Ignacio Erazo, Ph.D.

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Research Gate

Education

- **Georgia Institute of Technology** — Atlanta, USA
  Ph.D. in Operations Research, minor in Machine Learning; GPA: 4.0/4 — *August 2019 - Jan 2024*
  Courses: *Optimization (Linear, Discrete, Nonlinear, Stochastic, Advanced Combinatorial), Stochastic Processes (I, II, Simulation and its Theory), Computational Methods, Constraint Programming, Theoretical Statistics, Machine Learning, Reinforcement Learning Theory.*
- **Georgia Institute of Technology** — Atlanta, USA
  M.Sc. in Operations Research; GPA: 4.0/4 — *August 2019-December 2021*
- **University of Concepcion** — Concepcion, Chile
  B.Sc. in Industrial and Civil Engineering; GPA: 6.7/7; rank 1/120 — *March 2014-July 2019*
  Courses: *Traditional Engineering Classes + Optimization and Stats classes + Innovation, Entrepreneurship and Soft Skills classes.*

Experience

- **Amazon Science - Amazon Fulfillment Technologies** — Bellevue, WA
  Applied Scientist II — *April 2025 - Now*
  - **Optimization Algorithms Deployment**: Led the largest internal project towards pick productivity for Amazon Robotics Fulfillment Centers. Collaborated with SDEs to code new algorithms in production, deployed the code, monitored in real-time the progress and communicated with stakeholders. Deployed in all fulfillment centers (NA and EU), with savings upwards of 70 Million USD per year.
  - **Machine Learning for Optimization Speed Ups**: Innovative usage of ML to reduce optimization feasible region and improve algorithm convergence speed. Solver runtime reduced by 45% with no objective degradation.
  - **Learning to Configure Optimization Models**: Main Scientist leading a ML-driven project that seeks to inference optimal optimization model parameters/configuration for online problems to be solved in real-time. Results suggest improvements in resiliency and main KPIs.
- **Amazon Science - Amazon Fulfillment Technologies** — Bellevue, WA
  Research Scientist II — *Jan 2024 - March 2025*
  - **Large-scale online optimization**: Modeling, invention and implementation of the new generation of large-scale online optimization models for tri-partite assignment problems of work to machines and human associates. Created from scratch the new algorithm that is redefining Amazon's roadmap for the next 5 years in Amazon Robotics fulfillment centers.
- **Amazon Science - Amazon Fulfillment Technologies** — Seattle, WA
  Research Scientist Intern — *May 2023 - Aug 2023*
  - **Optimization Algorithms for Robotic picking at Amazon**: Inter project related to creating and discovering better ways to solve extremely large-scale problems seen in the largest robotic fulfillment centers in the world.
- **Amazon** — Edinburgh, Scotland
  Applied Scientist Intern — *Sep 2022 - Dec 2022*
  - **Natural Language Processing — Machine Learning**: Developed topic models to support classification tasks for private data and internal applications.
- **Apple** — Sunnyvale, CA
  Applied Scientist Intern in BPR's Advanced Analytics Team — *May 2022 - Sep 2022*
  - **Inventory Optimization**: Developed an stochastic-optimization tool to improve inventory levels average cost by using historical high dimension data for SKUs.
  - **Software Development**: Developed a tool that allows different optimization tools to work simultaneously to reduce transportation costs within Apple's supply chain.
- **BHP Billiton** — Santiago, Chile
  Junior Scientist at the Inventory Optimization Team — *Jan 2019 - Apr 2019*
  - **Process automation**: Developed a new automatized dashboard in Power BI to show results for stakeholders of the supply chain team (saved 2 days of work a month).
  - **Holding Inventory Improvement**: Proposed and implemented a new inventory classification system leading to inventory savings of +5 Million USD.

Current Research Projects

- **Batching and In-Building Delivery Routing with Capacitated Residential Parcel Lockers**: Joint Work with Prof. Dipayan Banerjee.
- **Routing in Rectangular Warehouses: Linear Programming Relaxation and Algorithms**: Joint Work with Prof. Alejandro Toriello.
- **Subadditive Dispatching Under Capacity Constraints: Theoretical and Computational Analysis of FIFO Policies**: Joint Work with Prof. Alejandro Toriello.
- **FIFO Optimality and OXS Valuations: Theoretical Analysis of The Relationship Between Economies of Scale and Substitability**: Joint Work with Prof. Alejandro Toriello.
- **Learning to Parametrize and Configure Optimization Models in Real-Time for Production**: Amazon Research

Published/Accepted Journal Papers

[J4] Submodular Dispatching with Multiple Vehicles: *INFORMS Journal of Computing*, joint work with Prof. Alejandro Toriello (2025).

[J3] Optimizing the Trade-Off Between Batching and Waiting: Subadditive Dispatching: *Operations Research*, joint work with Prof. Alejandro Toriello (2025).

– **Award:** Top 3 Research Video at the YinzOR 2021 Conference (Carnegie Mellon University).

[J2] Cost-Efficient Confidence Intervals for the Difference of Two Bernoulli Distributions' Success Parameters: *Journal of Simulation*, joint work with Prof. David Goldsman and Prof. Yajun Mei (2023).

[J1] Efficient Confidence Intervals for the Difference of Two Bernoulli Distributions' Success Parameters: *Journal of Simulation*, joint work with Prof. David Goldsman (2021).

Published/Accepted Peer-reviewed Conference Papers

[C6] Amazon-Confidential Project: *Amazon Consumer Science Summit*, joint work with Amazon Developer (2025).

[C5] Amazon-Confidential Project: *Amazon Robotics Conference*, joint work with Amazon Developer (2025).

[C4] Smart Sports Predictions Via Hybrid Simulation: NBA Case Study: *Winter Simulation Conference 2023*, only author (2023).

[C3] A Simulation-Optimization Framework to Improve the Organ Transplantation Offering System: *Winter Simulation Conference 2022*, joint work with Prof. David Goldsman and Prof. Pinar Keskinocak (2022).

– **Award:** Best Applied Student Paper, Winter Simulation Conference 2022.

[C2] A Simulation-Based Approach to Compare Policies and Stakeholders' Behaviors for the Ride-Hailing Assignment Problem: *Winter Simulation Conference 2021*, joint work with Prof. Rodrigo de la Fuente (2021).

[C1] Enabling Intelligent Processes in Simulation Utilizing the Tensor Flow Deep Learning Resources: *Winter Simulation Conference 2018*, joint work with Prof. Rodrigo de la Fuente and Raymond Smith III (2018).

Honors and Awards

- Amazon Fulfillment Technologies Innovation Maven Award (one awardee per year). 2024
- Amazon AWS AI & ML Scholarship Recipient. 2023
- NSF travel award for the Triennial INFORMS TSL Conference. 2023
- Best Applied Student Paper, Winter Simulation Conference. 2022
- Diversity award for a Ph.D. student, Winter Simulation Conference. 2022
- Top 3 Research Video at the YinzOR 2021 Conference (Carnegie Mellon University), Submodular Dispatching. 2021
- Stewart Fellowship in Georgia Tech.
- First place in "University of Concepcion" programming Competition, category "Non Computer Science Major". 2019
- University of Concepcion Prize (Class 2014 Industrial Civil Engineering). This award is given by the university to the most deserving student (if any) of the respective class. 2019
- Best GPA class 2014 of Industrial Civil Engineering. 2014–2019
- Leader of World Finalist Teams for Simio Simulation Competition. 2016–2017
- Highest Recognition "Très Bien" in French Baccalauréat, maximum scores in Mathematics, Physics and Chemistry.

Selected Presentations

* Denotes presented by a co-author.

- **Batching and In-Building Delivery Routing with Capacitated Residential Parcel Lockers**
  - INFORMS Optimization Society Conference 2026. Atlanta, Georgia. 03/2026
  - INFORMS Annual Meeting 2025. Atlanta, Georgia.* 10/2025
  - TRISTAN – Triennial Symposium on Transportation Analysis. Nago, Japan.* 06/2025
  - TALENT – Transportation and Logistics Early-Career North American Workshop. Atlanta, Georgia.* 05/2025
- **Reinventing Order Picking at Amazon Robotics Fulfillment Centers - Algorithms and Intelligence**
  - Amazon's Modeling and Optimization Seminar. Bellevue, Washington. 11/2025
  - INFORMS Annual Meeting 2025. Atlanta, Georgia. 10/2025
  - INFORMS Annual Meeting 2024. Seattle, Washington. 10/2024
- **Submodular Dispatching / Optimizing the Trade-Off Between Batching and Waiting: Subadditive Dispatching.**
  - Pontificia Universidad Catolica. Santiago, Chile.* 08/2025
  - Department of Industrial and Systems Engineering, University of Southern California. Los Angeles, California.* 02/2023
  - Amazon Modeling and Optimization. Bellevue, Washington.* 11/2022
  - International Workshop on Freight Transportation and Logistics (Odysseus). Tangier, Morocco.* 05/2022

– Rotterdam School of Management, Erasmus University. Rotterdam, the Netherlands.* 01/2022
– School of Computing and Augmented Intelligence, Arizona State University. Tempe, Arizona.* 11/2022
– INFORMS Annual Meeting 2021. Anaheim, California. 10/2021
– YinzOR Conference (virtual pre-submitted video), Carnegie Mellon University 08/2021

- **Submodular Dispatching with Multiple Vehicles**
  – International Workshop on Freight Transportation and Logistics (Odysseus). Carmona, Spain.* 05/2024
  – INFORMS Annual Meeting 2023. Phoenix, Arizona. 10/2023
  – INFORMS Transportation and Logistics Society Triennial Conference. Chicago, Illinois. 07/2023
- **Smart Sports Predictions Via Hybrid Simulation: NBA Case Study**
  – Winter Simulation Conference 2023. San Antonio, Texas. 12/2023
- **A Simulation-Optimization Framework to Improve the Organ Transplantation Offering System**
  – Keynote Talk at CICOS 2024 Conference (spanish, virtual and broadcasted). Morelos, Mexico. 10/2024
  – Winter Simulation Conference 2023. Singapore, Singapore. 12/2023
  – Winter Simulation Conference 2022. San Antonio, Texas. 12/2022

Skills Summary

- **Languages**: Spanish(+++), French(+++), English(+++) // Python(+++), R(++), Java(++), C++(+).
- **Software**: Gurobi(+++), Xpress(+++), Claude (+++), PyTorch(++), AutoGluon (++), Antigravity (++), Amazon-Q (++).
- **Soft Skills**: Leadership, Time Management, Eager to Learn, Hard-worker, Responsibility, Ownership.

Service and Outreach

- **Transportation Science Reviewer**: Reviewer for the Transportation Science Journal. 2026–Present
- **AAAI Reviewer and Program Committee Member**: Reviewer for AAAI on workshops such as Next-Gen Code Development with Collaborative AI Agents. 2025–Present
- **WSC Reviewer**: Reviewer for the Winter Simulation Conference Proceedings. 2023–Present
- **EJOR Reviewer**: Reviewer for the European Journal of Operational Research. 2022–Present
- **Amazon Conference Reviewer**: Reviewer for the Consumer Science Summit Conference, Amazon Machine Learning Conference and Amazon Fulfillment Simulation Symposium. 2024–Present
- **ISyE's GSAC**: Part of ISyE's Graduate Student Advisory Council (GSAC). 2021–2023
- **CoE GSAC**: Only ISyE representative in the College of Engineering GSAC. 2021–2023