Elena Alegret Regalado

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Research Interest

Machine Learning, 3D Computer Vision, 3D Object Reconstruction, Segmentation and Recognition, Scene Understanding, Robotics, Autonomous Driving, Healthcare applications.

Education

2025 - Present
MSc in Electrical Engineering and Information Technology
ETH Zürich, Switzerland

Major: Signal Processing and Machine Learning

2024 - 2025
Visiting Student — One-year Exchange
TUM, Munich, Germany

B.Sc. thesis supervised by Prof. Federico Tombari
GPA: 10/10

2021 - 2025
BSc in Artificial Intelligence
Universitat Politècnica de Catalunya - UPC, Barcelona, Spain

1st Class Honours: Voice and Dialog Processing, Advanced Models, HPC
GPA: 8.55/10
Top 10

2019 - 2021
Science & Technology Baccalaureate
Institut de Tremp, Tremp, Spain

GPA: 9.42/10 University Entrance Exam (PAU): 13.006/14

Work Experience

April 2024 - Present
Research Intern
TUM, Munich, Germany
Work on 3D scene reconstruction and understanding. Developed GALA, a framework for open-vocabulary 3D scene understanding on 3D Gaussian Splatting that learns instance features without labels and aligns them with language for efficient 2D/3D queries. The results of this work are accepted at 3DV 2026.
Advisors: Prof. Federico Tombari, Michael Niemeyer, Kunyi Li and Sen Wang.

Jul 2024 - Sep 2024
Research Intern
EPFL, Lausanne, Switzerland
Explored vision foundation models for *cancer detection in radiographic images*. Built a fine-tuning and evaluation pipeline; benchmarked SoTA models; investigated graph-based representations and graph construction for medical imaging workflows.
Advisors: Prof. Pascal Frossard and Cédric Vincent-Cuaz.

Sep 2023 - Jun 2024 **Research Intern**
Barcelona Supercomputing Center (BSC), Barcelona, Spain
Developed de-biasing approaches guided by Grad-CAM, integrated multiple medical-imaging datasets into a unified training template, and built MLflow- and Docker-based pipelines for reproducible experimentation and deployment.
Advisors: Prof. Dario García.

Honours and Awards

2025 **Bachelor's Thesis — Highest Honors**
TUM, Munich, Germany
Supervised by Prof. Federico Tombari. The results of this work are accepted at 3DV 2026.

2021 **Invesjove showcases research project for honoring academic endeavors.**
Institut de Tremp, Tremp, Spain
Selected to present my high-school research project at the Invesjove conference.

2021 **Academic Excellence Award — Spain's national university entrance exams**
Awarded for scoring above 9/10 in all subjects; overall score 13.006/14 in entrance exams.

Publications

Conference & Workshop Papers

1. **E. Alegret**, K. Li, S. Wang, S. Liang, M. Niemeyer, S. Gasperini, N. Navab, F. Tombari. *GALA: Guided Attention with Language Alignment for Open-Vocabulary Gaussian Splatting.* Accepted at International Conference on 3D Vision (**3DV 2026**) arXiv:2508.14278, 2025.

1. S. Wang, K. Li, S. Liang, **E. Alegret**, J. Ma, N. Navab, S. Gasperini. *Visibility-Aware Language Aggregation for Open-Vocabulary Segmentation in 3D Gaussian Splatting.* Accepted at International Conference on 3D Vision (**3DV 2026**). arXiv:2509.05515.

Further Training

2024 **LauzHack**
EPFL, Lausanne, Switzerland
Project: Entity matching on large-scale financial transactions.

2024 **HackTUM**
TUM, Munich, Germany
Project: Developed a trading algorithm for a simulated market.

2024 **HackUPC**
UPC, Barcelona, Spain
Project: Py AI-Driven Clothing Similarity: Enhancing Fashion E-commerce

2024 **Introduction to Docker Essentials**
Barcelona Supercomputing Center - BSC

2022 **NotOnlyFLOPs**
Barcelona Supercomputing Center - BSC

2022 **Convolutional Neural Networks for Visual Recognition**
Stanford University School of Engineering

2021 **CB3 E-LEARINING Universal Robots**
Robotics Course

2018 **CODING BOOTCAMP**
HTML Programming Course.

Languages

Spanish:	Native	English:	C1 (Advanced)	German:	Beginner
Catalan:	Native	French:	B2 (Upper-intermediate)		

Research Projects

Apr. 2025 - Aug. 2025 **GALA: Guided Attention with Language Alignment for Open-Vocabulary Gaussian Splatting**
Bachelor's thesis at TUM, Munich, Germany

GALA is a 3D scene understanding framework on 3D Gaussian Splatting. It learns scene-specific instance features in a self-supervised way and aligns them with language through a cross-attention module with two learnable codebooks, enabling efficient 2D and 3D open-vocabulary queries while keeping memory low.

Jun. 2024 - Jul. 2024 **Py AI-Driven Clothing Similarity**
UPC, Barcelona, Spain

Built a retail-focused visual similarity engine for large product catalogs (140k images). Designed a Siamese/Triplet CNN (ResNet-style) with an attribute head and semi-hard negative mining to learn robust embeddings. Deployed an end-to-end pipeline with FAISS vector search for fast look-alike retrieval and de-duplication.
Code: Py AI

May 2024 - Jun. 2024 **Explore and Find Node for Robot Exploration**
Universitat Politècnica de Catalunya, Barcelona, Spain

Extended the `frontier_exploration` ROS node with an external-control layer and a YOLO-based object detection node. Built an event-driven state machine that subscribes to YOLO detections and publishes high-level commands (warning/stop) to gate exploration. Implemented ROS topics/services wiring, rate limiting, and safety timeouts to avoid oscillations. Validated in Gazebo/rviz and on a mobile platform, enabling interruptible autonomous exploration.
Code: Explore and Find

Sep. 2021 Jul. 2021 **Design and Construction of a Remote-Control Car**
Institut de Tremp, Tremp, Spain

Built an Arduino UNO–based RC car as a year-long individual project, covering electronics wiring, motor control, and basic sensing for environment interaction. Implemented embedded code for control, telemetry, and remote operation. The project was selected for presentation at Invesjove (high-school research showcase).
Project Report: Remote-Control Car Report