Efficient terrain coverage for deploying wireless sensor nodes on multi-robot system

ABSTRACT

Coverage and connectivity are the two main functionalities of wireless sensor network. Stochastic node deployment or random deployment almost always cause hole in sensing coverage and cause redundant nodes in area. In the other hand precise deployment of nodes in large area is very time consuming and even impossible in hazardous environment. One of solution for this problem is using mobile robots with concern on exploration algorithm for mobile robot. In this work an autonomous deployment method for wireless sensor nodes is proposed via multi-robot system which robots are considered as node carrier. Developing an exploration algorithm based on spanning tree is the main contribution and this exploration algorithm is performing fast localization of sensor nodes in energy efficient manner. Employing multi-robot system and path planning with spanning tree algorithm is a strategy for speeding up sensor nodes deployment. A novel improvement of this technique in deployment of nodes is having obstacle avoidance mechanism without concern on shape and size of obstacle. The results show using spanning tree exploration along with multi-robot system helps to have fast deployment behind efficiency in energy.

Keyword: Deployment; Exploration; Multi-robot; Spanning tree; WSN