

# YALE COMMUNICATIONS AND NETWORKING SEMINAR

Professor Brian D. O. Anderson  
Australian National University and National ICT Australia  
Canberra ACT, Australia

will give a talk on

## FORMATIONS, RIGIDITY AND PERSISTENCE

on Tuesday, November 29  
at  
4:00pm  
in  
AK Watson Room 500

### Abstract

A paradigm for maintaining the shape of a moving formation in two or three dimensions of a collection of agents, assumed initially to be point agents for convenience, is to postulate that certain agent pairs measure the distance between each other, and maintain that distance constant. When enough of the inter-agent distances are explicitly maintained, the remaining ones will be consequentially maintained.

When for a given agent pair, both agents are tasked with maintaining the distance, the formation is akin to a physical structure that for each agent pair with inter-agent distance to be explicitly maintained inserts a bar between those agents, equal in length to the distance required to be maintained between the agents. One can then ask when the resulting structure will be **rigid**, and rigidity of the structure will correspond to maintenance of the formation shape. An alternative control structure involving agent pairs has only one member of the pair given the task of maintaining the prescribed distance. In this case, the notion of a physical structure and the modelling using an undirected graph is inadequate. One can ask now when the resulting structure will **persist**; rigidity is necessary but not sufficient.

**Brian Anderson** is the Chief Scientist and President of the newly formed National Information and Communications Technology Centre - Australia {NICTA}. He has served as president of the Australian Academy of Science, as a member of the Prime Minister's Science and Engineering Innovation Council and as Director of the Research School of Information Science and Engineering at the Australian National University, Canberra. He is a fellow of the Royal Society, London and a foreign associate of the US National Academy of Engineering. He has won many awards and prizes including the 1997 IEEE Technical Field Award for Control Systems and the 2001 IEEE James H. Mulligan Jr. Education Medal.