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Robot Colonies

Robots in groups or colonies can exhibit an enormous variety and richness of behaviors which cannot be observed with singly autonomous systems. Of course, this is analogous to the amazing variety of group animal behaviors which can be observed in nature. In recent years more and more investigators have started to study these behaviors. The studies range from classifications and taxonomies of behaviors, to development of architectures which cause such group activities as flocking or swarming, and from emphasis on the role of intelligent agents in such groups to studies of learning and obstacle avoidance. There used to be a time when many robotics researchers would question those who were interested in working with teams of robots: 'Why are you worried about robotic teams when it's hard enough to just get one to work?'. This issue responds to that question. Robot Colonies provides a new approach to task problem-solving that is similar in many ways to distributed computing. Multiagent robotic teams offer the possibility of spatially distributed parallel and concurrent perception and action. A paradigm shift results when using multiple robots, providing a different perspective on how to carry out complex tasks. New issues such as interagent communications, spatial task distribution, heterogeneous or homogeneous societies, and interference management are now central to achieving coordinated and productive activity within a colony. Fortunately mobile robot hardware has evolved sufficiently in terms of both cost and robustness to enable these issues to be studied on actual robots and not merely in simulation. Robot Colonies presents a sampling of the research in this field. While capturing a reasonable representation of the most important work within this area, its objective is not to be a comprehensive survey, but rather to stimulate new research by exposing readers to the principles of robot group behaviors, architectures and theories. Robot Colonies is an edited volume of peer-reviewed original research comprising eight invited contributions by leading researchers. This research work has also been published as a special issue of Autonomous Robots (Volume 4, Number 1).

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