

DEVELOPMENT AND INTEGRATION OF SPACE SYSTEMS AND LUNAR EXPLORATION TECHNOLOGIES

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Research Group: Aerospace Technology Research Group

The Aerospace Technology Research Group (ATRG) is a multidisciplinary research team bringing together expertise in telecommunications, aerospace, mechanical engineering, and computer science. Our origins date back to 2007 with the launch of the Xatcobeo CubeSat, and since then, we have deployed and operated five satellites. Leveraging a strong multidisciplinary approach, the group has extensive experience in mission analysis and design across a broad spectrum of scenarios, from Low Earth Orbit (LEO) missions to lunar and planetary exploration. ATRG is also actively engaged in several dual-use technology initiatives that bridge space and defense applications. Currently, the group participates in more than 12 projects with a combined budget of €58.43 million, of which €2.79 million is directly managed by ATRG. Our research activities are organized around five main lines: Thermo-Mechanical Engineering, focused on the analysis and verification of aerospace structures and systems; UAV Solutions, exploiting unmanned aerial vehicles to address societal challenges; Artificial Intelligence, applying advanced techniques to solve complex aerospace problems; Systems Engineering, aimed at achieving excellence in the design, integration, and operation of space projects; and Satellite Communications, developing reliable, high-data-rate space links and their applications.

Keywords: Satellite Systems Engineering | Mission Design | Radio and Optical Communications | Lunar Rovers | Ecosystem Monitoring

Research Focus:

Research in this area focuses on satellite systems engineering, covering the design, development, and operation of satellite missions and their associated ground segments. Key topics include radio-frequency and optical communications, data transmission protocols, signal processing, and Earth observation applications. This research line also addresses advanced technologies for lunar exploration, including lunar rovers, data acquisition systems, and subsurface exploration in extreme environments. In addition, it investigates satellite-based solutions for ecosystem monitoring, enabling the collection and analysis of environmental data to support sustainable resource management, environmental protection, and scientific research.