

Cooperative technology for unmanned systems

Unmanned vehicles, known as UxVs, are highly diverse machines that can provide valuable information to professionals in various fields. Gradiant has years of experience in equipping UxVs for different sectors. Its technological developments have diversified and enhanced the capabilities of unmanned vehicles, applying its expertise in RF communications, electronics, video analytics and intelligence to create UxVs equipment specially tailored to the industry's needs. Gradiant utilizes Artificial Intelligence and develops software and hardware specifically designed for each client.



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UxVs

for industry

by gradiant 

Tailored Solutions for Superior Performance

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Unleashing UxVs

At Gradiant, we design and develop advanced communication systems and intelligent solutions for unmanned vehicles (UxVs), adapted to the real operational needs of industry, defense, security, and critical infrastructures, supported by:

- ✓ A solid experience in the design, implementation and validation of UxV communication systems, from physical-layer link design to autonomous onboard intelligence.
- ✓ An approach that covers the entire system lifecycle, from requirements and architecture definition, design and simulation, HW/SW implementation and integration, to experimental validation and real-world testing.

Link Design & resilience:

Engineering the communication link from the physical layer to guarantee reliability in any operational scenario.

An advanced communications system has been developed, combining end-to-end link design [waveform, modulation/demodulation, and interference resilience] with hybrid connectivity across cellular, RF, and satellite networks, enabling autonomous switching in degraded conditions and incorporating real-time spectrum monitoring and interference countermeasures.

Network architectures for UxVs:

Deploying communication infrastructures that give operators full control over their fleets.

Mesh networks have been developed for drone swarms, where each node acts as a transmitter, receiver, and relay, enabling autonomous reorganization through distributed AI if nodes fail; in parallel, private networks for UxV operations provide full control over quality of service, latency, security, and traffic prioritization, supported by commercial and open-source architectures.



Mission planning & digital twins:

Characterizing drone behavior before takeoff to anticipate degraded scenarios and optimize mission outcomes.

Digital twins have been developed for route planning and GNSS health, enabling prediction of link quality along trajectories to ensure communication continuity, and estimating positioning accuracy by analyzing satellite geometry, ionospheric conditions, and interference.

Onboard intelligence & payloads:

Embedding autonomous decision-making and sensing capabilities directly into the vehicle.

Autonomous drone control with AI-based video analytics enables real-time adaptation and efficient BVLOS operations, complemented by custom payload integration for coverage, navigation, and inspection missions.

