivity analysis to isolate policy effects and assess robustness.

Multi-Outcome Marketplace Demand and Behavior Modeling

2025 - 2026

The Pennsylvania State University

- Built a leakage-controlled multi-outcome machine-learning pipeline on 6,258 consumer records and 67 behavioral, activity-chain, household, and spatial features to jointly predict out-of-home adoption and usage intensity.
- Improved PR-AUC by 6.9% and top-decile capture from 17.9% to 21.4% over an independent random-forest baseline; used geographic holdouts, permutation importance, partial dependence, and segment profiling to assess robustness and bias.

CORE AI RESEARCH, SIMULATION, AND MARKETPLACE SKILLS

- **Machine learning and sequential decision systems:** contextual bandits, constrained and offline RL formulations, logistic and discrete-choice models, random forests, gradient boosting, neural networks, regularized regression, Bayesian spatial/count models, demand forecasting, feature engineering, and interpretable diagnostics.
- **Simulation environments and evaluation:** agent-based and network simulation, real-versus-synthetic data tradeoffs, reward and constraint design, baseline-policy comparison, grouped cross-validation, geographic holdouts, rare-event metrics, matched experiments, sensitivity analysis, uncertainty, and before-and-after evaluation.
- **Programming and data systems:** Python, SQL, Java, C/C++, R, MATLAB, Stata, AnyLogic, MATSim, and ArcGIS Pro; automated experiment orchestration, geospatial and network feature engineering, data QA, statistical analysis, and decision-focused visualization.
- **Independent research and communication:** research agenda setting, hypothesis and benchmark design, paper and proposal writing, presentations for mixed research and engineering audiences, code and output review, mentorship, peer review, and publication.

SELECTED RESEARCH OUTPUTS, IMPACT, AND RECOGNITION

- Three TRB 2026 papers (two first-authored) on transit-health accessibility, last-mile marketplace simulation, and environmental/equity impacts; one peer-reviewed journal article in Transportation Research Interdisciplinary Perspectives, 2025.
- Institute of Transportation Engineers Young Leader to Follow, 2026; Leo P. Russell Fellowship for Outstanding Graduate Students, Penn State, 2026; University Park Allocation Committee Travel Grant, 2025-26.
- Contributed to modeling, implementation-risk, and funding evidence to a University of Washington Urban Freight Lab/Penn State proposal approved for a \$2.5M federal award with \$1.75M cost share.
- Peer reviewer for freight machine learning and intercity mode-choice research; Technical Program Subcommittee Member and Session Moderator, Mid-Colonial District ITE Annual Meeting 2026.