

## **Cooperative Robotic Systems: Challenges, Control and Applications**

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### ABSTRACT

Using a group of robots to achieve a common task is usually more efficient and with more operational capability than a single robot especially for tasks which are difficult or impossible for an individual robot to complete, such as co-manipulations in Industrial 4.0, combat, surveillance, mapping, and underwater mine hunting etc. In recent years, the cooperative control of multi-robot systems has been an active area of research with formulations such as collaborative robots (COBOTS), swarming, flocking, foraging, consensus and rendezvous, etc. This type of system is composed of several intelligent agents which interact with each other through communication channels, which imposes challenges in control to deal with the constraints such as time delays, data losses and bandwidth limitations. In this presentation, research on cooperative robotic systems in the Advanced Control and Mechatronics Lab at Dalhousie University will be introduced. Specifically, the presentation will focus on the distributed event-triggered formation control and adaptive robust control for multiple aerial and ground vehicles, and multiple manipulator systems. Extensive simulation and experimental results of the proposed schemes will be demonstrated.