

Renzo Massobrio

Curriculum Vitæ

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My research centers on using data analysis and artificial intelligence to tackle complex urban problems. To achieve this, I combine methods from operations research, machine learning, network science, high-performance computing and geographic information systems. I specialize in urban mobility, with a focus on service operations and control, topological assessment of public transport networks, accessibility and equity, and passenger demand analysis.

Education

- May 2021 **Ph.D. in Computer Science**, *Universidad de Cádiz*, Spain.
Advisors: Prof. Bernabé Dorronsoro and Prof. Sergio Nesmachnow
Thesis: “Learning for Optimization with Virtual Savant”
- Dec 2018 **M.Sc. in Computer Science**, *Universidad de la República*, Uruguay.
Advisor: Prof. Sergio Nesmachnow
Thesis: “Urban mobility data analysis in Montevideo, Uruguay”
- Sep 2015 **Engineer in Computer Science**, *Universidad de la República*, Uruguay.
Advisor: Prof. Sergio Nesmachnow
Project: “Taxi sharing optimization using evolutionary algorithms”

Academic appointments

- Jan 2024 **Principal Research Fellow**, *Modelling for Sustainability group, Department of Electronics-ICT, University of Antwerp*, Belgium.
–present Manager: Prof. Peter Hellinckx
- Sep 2021 **Researcher**, *Basic Sciences Development Program (PEDECIBA)*, Uruguay.
–present Research area: computer science
- Jun 2019 **Researcher**, *National System of Researchers*, Uruguay.
–present Research area: Engineering and Technology
- Jan 2022 **Postdoctoral researcher**, *Smart Public Transport Lab, Transport & Planning Department, Delft University of Technology*, the Netherlands.
–Dec 2023 Manager: Prof. Oded Cats
Topic: Network analysis for the comparative assessment of public transport networks in terms of accessibility, equity, and recoverability in the event of failures
- Jun 2016 **Teaching and Research Assistant**, *Department of Transportation, Faculty of Engineering, Universidad de la República*, Uruguay.
–Dec 2023
- Dec 2014 **Teaching and Research Assistant**, *Computer Science Institute, Faculty of Engineering, Universidad de la República*, Uruguay.
–Jun 2016

Awards and Honors

- 2022 **Ph.D. thesis award**, *Universidad de Cádiz*, Spain.
- 2021 **Ph.D. thesis award**, *Ph.D. thesis contest*, National Academy of Engineering, Uruguay.
- 2021 **Best paper award**, *Travel time estimation in public transportation using bus location data*, IV Ibero-american Congress of Smart Cities, Cancún, México.

- 2021 **Masters thesis award**, *Master thesis contest*, PEDECIBA-Informática, Uruguay.
- 2019 **Promising Young Researcher Award**, Ministry of Education and Culture, Uruguay.
- 2019 **Best masters thesis award**, *XXVI Latin American Contest of Master Thesis*, Latin American Center for Computational Studies (CLEI).
- 2015 **Best undergraduate thesis award**, *Faculty of Engineering*, Universidad de la República, Uruguay.

Grants

- 2022–2023 **Postdoc grant**, *Margarita Salas fund for young doctors*, European Union–NextGenerationEU.
- 2016–2021 **Ph.D. grant**, *Fundación Carolina*, Spain.
- 2016–2019 **Ph.D. grant**, *National Agency of Research and Innovation*, Uruguay.

Research Experience

Principal Investigator in Research Projects

- 2022–2023 **Walking accessibility to the public transport network of Montevideo.**
Grants: “Ing. Oscar Maggiolo” Montevideo City Government - Universidad de la República (~15 000€)
- 2020–2022 **Territorial, universal, and sustainable accesibility: characterizing the intermodal transportation system in Montevideo.**
Grants: National Agency of Research and Innovation, Uruguay (~50 000€)
- 2019–2020 **Study of mobility by public transport in the metropolitan area of Maldonado and accesibility to public services.**
Grants: Office of Planning and Budget, Uruguay (~10 000€)

Research stays

- Sep 2019 **Centro Nacional de Alta Tecnología (CeNAT).**
Urban mobility data analysis in Costa Rica
- Dec 2018–
Mar 2019 **Institut national de recherche en informatique et en automatique (Inria).**
Optimization and machine learning for the permutation flowshop problem
- Jul 2016 **Computer Science Department, CICESE Research Center.**
Transport planning in smart cities
- Feb – Mar
2016 **School of Computer Science & Informatics, Cardiff University.**
Optimization of urban transit and related smart city problems using computational intelligence
- Oct 2015 **Superior Technical School of Informatics, Universidad de Málaga.**
Infrastructure location for vehicular networks
- Sep – Oct
2015 **Superior School of Engineering, Universidad de Cádiz.**
SAVANT: Automatic Generation of Parallel Approximation Algorithms for Low-power Architectures Based on Machine Learning

Publications

*Complete list of publications available at www.fing.edu.uy/~renzom.

*In conference publications, the presenting author is underlined.

Refereed journal articles

- Z. Wang, K. Huang, R. Massobrio, A. Bombelli, and O. Cats. Quantification and comparison of hierarchy in public transport networks. *Physica A: Statistical Mechanics and its Applications*, 634:129479, 2024.
- S. Nesmachnow, R. Massobrio, S. Guridi, S. Olmedo, and A. Tchernykh. Big data analysis for travel time characterization in public transportation systems. *Sustainability*, 15(19), 2023.
- R. Massobrio, S. Nesmachnow, J. Muraña, and B. Dorronsoro. Learning to optimize timetables for efficient transfers in public transportation systems. *Applied Soft Computing*, 119:108616, 2022.
- R. Massobrio, S. Nesmachnow, F. Palomo-Lozano, and B. Dorronsoro. Virtual savant as a generic learning approach applied to the basic independent next release problem. *Applied Soft Computing*, 108:107374, 2021.
- R. Massobrio and S. Nesmachnow. Urban Mobility Data Analysis for Public Transportation Systems: A Case Study in Montevideo, Uruguay. *Applied Sciences*, 10(16):5400, 2020.
- D. Hernandez, M. Hansz, and R. Massobrio. Job accessibility through public transport and unemployment in Latin America: The case of Montevideo (Uruguay). *Journal of Transport Geography*, 85:102742, 2020.
- D. Peña, A. Tchernykh, S. Nesmachnow, R. Massobrio, A. Feoktistov, I. Bychkov, G. Radchenko, A. Y. Drozdov, and S. N. Garichev. Operating cost and quality of service optimization for multi-vehicle-type timetabling for urban bus systems. *Journal of Parallel and Distributed Computing*, 133:272–285, 2019.
- S. Nesmachnow, R. Massobrio, E. Arreche, C. Mumford, A. C. Olivera, P. J. Vidal, and A. Tchernykh. Traffic light synchronization for Bus Rapid Transit using a parallel evolutionary algorithm. *International Journal of Transportation Science and Technology*, 8(1):53–67, 2019.
- J. C. de la Torre, R. Massobrio, P. Ruiz, S. Nesmachnow, and B. Dorronsoro. Parallel virtual savant for the heterogeneous computing scheduling problem. *Journal of Computational Science*, 39:101048, 2019.
- R. Massobrio, S. Nesmachnow, A. Tchernykh, A. Avetisyan, and G. Radchenko. Towards a cloud computing paradigm for big data analysis in smart cities. *Programming and Computer Software*, 44(3):181–189, 2018.
- S. Nesmachnow, S. Baña, and R. Massobrio. A distributed platform for big data analysis in smart cities: combining Intelligent Transportation Systems and socioeconomic data for Montevideo, Uruguay. *EAI Endorsed Transactions on Smart Cities*, 2(5):1–18, 2017.
- R. Massobrio, S. Nesmachnow, J. Toutouh, and E. Alba. Infrastructure deployment in vehicular communication networks using a parallel multiobjective evolutionary algorithm. *International Journal of Intelligent Systems*, 32(8):801–829, 2017.
- R. Massobrio, G. Fagúndez, and S. Nesmachnow. Multiobjective evolutionary algorithms for the taxi sharing problem. *International Journal of Metaheuristics*, 5(1):67–90, 2016.

[Book chapters](#)

D. Peña, R. Massobrio, B. Dorronsoro, S. Nesmachnow, and P. Ruiz. Designing a Sustainable Bus Transport System with High QoS Using Computational Intelligence. In *Reference Module in Earth Systems and Environmental Sciences*. Elsevier, 2022.

R. Massobrio, S. Nesmachnow, and J. Toutouh. Multiobjective evolutionary algorithms for smart placement of roadside units in vehicular networks. In N. Nedjah, L. D. M. Mourelle, and H. S. Lopes, editors, *Evolutionary Multi-Objective System Design: Theory and Applications*, pages 1–36. Chapman & Hall/CRC Computer and Information Science Series, 2017.

[Selected conference contributions](#)

R. Massobrio and O. Cats. A topological analysis of recoverability in metro networks. In *Transportation Research Board (TRB) Annual Meeting*, 2024.

Renzo Massobrio and O. Cats. A typology of metro network system characteristics and topology. In *25th Euro Working Group Transportation (EWGT)*, pages 1–3, 2023.

Renzo Massobrio and O. Cats. Topological analysis of public transport networks’ recoverability. In *15th Conference on Advanced Systems in Public Transport (CASPT)*, pages 1–5, 2022.

Renzo Massobrio, S. Nesmachnow, and B. Dorronsoro. Virtual Savant: learning for optimization. In *34th Conference on Neural Information Processing Systems (NeurIPS 2020). Learning Meets Combinatorial Algorithms (LMCA) workshop.*, pages 1–5, 2020.

Renzo Massobrio. Urban mobility data analysis in Montevideo, Uruguay. In *XLV Latin American Computing Conference*, pages 1–18, 2019.

Renzo Massobrio, S. Nesmachnow, and B. Dorronsoro. Support Vector Machine Acceleration for Intel Xeon Phi Manycore Processors. In E. Mocskos and S. Nesmachnow, editors, *High Performance Computing*, pages 277–290, Cham, 2018. Springer International Publishing.

Teaching experience

[Graduate and Postgraduate Courses](#)

- 2017–2023 **Foundations of urban informatics: data analysis and processing**, *Postgraduate course*, Universidad de la República, (Module leader).
- 2023–2023 **Public Transport Demand and Network Planning and Operations**, *Masters module*, TU Delft, (Teaching Assistant).
- 2015–2020 **Evolutionary algorithms**, *Graduate and postgraduate course*, Universidad de la República, (Module co-leader).
- 2016 **Distributed and Cloud Computing**, *M.Sc. module*, School of Computer Science and Informatics, Cardiff University, (Teaching Assistant).

[Masters Thesis Supervision](#)

- 2022–present **Walking accessibility to the public transport network in Montevideo**, Masters in Operational Research, Universidad de la República, Student: Sara Perera.
- 2022–2023 **Roadmap towards an unified European high-speed rail network**, M.Sc. in Transport, Infrastructure and Logistics, TU Delft, Student: Filippo Borgogno.
- 2022–2023 **Quantification and Comparison of Hierarchy in Unimodal Public Transport Networks**, M.Sc. in Transport, Infrastructure and Logistics, TU Delft, Student: Ketong Huang.

- 2022–2022 **Topological Comparative Assessment of Metro Networks**, M.Sc. in Transport, Infrastructure and Logistics, TU Delft, Student: Sam Vijlbrief.
[Bachelors Final Project Supervision](#)
- 2021–present **Evolutionary algorithms and neural networks for sewer network design in Latinamerica**, Computer Science Engineering, Universidad de la República, Students: Nicolás Herrera and Lucas Barbachan Rodríguez.
- 2018–present **Public transport optimization in smart cities**, Computer Science Engineering, Universidad de la República, Student: Andrés García.
- 2022–2023 **Passenger flow control strategy optimization in an urban rail transit network under epidemic conditions**, *Joint BSc in Traffic and Transportation*, Beijing Jiaotong University and TU Delft, Student: Yike Hu.
- 2017–2018 **Machine learning for automatic program generation**, Computer Science Engineering, Universidad de la República, Students: Mauro Picó and Marccio Silva.
- 2016–2018 **Big data processing for urban mobility**, Computer Science Engineering, Universidad de la República, Student: Jonathan Denis.
- 2016–2018 **Computational intelligence applied to urban transport optimization problems**, Computer Science Engineering, Universidad de la República, Student: Enzo Fabbiani.

Service to Profession

[Management Activities](#)

- 2022–present **Young Member Coordinator**, *Standing Committee on Transit Data, Transportation Research Board*.

[Memberships/Affiliations](#)

- 2023–present **Latin American Chapter of the International Network for Transport and Accessibility in Low Income Communities (INTALInC-LAC)**.
- 2018–2021 **Thematic Network: “Totally integral, efficient, and sustainable smart cities (CITIES)”**.
- 2017–2021 **Iberoamerican Network for High Performance Computing**.

[Editor in journals](#)

- 2023 **Cities**, *Elsevier*, Guest editor.

[Journal Manuscript Reviews](#)

PLOS One, *Public Library of Science*.
Travel Behaviour and Society, *Elsevier*.
Sustainable Cities and Society, *Elsevier*.
Journal of Public Transportation, *Elsevier*.
Physica A: Statistical Mechanics and Its Applications, *Elsevier*.
Journal of Rail Transport Planning and Management, *Elsevier*.
European Journal of Transport and Infrastructure Research, *TU Delft*.
Annals of Operations Research, *Springer*.
Applied Soft Computing, *Elsevier*.
International Journal of Metaheuristics, *Inderscience Publishers*.
Abstract and Applied Analysis, *Hindawi*.
Swarm and Evolutionary Computation, *Elsevier*.

Event Organization

- 2019-2022 **Public Transport and mobility seminar**, *Faculty of Engineering, Universidad de la República*, Montevideo, Uruguay.
- 2015 **International workshop: transport planning and smart cities**, *Faculty of Engineering, Universidad de la República*, Montevideo, Uruguay.

Session Organization/Chair in Conferences

- 2023 **Special session: Computational intelligence for smart cities**, *International Conference in Optimization and Learning*, Málaga, Spain.
- 2021-2022 **Special session: Urban Informatics, Big Data, Data Management, Analytics and Artificial Intelligence for Smart Cities**, *Ibero-American Congress on Smart Cities*.
- 2022 **Special session: Optimization in public transport (Mobility and Traffic stream)**, *International Conference on Operations Research (OR 2022)*, Karlsruhe, Germany.

Technical Program Committee Member in Conferences

- 2018-2023 **1st-6th Ibero-American Congress on Smart Cities**.
- 2023 **16th International Conference on Computational Intelligence in Security for Information Systems**, *Salamanca, Spain*.
- 2021-2023 **International Conference in Optimization and Learning**.
- 2020 **8th International Conference on Metaheuristics and Nature Inspired Computing**, *Marrakech, Morocco*.
- 2019-2020 **International Workshop on the Synergy of Parallel Computing, Optimization and Simulation**.
- 2020 **2nd International Workshop on Parallel Optimization using/for Multi- and Many-core High Performance Computing**, *Barcelona, Spain*.
- 2019 **International Conference in Optimization and Learning**, *Cádiz, Spain*.
- 2017-2018 **High Performance Computing Latin America**.

Reviews for conferences

- 2023 **11th Symposium of the European Association for Research in Transportation (hEART)**, *Zurich, Switzerland*.
- 2023 **LV Simpósio Brasileiro de Pesquisa Operacional**, *São José dos Campos, Brazil*.
- 2022 **15th International Conference on Advanced Systems in Public Transport (CASPT)**, *Tel Aviv, Israel*.
- 2018 **The 21st IEEE International Conference on Intelligent Transportation Systems**, *Maui, Hawaii, USA*.

Department/University Service

Masters thesis assessments

- 2023 **Roadmap towards an unified European high-speed rail network**, M.Sc. in Transport, Infrastructure and Logistics, TU Delft, Student: Filippo Borgogno.
- 2022 **Quantification and Comparison of Hierarchy in Unimodal Public Transport Networks**, M.Sc. in Transport, Infrastructure and Logistics, TU Delft, Student: Ketong Huang.
- 2022 **Topological Comparative Assessment of Metro Networks**, M.Sc. in Transport, Infrastructure and Logistics, TU Delft, Student: Sam Vijlbrief.

Bachelors final project assessments

- 2023 **Process mining for urban mobility analysis**, *Computer Science Engineering, Universidad de la República*, Students: Bruno Rodao, Nicolás Carignani, Santiago Ferreira.
- 2021 **Computational intelligence and learning for the prediction of traffic incidents**, *Computer Science Engineering, Universidad de la República*, Students: Guillermo Gabrielli, Ignacio Ferreira, Pablo Dalchiele.
- 2020 **Computational intelligence for traffic data analysis and estimators learning**, *Computer Science Engineering, Universidad de la República*, Students: Juan Serra and Hernán Winter.
- 2020 **Feeder bus line generation for public transport systems**, *Computer Science Engineering, Universidad de la República*, Students: Matías Dornel and Nicolás Erlichman.
- 2017 **Neuroevolution applied to the automatic generation of artificial intelligence for videogame verification**, *Computer Science Engineering, Universidad de la República*, Students: Facundo Parodi and Sebastián Rodríguez.
- 2016 **Solving the clustering problem using evolutionary algorithms**, *Computer Science Engineering, Universidad de la República*, Students: Lucía Carozzi and María Eugenia Curi.
- 2016 **Scheduling in heterogeneous systems using hwloc**, *Computer Science Engineering, Universidad de la República*, Student: Diego Regueira.
- 2015 **Cloud computing over open source infrastructures and the application to embryonic development study**, *Computer Science Engineering, Universidad de la República*, Students: J. Martín, M. Escobar, G. Urrutia, S. Falero.

Participation in hiring committees

- 2022 **Open Call for Teaching and Research Assistant position**, *Structures and Transport Institute, Universidad de la República*.
- 2020–2022 **Three Open Calls for Teaching and Research Assistant positions**, *Computer Science Institute, Universidad de la República*.

Management activities

- 2021–present **Representative**, *Academic subcomission for civil engineering postgraduate affairs, Faculty of Engineering, Universidad de la República*.

Other professional activities

Consultancies

- 2022–present **Associate consultant in Artificial Intelligence**, *Inter-American Development Bank*. Evolutionary methods and artificial intelligence for the analysis and massive processing of data for water and sanitation systems
- 2020–2021 **Associate consultant in mobility**, *Opción Consultores*.
Origin-destination matrix generation within the project “Promotion of Electric Urban Mobility in Uruguay” funded by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Further education

Short Courses

- 2022 **Coaching Individual Students and Project groups**, *TU Delft, Delft, Netherlands*.
- 2022 **Assessing Students and Master Thesis Projects**, *TU Delft, Delft, Netherlands*.
- 2019 **Planning Public Transport Services (PPTS)**, *TU Delft, Amsterdam, Netherlands*.

- 2017 **High-performance computing school (ECAR–HPC School)**, *Universidad de Buenos Aires*, Buenos Aires, Argentina.
- 2017 **Summer School on Machine Learning**, *Institute of New Imaging Technologies (INIT) Universitat Jaume I and Spanish Association of Pattern Recognition and Image Analysis (AERFAI)*, Benicàssim, Spain.
- 2016 **Geospatial data analysis using QGIS–Quantum GIS**, *REDES center*, Buenos Aires, Argentina.
- 2015 **Research connect: communication skills for researchers**, *British Council*, Montevideo, Uruguay.
- 2014 **High-performance computing school (ECAR–HPC School)**, *Universidad Técnica Federico Santa María*, Valparaíso, Chile.

Languages

Spanish	Native	
English	C2, Certificate of Proficiency in English, University of Cambridge	2009
Dutch	A1, TU Delft	2022

References

Prof. Oded Cats

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