Romario Gualdrón-Hurtado

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M.Sc. and BSc. in Computer Science, and Junior Researcher with expertise in computational imaging, computer vision, signal processing, inverse problems, algorithms, and deep learning. Nominated for the *Outstanding Master's Thesis Award* in 2025. Earned the *Cum Laude Award* and *Outstanding Undergraduate Thesis Award* in 2023 from Universidad Industrial de Santander, Colombia. Recipient of the **IEEE Signal Processing Society Scholarship** in 2023 and 2024. Co-first author in a **NeurIPS 2025** accepted paper. Research Intern at the **University of Delaware, USA**, from Jan. to Jul. 2026.

Education

Universidad Industrial de Santander (UIS)

*Master of Science in Computer Science. (GPA: **4.92/5.0**)* — *Aug. 2023 – Jun. 2025*

*Bachelor of Science in Computer Science. (GPA: **4.72/5.0**)* — *Jan. 2019 – Apr. 2023*

Prizes and Awards

1. **Outstanding Master's Thesis Award (UIS, 2025)**
   Author of: "A Deep Distillation Algorithm for Non-linear Gradient Preconditioning in Inverse Problems".
2. **Signal Processing Society (SPS) Scholarship Program (IEEE SPS, 2023-2024)**
   Selected as one of only 45 recipients worldwide of the prestigious SPS Scholarship Program.
3. **Cum Laude Systems Engineer (UIS, 2023)**
   Graduated Cum Laude with a GPA of 4.72/5.0, which secured full funding for my Master's studies.
4. **Outstanding Undergraduate Thesis Award (UIS, 2023)**
   Author of: "Iterative Algorithm for Spectral Image Reconstruction Considering Optical System Mismatch Using a Reinforcement Regularizer", with hands-on experience.
5. **National Distinction for Excellence (Ministry of Education of Colombia, 2019-2023)**
   Grant winner to fund its undergrads' studies for being a top student.
6. **Recognition for Academic Excellence (HDSP Research Group, 2022)**
   Acknowledged for outstanding academic performance as a research student in the HDSP group.
7. **Distinguished Student (UIS, 2019-2022)**
   Recognized for consistent academic excellence throughout my undergraduate studies.
8. **National PISA Test Competition (Programme for International Student Assessment, 2017)**
   Awarded first place among 31 top students during the launch of the PISA test presentation platform.

Publications

Top-Tier Conference Proceedings

1. Jacome*, **Gualdrón***, Suárez, Arguello. "NPN: Non-Linear Projections of the Null-Space for Imaging Inverse Problems." *Co-first authorship. — NeurIPS, 2025

Journal Articles

1. **Gualdrón**, Arguello, Bacca. "Deep Learned Non-Linear Propagation Model Regularizer for Compressive Spectral Imaging." — IEEE Trans. Comp. Imag. (TCI), 2024

Conference Proceedings

1. **Gualdrón**, Jacome, Suárez, Martínez, Arguello. "Improving Compressive Imaging Recovery via Measurement Augmentation." — IEEE ICASSP, 2025
2. Jacome, Suárez, **Gualdrón**, González, Arguello. "Learning to Reconstruct Signals With Inexact Sensing Operator via Knowledge Distillation." — IEEE ICASSP, 2025
3. Martínez, Suárez, **Gualdrón**, Jacome, Arguello. "Compressive Imaging Reconstruction via Conditional Diffusion Model With Augmented Measurements." — IEEE ICASSP, 2025
4. Martínez, Jacome, **Gualdrón**, Esnaola, Arguello. "Compressive Sensing with Augmented Measurements via Generative Self-Distillation." — IEEE SSP, 2025

5. **Gualdrón**, Jacome, Urrea, Arguello, González. "Learning Point Spread Function Invertibility Assessment for Image Deconvolution." — EUSIPCO, 2024
6. **Gualdrón**, García, Arguello, Bacca. "Learning a Spatially-Variant Propagation Model for Compressive Spectral Imaging." — Optica Imaging Congress (COSI), 2023
7. **Gualdrón**, Bacca, Arguello. "Compressive Spectral Image Reconstruction by using a Deep Image Prior with a Mismatch Regularizer." — Imaging and Applied Optics Congress (COSI), 2022

Conference Papers (Accepted)

1. **Gualdrón**, Torres, Galvis, Arguello. "Semantic Index Encoder of Remote Sensing Indices for Transformer-Based Hyperspectral Image Classification." — IEEE WHISPERS, 2025
2. **Gualdrón**, Jacome, Suárez, Galvis, Arguello. "Deep Distillation Gradient Preconditioning for Inverse Problems." — IEEE CAMSAP, 2025
3. Suárez, Jacome, **Gualdrón**, Mantilla, Arguello. "DICE: Diffusion Consensus Equilibrium for Sparse-view CT Reconstruction." — IEEE CAMSAP, 2025
4. Jacome, **Gualdrón**, Suárez, Arguello. "UTOPY: Unrolling Algorithm Learning via Fidelity Homotopy for Inverse Problems." — IEEE CAMSAP, 2025

Top Tier Conference Papers (Under Review)

1. **Gualdrón**, Jacome, Suárez, Arguello. "GSNR: Graph Smooth Null-Space Representation for Inverse Problems." — CVPR, 2026

Journal Articles (In Preparation)

1. **Gualdrón**, da Silva, Bacca, Arguello. "Patch-based Deep Coded Aperture Design for the Near-Infrared Spectral Range." — Applied Optics
2. **Gualdrón**, Jacome, Suárez, Arguello. "DIPA: Distilled Preconditioned Algorithms for Solving Imaging Inverse Problems." — Journal of Machine Learning Research
3. **Gualdrón**, Diaz, Gomez, Vera, Gotchev, Menon, Arguello "Uniform Sampling Diffractive Optical Element." — Optica, Optica Publishing Group

Research Projects

Research Intern in Computational Lithography & LLMs — *Delaware, USA*
Supervisor: Prof. Gonzalo Arce, University of Delaware — *Jan. 2026 – Jul. 2026*

AI Engineer with Expertise on Inverse Problems — *Bucaramanga, Colombia*
Universidad Industrial de Santander — *Nov. 2025 - Dec. 2025*
"Reconciling land use practices and ecosystem sustainability through the integration of agro-geophysics, artificial intelligence, and citizen science."

Computational Imaging Expert — *Bucaramanga, Colombia*
Universidad Industrial de Santander — *Aug. 2025*
"Optoelectronic system optimized with artificial intelligence for classification tasks using a rolling shutter sensor."

Master Thesis — *Bucaramanga, Colombia*
Universidad Industrial de Santander — *Aug. 2023 - Jun. 2025*
"Deep Distillation Algorithm for Non-linear Gradient Preconditioning in Inverse Problems."

Engineer with Expertise in Computational Optics — *Bucaramanga, Colombia*
Universidad Industrial de Santander — *May. 2023 - Jul. 2023*
"Optical-computational coded image acquisition system for privacy preservation and action recognition in clinical environments."

Undergraduate Thesis — *Bucaramanga, Colombia*
Universidad Industrial de Santander — *Feb. 2022 - Apr. 2023*
"Iterative Algorithm for Spectral Image Reconstruction Considering Optical System Mismatch Using a Reinforcement Regularizer."

Machine Learning Engineer — *Bucaramanga, Colombia*
Collaboration between Air Force Office of Scientific Research (AFOSR) and UIS — *Aug. 2022 - Feb. 2023*
"Infrared Color-Coded Aperture Optimization for Object Tracking and Spectral Classification."

Professional and Leadership Experience

Quantitative Research Engineer *Remote*
Helios & Partners *Aug. 2025 - Nov. 2025*
Technical lead for research-to-production Machine Learning systems supporting trading decision-making.

Contributor of Computational Optics Learning Library (PyColibri) *2023 - Present*

- Active contributor of PyColibri, an open-source **PyTorch** library for computational imaging (CI) tasks, to build and maintain the optics and mathematical models behind PyColibri.

Scientific Committee Member (STSIVA 2024 and STSIVA 2025) *2024 - 2025*

International Symposium on Image, Signal Processing and Artificial Vision (STSIVA)

- Conducted thorough peer reviews of submitted papers, upholding high standards of quality and relevance in signal processing, spanning theoretical foundations to practical applications in data science.

Teaching Experience

Teaching Assistant *Bucaramanga, Colombia*
Universidad Industrial de Santander *Jan. 2024 - Jun. 2025*
Supported undergraduate Numerical Methods by leading the practical component, designing exams and labs, grading assessments, leading student research projects, and preparing slide decks.

Skills

Languages: English C1 (TOEFL 103), Spanish (Native speaker).

Software: Python, Bash, SSH, Matlab, Git, PyTorch, TensorFlow, Hydra, Scikit-Learn, Docker, Google Cloud, AWS, n8n, PostgreSQL, Apache Kafka, Kubernetes, LangChain, OpenAI API, Claude API, Gemini API, AWS EKS, AWS GKE, LlamaIndex, Haystack, FlowWise, TypeScript/Node.js, FastAPI, RESTful APIs, SQL, PyTest, Pandas, Weights & Biases, Google Earth Engine, GitHub Actions, Sphinx, R, OpenMP, CUDA, C, C++.

Referees

1. **PhD. Henry Arguello (2021-Present):** Professor, Master advisor, and Undergrad coadvisor.
   Full-time professor at Universidad Industrial de Santander, Colombia. henarfu@uis.edu.co

2. **PhD. Gonzalo Arce (2025-Present)** Collaborator and future supervisor during the Research Internship.
   Charles Black Evans Professor, JPMorgan-Chase Senior Faculty Fellow at University of Delaware, USA. arce@udel.edu

3. **PhD. Iñaki Esnaola (2025-Present)** Collaborator.
   Associate Professor at the University of Sheffield, UK. esnaola@sheffield.ac.uk
   Visiting Research Collaborator at Princeton University, USA.

4. **PhD. Carlos Fajardo (2024-Present)** Master thesis evaluator.
   Full-time professor at Universidad Industrial de Santander, Colombia. cafajar@uis.edu.co

5. **PhD. Ana Ramirez (2024-Present)** Professor.
   Full-time professor at Universidad Industrial de Santander, Colombia.
   Director of Research and Outreach - Faculty of Physical and Mechanical Engineering. anaberam@uis.edu.co

6. **PhD. Hans Garcia (2022-Present):** Professor, IEEE Chair, and research project supervisor.
   Full-time professor at Universidad Industrial de Santander, Colombia. hayegaar@uis.edu.co

7. **PhD. Edwin Vargas (2022-Present):** Research project supervisor.
   Rice Academy Fellow at Rice University, USA. edwin.vargas@rice.edu

8. **PhD. Laura Galvis-Carreño (2022-Present):** Professor and collaborator.
   Full-time professor at Universidad Industrial de Santander, Colombia. lavigal@uis.edu.co

9. **PhD. (s) Paula Arguello (2021-Present):** Former lab partner, former classmate, and colleague.
   Ph.D. student at the University of Southern California, USA. parguell@usc.edu