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 **17 peer-reviewed publications** (**7 first-author**). 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 — Newark, DE, USA
Research and Teaching Assistant — *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** ($\sim$**100k** 3D tensors); achieved $<$**1 m MAE** on CHM/DTM and multiple height percentiles under compressive sampling ($\sim$**25%** sampling).

- Built scalable end-to-end pipelines (data processing $\rightarrow$ training $\rightarrow$ evaluation) on $\sim$**60 GB** datasets; ran $\sim$**5-day** training cycles on a single **A100** and produced inference over $\sim$**600 m^2** areas in $\sim$**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 — Newark, DE, USA
Visiting Scholar — *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.

Industry Experience

Apple Inc. — Cupertino, CA, USA
Large Language Models and Generative AI Engineering Intern — *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 $\sim$**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 ($\sim$**2,500** human-created conversations spanning $\sim$**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 $\sim$**3%** to **0%** on internal testing by analyzing error patterns and recommending mitigation changes.

Vertex Pharmaceuticals   San Diego, CA, USA
Computer Vision and Machine Learning Engineer   *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 ($\sim$**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   Chia, Colombia
Mechanical Engineering Professor   *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   Newark, DE, USA
Ph.D. in Electrical and Computer Engineering   *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   Bogota, Colombia
M.S. in Computer and Electronic Engineering   *Mar 2016*
- Graduated *Cum Laude*.

University of Los Andes   Bogota, Colombia
B.S. in Electronic Engineering   *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.