Sergi **Sanchez Orvay**

ROBOTICS RESEARCH INTERN AT BMW GROUP (ROBOTAC LAB) - MSC ROBOTICS STUDENT AT ETH ZÜRICH

Munich, Germany

☐ (+34) 610 47 84 53 | ✉ sergi.sanchez.orvay@gmail.com | 🏠 sergisanchezz.github.io | ⬡ sergisanchezz | in sergisanchezz

Experience

Robotics Research Intern, **BMW Group** (**RoboTac Lab**) - Munich, Germany

SUPERVISOR: PROF. DR. MOHSEN KABOLI   *Sept. 2025 - Present*

Research at the intersection of embodied intelligence, cross-modal perception and robotic manipulation. Focusing on building robotic foundation models that unify tactile sensing, visual observations and action sequences into a shared representation using transformers and variational inference in PyTorch, enabling a pre-trained and generalizable model for diverse downstream tasks. Contributing in parallel to the PHASTRAC project (Horizon Europe), using Oscillatory Neural Networks to advance efficient edge intelligence for robotics.

Robotics Research Intern, **Institut de Robòtica i Informàtica Industrial (IRI-CSIC)** - Barcelona, Spain

SUPERVISOR: DR. JUAN ANDRADE-CETTO   *Sept. 2023 - July 2024*

Research on lightweight, interpretable algorithms for motion and feature estimation using event cameras in an aerial robotic platform performing agile motion (accelerations of up to 40 rad/s^2 and 15 m/s^2). Developed and implemented methods for event-based optical flow estimation using plane-fitting techniques on surfaces of active events. Implemented a state-of-the-art robust corner detection algorithm in Python. Designed a geometric model-based pipeline for egomotion estimation, combining normal flow, inverse depth optimization and RANSAC-based motion recovery using MATLAB and ROS2.

Student Researcher, **ETH Zürich** (**Vision for Robotics Lab**) - Zürich, Switzerland

SUPERVISORS: XINYI LI, WILLIAM TALBOT, DR. DAVID HUG, DR. CORNELIUS VON EINEM, PROF. DR. MARGARITA CHLI   *Feb. 2025 - July 2025*

Advancing continuous-time SLAM through Gaussian Belief Propagation (GBP). Focused on analyzing and resolving the numerical instabilities of Hyperion (the first open-source continuous-time GBP solver) that prevented its deployability by identifying ill-conditioned landmark covariances and underconstrained spline tails as core failure modes. Designed and implemented improved regularization strategies, including diagonal and Levenberg-Marquardt regularization, message damping and spline tail-fixing, enabling stable online optimization. These improvements yielded millimeter-level trajectory accuracy, consistent convergence across synthetic and indoor sequences, and runtime reductions of more than 100× compared to Ceres-based Non-Linear-Least-Squares solvers, demonstrating the viability of GBP as an efficient continuous-time state estimation framework. Project report: Gaussian Belief Propagation for Continuous-Time SLAM.

Education

MSc in Robotics, Systems and Control, **ETH Zürich** - Zürich, Switzerland

ACADEMIC SUPERVISOR: PROF. DR. ROLAND SIEGWART   *Sept. 2024 - Present*

Pursuing advanced training in robotics with a focus on embodied intelligence and robot learning & perception. Strong theoretical foundation in deep learning, robot control, probabilistic AI and computer vision, combined with extensive hands-on project experience. This includes work on Gaussian Belief Propagation for Continuous-Time SLAM with the Vision for Robotics Lab, Multi-Modal World Models for Autonomous Driving with the Computer Vision and Geometry Group and ongoing research in cross-modal perception and tactile intelligence at the BMW Group (RoboTac Lab).

BSc in Electronic Eng. & Telecommunications, **Universitat Politècnica de Catalunya** - Barcelona, Spain

BACHELOR'S THESIS SUPERVISORS: DR. JUAN ANDRADE-CETTO, PROF. DR. MONTSE NÁJAR   *Sept. 2020 - July 2024*

Ranked 1st of the class (GPA: 9/10) with honors in +30% of the courses and receiving the Best Academic Transcript Award. Conducted a research internship at IRI-CSIC working on vision algorithms for event-cameras that lead to my bachelor's thesis, Event-based egomotion estimation (Grade: 9.8/10).

Awards & Scholarships

Nova Talent Member (professional network connecting and mentoring top talent), Nova - Nov. 2024, Madrid, Spain

JAE Intro ICU - Robotics Research Scholarship, Consejo Superior de Investigaciones Científicas (CSIC) - 2023, Barcelona, Spain

Finalist in the Rohde & Schwarz International Engineering Competition, Rohde & Schwarz - 2023, Munich, Germany

Best student award in the Initial Phase of Electronic Eng. & Telecommunications degree, UPC - 2021, Barcelona Spain

Academic Excellence Award - Full financial support for the first university year, Govern de les Illes Balears - 2020, Ibiza, Spain