



FORMATION CONTROL OF MULTIPLE AUTONOMOUS ROBOTS: THEORY AND EXPERIMENTATION

WEI KANG

*Department of Mathematics
Naval Postgraduate School
Monterey, CA93943, USA*

NING XI

*Dept. of Electrical and Computer Eng.
Michigan State University
East Lansing, MI 48824, USA*

JINDONG TAN

*Dept. of Electrical and Computer Eng.
Michigan Technological University
Houghton, MI 49931, USA*

YUECHAO WANG

*Shenyang Institute of Automation
Chinese Academy of Science
Shenyang, China*

ABSTRACT—This paper presents an approach to the control of a formation of autonomous robots using a perceptive reference frame. The perceptive frame uses a parameter that is directly related the fusion of the sensory measurement of the formation as the motion reference. The paper presents the concept of the perceptive reference frame and the design procedure based on the perceptive reference. The stability of the system based on the perceptive reference is investigated. Examples are given to show the flexibility and advantage of the proposed approach. Some useful strategies of coordination are implemented in a perceptive frame by reference projections. The feature of the coordination is illustrated by experiments using three mobile robots. Lab experiments on mobile robot are carried out in an environment with unexpected obstacles and unexpected stop for an arbitrary period of time.

Key Words: Formation control, perceptive reference frame, robot formation, event based control, mobile robots