Fernando Peña Bes

PhD Student in Robotics and Computer Vision
Robotics, Computer Vision and Artificial Intelligence Group (RoPeRT), Universidad de Zaragoza, Spain

fpena@unizar.es www.ferpb.com ferpb fernando-pena-bes 0000-0002-6773-9315

Education

PhD in Systems and Informatics Engineering *Oct 2023 – Today*
Universidad de Zaragoza, Zaragoza, Spain
Research topics: scene understanding, federated learning, 3D reconstruction, computational efficiency.

MSc in Robotics, Graphics and Computer Vision *Sep 2021 – Feb 2023*
Universidad de Zaragoza, Zaragoza, Spain
Master's Thesis completed at the University of Technology Sydney (Australia): "Hyperspectral Image Processing for Livestock and Agriculture Applications," supervised by Teresa Vidal-Calleja and Alen Alempijevic.

BSc in Informatics Engineering (Computing Track) *Sep 2017 – Sep 2021*
Universidad de Zaragoza, Zaragoza, Spain
Bachelor's Thesis: "Deep Learning Models for Eye Tracking Data," supervised by Daniel Martin and Belen Masia.

Research Experience

Visiting PhD Researcher – Robot Perception and Learning Lab (RPL) *Aug 2026 – Dec 2026*
Robot Perception and Learning Lab (RPL), University of Bonn, Germany
Research on federated and self-supervised learning for domain adaptation in robotic perception, supervised by Hermann Blum. DAAD-funded research stay.

FPI Predoctoral Researcher *Oct 2023 – Today*
Robotics, Computer Vision and Artificial Intelligence Group, Universidad de Zaragoza, Spain
Research on multimodal perception and distributed learning. Supervisors: Ana C. Murillo and Darío Suárez Gracia.

Predoctoral Researcher – SEPARA Project *Mar 2023 – Oct 2023*
Robotics, Computer Vision and Artificial Intelligence Group, Universidad de Zaragoza, Spain
Researched on the design, implementation, and evaluation of efficient image-processing algorithms in resource-constrained environments. Supervisors: Darío Suárez Gracia and Ana C. Murillo.

Research Intern – UTS Robotics Institute *Nov 2022 – Jan 2023*
UTS Robotics Institute, University of Technology Sydney, Australia
Contributed to the creation of a novel dataset with hyperspectral images and their analysis using deep learning. Supervisors: Teresa Vidal-Calleja, Alen Alempijevic, and Raphael Falque.

Research Assistant *Mar 2022 – Jul 2022*
Robotics, Computer Vision and Artificial Intelligence Group, Universidad de Zaragoza, Spain
Analyzed and implemented proposals to improve performance and energy efficiency of a deep learning-based hyperspectral imaging system. Supervisors: Darío Suárez Gracia and Ana C. Murillo.

Collaboration Research Scholarship *Nov 2020 – Jun 2021*
Department of Science and Technology of Materials and Fluids, Universidad de Zaragoza, Spain
Designed and implemented an automation system for a test bench to characterize fuel cells. Supervised by Miguel Ángel Laguna-Bercero.

Research Intern *Jul 2020 – Sep 2020*
Multiscale in Mechanical and Biological Engineering Group, Universidad de Zaragoza, Spain
Simulation and computational modeling of intracellular signaling networks. Supervisor: Francisco Merino-Casallo.

Publications

Peer-Reviewed Conference Publications

David Morilla-Cabello, María Peribáñez, Fernando Peña, Rubén Martínez-Cantín, Ana C. Murillo, Eduardo Montijano. "Agentic Social Robotic System for Work Environments." *ROBOT2026: 9th Iberian Robotics Conference*, 2026.

Sara Casao*, Fernando Peña*, Alberto Sabater, Rosa Castillón, Darío Suárez Gracia, Eduardo Montijano, Ana C. Murillo. "SpectralWaste Dataset: Multimodal Data for Waste Sorting Automation." *2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), pp. 5852–5858*, 2024. doi:10.1109/IROS58592.2024.10801797.

Fernando Peña*, Jasprabhjit Mehami*, Raphael Falque, Timothy Patten, Alen Alempijevic, Teresa Vidal-Calleja. "Subcutaneous Fat Depth Regression Using Hyperspectral and Depth Imaging." *Australasian Conference on Robotics and Automation (ACRA)*, 2022.

Fernando Peña, Pilar Vidal Aguilar, Darío Suárez Gracia, Ana C. Murillo. "Efficient Semantic Segmentation With Hyperspectral Images." *ROBOT2022: Fifth Iberian Robotics Conference, pp. 187–198*, 2022. doi:10.1007/978-3-031-21065-5_16.

Other Publications

Fernando Peña, David Morilla-Cabello, Toon Goedemé, Eduardo Montijano, Darío Suárez Gracia, Ana C. Murillo. "Informed Client Selection Strategies for Federated Semantic Segmentation." *In preparation for submission*, 2025.

Fernando Peña, Ana C. Murillo, Darío Suárez Gracia. "Towards More Efficient Data Preprocessing in Deep Networks." *19th International Summer School on Advanced Computer Architecture and Compilation for High-performance Embedded Systems (ACACES)*, 2023.

Fernando Peña, Álvaro García-Díaz, Alejandro Gómez-González, Adrián Martín-Marcos, Álvaro Romeo, José Manuel Sánchez-Aquilué, Alba Vallés, Elvira Mayordomo. "A Phylogenetic Study of COVID-19 Data From Aragon and Catalonia Over a Year: Learning Bioinformatics During a World Pandemic." *Actas de la XI Jornada de Jóvenes Investigadores del I3A, vol. 10*, 2022. doi:10.26754/jjii3a.20227017.

*Joint first authors.

Conference Participation

2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) *Oct 2024*
Abu Dhabi, United Arab Emirates
Presentation: *SpectralWaste Dataset: Multimodal Data for Waste Sorting Automation* (Spotlight and poster)

2022 Australasian Conference on Robotics and Automation (ACRA) *Dec 2022*
Brisbane, Australia
Presentation: *Subcutaneous Fat Depth Regression Using Hyperspectral and Depth Imaging* (Oral)

XI Conference of Young Researchers, I3A *Jun 2022*
Zaragoza, Spain
Presentation: *A Phylogenetic Study of COVID-19 Data From Aragon and Catalonia Over a Year: Learning Bioinformatics During a World Pandemic* (Poster)

Scholarships, Grants and Mobility Programs

DAAD Research Grants in Germany (2026) *Aug 2026 – Dec 2026*
University of Bonn, Bonn, Germany
Competitive research grant for a four-month doctoral research stay at the Robot Perception and Learning Lab, University of Bonn.
Funding: German Academic Exchange Service (DAAD).

FPI Predoctoral Contract *Oct 2023 – Today*
Universidad de Zaragoza, Zaragoza, Spain
Doctoral research under the iSUMA project, supported by a four-year contract.
Funding: Spanish Ministry of Science, Innovation and Universities / Spanish State Research Agency (MCIN/AEI).

North America/Asia/Oceania Mobility Program (NAO) *Jul 2022 – Jan 2023*
University of Technology Sydney, Sydney, Australia
Scholarship granted by the University of Zaragoza to study abroad in a country from North America, Asia or Oceania.
Funding: Universidad de Zaragoza Mobility Grants.

Collaboration Research Scholarship *Nov 2020 – Jun 2021*
Department of Science and Technology of Materials and Fluids, Universidad de Zaragoza, Spain
Scholarship to collaborate with a research group in Spain.
Funding: Spanish Ministry of Education.

Funded Projects

AI-FUSE – AI for Universal Scene Understanding: Environmental Monitoring *Dec 2025 – Nov 2028*
Robotics, Computer Vision and Artificial Intelligence Group, Universidad de Zaragoza, Spain
Role: Predoctoral Researcher
Funding: Project funded by the Spanish State Research Agency (AEI), under the "Proyectos de Investigación en el Ámbito de la Inteligencia Artificial - 2025" call.
Principal Investigator: Ana C. Murillo, Eduardo Montijano

iSUMA – Improving Scene Understanding with Multiple Sensor Modalities and Active Perception *Oct 2023 – Aug 2025*
Robotics, Computer Vision and Artificial Intelligence Group, Universidad de Zaragoza, Spain
Role: FPI Predoctoral Researcher
Funding: Project funded by MCIN/AEI and co-funded by FEDER and NextGenerationEU.
Principal Investigator: Ana C. Murillo, Eduardo Montijano

SEPARA – Technological Transformation of the Waste Recovery Sector to Drive an Effective Circular Economy in Spanish Industry *Mar 2023 – Oct 2023*
Robotics, Computer Vision and Artificial Intelligence Group, Universidad de Zaragoza, Spain
Role: Predoctoral Researcher
Funding: Project funded by CDTI (Missions 2020 Program), led by Ecoembes.
Principal Investigator: Ana C. Murillo

Professional Service

Peer Reviewer (Conferences)

- IEEE International Conference on Robotics and Automation (ICRA) · 2026
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) · 2024, 2026

Peer Reviewer (Journals)

- Pattern Recognition · 2026

Teaching

- **Artificial Intelligence**
  BSc in Informatics Engineering, Universidad de Zaragoza
  Teaching Assistant · 2024/25, 2025/26
- **Robotics**
  BSc in Informatics Engineering, Universidad de Zaragoza
  Teaching Assistant · 2026/27

Dissemination

- Mar 2026 – Organizing collaborator at the XVII Engineering and Architecture Week, School of Engineering and Architecture.
- Apr 2025 – Organizing collaborator at the XVI Engineering and Architecture Week, School of Engineering and Architecture.

Volunteering/Organization

- 2026 – Volunteer at the Davos Tech Summit: event operations, Robot City guided tours and robot operation.
- 2024 – Exam supervision at the 2024 Universidad de Zaragoza entrance exams.
- 2023 – Member of the Local Organizing Committee of the XLIV Jornadas de Automática (Zaragoza).

Additional Training

- Jan 2025 – *Exploratory Data Analysis*, Universidad de Zaragoza.
- Jul 2023 – *Advanced Techniques in Programming: The Functional Paradigm*, Universidad de Zaragoza.
- Jul 2023 – *19th International Summer School on Advanced Computer Architecture and Compilation for High Performance Embedded Systems (ACACES)*, HiPEAC Network.

Professional Membership

- IEEE Graduate Student Member, from 2024.
- IEEE Robotics & Automation Society (RAS) Member, from 2024.
- Instituto de Investigación en Ingeniería de Aragón (I3A), from 2022.

Languages

- **Spanish:** Native
- **English:** B2 Level (Cambridge FCE, obtained in 2016). Fluent in academic and professional environments.

Technical Skills

- **Languages:** Python, C, C++, Rust, JavaScript, Haskell; LaTeX, HTML/CSS.
- **Frameworks:** PyTorch, NumPy, Pandas, JAX, TensorFlow, CUDA, OpenCV.
- **Tools:** Git, POSIX shell, Docker, GitHub Actions, AWS (EC2, S3, Lambda).