Multi-drone Control with Autonomous Mission Support

Nuno Paula[1], Bruno Areias[1], André Braga Reis[1], Susana Sargento[1]

Recent advancements on miniaturization and cost of sensors and instruments have promoted a growth in the usage of drones in an increasingly wide range of scenarios such as search and rescue, agriculture and environmental monitoring. However, most mechanisms for drone control still require an active pilot, limiting the ability to execute complex missions, especially when multiple drones are involved. Leveraging recent advances in the autonomous capabilities of commercially-available drone equipment, we introduce a complete and modular solution for controlling multiple drones, implementing the functionality necessary for inexperienced users to plan, execute and monitor complex missions that require drone cooperation.

1 — Department of Electronics, Telecommunication and Informatics & IT, University of Aveiro

We seek to combine the advantages of a single Unmanned Aerial Vehicle (UAV) with the advantages of a swarm, including the possibility of continuously executing a mission even when an unexpected event results in the loss of a drone. This increases mission flexibility by allowing a set of drones to dynamically adapt to a mission to, for example, increase the capacity for area coverage.

Through a reference set of real-life experiments, ranging from simple tests to the baseline capabilities of the platform to more sophisticated tasks which require the automation of full paths and multiple drone collaborative missions, the features of the platform have been thoroughly verified and profiled, and the successful completion of the proposed experiments shows that the platform is able to correctly handle the execution of missions containing large sequences of commands and waypoints.

This platform is a basis for the research of new networking approaches to interconnect multiple drones in the air, their sensors, and provide a nomadic network in the air for the support of future beyond 5G services.