Abstract

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A Navigation Approach for Configuring Distributed Hexagonal Metamorphic Autonomous Mobile Robots

In this paper, the navigation problem for a metamorphic robotic system is addressed. The metamorphic robotic system is a composition of any number of two dimensional hexagonal autonomous mobile robots (modules), which aims to form the desired configurations. The proposed algorithm consists of two parts, which act in centralized and decentralized form. The centralized part is utilized by the leader robot for the Selection process of the local robots and for the communication with the local robots. The decentralized part is the navigation part used by each local robot to choose the next cell to be chosen in the robot movement path. This next cell is called sub-goal cell, which is one of the cells adjacent to the robot. Local robots fill in the sub-goals and then they are moving through the path to reach their goal destinations without collisions deadlock. As overall, the desired configuration is achieved while local robots reach their goal destinations and connect to each other. Extensive simulations are carried to show the effectiveness of the proposed algorithm.