Pablo Guarda

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Education

Carnegie Mellon University (CMU) **Pittsburgh, PA**

PhD in Civil and Environmental Engineering *August 2023*

- Thesis: Inferring demand and supply characteristics of transportation networks through multi-source system-level data

Master of Science in Machine Learning *December 2022*

- Coursework: Machine Learning with Large Datasets, Graduate Artificial Intelligence, Convex Optimization, Intermediate Deep Learning, Deep Reinforcement Learning and Control, Probabilistic Graphical Models

University College London (UCL) **London, United Kingdom**

Master of Science in Cognitive and Decision Sciences *July 2017*

- Thesis: Understanding route choice decisions in public transport: Lab experiments in London, UK and Santiago, Chile

Pontifical Catholic University of Chile (PUC) **Santiago, Chile**

Master of Science in Transportation Engineering *July 2015*

- Thesis: What is behind fare evasion in public transport? An econometric approach

Bachelor of Science in Industrial Engineering *December 2013*

Skills

Programming Languages: Python, R, C#, Bash, Java, Visual Basic
Developer Tools: Cursor, VS Code, PyCharm, RStudio, Docker, Git, Github, Gitlab, Linux terminal, Eclipse, Conda
Data Science: SQL, Tableau, Pandas, Numpy, Scikit-learn, NetworkX, GeoPandas, Tidyverse, QGIS, ArcGIS, Stata, SPSS
Cloud and Parallel Computing: AWS, IBM Cloud, Spark
Simulation and Optimization: SciPy, CVXpy, Matlab, Octave, Arena, Pyomo, Pulp, Gurobi, AMPL, Maple
Deep Learning Frameworks: TensorFlow, PyTorch, Torchvision, Rastervision
Languages: Advanced level in reading, writing and conversational English and Spanish (native)

Professional Experience

Uber Technologies **San Francisco, CA**

Scientist *May 2025 - Present*

- Leading the Science team's work on guest vertical products within Uber for Business

Fujitsu Research – Convergence Technologies Lab **Pittsburgh, PA**

Principal Researcher *August 2024 - May 2025*

- Built and led a team of data scientists to successfully integrate the data-driven traffic simulator developed during my PhD into Fujitsu's Social Digital Twin platform, enabling fast, automated and scalable city-wide traffic simulation
- Prepared and presented demos to multiple stakeholders on a traffic simulation technology that optimizes the allocation and pricing of tolls and estimates the local and network-wide impacts of traffic incidents and road closures
- Co-developed a computer vision pipeline for road segmentation using high-resolution satellite imagery, Meta's Segment Anything model, and OpenStreetMap data, resulting in a patent filing and a conference paper

Senior Researcher *August 2023 - July 2024*

- Filed a patent with Carnegie Mellon University researchers and presented a paper at the IEEE ITSC conference on a world-first traffic simulator that can be trained using satellite imagery and multi-source spatiotemporal data
- Developed and deployed a machine learning pipeline that leverages state-of-the-art computer vision algorithms and geospatial packages to estimate road traffic density at a city scale using satellite imagery and OpenStreetMap data

AT&T Labs – Network Analytics and Automation **Remote**

Research Intern, PhD *June 2022 - August 2022*

- Implemented a machine learning pipeline to predict cellular traffic using open-source and AT&T proprietary datasets
- Filed a patent of a machine learning system to predict cellular traffic and rank optimal locations to build cellular towers
- Prototyped a web-based tool using Python and Kepler.GL to support AT&T cellular network planning in San Jose, CA

Inter-American Development Bank (IDB) **Santiago, Chile**

External Consultant *February 2018 - July 2018*

- Processed datasets with millions of smartcard transactions and fare evasion records collected from a bus system in Chile
- Trained random forest, support vector machines and logistic regression models to identify bus stops with high evasion

World Resources Institute (WRI) – Ross Centre for Sustainable Cities **Washington, DC**

External Consultant *August 2016, August 2017*

- Computed data quality KPIs with scraped data from BRTData.org to improve the website's data collection strategy
- Estimated multiple linear and ordinal logistic regression models to capture the relationship between performance and design elements of bus rapid transit systems worldwide using R and BRTData.org data

Transport Research Intern *February 2016 - July 2016*

- Leveraged classic statistical methods and publicly available datasets to benchmark bus rapid transit systems in China
- Published a journal article and a grey paper that convey the research findings to practitioners and policymakers
- Created a Tableau dashboard to benchmark bus rapid transit systems worldwide based on the article's methodology

Research Experience

Carnegie Mellon University (CMU) **Pittsburgh, PA**

Graduate Research Assistant *August 2019 – July 2023*

- Released three open-source repositories to model travel behavior and traffic flow dynamics in transportation networks
- Leveraged computational graphs and neural networks to compute traffic equilibrium, estimate city-wide traffic flow and travel time, and learn time-varying origin-destination matrices in large-scale transportation networks
- Developed large-scale optimization algorithms and a new hypothesis testing framework to infer travelers' route choice preferences from traffic counts and geospatial data

Centre of Excellence for Bus Rapid Transit (BRT-CoE) **Santiago, Chile**

Research Assistant *November 2017 – August 2018*

- Implemented a lab experiment in Python Qt to simulate public transport and collect route choice data
- Developed R scripts to analyze the effects of travel time variability and time perception using discrete choice models
- Disseminated research findings at four international conferences in Cognitive Science and Transportation Science

Centre for Sustainable Urban Development (CEDEUS) **Santiago, Chile**

Research Assistant *April 2015 – January 2016*

- Leveraged econometric and optimization methods to improve the allocation of bus ticket inspectors at a city-wide scale
- Published a journal article on fare evasion in buses that earned the best paper award at a transportation conference

Selected Publications

Guarda, P., Qian, S., 2025. Traffic estimation in unobserved network locations using data-driven macroscopic models. *Transportmetrica A: Transport Science.*

Kawamura, R., **Guarda, P.**, Narwade, P., Patel, Y., Niinuma, K., 2025. RN-SAM: Road network-aided SAM optimization for road segmentation in satellite imagery. *2025 IEEE International Conference on Image Processing*, Anchorage, AK, USA

Liu, J., **Guarda, P.**, Niinuma, K., Qian, S., 2024. Enhancing multi-class mesoscopic network modeling with high-resolution satellite imagery. *2024 IEEE 27th International Conference on Intelligent Transportation Systems*, Edmonton, Canada.

Guarda, P., Battifarano, M., Qian, S., 2024. Estimating network flow and travel behavior using day-to-day system-level data: a computational graph approach. *Transportation Research Part C: Emerging Technologies* 158.

Guarda, P., Qian, S., 2024. Statistical inference of travelers' route choice preferences with system-level data. *Transportation Research Part B: Methodological* 179.

Geng, K., Wang, Y., Cherchi, E., **Guarda, P.**, 2023. Commuter departure time choice behavior under congestion charge: Analysis based on cumulative prospect theory. *Transportation Research Part A: Policy and Practice* 20, 55-71.

Astroza, S., **Guarda, P.**, Carrasco, J., 2022. Modeling the relationship between food purchasing, transport, and health outcomes: Evidence from Concepcion, Chile. *Journal of Choice Modelling* 42, 100341.

Velásquez J. , Tun H., Hidalgo, D., Ramos, C., **Guarda, P.**, Chen, X., Zhong, G., 2017. Bus Rapid Transit in China: A Comparison of Design Features with International Systems. World Resources Institute, Washington D.C., USA.

Guarda, P., Galilea, P., Handy, S., Muñoz, J.C., Ortúzar, J. de D., 2016. Decreasing fare evasion without fines? A microeconomic analysis. *Research in Transportation Economics* 59, 151-158.

Guarda, P., Galilea, P., Paget-Seekins, L., Ortúzar, J. de D., 2016. What is behind fare evasion in urban bus systems? An econometric approach. *Transportation Research Part A: Policy and Practice* 20, 55-71.

Patents

Liu, Z., Chen, X., Liu, Y., Hsu, C., Shahi, N. **Guarda, P.**, 2025, Cellular traffic prediction using open transportation data, U.S. Patent 18/536,791, filed on December 12, 2023, published Jun 12, 2025, with AT&T labs. Patent pending.

Kawamura, R., **Guarda, P.**, Narwade, P., Patel, Y., Niinuma, K., 2025. Road area segmentation using satellite imagery and OpenStreetMap data, U.S. Patent 19/312,636, filed on August 28, 2025, with Fujitsu Research. Patent pending.

Guarda, P., Liu, J., Niinuma, K., Qian, S., 2024, Traffic simulator adjustment using satellite imagery and multi-source spatiotemporal data, U.S. Patent 18/791,147, filed on July 31, 2024, with Fujitsu Research. Patent pending.