Title: Models and Control of Individual Agents

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Abstract: In this talk we will describe the self-steering particle model of agents for use in the study of collective phenomena (bird flocks, fish schools, insect swarms, and aerial as well as ground robots). Using the language of differential geometry of curves, these models will permit the formulation and dynamic analysis of a variety of interaction laws based on dyadic pursuit mechanisms – such as motion camouflage, constant bearing pursuit, etc. This material will form the basis of the dynamic analysis of mission-oriented modifications of certain collective behavior strategies in the talks to follow. This talk will also provide an introduction to details of the test-bed in the Intelligent Servosystems Laboratory (ISL) where we explore these ideas, including sensing apparatus such as Vicon motion capture system, issues of field-of-view limitations on sensors, and consequences of such limitations in the natural world as well as in engineered systems used in missions.