# PEDRO CAMARGO

## Education

**PhD, Transportation Sciences (2014)**, University of California, Irvine, USA

**MSc, Transportation Engineering (2010)**, University of Sao Paulo, Brazil

**BSc Civil Engineering (2004),** University of Sao Paulo, Brazil

## Experience

**Transportation Scientist**, Independent/Outer Loop Consulting, Australia, 06/2019 – present

**Transportation Model Developer**, Veitch Lister Consulting, Australia, 02/16 – 06/19

**Transportation Engineer**, Maricopa Association of Governments, AZ, 11/2013 –Dec 2015

**Research Fellow**, Instituto de Pesquisas Econômicas Aplicadas, Brazil, 03/14 – 03/16

**Graduate Student Researcher**, University of California, Irvine, CA, 09/2009 – 11/2013

**Independent Consultant**, Brazil, 07/2008 – 09/2009

**Engineer**, Vale, Belo Horizonte, Brazil, 01/2006 – 07/2008

**Engineer**, Logit Engenharia, Sao Paulo, Brazil, 01/2003 – 11/2005

## Overview

Dr. Pedro Camargo is transportation model developer with over 15 years of experience delivering models in three continents. Pedro has improved existing models and established new ones from the ground up in varied software platforms (Cube, Emme, OmniTrans & TransCAD).

Pedro's model development work spans three continents, from traditional 4-step models in Brazil to agent-based models in the United States and advanced 4-step models in Australia. In Australia, his work included the implementation of a new departure-time choice model and new toll choice parameters for the Zenith modelling system.

Pedro combines advanced academic knowledge, substantial practical experience, spanning several modelling frameworks and software. This allows him in-depth knowledge of the advantages and drawbacks of most of the different tools and frameworks available in the market.

Pedro is also world renowned for having created AequilibraE, the premier Open-Source alternative to commercial modelling software, and has developed several general-purpose GIS applications, as well as other related to vehicle tracking and mobile phone data.

## Select Projects

**Goods and services model development** (DTMR, Australia) – As a freight modelling expert, Dr. Camargo is supporting the Department of Transport and Main Roads (DTMR) in its efforts to re-design and rebuild its new commodity-based Freight Model.(2021)

**Statewide Network Resilience framework** (Arkansas DOT, University of Arkansas - USA) – Dr. Camargo is developing the framework to determine the resilience of the state-maintained network and identify potential critical pieces of transport infrastructure that might cause particularly high disruption should them be rendered inactive for any reason. (2021 - ongoing)

**Large-scale agent-based model development** (Argonne National Laboratory, USA) – Dr. Camargo is part of the team developing the modeling platform Polaris and its associated metropolitan models, used by the US Department of Energy to estimate future energy demands from the transportation system under several different growth and infrastructure scenarios. (2020-ongoing)

**Air-travel analysis using Location Bases Services data** (Client - confidential) – Dr. Camargo designed and implemented a database architecture capable of ingesting over 18 billion records (GPS pings), as well as a series of prototype

## Select Publications

**Camargo P.V**., Pammenter E, Inayathusein A. "Mobility-as-a-Service and Demand-Responsive Transport: Practical Implementation in Traditional Forecasting Models". Transportation Research Record. December 2020.

Zill, J., **Camargo, P.V.**, Daisy, N., Veitch, T. "Toll Choice and Stochastic User Equilibrium: Ticking All the Boxes", Transportation Research Record, Vol 2673 Issue 4

**Camargo, P.V.**, Hong,S., Livshits, V., 2017, "Expanding the Uses of Truck GPS Data in Freight Modeling and Planning Activities", Transportation Research Record, Issue 2646, pp. 68-76

Ranaiefar, F., Chow, J.Y.J., Rodriguez-Roman, D., **Camargo, P.V.**, Ritchie, S.G., 2013. "Structural commodity generation model that uses public data: geographic scalability and supply chain elasticity analysis.", Transportation Research Record, Vol 2378 Issue 1, pp. 73-83

**Camargo, P.V.** "ReMuLAA - A new algorithm for the route choice problem". University of California Irvine. 2014 (PhD Dissertation, Advisors Michael G. McNally and R. Jayakrishnan)

**Camargo, P.V**. "Analysis of a closed loop rail transportation system through a hybrid simulation-optimization approach". University of Sao Paulo 2010 (MSc Transport Engineering Thesis, Advisor Claudio Barbieri da Cunha)

algorithms for stop and travel inference in order to estimate trip origin distribution for land access to a major Australian Airport (2018 – 2019)

**Redevelopment of the Sydney Zenith model** (various) – Dr. Camargo re-estimated the new Zenith model for Sydney based on the latest household travel survey. Dr. Camargo also developed new software that allows for fast model estimation and validation, allowing for new model variations to be quickly developed. (2018-2019)

**Regional Freight Assignment Model: Review and Improvement**, (TfNSW)

In two different engagements, Dr Camargo designed a model development roadmap for the TfNSW's TransCAD regional freight assignment model and made targeted improvements in data pre and post processing., as well as developing a new multi-class assignment to allow the model to reflect the effects of congestion around urban areas throughout NSW. (2018-2019)

**North-East Link**, Australia (North-East Link Authority) – Dr. Camargo redesigned the traditional Zenith model for Melbourne with the inclusion of a departure time choice model that reflected peak-spreading in order to support the evaluation of the North-East Link, one of the most expensive pieces of infrastructure ever built in Australia. (2017)

**Sun Corridor Activity-Based** M**odel** (MAG) – Dr. Camargo was part of the internal team that reviewed the components of its state-of-the-art Activity-Based Model delivered by the consultant. (2014 – 2016)

**Sun Corridor Agent-Based Freight Model** (SHRP2 C20 IAP), Arizona – Dr. Camargo played a central role in writing the proposal that obtained US$350k grant from the SHRP2 C20 IAP from the Federal Highway Administration (FHWA). He was also the project manager for the development of 3 of the 4 sub-models that compose the model system and developed key portions of the models himself. (2014 – 2016)

**California Statewide Freight Forecasting Model** (CSFFM) – Dr. Camargo played a critical role in defining model structure, modeling techniques and general model framework. He was also responsible for developing and implementing a new methodology for agriculture seasonality analysis and a novel traffic assignment algorithm (2011 – 2013)

**Rio Branco Transportation Master Plan** – Dr. Camargo provided modeling support in network development and 4-step model estimation for the development of the Transportation Master Plan for the City of Rio Branco in Acre State, Brazil. (2007 – 2008)

**Belo Horizonte's Metropolitan Area Freight and Urban Transportation Master Plan** – Dr. Camargo provided data analysis and modeling expertise to support the development of Belo Horizonte's Metropolitan Area Freight and Urban Transportation Master Plan in Brazil (2008 – 2009)

**BRT feasibility Study** (Municipality of Rio de Janeiro) – Dr. Camargo was responsible for the demand modelling component for the feasibility Study for BRT from Barra da Tijuca to Penha corridor (T5), building upon his previous work on the development of the metropolitan model and further detailing it along the BRT corridor. (May 2004 – Dec 2005)

**Goiânia Metro demand estimate** (SEINFRA) – Dr. Camargo was responsible for developing a simplified 4-step model to support preliminary the development of the Future Demand and Risk and Socio-economic Analysis report on the implementation of a Mass Transportation System for the Metropolitan Region of Goiânia (Nov 2003 – Apr 2004)

**Rio de Janeiro's Metropolitan Area Freight and Urban Master Plan** (CENTRAL) - Dr. Camargo was the consultant estimating most of the components of the traditional 4-step model developed for the metropolitan region of Rio de Janeiro and its implementation in GISDK, the TransCAD scripting language (Dec 2001 – Apr 2005)

## Online Presence

**Transportation modeling tutorial videos** – close to 134,000 views as of April 2021

**Technical blog:** www.xl-optim.com – technical blog focusing on transportation modeling, GIS and other related subjects. All content is open source and open data.

## Full list of publications

Akter, T., Hernandez, S., & **Camargo, P. V.** (2023). Freight Operational Characteristics Mined from Anonymous Mobile Sensor Data. Transportation Research Record, 0(0). https://doi.org/10.1177/03611981231158639

**Camargo P.V**., Pammenter E, Inayathusein A. (2020) "Mobility-as-a-Service and Demand-Responsive Transport: Practical Implementation in Traditional Forecasting Models". Transportation Research Record.

Zill, J., **Camargo, P.V.**, Daisy, N., Veitch, T. (2019) "Toll Choice and Stochastic User Equilibrium: Ticking All the Boxes", Transportation Research Record, Vol 2673 Issue 4

**Camargo, P.V.**, Hong,S., Livshits, V., 2017, "Expanding the Uses of Truck GPS Data in Freight Modeling and Planning Activities", Transportation Research Record, Issue 2646, pp. 68-76

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**Camargo, P.V.** "ReMuLAA - A new algorithm for the route choice problem". University of California Irvine. 2014 (PhD Dissertation, Advisors Michael G. McNally and R. Jayakrishnan)

**Camargo, P.V**. "Analysis of a closed loop rail transportation system through a hybrid simulation-optimization approach". University of Sao Paulo 2010 (MSc Transport Engineering Thesis, Advisor Claudio Barbieri da Cunha)

## Full list of conference presentations

**Camargo, P.V.**, (2025) "Visualizing Dynamic Model Outputs in Traditional GIS Software", 104th Annual Meeting of the Transportation Research Board, Washington, DC (upcoming)

**Camargo, P.V.**, Tanveer, S., (2025) "Designing Large-Scale Hydrogen Distribution Network: A practical Approach for Scenario Analysis", 104th Annual Meeting of the Transportation Research Board, Washington, DC (upcoming)

**Camargo, P.V.**, Imai, R., "Map-matching large streams of vehicle GPS data into bespoke networks", Australasian Transport Research Forum (ATRF), 45th, 2024, Melbourne, Australia

Moss, J., **Camargo, P.V.**, de Freitas, C., Imai, R. "High-performance route choice set generation on large networks", Australasian Transport Research Forum (ATRF), 45th, 2024, Melbourne, Australia

Zill, J., **Camargo, P.V.**, "State-wide route choice models", Australasian Transport Research Forum (ATRF), 45th, 2024, Melbourne, Australia

## Select Conference Presentations

**Camargo, P.V.**, 2021. “A Model from nothing. How far can get (and what can you do), with Open-Source and Open-Data alone”, 18th TRB Conference on Transportation Planning Applications, USA

**Camargo, P.V.**, Endrei, E., Inayathusein, A., 2020. “MaaS and DRT: Practical implementation in traditional forecasting models”, 98th Annual Meeting of the Transportation Research Board, Washington, DC

Zill, J., **Camargo, P.V.**, Daisy, N., Veitch, T., 2019. “Toll Choice and Stochastic User Equilibrium: Ticking All the Boxes”, 98th Annual Meeting of the Transportation Research Board, Washington, DC

**Camargo, P.V.**, Zill, J., Veitch, T., 2018. “Advanced equilibration methods applied to multi-class traffic assignment”, 1st Irvine Symposium on Emerging Research in Transportation, Irvine, CA

**Camargo, P.V.**, 2018. “Building Desire Lines using Delaunay graphs”, 97th Annual Meeting of the Transportation Research Board, Washington, DC

**Camargo, P.V.**, Spalding, T., Alaimo, A., 2017. “Improving a traditional 4-step transport model with a Departure Time Choice model component”, Australasian Transport Research Forum, Australasian Transport Research Forum (ATRF). Auckland, NZ

**Camargo, P.V.**, Hernandez, S., 2016. “Vehicle Route Reconstruction from Mobile Source Data - A map-matching algorithm harnessing open source software”, 27th ARRB annual conference, Melbourne

**Camargo, P.V.**, 2015. “AequilibraE - A free QGIS add-on for transportation modelling”. In: FOSS4G North America 2015, San Francisco, CA

**Camargo, P.V.**, McNally, M.G., Ritchie, S., 2014. “Exploratory use of raster images as a data source for agricultural commodities transportation planning”, In: Proc. 93rd Annual Meeting of the Transportation Research Board, Washington, DC.

**Camargo, P.V.**, Cunha, C.B., 2011. ”Railroad freight transportation system operating on a closed loop analyzed on a simulation-optimization framework”, In: Proc. Annual UCTC Student Conference, Berkeley, CA.

**Camargo, P.V.**, Zuniga-Garcia N., Stinson, M., “Synthesizing truck tours from trip lists: A simulation-optimization approach”, 2024, 103rd Annual Meeting of the Transportation Research Board, Washington, DC

**Camargo, P.V.** “AequilibraE and Tradesman: current state of affairs of modelling with open-source software”, Australasian Transport Research Forum (ATRF), 44th, 2023, Perth, Australia

Moss, J., O’Brien, C., Cook, J., **Camargo, P.V.** “Performance effects of heap structure choice for path-finding: A traffic modelling perspective”, Australasian Transport Research Forum (ATRF), 44th, 2023, Perth, Australia

Akter, t., Hernandez, s., **Camargo, P.V.**, “Freight operational characteristics mined from anonymous mobile sensor data”, (2023) Transportation Research Record 2677 (9), 236-247

**Camargo, P.V.**, “Network resilience analysis with large streams of mobility data and Open Source software”, Australasian Transport Research Forum (ATRF), 43rd, 2022, Adelaide, Australia

McHugh C., **Camargo P.V.** ”Freight modelling in Australia in 2021 – A data availability perspective”. 42nd Australasian Transport Research Forum (ATRF). December 2021

**Camargo, P.V.**, 2021. “A Model from nothing. How far can get (and what can you do), with Open-Source and Open-Data alone”, 18th TRB Conference on Transportation Planning Applications, USA

**Camargo, P.V.**, Endrei, E., Inayathusein, A., 2020. “MaaS and DRT: Practical implementation in traditional forecasting models”, 98th Annual Meeting of the Transportation Research Board, Washington, DC

Zill, J., **Camargo, P.V.**, Daisy, N., Veitch, T., 2019. “Toll Choice and Stochastic User Equilibrium: Ticking All the Boxes”, 98th Annual Meeting of the Transportation Research Board, Washington, DC

**Camargo, P.V.**, Zill, J., Veitch, T., 2018. “Advanced equilibration methods applied to multi-class traffic assignment”, 1st Irvine Symposium on Emerging Research in Transportation, Irvine, CA

Viswanathan, K., Khurana, M., Livshits, V., Nippani, S., **Camargo, P.V.**, 2018. “Data Framework for Megaregion Freight Models”, 97th Annual Meeting of the Transportation Research Board, Washington, DC

**Camargo, P.V.**, 2018. “Building Desire Lines using Delaunay graphs”, 97th Annual Meeting of the Transportation Research Board, Washington, DC

**Camargo, P.V.**, Spalding, T., Alaimo, A., 2017. “Improving a traditional 4-step transport model with a Departure Time Choice model component”, Australasian Transport Research Forum, Australasian Transport Research Forum (ATRF). Auckland, NZ

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**Camargo, P.V.**, Cunha, C.B., 2011. ”Railroad freight transportation system operating on a closed loop analyzed on a simulation-optimization framework”, In: Proc. Annual UCTC Student Conference, Berkeley, CA.

## References

References are available upon request.