NEXT LEVEL INNOVATION IN ROBOTICS AND AUTONOMY

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Title: **Nonlinear formation control strategies for agents without relative measurements under heterogeneous networks**

This talk will focus on cooperative control protocols for a group of unmanned vehicles to make a stable formation around a maneuvering target. The control protocols are proposed on the basis of heterogeneous communication networks, which represent more challenging and generalized situations. Two different scenarios are considered. Separate control protocols are developed for each case. In both scenarios, agents do not have relative position, velocity, and acceleration measurements as feedback. In the first scenario, each agent uses its own position and velocity measurement in a consensus algorithm. In the second scenario, each agent needs only its own position information for the consensus algorithm. For both protocols, agents compute virtual estimates of a target's position and velocity and exchange these among the neighbors. Three different communication networks are used for exchanging two virtual estimates calculated by each agent and a time derivative of one virtual estimate. Each integrant communication network is represented by a fixed, undirected, and connected graph. Furthermore, it is considered that at least one agent receives the position, velocity, and acceleration information of the maneuvering target. It is not necessary that the agent receiving the target's position and the agent receiving the velocity and/or the acceleration information of the target be the same. However, the target does not receive any information about any agent. It is also shown that, despite the large difference in received information, the acceleration of the agents remains bounded for all time.