

Cooperative dynamic behaviors in heterogeneous multi-robot systems

Abstract:

Decentralized control strategies for multi-robot systems have been extensively studied in the last few years. Typically, these strategies aim at exploiting local interaction rules to regulate the overall state of the multi-robot system towards a desired configuration, thus generating some desired coordinated behavior, such as synchronization, swarming, deployment, or formation control.

However, when considering real world application of multi-robot systems, more complex cooperative dynamic behaviors are desirable. On these lines, we propose a methodology to control a multi-robot system for cooperatively tracking arbitrarily defined periodic setpoint trajectories. This objective is fulfilled defining a heterogeneous multi-robot systems, in which robots are partitioned into two groups: independent robots (that can provide control inputs) and dependent robots (that are controlled through local interaction). The motion of the independent robots is then defined in such a way that, exploiting local interactions, the dependent robots are controlled to track the desired trajectories.