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題目

Deployment and Scheduling in Wireless Rechargeable Sensor Networks

Abstract:

In most existing schemes, wireless rechargeable sensor networks (WRSNs) are generally equipped with one or more wireless charging vehicles (vehicles) to serve sensor nodes (SNs). These schemes solve the energy issue to some extent; however,due to off-road and speed limitations of vehicles, some SNs still cannot be charged in time, negatively affecting the lifetime of the networks. Thus, our work proposes a new WRSN model equipped with one wireless charging drone (drone) with a constrained flight distance coupled with several wireless charging pads (pads) deployed to charge the drone when it cannot reach the subsequent stop. A wireless charging pad deployment problem is formulated, which aims to apply the minimum number of pads so that at least one feasible routing path can be established for the drone to reach every SN in a given WRSN. Four feasible heuristics, three based on graph theory and one on geometry, are proposed for this problem. However, the major weakness of the heuristics is that they only consider deploying a wireless charging pad at the locations of the wireless sensor nodes. These schemes are limited and constrained because usually every point in the deployed area can be considered to deploy a pad. Moreover, the deployed pads suggested by these schemes may not be able to meet the connected requirements due to sparse environments. As a result, we introduced a new scheme that utilizes the Quad-Tree concept to address the wireless charging pad deployment problem and reduce the number of deployed pads at the same time. Finally, to conquer the drawbacks of WCVs and drones, we also proposed a novel WRSN model which integrates WCVs, WCV-carried drones and independent drones to construct an efficient novel charging system.

個人簡介

俞教授曾獲得多項最佳論文獎，包括 2008 年 ACM 國際感測器、隨意與網狀網路會議，2004 年與 2007 年移動計算研討會，以及 2013 年與 2021 年無線、隨意與感測器網路研討會的最佳論文獎。俞教授已發表超過 70 篇論文，其中包括刊載於（IEEE Journal on Selected Areas in Communications）、（IEEE Transactions on Parallel and Distributed Systems）、IEEE Transactions on Vehicular Technology）、（Theoretical Computer Science）、（ACM/Springer Wireless Networks）、（Elsevier Computer Communications）、（Elsevier Ad Hoc Network），（ACM Transactions on Embedded Systems）等等。

此外，俞教授還擔任多個國際期刊的編輯及客座編輯，包括《隨意與感測器無線網路：國際期刊》（Ad Hoc & Sensor Wireless Networks: An International Journal）。他同時也是兩個國際研討會的組織者，即國際無線網路算法與理論研討會（WiNA）以及國際無線網路效能評估研討會（PEWiN）。

Research Interest

Graph algorithms, Algorithms in Wireless Sensor Networks, Algorithms for Multidisciplinary Applications