Sergio Alberto De León Martínez

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Computer vision specialist focused on **Visual SLAM**, **3D vision**, and **probabilistic modeling**. Strong background in physics and optimization (BSc Physics, MSc Computer Science at **CIMAT**). Experienced with **PyTorch**, **OpenCV**, and **Open3D**, with reproducible research and clean engineering practices.

Experience

Centre for Research in Mathematics (CIMAT) **Guanajuato, Mexico**
Research Assistant – MSc in Computer Science *Aug 2023 – Sept 2025*
Applied research in **Visual SLAM** and **3D Computer Vision**, developing a real-time SLAM pipeline built on **2D Gaussian Splatting** with **Gaussian Processes** for dynamic masking.

- Designed and implemented a **Gaussian Splatting-based SLAM system** (*DynaMiTE-SLAM*) with a multi-threaded architecture (tracking, mapping, dynamic-mask trainer).
- Built **Gaussian Process** modeling for **dynamic-object** detection & down-weighting; added **active point selection** via predictive variance / mutual information; incremental SVGP training.
- Engineered reproducible experiments with **PyTorch 2.x (CUDA)**, **gpytorch**, **OpenCV**, rerun-based visualization, and dataset tooling (Replica, TUM RGB-D, Bonn RGB-D Dynamic).

Open-Source / Independent Projects
Computer Vision Developer *2023 – Present*

- **DynaMiTE-SLAM** **2024 – 2025**
  2D Gaussian Splatting-based SLAM with GP Dynamic Masking
  Project webpage: DynaMiTE **Repo:** github.com/sergio-alberto-dlm/DynamicGS-SLAM. **Highlights:** Real-time tracking/mapping, analytic Jacobians, GP-based active selection & dynamic down-weighting, evaluation on Replica/TUM/Bonn.
- **Cross device Visual Localization** **2025**
  MegaLoc + VGGT
  Repo: github.com/sergio-alberto-dlm/visual_localization. **Highlights:** Multi-sensor retrieval with MegaLoc global features + FAISS for fast top-k image search; pose estimation with bundle adjustment and foundation models (VGGT); dataset visualization tools.
- **Visual Odometry** **2025**
  Monocular VO Front-End
  Repo: github.com/sergio-alberto-dlm/visual_odometry. **Highlights:** ORB + LK tracking with FB check, E-matrix + RANSAC, scale-limited triangulation, rerun visualization.
- **GS Lab** **2025**
  Photorealistic 3D Reconstruction Pipeline
  Repo: github.com/sergio-alberto-dlm/gs_lab. **Highlights:** Photorealistic 3D reconstruction experiments with `gsplat` and foundation models (VGGT), focusing on quality–speed trade-offs.

Education

Centre for Research in Mathematics (CIMAT) **Guanajuato, Mexico**
MSc in Computer Science *Aug 2023 – Jul 2025*
Focus on **Visual SLAM**, **3D Vision**, and **Machine Learning**. Coursework: Pattern Recognition, Deep Learning, NLP, Optimization, Statistical Learning. Thesis topic: *2D Gaussian Splatting-based camera localization*.

Universidad Autónoma de San Luis Potosí (UASLP) **San Luis Potosí, Mexico**
BSc in Physics *Aug 2017 – Dec 2022*
Strong foundation in **applied mathematics**, numerical methods, and scientific computing.

Other Experiences

- **Fourth place** at the International Conference in Computer Vision **ICCV 2025** challenge: CroCoDL - Cross-device Collaborative Dataset for Localization
- **Data Science Kitchen** seminar organization: Seminar addressed to CIMAT community about industry relevant tech skills.
- Poster presentation at **NeuroVision 2025** with the work titled: DynaMiTE: Towards robust 2D Gaussian Splatting-based camera localization.
- Published tutorial: "2D Gaussian Splatting: from pixels to geometry" on Medium (link)
- Certificate – OpenCV University: Deep Learning with PyTorch 2.x
- Industry Problem Solving Workshop (SPI) 2025
- Mexican NLP Summer School 2024

Skills

Technical Skills

- **Core:** Visual SLAM, 3D Vision, Gaussian Splatting (2DGS), Probabilistic Modeling
- **Programming:** Python, C++, Bash
- **Frameworks:** PyTorch, TensorFlow, scikit-learn, pandas, gpytorch, OpenCV, YOLO, SAM, HuggingFace, Open3D, FAISS, PyPose, SQL, Docker.
- **Ecosystem:** NumPy, SciPy, Matplotlib, pandas, rerun
- **Systems:** CUDA-aware builds, Git, LaTeX

Soft Skills

- Research & Analytical Thinking
- Problem Solving & Experiment Design
- Clean Engineering & Reproducibility
- Communication & Technical Writing
- Collaboration & Mentoring

Languages

Spanish
Native proficiency

English **TOEFL**
Advanced; professional working proficiency *87 iBT*