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About our project, Autonomous Charging Environment. The Development of an Autonomous Tactical System.

Dear representatives of Jerónimo Martins,

Autonomous technologies are shaping a vast range of industries. From planning a product's logistics to a growing intervention emergency response. However, as the utility got exponentially complex, the number of devices scale and the missions become more and more prolonged, maintenance and consumption logistics became a common and critical limitation. UAV's operating in swarms offer their challenges. The inability to autonomously recharge leads to operational downtime and consequently to a lack of practicality and reliability. Furthermore, coordinating multiple drones introduces a logistical nightmare, including airspace conflicts, battery prioritization, and flight path optimization.

Without an intelligent tactical system, the autonomous fleet's potential is heavily constrained, leaving human operators burdened with frequent manual and complex supervisory tasks that could be automated.

The Air&Land Autonomous Charging Environment (A.C.E.) aims to solve these bottlenecks by establishing a fully coordinated, autonomous ecosystem. It enables real-time communication between drones and intelligent charging stations, integrating autonomous navigation, scheduling, and inter-drone coordination to ensure continuous operation.

First, the interaction and communication of the environment can lead to a coordinated action, aiming the continuous maintenance of the UAV's or UGV's. The network of autonomous agents would also, while helping in the maintenance, focus on the fulfillment of the mission, providing priority to the agents fulfilling the most important tasks, optimizing flight paths, adapting charging queues and possibly much more in order to complete the objective. Finally, the modular architecture seamlessly is able to scale very easily. Stations could be placed and replaced and the environment would still adapt in order to fulfill the primitive purposes.

Our first prototype, up for evaluation for project ElectroCap, is a commercial drone retrofitted with autonomous landing and communication software. It successfully demonstrates efficient, drone management by one station. In simulation, we've been able to expand that idea to multiple stations and multiple drones. Thus showing that this concept is ready for market-ready production.

Adopting the A.C.E. ecosystem delivers immediate, tangible benefits to organizations managing drone fleets. By automating the charging and coordination loop, businesses drastically reduce operational downtime and maximize asset utilization. Continuous, uninterrupted drone operations translate to faster data collection, reliable security monitoring, and optimized logistics. Crucially, the system shifts human operators from micro-managers to strategic overseers, significantly lowering labor costs and mitigating human error. Adaptable across industries, this solution offers a definitive competitive advantage enabling reliable, fully autonomous drone operations that save time, cut costs, and elevate operational safety.

