Felipe de Souza

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EDUCATION

2018 Ph.D., Transportation Systems Engineering, University of California Irvine
Advisor: Professor Wenlong Jin, GPA: 4/4
2012 M.S. Systems Engineering, Universidade Federal de Santa Catarina, Brazil
Advisor: Professor Eduardo Camponogara
2008 B.S. Control and Automation Engineering, Universidade Federal de Santa Catarina, Brazil

RESEARCH

2020- Research Consultant – Transportation Systems Simulation at Argonne National Laboratory on the Vehicle and Mobility Systems (lead by Aymeric Rosseau) under supervision of Joshua Auld. Main Projects were the Systems and Modeling for Accelerated Research in Transport (SMART) and its sequel (SMART 2.0). My main role is the development and implementation of core Traffic Flow Models with focus on Connected and Automated Vehicles and simulation within the Polaris software (C++)

2018-2020 Postdoctoral Appointee – Transportation Systems Simulation at Argonne National Laboratory on the Vehicle and Mobility Systems (lead by Aymeric Rosseau) under supervision of Joshua Auld. Main Projects were the Systems and Modeling for Accelerated Research in Transport (SMART) and its sequel (SMART 2.0). My main role is the development and implementation of core Traffic Flow Models with a focus on Connected and Automated Vehicles and simulation within the Polaris software (C++). Tangentially, this role also includes the development of algorithms for managing fleets of autonomous vehicles and urban traffic control algorithms.

2016-2016 Graduate Research Assistant at University of California Irvine on the project "A Unified Framework for Analyzing and Designing Signals for Stationary Arterial Networks" (PI: Wenlong Jin) in which my roles were the analysis and implementation of traffic flow models.

2015-2015 Graduate Research Assistant at University of California Irvine on the project "Performance Analysis and Control Design for On-ramp Metering of Active Merging Bottlenecks" (PI: Wenlong Jin) in which my roles were the analysis and implementation of traffic flow models.

2010-2010 Graduate Research Assistant at Universidade Federal de Santa Catarina on project "Models and Algorithms for Distributed Control of Linear Dynamic Networks". My roles were in the implementation of the distributed algorithm and a study-case in signal timing control using microsimulation.

2008-2010 Research Assistant at Universidade Federal de Santa Catarina, Brazil. Extension of CONTREAL project (below) concerning the first deployment of the traffic control center in the city of Macaé, Brazil. I was responsible for the system deployment and customization and co-responsible for the calibration of the real-time algorithm.

2003-2005 Undergraduate Research Assistant, Universidade Federal de Santa Catarina. Project named CONTREAL, with the goal of developing a real-time urban traffic control system. My roles were on the Actuated Traffic Signal Firmware Development (C/C++), user interface and database management of the center station (Python, SQL)

TEACHING

2018 Teaching Assistant for course CEE-229 "Transportation Systems Operations and Control" at University of California Irvine with main roles of assisting students with their homework assignments and project. Also, I gave the lectures related to Freeway Operations and Control (Volunteer appointment).

INDUSTRY EXPERIENCE

2012-2014 Systems Engineer, Brascontrol, Brazil. This company is a supplier of traffic equipment for traffic agencies. I worked on the development of the firmware of the actuated traffic signal equipment (C, C++, Python), implementation of standard protocols (UTMC, NTCIP). Server-side software for remote communication with field equipment.

2009-2012 Co-founder and CTO of "ATTA Automação in Brazil". The company's focus was on the development of IT and hardware solutions for urban mobility in Brazil. Examples of project include traffic sensors (magnetometer), sensors for parking lots, web-based systems for traffic information dissemination and consultant projects, especially related to traffic microsimulation.

PUBLICATIONS

Google Scholar Profile: https://scholar.google.com/citations?user=d8So6LYAAAAJ&hl=en&oi=sra

Books Chapters

Enam, Annesha, **Felipe de Souza**, Omer Verbas, Monique Stinson, and Joshua Auld. "Autonomous Vehicles and Transportation Modeling." International Encyclopedia of Transportation (2021): 557-563.

Peer-Reviewed Journal Articles

Felipe de Souza, Rafael Minatto Saucedo, Omid Mousavizadeh, Rodrigo Castelan Carlson, and Mehdi Keyvan-Ekbatani. "On the evaluation and selection of network-level traffic control policies: Perimeter control, TUC, and their combination." *Transportation Research Part A: Policy and Practice* 186 (2024): 104161.

Camponogara, Eduardo, Eduardo Rauh Müller, **Felipe Augusto de Souza**, Rodrigo Castelan Carlson, and Laio Oriel Seman. "Distributed optimization for multi-commodity urban traffic control." *Transportation Research Part C: Emerging Technologies* 167 (2024): 104823.

Long, Keke, Haotian Shi, Zhiwei Chen, Zhaohui Liang, Xiaopeng Li, and **Felipe de Souza**. "Bi-scale car-following model calibration based on corridor-level trajectory." *Transportation Research Part E: Logistics and Transportation Review* 186 (2024): 103497.

Dean, Matthew D., **Felipe de Souza**, Krishna Murthy Gurumurthy, and Kara M. Kockelman. "Multi-stage charging and discharging of electric vehicle fleets." *Transportation Research Part D: Transport and Environment* 118 (2023): 103691.

Dean, Matthew D., Krishna Murthy Gurumurthy, **Felipe de Souza**, Joshua Auld, and Kara M. Kockelman. "Synergies between repositioning and charging strategies for shared autonomous electric vehicle fleets." *Transportation Research Part D: Transport and Environment* 108 (2022): 103314.

Cokyasar, Taner, **Felipe de Souza**, Joshua Auld, and Omer Verbas. "Dynamic Ride-Matching for Large-Scale Transportation Systems." Transportation Research Record, (October 2021). https://doi.org/10.1177/03611981211049422.

de Souza, Felipe, and Mariana Teixeira Sebastiani. "Improving resilience of bus bunching holding strategy through a rolling horizon approach." *Journal of Transportation Engineering, Part A: Systems* 147.10 (2021): 04021074.

de Souza, Felipe, Rodrigo Castelan Carlson, Eduardo Rauh Müller, and Konstantinos Ampountolas. "Multi-Commodity Traffic Signal Control and Routing With Connected Vehicles." IEEE Transactions on Intelligent Transportation Systems (2020).

de Souza, Felipe, and Raphael Stern. "Calibrating Microscopic Car-Following Models for Adaptive Cruise Control Vehicles: Multiobjective Approach." Journal of Transportation Engineering, Part A: Systems 147, no. 1 (2021): 04020150.

Gurumurthy KM, **de Souza F**, Enam A, Auld J. Integrating Supply and Demand Perspectives for a Large-Scale Simulation of Shared Autonomous Vehicles. Transportation Research Record. 2020:0361198120921157.

Souza, F.A., Camponogara, E., Kraus, W. and Peccin, V.B., 2015. Distributed Model Predictive Control Applied to Urban Traffic Networks: A simulation-based performance analysis. Optimal Control Application and Methods, 36(3), PP. 353-368.

Kraus, W. **de Souza, F.A.**, Carlson, R.C., Papageorgiou, M., Dantas, L.D., Camponogara, E., Kosmatopoulos, E. and Aboudolas, K., 2010. Cost Effective Real-Time Traffic Signal using the TUC Strategy. IEEE Intelligent Transportation Systems Magazine 2(4), PP. 6-17

Peer-Reviewed Conference Articles

de Souza, Felipe, Krishna Murthy Gurumurthy, Omer Verbas, and Joshua Auld. "POLARIS-LC: A Multi-Class traffic Flow Model in Lagrangian Coordinates for Large-Scale Simulation." *Procedia Computer Science* 238 (2024): 771-778.

Dean, M. D., **de Souza, F.,** Gurumurthy, and Kockelman, K.M (2023) "Multi-Stage Charging & Discharging of Electric Vehicle Fleets" *Presented at 102nd TRB Annual Meeting*

de Souza, F., Gurumurthy, K.M., Verbas, O., and Auld, J. (2023) "Can Road Side Units replace navigation Apps? A Simulation-Based Analysis of Re-Routing under Non Recurring Congestion" *Presented at 102nd t TRB Annual Meeting*

Auld, J., **de Souza, F.**, Gurumurthy, K.M., Verbas, O., Sahin O., Freyermuth, and V., Rousseau, A., (2023) "Multi-Regional Analysis of Near-Term Smart Mobility Scenarios using the POLARIS Modeling Workflow" To be *Presented at 102nd t TRB Annual Meeting*

Dean, M. D., Gurumurthy, K.M., **de Souza, F.,** Joshua Auld, and Kara M. Kockelman. (2022) "Synergies between repositioning and charging strategies for shared autonomous electric vehicle fleets." *Presented at 101st TRB Annual Meeting*

de Souza, F., O. Verbas, J. Auld (2021). ABM-LTM: A Link-Transmission-Model with Discrete Flows Able to Track Individual Vehicles. Presented at 100th TRB Annual Meeting.

Cokyasar, T, **de Souza, F**., Auld, J., Verbas, O., (2021) "Dynamic Ride-matching for Large-scale Transportation Systems". Presented at 100th TRB Annual Meeting

Cokyasar, Taner, Joshua Auld, Mahmoud Javanmardi, Omer Verbas, and **Felipe de Souza**. "Analyzing Energy and Mobility Impacts of Privately-owned Autonomous Vehicles." In 2020 IEEE 23rd International Conference on Intelligent Transportation Systems (ITSC), pp. 1-6. IEEE, 2020.

Sarma, JS Navjyoth, Daisik Nam, Michael F. Hyland, **Felipe de Souza**, Dingtong Yang, Arash Ghaffar, and I. Omer Verbas. "Effective and Efficient Fleet Dispatching Strategies for Dynamically Matching AVs to Travelers in Large-scale Transportation Systems." In 2020 IEEE 23rd International Conference on Intelligent Transportation Systems (ITSC), pp. 1-6. IEEE, 2020.

de Souza F, Gurumurthy KM, Auld J, Kockelman KM. An Optimization-based Strategy for Shared Autonomous Vehicle Fleet Repositioning. In VEHITS 2020 (pp. 370-376).

de Souza F, Gurumurthy KM, Auld J, Kockelman KM. A repositioning method for shared autonomous vehicles operation. Procedia Computer Science. 2020 Jan 1;170:791-8.

Auld, J.A., **de Souza F**, Enam A, Javanmardi M, Stinson M, Verbas O, Rousseau A. Exploring the mobility and energy implications of shared versus private autonomous vehicles. In2019 IEEE Intelligent Transportation Systems Conference (ITSC) 2019 Oct 27 (pp. 1691-1696). IEEE.

de Souza F. Calibration Procedure for Traffic Flow Models of Merge Bottlenecks. In2019 6th International Conference on Models and Technologies for Intelligent Transportation Systems (MT-ITS) 2019 Jun 5 (pp. 1-7). IEEE.

de Souza, F., 2019. Freeway Loop Detector Data Reconciliation Based on Vehicle Conservation. Procedia Computer Science, 151, pp.321-326.

de Souza, F., Verbas, O. and Auld, J., 2019. Mesoscopic Traffic Flow Model for Agent-Based Simulation. Procedia Computer Science, 151, pp.858-863.

de Souza, Felipe, Marjan Mosslemi, Jasper A. Vrugt, and Wenlong Jin. "Microscopic simulation replicates the capacity drop phenomenon." Procedia computer science 130 (2018): 908-913.

de Souza, F.A., Peccin, V.B. and Camponogara, E., 2010, August. Distributed Model Predictive Control Applied to Urban Traffic Networks: Implementation, Experimentation, and Analysis. In Automation Science and Engineering (CASE), 2010 IEEE Conference on (PP. 399-405). IEEE

de Souza, F., Verbas, O., Auld, J. ABM-LTM: A Link-Transmission-Model with Discrete Flows Able to Track Individual Vehicles, TRB Annual Meeting (No. 21-04108)

Cokyasar, T., **de Souza, F**., Auld, J., Verbas, O., Dynamic Ride-matching for Large-Scale Transportation Systems, TRB Annual Meeting (No. 21-03909)

de Souza, F., Stern R., Calibrating Microscopic Models for Commercially Available Autonomous Driving Systems: A Multi-Objective Approach

Gurumurthy K.M., **de Souza, F.**, Enam, A., Auld J., Large-Scale Simulation of Shared Autonomous Vehicles: Integrating the Supply and Demand Perspectives, TRB Annual Meeting (No., 20-05837)

Sebastiani, M.T. and **de Souza, F.**, 2019. Bus Bunching Management: A Computationally Efficient Rolling Horizon Approach TRB Annual Meeting (No. 19-02485).

de Souza, F. and Jin, W., 2017. Integrating a Smith Predictor into Ramp Metering Control of Freeways TRB Annual Meeting (No. 17-06265)

de Souza, F. and Jin, W., 2016. System Performance and Controller Design of the PI-ALINEA Ramp Metering Scheme TRB Annual Meeting (No. 16-6183)

HONORS AND AWARDS

2018 Miguel Velez Scholarship: awarded to Latin American students with outstanding academic achievements.

2017 ITS California Scholarship: awarded to students in fields that will have a future impact on Intelligent Transportation Systems

2010 Best Paper Award at IEEE CASE, 2010: Paper "Distributed Model Predictive Control Applied to Urban Traffic Networks: Implementation, Experimentation, and Analysis (de Souza, F., Peccin, V, Camponogara, E.)

PEER REVIEW

Submitted one or more reviews for the following Journal or Conferences:

- IEEE Transactions on Intelligent Transportation Systems
- Transportation Research Part C: Emerging Technologies
- Transportation Science
- Journal of Transportation Engineering, Part A: Systems
- Journal of Intelligent Transportation Systems
- IET Intelligent Transportation Systems
- Optimal Control Applications and Methods
- TRB Annual Meeting
- Multiple conferences of IEEE Intelligent Transportation Systems Society