

Andres Ramirez-Jaime

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Summary

Ph.D. Candidate, Electrical and Computer Engineering (University of Delaware; expected Jul 2026) focused on generative/reconstructive ML for computational imaging and perception (diffusion models, transformers, GANs) across 3D LiDAR, hyperspectral remote sensing, and gigapixel pathology. Co-authored 20+ peer-reviewed publications. Industry research engineering experience at Apple (LLM tool-use/agentic workflows: RAG, LoRA fine-tuning, evaluation pipelines) and Vertex Pharmaceuticals (semantic segmentation for whole-slide imaging). Seeking Research Scientist / AI Researcher / ML Scientist roles in generative modeling, multimodal learning, and perception.

Technical Skills

- **Programming:** Python, C, MATLAB, LabVIEW.
- **ML / Deep Learning:** PyTorch, TensorFlow, Keras; diffusion models, transformers, GANs; LLM fine-tuning (LoRA); retrieval-augmented generation (RAG); multimodal neural networks.
- **Computer Vision / Imaging:** semantic segmentation, super-resolution, denoising, reconstruction; computational imaging; medical and remote-sensing imagery.
- **Data / Systems:** large-scale training and evaluation (gigapixel images; 3D tensors; GPU training); dataset curation; experiment evaluation and test-suite design.
- **Tools:** Linux, Git, GIS, Latex.

Research Experience

University of Delaware

Research and Teaching Assistant

Newark, DE, USA

Feb 2022 – Present

- Lead research on generative and multimodal ML for LiDAR and hyperspectral remote sensing (diffusion models, transformers, GANs) within the **NASA CASALS** project.
- Developed reconstruction and super-resolution methods for the **HyperHeight Data Cube (HHDC) 2 m NEON dataset** (~100k 3D tensors); achieved <1 m MAE on CHM/DTM and multiple height percentiles under compressive sampling (~25% sampling).
- Built scalable end-to-end pipelines (data processing → training → evaluation) on ~60 GB datasets; ran ~5-day training cycles on a single **A100** and produced inference over ~600 m² areas in ~12 min.
- Published and presented research: 17 peer-reviewed papers (**7 first-author**); presented at international venues in remote sensing and computational imaging.
- Mentored 2 Ph.D. students, 1 master's student, and visiting researchers; TA for Statistical Learning, Imaging and Deep Learning, and Probability/Statistics.

University of Delaware

Visiting Scholar

Newark, DE, USA

Jul 2021 – Dec 2021

- Designed the HyperHeight Data Cube (HHDC) representation for efficient storage and processing of compressed 3D satellite LiDAR data, enabling downstream learning and reconstruction workflows.
- Implemented a 3D convolutional autoencoder for HHDC reconstruction, improving reconstruction quality vs. classical image-processing baselines by +6 dB on CHM and +18 dB on DTM.

Professional Experience

Apple Inc.

Large Language Models and Generative AI Engineering Intern

Cupertino, CA, USA

Jun 2024 – Aug 2024

- Built a retrieval-augmented generation (RAG) system grounded in the iPhone user manual to generate higher-quality internal tool descriptions; improved descriptions for ~85% of tools by strengthening retrieval and grounding.
- Fine-tuned Apple Intelligence LLMs for iPhone-focused tool usage via dataset curation and LoRA adapters; improved single-turn tool-selection accuracy from **61%** to **90.2%**.

- Created evaluation datasets and hand-crafted test suites (~**2,500** human-created conversations spanning ~**80** tools) to stress-test edge cases; used results to diagnose failure modes and prioritize fixes.
- Optimized the training/evaluation pipeline to increase iteration rate from **1** to >**4** cycles/day, accelerating experimentation and readiness for deployment.
- Reduced tool hallucinations (nonexistent tools) from ~**3%** to **0%** on internal testing by analyzing error patterns and recommending mitigation changes.

Vertex Pharmaceuticals

Computer Vision and Machine Learning Engineer

San Diego, CA, USA

Jun 2023 – Aug 2023

- Partnered with biologists, physicians, and chemists on early drug discovery (IPF, ADPKD), translating scientific goals into ML deliverables and evaluation criteria.
- Built a U-Net semantic segmentation model for gigapixel pathology images achieving >90% accuracy; replaced outsourced processing (100 slides; up to 3-month turnaround) with in-house inference (~**15 min** per processed slice/region), reducing vendor dependence and avoiding up to **\$600k/year** external spend.
- Developed an automated pipeline to segment kidney organoids in whole-slide images and estimate morphology (size, wall thickness) with <3% error, improving measurement consistency for downstream analysis.

Teaching & Leadership

University of La Sabana

Mechanical Engineering Professor

Chia, Colombia

Jan 2018 – Dec 2021

- Supervised 12 undergraduate thesis projects; taught courses in prototypes and manufacturing.
- Designed and programmed embedded control for the UNISABANA HERONS mechanical ventilator deployed in **400+** units during COVID-19; implemented respiratory control and data collection in C and LabVIEW, supporting regulatory approval by the Colombian FDA.
- Led a robotics team for RoboCup 2019 (Sydney); reached the **Community Shield final** as runner-up, owning end-to-end technical execution (perception, control, systems integration) as team leader.

Education

University of Delaware

Ph.D. in Electrical and Computer Engineering

Newark, DE, USA

Jul 2026 (Expected)

- GPA: 3.92; 2022 George W. Laird Fellow; 2024 ECE Signal Processing Award; 2024 Doctoral Fellowship for Excellence.

University of Los Andes

M.S. in Computer and Electronic Engineering

Bogota, Colombia

Mar 2016

- Graduated *Cum Laude*.

University of Los Andes

B.S. in Electronic Engineering

Bogota, Colombia

Oct 2013

Selected Publications

- Full publication list: Google Scholar (link in header).
- **Super-Resolved 3D Satellite LiDAR Imaging of Earth Via Generative Diffusion Models.** Ramirez-Jaime, A., Porras-Diaz, N., Arce, G. R., Stephen, M., *IEEE Transactions on Geoscience and Remote Sensing*, 2025.
- **SpectralCam: High-Resolution Low-Cost Spectral Imaging Using DSLR Cameras.** Paruchuri, A., Ramirez-Jaime, A. et al., in *Proc. IEEE ICASSP*, 2025.
- **Super-Resolution of Satellite Lidars for Forest Studies Via Generative Adversarial Networks.** Ramirez-Jaime, A., Porras-Diaz, N., Arce, G. R. et al., in *Proc. IGARSS 2024 – IEEE International Geoscience and Remote Sensing Symposium*, 2024.
- **Transformer End-to-End Optimization of Compressive LiDARs Using Imaging Spectroscopy Side Information.** Porras-Diaz, N., Ramirez-Jaime, A., Arce, G. R. et al., *IEEE Transactions on Geoscience and Remote Sensing*, 2024.
- **HyperHeight LiDAR Compressive Sampling and Machine Learning Reconstruction of Forested Landscapes.** Ramirez-Jaime, A., Peña-Peña, K., Arce, G. R. et al., *IEEE Transactions on Geoscience and Remote Sensing*, 2024.
- **The Development and Implementation of a Low-Cost Mechanical Ventilator in a Low-Middle-Income Country During the COVID-19 Pandemic: The Unisabana-HERONS.** Giraldo-Cadavid, L. F., Echeverry, J., Varón, F., Ramirez-Jaime, A. et al., *Heliyon*, 2024.