Matt Battifarano

PhD Student • Transportation Researcher • Data Scientist • Software Engineer

917-617-7875 | matthew.battifarano@gmail.com | mbattifarano.github.io | mbattifarano | mbattifarano

Education

PhD Advanced Infrastructure Systems — *Pittsburgh, PA*
Carnegie Mellon University — *2017 - expected 2022*
Dissertation: *System-level impact and behavior of coordinated vehicle fleets in transportation networks*

MS Machine Learning — *Pittsburgh, PA*
Carnegie Mellon University — *2021 - 2022*

MS Advanced Infrastructure Systems — *Pittsburgh, PA*
Carnegie Mellon University — *2017 - 2019*

BA Mathematics | Minor Computational Neuroscience — *Chicago, IL*
University of Chicago — *2008 - 2012*

Experience

Mobility Data Analytics Center — *Pittsburgh, PA*
PhD Candidate — *2017 - present*
- Demonstrated novel statistical behavior inference from non-stationary policies on ride-hailing driver behavior during the COVID-19 lockdown.
- Found optimal deployment patterns of connected/coordinated fleets to achieve minimum road network congestion levels.
- Built real-time machine learning model of Uber and Lyft surge pricing to predict supply-demand imbalance up to two hours in advance.

Aurora Innovation — *Pittsburgh, PA*
Strategy Intern — *Summer 2021*
- Collaborated with stakeholders in business strategy and operations to identify pivotal questions and challenges in terminal operations.
- Developed a Stochastic Petri Net Model to demonstrate and quantify key strategic trade-offs in terminal infrastructure and operations.
- Presented project findings to stakeholders including the Chief Product Officer and Vice President of Strategy.
- Designed and built the cloud execution framework on AWS for the team's ride-hailing marketplace simulator.

Uber Advanced Technologies Group — *Pittsburgh, PA*
Strategy Intern — *Summers 2019 and 2020*
- Extended an open source transportation simulator to quantify costs and benefits of a self-driving vehicle deployment.
- Created a python package to automate simulation scenario generation based on internal Uber data.
- Returned in Summer 2020 to expand the simulation engine.
- Prototyped a game-theoretic model of drivers, TNCs and AV operators in a market.

Transit Systems — *Brisbane, Australia*
Special Consultant — *Summer 2017*
- Guided the acquisition and integration of the Bridj software, including hiring strategy, software preparation, and documentation.
- Prepared Bridj software for use and further development in Australia

Bridj — *Boston, MA*
Associate Data Scientist — *2014 - 2017*
- Implemented an evolutionary algorithm in python to optimize a fleet of vehicles over travel requests in real-time.
- Extracted travel demand clusters from cellphone and census data.
- Prepared analysis and slides for investors and partners, helping to secure a pilot with the Kansas City Area Transportation Authority.

Osborne Lab, University of Chicago — *Chicago, IL*
Research Specialist — *2012 - 2014*
- Characterized oculomotor decision rules as a function of visual motion predictability using a custom-built visual stimuli.

Publications

Behavioral Inference from Non-Stationary Policies: Theory and Application to Ridehailing Drivers during COVID-19 Lockdowns
Transportation Research Part C (in review) — *2022*

The Impact of Optimized Fleets in Transportation Networks
Transportation Science (in review) — *2022*

Distinguishing Engineered TiO_2 Nanomaterials from Natural Ti Nanomaterials in soil using spICP-TOFMS and Machine Learning
Environmental Science & Technology — *2021*

Predicting surge pricing of ride-hailing companies in real time
Transportation Research Part C — *2019*

Shared Sensory Estimates for Human Motion Perception and Pursuit Eye Movements
Journal of Neuroscience — *2015*

Presentations

On the Impact of Fleet Optimal Routing in Transportation Networks — *Washington DC*
Transportation Research Board Annual Meeting — *2020*

On the Impact of Fleet Optimal Routing in Transportation Networks — *Seattle, WA*
INFORMS — *2019*

Predicting surge pricing of ride-hailing companies in real time — *Seattle, WA*
INFORMS — *2019*

Awards

2019 **University Transportation Centers Outstanding Student of the Year**, Transportation Research Board Annual Meeting — *Washington, DC*
2018 **Dwight D. Eisenhower Transportation Fellow**, Transportation Research Board Annual Meeting — *Washington, DC*

Coursework

Statistics	Game-Theoretic Statistical Inference • Intermediate statistics
Machine Learning	Machine Learning in Practice • Deep Reinforcement Learning & Control • Advanced Machine Learning Theory and Methods • Artificial Intelligence • Probabilistic Graphical Models • Introduction to Machine Learning • Convex Optimization
Urban Science	Urban Policy • Cities, Technology & the Environment • Logical Foundations of Cyber Physical Systems • Societal Consequences of Autonomous Vehicle Technology • Urban Systems Modeling • Civil Systems: Investment Planning and Pricing
Teaching Assistant	Introduction to Civil and Environmental Engineering • Geographic Information Systems

Skills

Programming	Python, Cython, Java, Rust, LaTeX, bash
Data	numpy, scipy, pandas, tensorflow, scikit-learn, SQL, Hadoop
DevOps	AWS, Linux, Docker