Jorge Huertas

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Profile

Ph.D. student with research interests in combining data analysis, mathematical modelling, computational simulation, and artificial intelligence to tackle problems in manufacturing, transportation, logistics, and communications systems.

Education

Aug, 2020 – Present **Ph.D. student in Operations Research. Georgia Institute of Technology** – Atlanta, GA

Jun, 2024 M.Sc. in Operations Research. Georgia Institute of Technology – Atlanta, GA

Oct, 2016 M.Sc. in Industrial Engineering. Universidad de los Andes – Bogotá, Colombia

Jan, 2016 Six Sigma (6σ) Black Belt. Arizona State University (ASU) – Tempe, AZ, USA.

Mar, 2015 B.Sc. in Industrial Engineering. Universidad de los Andes – Bogotá, Colombia

Mar, 2015 B.Sc. in Systems and Computing Engineering. Universidad de los Andes – Bogotá, Colombia

Experience

Aug, 2020 – Present **Graduate Research Assistant.** – Georgia Institute of Technology (Atlanta, GA).

- Advisor: Pascal Van Hentenryck
- Research at AI4OPT to combine optimization and AI to improve semiconductor manufacturing supply chains.
- Work in the Socially-Aware Mobility (SAM) lab to develop and deploy MARTA Reach: Pilot of an on-demand multi-modal transit system in Atlanta, GA.
- Plan large-scale evacuations at a strategic level using **optimization** algorithms (Column Generation, Benders Decomposition) and validate them using traffic **simulation**.
- Teaching Assistant of the Seth Bonder Summer Camp on Computational and **Data Science**.

May,2022 – May, 2024 Operations Research Engineering Intern – **Intel Corporation**, CPLG - Supply Chain Management and Decisions Science (SMDS) Team.

- Developed a tuning tool that improved the performance of the production scheduler up to 50%.
- Developed and implemented tools that allow fast root-cause production issues.
- Devised decomposition strategies of mathematical models to improve solve time performance.
- Investigate new machine learning models to improve the cycle time prediction in wafer fabs.

Aug, 2016 – Dec, 2020 **Instructor**. Industrial Engineering Department, Universidad de los Andes – Bogotá, Colombia.

- Taught master lectures to approximately 200 students per semester:
  - Undergraduate courses focused on **problem-solving** processes:
    - **Decision Support Systems**: programming course using MS-Excel, VBA, and Access.
    - Optimization Principles: mathematical **formulation of optimization models** and implementation using specialized software and solvers (Xpress-MP, Python, Gurobi, Java).
    - **Discrete-Event Simulation**: formal conceptualization of simulation models and implementation using general-purpose programming languages and specialized software (Java, VBA, Python, SSJ, Simio).
  - Invited modules at graduate-level courses: **large-scale optimization** under uncertainty, networks flows, and simulation.
  - Link to Youtube channel: http://www.youtube.com/channel/UCLN18FiGw7dSfIVZXR9n-yA
- Advised and co-advised projects using *Analytics*, OR, and Six Sigma tools.

Aug, 2016 – Dec, 2020 **Researcher**. Center for Optimization and Applied Probability (COPA).

- Simulated the Gen-Core laboratory at Uniandes to optimize Covid-19 testing procedures.
- Developed and implemented a **data-informed framework** to calculate the *Level of Traffic Stress* (LTS) of cyclists in Bogotá's urban road network using a multidisciplinary approach.
- Supported Uniandes' Campus Management Department's infrastructure decisions with **analytics**.
  - Improved evacuation dynamics in the historic city center with key infrastructure adequacy interventions, obtained and evaluated combining **optimization and simulation** models.
  - Improved vertical flow of people in large buildings inside Uniandes' campus using **data analysis** and **simulation** models.

Mar, 2019 – Sep, 2019 **Contractor – Analytics consultant**. Bogotá's Planning Secretariat – Bogotá, Colombia
- Conceived, developed, and implemented a **data-driven methodology** to classify Bogotá's urban road network as a component to reformulate Bogotá's Territory Plan.

Feb, 2018 – Jul, 2018 **Technology and Analytics Short-Term Consultant**. **The World Bank Group** – Bogotá, Colombia
- Work with Bogotá's Mobility Secretariat and *Despacio* foundation on the *Data* component of a project to impulse non-motorized modes of transportation in the city.
  - Perform, summarize, and present key findings from bicycle traffic analyses in Bogotá, Colombia.

Publications

- Parallel Batch Scheduling With Incompatible Job Families Via Constraint Programming. **Jorge A. Huertas** and Pascal Van Hentenryck. Submitted to *IEEE Transactions on Semiconductor Manufacturing*. Oct, 2024. doi: 10.48550/arXiv.2410.11981
- MARTA Reach: Pilot of an On-Demand Multimodal Transit System in Atlanta. Pascal Van Hentenryck, Connor Riley, Anthony Trasatti, Hongzhao Guan, Tejas Santanam, **Jorge A. Huertas**, Kevin Dalmeijer, Kari Watkins, Juwon Drake, Samson Baskin. Oct, 2023. doi: 10.48550/arXiv.2308.02681
- Large-scale zone-based evacuation planning: Generating convergent and non-preemptive evacuation plans via column generation. **Jorge A. Huertas** and Pascal Van Hentenryck. *In the Proceedings of the 55th Hawaii International Conference on System Sciences*. Jan, 2022. doi: 10.24251/HICSS.2022.307
- Pedestrian evacuation planning: unveiling evacuation routes via column generation. Nicolás Cabrera, **Jorge A. Huertas,** and Andrés L. Medaglia. *EURO Journal on Transportation and Logistics*. Volume 11, 2022, 100089. doi: 10.1016/j.ejtl.2022.100089
- Time estimation and hotspot detection in the evacuation of a complex of buildings: a mesoscopic approach and case study. Jony A. Zambrano, **Jorge A. Huertas**, Ethel Segura-Durán, and Andrés L. Medaglia. *IEEE Transactions on Engineering Management*. Volume 67, Issue 3, 2020, p. 641 - 658. doi: 10.1109/TEM.2019.2960354
- Evacuation dynamics: a modeling and visualization framework. **Jorge A. Huertas**, Daniel Duque, Ethel Segura-Durán, Raha Akhavan-Tabatabaei, and Andrés L. Medaglia. *OR Spectrum*. Volume 42, 2020, p. 661691. doi: 10.1007/s00291-019-00548-x
- Level of traffic stress-based classification: a clustering approach for Bogotá, Colombia. **Jorge A. Huertas**, Alejandro Palacio, Marcelo Botero, Germán A. Carvajal, Thomas Van Laake, Diana Higuera-Mendieta, Sergio Cabrales, Luis A. Guzmán, Olga L. Sarmiento, and Andrés L. Medaglia. *Transportation Research Part D: Transport and Environment*. Volume 85, 2020, p. 102420. doi: 10.1016/j.trd.2020.102420
- The role of engineering in the COVID-19 pandemic (in Spanish). Paola Betancourt Ruiz, Marcela Guevara Suárez, Marylin Hidalgo, Silvia Restrepo, Erik Potdevin, **Jorge A. Huertas**, Andrés Medaglia, Juan Pedraza, Martha Cepeda, Pablo Arbeláez. *Revista de Ingeniería*. Volume 50, 2020, p. 8-13. doi: 10.16924/revinge.50.1
- Addressing cooperation between mobile operators in telecommunication networks via optimization: A lexicographic approach and case study in Colombia. Francisco J. MacAllister, Laura Maya, **Jorge A. Huertas**, Carlos Lozano-Garzón, and Yezid Donoso. *International Journal of Computers Communications & Control (IJCCC)*. Volume 15, Issue 6, 2020, p. 1-16. doi: 10.15837/ijccc.2020.6.3975
- Multi-objective tabu search to balance multihoming loads in heterogeneous wireless networks. **Jorge A. Huertas**, and Yezid Donoso. *International Journal of Computers Communications & Control (IJCCC)*. Volume 13, Issue 6, 2018, p. 956-971. doi: 10.15837/ijccc.2018.6.3360
- Two-stage analytics framework for warehouse location for Rappi: A case study in Ciudad de Mexico (Mexico). Ana María Quintero-Ossa, **Jorge A. Huertas**, Carlos Lozano-Garzón, Alejandro Correa-Bahnsen, Yezid Donoso, and Andrés L. Medaglia. *Technical report, COPA-2021-02*. Universidad de los Andes, 2021. url: `http://hdl.handle.net/1992/50594`
- Solving the time-ahead pricing of energy supply problem with nonlinear utility function for consumers via a bilevel optimization approach. **Jorge A. Huertas**, Daniel M. Eslava, Andrés F. Pardo, and Jaime E. González. *Technical report, COPA-2014-12*. Universidad de los Andes, 2015. url: `http://hdl.handle.net/1992/31241`

Awards

Advisor of the **best** Latin American undergraduate thesis

XV IISE Latin American Congress (Mar, 2018) – **San José, Costa Rica**.
- Thesis: A Column Generation Approach for Evacuation Planning.
- Authors: Nicolás Cabrera and **Jorge A. huertas**

Winner
COPPTA TEAM
(Uniandes)

2014 AIMMS–MOPTA Optimization Modeling Competition. – **Lehigh University, PA, USA.**
- Proposed a cut-based heuristic to solve the *time-ahead pricing of energy supply* bilevel optimization problem for the Borough of Madison, NJ, USA.
- Competed against graduate teams from 22 international top universities.

Conference talks

Oct, 2023 A column-generation approach for wafer fab scheduling. **Jorge A. Huertas**, Ashish Nemani, Zhenying Zhao, and Pascal Van Hentenryck. INFORMS Annual Meeting – **Phoenix**, AZ, USA.

Oct, 2021 Large-scale zone-based evacuation planning: Generating convergent and non-preemptive evacuation plans via column generation. **Jorge A. Huertas** and Pascal Van Hentenryck. INFORMS Annual Meeting – **Anaheim**, CA, USA.

Oct, 2019 Data-driven origin-destination matrix estimation in large-scale integrated public transport systems. Alejandro Palacio, Marcelo Botero, **Jorge A. Huertas**, Carolina Osorio, Andrés L. Medaglia, and Sergio Cabrales. INFORMS Annual Meeting – **Seattle**, WA, USA.

Oct, 2019 Analytics Framework To Improve Building Flow Dynamics. **Jorge A. Huertas**, Valeria Puyo, Liseth Daniela Grosso, Daniel Cifuentes, Diego Monroy, Maurix Suárez, Andres L. Medaglia. INFORMS Annual Meeting – **Seattle**, WA, USA.

Jul, 2019 Multi-objective tabu search to balance multihoming loads in heterogeneous wireless networks. **Jorge A. Huertas** and Yezid Donoso. Metaheuristics International Conference (MIC) – **Cartagena**, Colombia.

Jul, 2018 Modeling evacuation dynamics. **Jorge A. Huertas**, Jony A. Zambrano, Nicolás Cabrera, Daniel Duque, Ethel Segura-Durán, Raha Akhavan-Tabatabaei,and Andrés L. Medaglia. EURO Annual Meeting – **Valencia**, España.

Oct, 2017 A mesoscopic model to evaluate the evacuation dynamics in a university campus. **Jorge A. Huertas**, Jony A. Zambrano, and Andrés L. Medaglia. INFORMS Annual Meeting – **Houston**, TX, USA.

Nov, 2016 Supporting evacuation decisions via network optimization. **Jorge A. Huertas**, Daniel Duque, Ethel Segura-Durán, Raha Akhavan-Tabatabaei, and Andrés L. Medaglia. INFORMS Annual Meeting – **Nashville**, TN, USA.

Software and Programming skills

Advanced Java, Visual Basic, Xpress-IVE, Simio, Gurobi, Meteor, HTML.
Intermediate Python, LaTeX, R, ArcGIS, AIMMS, Ruby on Rails, SQL.
Basic CSS, JavaScript

Languages and affiliations

Languages
- **Native:** Spanish
- **Fluent:** English

Affiliations INFORMS, IISE, ASOCIO.

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