



Jesús Bautista Villar

PhD Candidate

📍 Granada, Spain ✉️ jesusbv@ugr.es 🌐 jesusbv20.github.io

🆔 0009-0006-0080-545X 🎓 Google Scholar 🔄 [jesusBV20](#)

🔗 [jesus-bautista-villar-27b037290](#)

About me

I am a PhD candidate in Information and Communication Technologies, specializing in Cognitive Systems and Robotics, at the University of Granada, and a predoctoral researcher at the [Swarm Systems Lab](#). My research focuses on the control of autonomous robot swarms: I combine control theory, geometric methods and physical principles to develop distributed Guidance, Navigation and Control (GNC) algorithms for multi-robot systems, with an emphasis on distributed, resilient and experimentally validated solutions.

Education

PhD	University of Granada , Information and Communication Technologies	Granada, Spain
	• Specialization: Cognitive Systems and Robotics. • Research focus: distributed control, robot swarms, autonomous aerial systems, guiding vector fields, formation control and geometric control.	2023 – present
MSc	University of Granada , Data Science and Computer Engineering	Granada, Spain
		2023
BSc	Complutense University of Madrid , Physics	Madrid, Spain
		2022

Experience

Swarm Systems Lab, Institute of Mathematics of Granada (IMAG), University of Granada , Predoctoral Researcher	Granada, Spain
• Development of distributed Guidance, Navigation and Control (GNC) algorithms for autonomous robot swarms, with particular emphasis on formation control, source seeking and cooperative motion. • Development and implementation of geometric control and guiding vector field algorithms for autonomous aerial vehicles, including fixed-wing aircraft. • Assembly, integration, maintenance and experimental validation of autonomous radio-controlled robot swarms involving both aerial and ground vehicles. • Development of mathematical models and simulation tools to analyze the physical behavior and collective dynamics of autonomous vehicles and multi-robot systems. • Implementation and experimental validation of onboard autonomy algorithms on real fixed-wing drones, including formation flight, crosswind navigation and autonomous maneuvering. • Development of open-source software and reproducible simulation tools supporting research in distributed robot-swarm control. • Research supported by the <i>ERC Starting Grant</i> iSwarm (101076091) and the <i>Ramón y Cajal</i> grant RYC2020-030090-I of the Spanish Ministry of Science.	Dec 2022 – present 3 years 11 months

Department of Computer Architecture and Automation, Complutense University of Madrid, Research Intern

Collaboration grant from the Spanish Ministry of Education and Professional Training.

- Contributions to [Paparazzi UAS](#), an open-source hardware/software project for autonomous aerial vehicles.
- Maintenance and development of ground radio-controlled autonomous vehicles.
- Development of drivers and embedded software for systems based on STM32 microcontrollers.

Madrid, Spain
Sept 2021 – June 2022
10 months

Journal publications

- Fully distributed and resilient source seeking for robot swarms** 2026
J. Bautista, A. Acuaviva, J. Hinojosa, W. Yao, J. Castellanos, HG de Marina
[10.1109/tac.2026.3727211](#) (IEEE Transactions on Automatic Control)
- Leaderless Collective Motion in Affine Formation Control over the Complex Plane** 2026
J. Bautista, E. Morella, L. Wang, HG de Marina
[10.1109/tcns.2026.3718812](#) (IEEE Transactions on Network Systems)
- Dispersion Formation Control: from Geometry to Distribution** 2025
J. Chen, **J. Bautista**, B. Jayawardhana, HG de Marina
[ieeexplore.ieee.org/document/11194724](#) (IEEE Transactions on Automatic Control)

Conference publications

- Distributed 3D Source Seeking via SO(3) Geometric Control of Robot Swarms** 2026
J. Bautista, HG de Marina
[10.48550/arxiv.2510.06836](#) (IFAC World Congress)
- Distributed Oscillatory Guidance for Formation Flight of Fixed-Wing Drones** 2025
Y. Xu, **J. Bautista**, J. Hinojosa, HG de Marina
[10.1109/iros60139.2025.11246740](#) (IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS))
- Inverse Kinematics on Guiding Vector Fields for Robot Path Following** 2025
Y. Zhou, **J. Bautista**, W. Yao, HG de Marina
[10.1109/icra55743.2025.11127300](#) (IEEE International Conference on Robotics and Automation (ICRA))
- Resilient source seeking with robot swarms** 2024
A. Acuaviva, **J. Bautista**, W. Yao, J. Jiménez, HG de Marina
[10.1109/cdc56724.2024.10886464](#) (63rd IEEE Conference on Decision and Control (CDC))
- Behavioral-based circular formation control for robot swarms** 2024
J. Bautista, HG de Marina
[10.1109/icra57147.2024.10610826](#) (IEEE International Conference on Robotics and Automation (ICRA))

Under review

- Singularity-Free Guiding Vector Fields on SO(3) with Designer-Specified Progression Behavior** 2026
J. Bautista, HG de Marina
[10.48550/arxiv.2609.07269](#) (Submitted to Automatica)

SO(3) attitude controllers and the alignment of robots with non-constant 3D vector fields

2024

J. Bautista, HG de Marina

[10.48550/arxiv.2406.14998](https://arxiv.org/abs/10.48550/arxiv.2406.14998) (arXiv)