

The Center for Control, Dynamical Systems, and Computation Spring Seminars Presents



Persistent Autonomous Formations and Cohesive Motion Control

by Dr. Baris Fidan

National ICT Australia &
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Friday, June 9th, 2006 3:00 - 4:00 PM ESB 2001

Abstract:

This talk is on analysis of a general class of autonomous multi-agent systems moving in formation, namely persistent formations, based on a recently developed theoretical framework of graph rigidity and persistence. In a persistent formation, the formation shape is maintained during any continuous motion via a set of constraints on each agent to keep its distances from a pre-specified group of other neighboring agents constant. In the first part of the talk the general characteristics of rigid and persistent graphs, their implications on the control of persistent formations and some operational criteria to check the persistence of a given formation are reviewed. In the second part, acquisition and maintenance of the persistence of certain types of autonomous formations are considered. Some common operations on persistent formations including addition of new agents to the formation, closing ranks when an agent is lost, merging two or more formations, splitting a formation into smaller formations are reviewed, and strategies for maintaining persistence during these operations are presented. The third and final part is on the cohesive motion control of persistent autonomous formations, where the aim is designing distributed control schemes for moving a given persistent formation with specified initial position and orientation to arbitrary desired final position and orientation without deforming the shape of the formation during the motion.

Acknowledgement: This talk is based on a series of joint studies with Brian D.O. Anderson, Changbin Yu, and Julien M. Hendrickx.

About the Speaker:

Baris Fidan received the B.S. degrees in electrical engineering and mathematics from Middle East Technical University, Turkey in 1996, the M.S. degree in electrical engineering from Bilkent University, Turkey in 1998, and the Ph.D. degree in Electrical Engineering-Systems at the University of Southern California, Los Angeles, USA in 2003. After working as a postdoctoral research fellow at the University of Southern California for one year, he joined the Systems Engineering and Complex Systems Program of National ICT Australia and the Research School of Information Sciences and Engineering of the Australian National University, Canberra, Australia in 2005, where he is currently a researcher. His research interests include autonomous formations, sensor networks, adaptive and nonlinear control, switching and hybrid systems, mechatronics, and various control applications including high performance and hypersonic flight control, semiconductor manufacturing process control, and disk-drive servo systems.
