EPSRC CDT in Distributed Algorithms

PhD Project: Distributed Exploration and Exploitation with Passive RF sensors

University of Liverpool

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Project Description

This project has been developed by the University of Liverpool and STFC's Hartree centre in partnership with MBDA.

This PhD will develop cooperative guidance and navigation methods to allow small formations of Uninhabited Air Vehicles (UAVs) to investigate and explore otherwise ill-defined regions while employing passive RF sensors (i.e. providing only angle of arrival and signal-strength measurements) – providing both contextual information (what?) and localisation information (where?).

Current UAVs tend to be directly controlled by an operator or to fly prescribed, pre-planned routes. With recent improvements in processing speed and artificial intelligence, it is likely that future UAVs will have more flexibility and provide a degree of coordination and cooperation within an overall defined mission. Such automated control of UAVs will be significantly enhanced by the ability to share identification and position information across platforms, particularly for the case of Passive RF sensors where individual measurements are ambiguous. It will allow a top-level requirement to be fixed by an operator whilst permitting the UAVs a degree of flexibility to allocate resources appropriately to meet this requirement.

The key challenges in this work are in the efficient prioritisation of the individual tasks required to meet the overarching mission requirement, the high degree of uncertainty associated with the abilities of the sensors, and the optimisation of the scheduling of these tasks, which may include different sensor capabilities The choice of scenarios considered, the properties of the UAVs, and the task requirements will be developed in collaboration with the industrial partner, MBDA.

Go to the EPSRC CDT in Distributed Algorithms website.