



# Enrique Heredia Aguado

Robotics, Computer Vision and AI · PhD Student

[e.heredia@umh.es](mailto:e.heredia@umh.es) · [enheragu.github.io](https://github.com/enheragu)

## About me

**Robotics and Computer Vision researcher**, currently pursuing a PhD at *Universidad Miguel Hernández de Elche (UMH)* within the Automation, Robotics and Computer Vision Lab (ARVC).

My current work focuses on **multi-modal sensor fusion** (RGB-Thermal, LiDAR), **deep learning-based object detection** and **research methodology**.

## Education

**[Dec. 2022 – present] · PhD in Industrial & Telecom Technologies · UMH**

Thesis on multispectral image fusion (thermal and RGB) and its methodological study through deep learning, extended to multisensor integration including LiDAR. Directed by Arturo Gil Aparicio and David Valiente García.

**[Oct. 2021 – Sep. 2022] · M.Sc. Robotics · UMH**

- **Master's Thesis:** "Integración de tecnologías láser y GPS/RTK para navegación autónoma en exteriores" (2022). Directed by Arturo Gil Aparicio and David Valiente García. [\[link\]](#)

**[Sep. 2012 – Feb. 2018] · B.Sc. Electronics & Automation Eng. · UPM**

- **Bachelor's Final Degree Project:** "Diseño y construcción de un brazo robótico para el apoyo a la interactividad de personas enfermas (RHA - RoboHealth ARM)" (2018). Directed by Miguel Hernando Gutierrez and Alberto Brunete González. [\[link\]](#)

## Work Experience

**[Dec. 2022 – present] · Research Engineer & PhD Student · UMH**

[Engineering Research Institute of Elche \(I3E\)](#), [ARVC research group](#).

- Multi-modal sensor fusion (RGB + Thermal + LIDAR) for deep learning-based object detection.
- Multispectral camera design, calibration and integration with ROS/ROS2.
- Research methodology and experimental design for better replicability.
- Teaching Assistant in Computer Vision and Robotics (2022–2027).

**[Mar. – Jun. 2026] · Lecturer · UMH**

**[Dec. 2025 · May–Jul. 2026] · Visiting researcher · DFKI Bremen**

**[Feb. 2022 – Sep. 2022] · Research Intern · UMH**

**[Feb. 2017 – Oct. 2021] · Robotics Engineer · GMV · On Board Autonomy Division**

Development and integration of autonomy systems: mission planning, mission control and monitoring, path planning (mobile robot base and robotic arm).

- Development of on board controller to handle different autonomy levels and components, execution monitoring and mission plan execution.

**[Feb. 2016 – Aug. 2016] · Intern · BQ**

## Skills

### Engineering:

- Programming languages: advanced C/C++ and Python. Intermediate ROS/ROS2.
- Deep Learning frameworks: PyTorch, TensorFlow/Keras for detection and segmentation tasks.
- Computer Vision: OpenCV, PCL and deep learning.

- Robotics frameworks: ROS, TASTE, ROCK.
- DevOps: Git, Docker/Docker Compose, CI/CD pipelines.
- Documentation: LaTeX, MS Office, Google Workspace.
- OS: Linux (Ubuntu, Debian), Windows.

**Languages:** Spanish (native), English (professional working proficiency).

## Publications

### Journal Articles

- Enrique Heredia-Aguado, Juan José Cabrera, Luis Miguel Jiménez, David Valiente, Arturo Gil. (2025). **Static Early Fusion Techniques for Visible and Thermal Images to Enhance Convolutional Neural Network Detection: A Performance Analysis**. *Remote Sensing*. Vol. 17(6). doi:10.3390/rs17061060
- Antonio Santo, Enrique Heredia-Aguado, Carlos Viegas, David Valiente, Arturo Gil. (2025). **Ground Segmentation for LiDAR Point Clouds in Structured and Unstructured Environments Using a Hybrid Neural–Geometric Approach**. *Technologies*. Vol. 13(4). doi:10.3390/technologies13040162

### Book Chapters

- Antonio Santo, Arturo Gil, David Valiente, Álvaro Martínez, Enrique Heredia. (2026). **Sparse Convolutional 3D Neural Networks for the Assessment of Environment Traversability**. In *Informatics in Control, Automation and Robotics*. Springer Nature Switzerland. pp. 199–218. doi:10.1007/978-3-031-94989-0\_9
- Shashank Govindaraj, Wiebke Brinkmann, Francisco Javier Colmenero, Irene Sanz Nieto, Alexandru But, ... Enrique Heredia, et al. (2024). **Building a Lunar Infrastructure with the Help of a Heterogeneous (Semi)Autonomous Multi-robot-Team**. In *Space Robotics: The State of the Art and Future Trends*. Springer Nature Switzerland. pp. 395–431. doi:10.1007/978-3-031-39214-6\_18

### Conference Papers

- Enrique Heredia-Aguado, María Flores, Mónica Ballesta, David Valiente, Luis Payá, Arturo Gil, Juan José Cabrera. (2026). **Fusión temprana de imágenes multiespectrales mediante técnicas de reproyección para tareas de detección mediante algoritmos profundos: Un estudio comparativo**. *Simpósio CEA de Robótica, Bioingeniería, Visión Artificial y Automática Marina*. Vol. 2(2). doi:10.64117/simposioscea.v2i2.174
- María Flores, Enrique Heredia-Aguado, Juan José Cabrera, Arturo Gil, David Valiente, Luis Payá. (2026). **Localización global mediante descriptores basados en un diccionario semántico-visual**. *Simpósio CEA de Robótica, Bioingeniería, Visión Artificial y Automática Marina*. Vol. 2(2). doi:10.64117/simposioscea.v2i2.224
- Enrique Heredia-Aguado, Marcos Alfaro-Pérez, María Flores, Luis Payá, David Valiente, Arturo Gil. (2025). **A Robust Comparative Study of Adaptative Reprojection Fusion Methods for Deep Learning Based Detection Tasks with RGB-Thermal Images**. *Proceedings of the 22nd International Conference on Informatics in Control, Automation and Robotics (ICINCO)*. SciTePress. pp. 313–320. doi:10.5220/0013761800003982
- Marcos Alfaro, Juan Cabrera, Enrique Heredia-Aguado, Oscar Reinoso, Arturo Gil, Luis Payá. (2025). **Place Recognition with Omnidirectional Imaging and Confidence-Based Late Fusion**. *Proceedings of the 22nd International Conference on Informatics in Control, Automation and Robotics (ICINCO)*. SciTePress. pp. 117–125. doi:10.5220/0013743100003982
- Miriam Máximo, Mónica Ballesta, Enrique Heredia-Aguado, David Valiente, Oscar Reinoso. (2024). **Localización topológica Monte Carlo basada en descripción de nubes de puntos LiDAR 3D**. *Actas del Simposio de Robótica, Bioingeniería y Visión por Computador*. pp. 55–60. [link]
- Enrique Heredia-Aguado, David Valiente, Arturo Gil, Miriam Máximo, Luis Payá. (2024). **Fusión estática de imágenes del espectro visible y térmico para una mejor detección de personas mediante Redes Neuronales Convolucionales: un análisis del rendimiento**. *Actas del Simposio de Robótica, Bioingeniería y Visión por Computador*. pp. 263–268. [link]
- Wiebke Brinkmann, Leon Danter, Tobias Stark, Enrique Heredia-Aguado, Francisco Javier Colmenero, Mercedes Alonso. (2022). **Mantis Within a Multi Robot Team for Lunar Exploration and Construction Tasks**. *2022 IEEE Aerospace Conference (AERO)*. IEEE. doi:10.1109/AERO53065.2022.9843351
- Shashank Govindaraj, Wiebke Brinkmann, Francisco Javier Colmenero, Enrique Heredia-Aguado, Mercedes Alonso, Alexandru But, Leon Danter, Luís Lopes. (2021). **Building a Lunar Infrastructure with the Help of a Heterogeneous (Semi)Autonomous Multi-Robot-Team**. *International Astronautical Congress (IAC)*. [link]
- Shashank Govindaraj, Irene Nieto, Alexandru But, Wiebke Brinkmann, Alexander Dettmann, ... Enrique Heredia-Aguado, et al. (2020). **Multi-Robot Cooperation for Lunar Base Assembly And Construction**. *International Symposium on Artificial Intelligence, Robotics and Automation in Space (i-SAIRAS)*. [link]
- Jorge Ocon, Francisco Colmenero, Iulia Dragomir, Enrique Heredia-Aguado, Mercedes Alonso, Joaquin Estremera, et al. (2019). **Testing Autonomous Robots: A Discussion on Performances Obtained During the ERGO Field Tests**. *Symposium on Advanced Space Technologies in Robotics and Automation (ASTRA 2019)*. [link]
- Jorge Ocon, Francisco Colmenero, Joaquin Estremera, Karl Buckley, Mercedes Alonso, Enrique Heredia-Aguado, et al. (2018). **The ERGO framework and its use in planetary/orbital scenarios**. *Proceedings of the 69th International Astronautical Congress (IAC)*. [link]

### Preprints

- Enrique Heredia-Aguado, Alejandro Rujano, Mónica Galdeano, David Valiente, Arturo Gil. (2026). **The Impact of Performance Variability on Neural Network Evaluation and its Implications for Model Design**. *Preprint*.

## Oral Presentations

- Laura Cepero Amores, Enrique Heredia-Aguado, Alejandro Rujano, Victoria Plaza, M. Pilar Aivar. (2026). **Ojo al dato: Soluciones interdisciplinarias a problemas metodológicos en experimentos de búsqueda visual.** *XIX Congreso de Metodología de las Ciencias Sociales y de la Salud (AEMCCO)*, Almería.
- Alejandro Rujano, Enrique Heredia-Aguado. (2026). **Aunque la hipótesis se vista de seda: Sesgos metodológicos en el estudio de la paradoja de la igualdad.** *XIX Congreso de Metodología de las Ciencias Sociales y de la Salud (AEMCCO)*, Almería.
- Enrique Heredia-Aguado, Alejandro Rujano, David Valiente, Arturo Gil. (2026). **Que no te engañe el azar: Cómo impacta la aleatoriedad en el diseño de redes neuronales.** *XIX Congreso de Metodología de las Ciencias Sociales y de la Salud (AEMCCO)*, Almería. [\[slides\]](#)
- Laura Cepero Amores, Enrique Heredia-Aguado, Alejandro Rujano, M. Pilar Aivar, Victoria Plaza. (2026). **Búsqueda visual repetida en contexto natural, ¿eficiencia o aprendizaje?.** *VI Congreso Anual de Estudiantes de Doctorado (UMH)*.
- Enrique Heredia-Aguado, Alejandro Rujano, David Valiente, Arturo Gil. (2026). **Técnicas de fusión de imágenes multispectrales para una mejor detección mediante algoritmos de aprendizaje profundo.** *VI Congreso Anual de Estudiantes de Doctorado (UMH)*. [doi:10.13140/RG.2.2.31157.33760](https://doi.org/10.13140/RG.2.2.31157.33760)
- Enrique Heredia-Aguado, Laura Cepero Amores, Luis Miguel Jiménez, Victoria Plaza, M. Pilar Aivar. (2025). **Colaboración interdisciplinar en estudios de doctorado: Estudiando el proceso de búsqueda visual en personas a través de la visión por computador.** *V Congreso Anual Internacional de Estudiantes de Doctorado (UMH)*. [doi:10.13140/RG.2.2.35237.41443](https://doi.org/10.13140/RG.2.2.35237.41443)
- Laura Cepero Amores, Enrique Heredia-Aguado, Victoria Plaza, M. Pilar Aivar. (2025). **Visual Search Strategies: Comparing Screen-Based and Real-World Contexts.** *Reunión Científica sobre Atención (RECA14)*.

## Poster Presentations

- Laura Cepero Amores, Enrique Heredia-Aguado, Lucía Bernardino, Alejandro Rujano, Jose David Moreno, Pilar Aivar, Victoria Plaza. (2026). **From Screens to the Real World: How context shapes Visual Search.** *11th Iberian Congress of Perception (CIP 2026)*. [doi:10.13140/RG.2.2.15132.04488](https://doi.org/10.13140/RG.2.2.15132.04488)
- M. Pilar Aivar, Laura Cepero Amores, Enrique Heredia-Aguado, Alejandro Rujano, Rocío Asperilla, Victoria Plaza. (2026). **Visual search for real objects: how spatial consistency facilitates performance.** *Vision Sciences Society Annual Meeting (VSS 2026)*.
- Laura Cepero Amores, Enrique Heredia-Aguado, Lidia Sobrino, M. Pilar Aivar. (2024). **Bringing Visual Search to Life: how we find colored objects when performing a natural task.** *XIV Congress of the Spanish Society for Experimental Psychology (SEPEX24)*.

## Software Tools

- Enrique Heredia-Aguado, Alejandro Rujano. (2026). **Psychometric Tools: An Interactive Web Applications for Measurement and Assessment Research.** Zenodo. [doi:10.5281/zenodo.19163768](https://doi.org/10.5281/zenodo.19163768)
- Enrique Heredia-Aguado, Alejandro Rujano, David Valiente, Arturo Gil. (2026). **MLV Tools: Interactive Web Applications for Machine Learning Variance Analysis.** Zenodo. [doi:10.5281/zenodo.20268237](https://doi.org/10.5281/zenodo.20268237)

## Awards

- José Alejandro Rodríguez Rujano, Enrique Heredia-Aguado. (2026). **Premio AEMCCO de Divulgación y Transferencia en Metodología: "Herramientas estadísticas y psicométricas".** *Asociación Española de Metodología de las Ciencias del Comportamiento (AEMCCO)*, *XIX Congreso de Metodología de las Ciencias Sociales y de la Salud*, Almería. [\[link\]](#) [\[slides\]](#)

## Projects

Some relevant projects I have been involved in over the last years:

### At UMH (2022–present)

- **PROMETEO 2025** (Sep 2025 – present): "Aprendizaje profundo para navegación autónoma, interpretación del entorno e interacción social con robots móviles". Generalitat Valenciana.
- **FIND** (2025 – present): "¡Perdido y encontrado! Por qué nos cuesta encontrar ciertos objetos y cómo optimizar nuestras estrategias de búsqueda". AEI/FEDER. Collaboration with Universidad Autónoma de Madrid.
- **ROBDEKON II**: research stays at DFKI Bremen (Dec. 2025; May – Jul. 2026), contributing to ROBDEKON, the BMBF-funded German competence center developing autonomous, semi-autonomous and teleoperated robots that cooperate with human operators to perform decontamination and dismantling tasks in environments hazardous to humans. [\[DFKI\]](#)
- **AViRobots** (Jan 2025 – Oct 2025): "Development of an intelligent surveillance and security infrastructure system based on mobile robots".
- **Robot\_Vigilante** (Sep 2024 – present): "Robótica móvil para la vigilancia automática de recintos e identificación de situaciones de riesgo en condiciones desafiantes mediante técnicas de aprendizaje profundo". AEI/MICIU + FEDER.
- **ACTVIS** (2022 – 2025): "Visión Activa: qué nos enseñan los movimientos oculares sobre las estrategias de búsqueda visual". Collaboration with Universidad Autónoma de Madrid.
- **TED2021** (Dec 2022 – Nov 2024): "Desarrollo de tecnologías móviles inteligentes para tareas de seguridad y vigilancia de entornos de interior y exterior". MICIU/AEI + NextGenerationEU/PRTR.
- **PROMETEO** (Nov 2022 – Dec 2024): "Towards Further Integration of Intelligent Robots in Society: Navigate, Recognize and Manipulate". Generalitat Valenciana.

### At GMV (2017–2021)

- **MOSAR** (Mar 2019 – Oct 2021): "MOdular Spacecraft Assembly and Reconfiguration". Focused on orbital operations, this project focused on in-orbit reconfiguration and servicing capabilities. A set of spacecraft modules and a walking manipulator was deployed to autonomously reconfigure functionality, geometry, power and data transfer among spacecraft modules. H2020 SRC PERASPERA OG9. [\[link\]](#)
- **PROACT** (Feb 2019 – Oct 2021): "Planetary ROBots Deployed for Assembly and Construction Tasks". Focused on collaboration in planetary robotics, this project focused on extending OG2 autonomy capabilities to a multi-agent system. Using this approach, a fleet of robots could autonomously execute a representative set of operations to build an ISRU plant. H2020 SRC PERASPERA OG11. [\[link\]](#)
- **ADE** (Feb 2019 – Oct 2021): "Autonomous DEcision making in very long traverses". Focused on planetary exploration robots, this project focused on enhancing the Autonomy framework with space hardware specifically targeting the accomplishments of long traverses in full autonomy. H2020 SRC PERASPERA OG10. [\[link\]](#)
- **ERGO** (Jan 2018 – Jan 2019): "European Robotic goal-oriented autonomous COntroller". Focused on delivering an advanced and flexible space autonomous framework with adaptable levels of autonomy. The framework includes mission planning, execution and monitoring along with path planning and trajectory control for both mobile robot base and robotic arms among other functionalities. H2020 SRC PERASPERA OG2. [\[link\]](#)
- **GOTCHA** (Feb 2017 – May 2018): "GOAC TRL-increase Convenience-enhancements, Hardening and Application-extension". Aiming to develop a robotic autonomous controller for the space domain integrating an action-based planner. Its purpose is to enhance the autonomy capabilities on board space systems offering goal-based commanding and telemetry monitoring. ESA/GSTP. [\[ESA post\]](#)

### At UPM (2012–2018)

- **RHA (RoboHealth ARM)** (Feb 2017 – Feb 2018): "Diseño y construcción de un brazo robótico para el apoyo a la interactividad de personas enfermas" (B.Sc. thesis). Part of the ROBOHEALTH national coordinated project (UPM · UC3M): "Entornos inteligentes para paciente conviviendo con robots". Ministerio de Economía y Competitividad (RETOS · DPI2013-47944-C4-2-R). [\[link\]](#)
- **HIDALGO** (Sep 2015 – Sep 2016): Spanish humanoid robot project led by Miguel Hernando at UPM, born from the HackLab UPM-BQ maker lab, aiming to build the lightest, lowest-cost humanoid possible. [\[project blog\]](#)

## Courses and Workshops

- 01/2025 – 06/2025: Diploma de Formación Inicial para la Docencia Universitaria — UMH (100 h)
- 05/2025: Comunicación visual efectiva — UMH (18 h)
- 11/2024: Soporte Vital Básico y RCP con DEA — UMH (4 h)
- 08/2020: Docker Containers and Kubernetes — PUE (30 h)
- 03/2019: Advanced Programming with C++11/14/17 — UC3M, José Daniel García Sánchez (25 h)