Alexander Gabriel Valverde Guillén

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Research Interests

3D Reconstruction ∘ Geometry Processing ∘ Neural Rendering ∘ Optimization Methods for Vision ∘ Gaussian Splatting ∘ Sequential Learning

Publications

Back Home: A Computer Vision Solution to Seashell Identification for Ecological Restoration.
International Conference on Computer Vision, 2025

GauSSmart: Enhanced 3D Reconstruction through 2D Foundation Models and Geometric Filtering
Under conference review, 2025.

M.Sc. Thesis: *Convex-Guided Outlier Removal for 3D Point Clouds.*
University of California, Santa Cruz, 2025.

Research Experience

Graduate Researcher (3D Vision) *Santa Cruz, CA*
VLAA Lab, UCSC *Sept. 2024 – July. 2025*

- Developed convex optimization methods for outlier removal and denoising in SfM point clouds.
- Explored single-image 3D mesh generation via diffusion and autoregressive transformer backbones.
- Proposed convex-smoothness regularization to preserve high-frequency detail in surface reconstruction.
- Collaborated with other lab and external researchers on interdisciplinary projects related to 2D foundation models in 3D reconstruction tasks.
- Conducted interviews and recruited undergraduate students for research positions within the lab.
- Mentored undergraduate researchers by providing project guidance, technical direction, and research methodology training.

Education

University of California, Santa Cruz *Santa Cruz, CA*
M.Sc. Scientific Computing and Applied Mathematics *June. 2025*
Completed 2-year program in 1 year with thesis

Universidad Latinoamericana de Ciencia y Tecnología *San José, Costa Rica*
B.Sc. Economics, GPA: 3.85/4.0 *May. 2022*

Work Experience

Research Engineer *San José, CR*
Plannatech *July. 2025 - Actual*

- Created architectures that employ sequential learning via attention mechanisms to capture in-game plays based on local information from the same game among the different plays.
- Developed and deployed end-to-end deep learning pipelines for sports analytics, including model training in PyTorch and deployment on betting platforms.
- Led synthetic data generation using diffusion-based approaches (TabDDPM) to improve model robustness and generalization.

Machine Learning Engineer *San José, CR*
FIFCO *Sept. 2022 – Sept. 2024*

- Built a large-scale classification pipeline for ecological restoration ("Back Home"): 36,000 seashell images, 87% accuracy.
- Designed a vision feature-extraction module integrated with language models for model interpretability.

- Trained object detectors (YOLO) for beer recognition.
- Co-developed an AI-driven CDP integrating Salesforce Einstein for personalization and targeting.

Relevant Coursework

Convex Optimization, PDEs, Scientific Machine Learning, Numerical Methods, Numerical Linear Algebra, High Performance Computing

Awards

- **Funded Scholar Researcher** *2024–2025*
  CAHSI–Google Institutional Research Program University of California, Santa Cruz
  Supervised by Dr. Yuyin Zhou
- **Presidential Scholarship** *2021–2022*
  Universidad Latinoamericana de Ciencia y Tecnología
  Awarded for leadership and service as President of the School.

Selected Projects

ConvMesh
Implementation of convex optimization techniques for mesh reconstruction and surface smoothing, focusing on preserving geometric details (Project for AM229-Convex Optimization)

3D AR visualizations
Two AR elements developed for a conference paper using JavaScript libraries (Mind-AR) that was developed using color and alpha videos, that are displayed based on a marker image created using computer vision tools.

Specializations and Courses

Python 3 Programming, University of Michigan (2023)

Deep Learning Specialization, DeepLearningAI (2023)

Advanced Computer Vision with TensorFlow, DeepLearningAI (2023)

C for Everyone: Structured Programming, UC Santa Cruz (2023)

Generative AI with Diffusion Models, NVIDIA (2024)

Languages

Spanish (Native), English (Fluent), Italian (Fluent), French (Basic)