

一种基于 N -最优阶次序列的无线传感器网络节点定位方法

裴忠民, 邓志东, 徐硕, 许潇

1. 智能技术与系统国家重点实验室, 清华信息科学与技术国家实验室(筹), 清华大学计算机系 北京 100084

2. 中国科学技术信息研究所 北京 100038

收稿日期 2008-11-12 修回日期 2009-3-25 网络版发布日期 接受日期

摘要

基于阶次序列的无线传感器网络(Wireless sensor networks, WSN)定位方法是一种新颖的高精度定位方法, 该方法将定位空间划分为不同的子区域, 每个子区域用一条阶次序列唯一标识. 但该方法存在区域边界节点定位误差较大且不能保证平均定位误差最优. 提出了一种基于 N -最优阶次序列的节点定位方法. 首先基于无线信号衰减模型产生虚拟测试点, 以参考点为样本, 通过随机采样确定最优 N 值, 然后选择阶次位于前 N 位的序列所表示的子区域, 对目标进行加权定位. 文中完成了 100 个节点的仿真实验、15 个 ZigBee 网络硬件节点的室外实验以及 10 个 ZigBee 硬件节点的防空洞模拟矿井应用实验. 结果表明, 本文方法有效地降低了平均定位误差, 并改善了边界节点的定位精度.

关键词 [无线传感器网络](#) [定位](#) [信号强度指示](#) [阶次序列](#)

分类号

A New Localization Method for Wireless Sensor Network Nodes Based on N -best Rank Sequence

PEI Zhong-Min, DENG Zhi-Dong, XU Shuo, XU Xiao

1. State Key Laboratory of Intelligent Technology and Systems, Tsinghua National Laboratory for Information Science and Technology, Department of Computer Science, Tsinghua University, Beijing 100084

2. Institute of Scientific and Technical Information of China, Beijing 100038

Abstract

Rank sequence-based localization method is a novel and high-accuracy wireless sensor networks (WSN) localization technique. The localization space is divided into distinct sub-regions and each is uniquely identified by a rank sequence. However, the localization errors for nodes on the edge of a region are rather large and they are not optimal in view of average localization errors. This paper proposes a new N -best rank sequence localization method. The best value N is first achieved using the random sampling for reference nodes based on a wireless channel fading model, and the coordinates for the target are then computed through selecting the top N rank sequences. We have conducted the simulation with 100 nodes, the outdoor experiment with 15 ZigBee physical nodes, and the air-raid shelter tunnel test with 10 ZigBee nodes. All the results have shown that our method reduces the average localization errors and improves the localization accuracy for nodes on the edge of the region.

Key words [Wireless sensor network \(WSN\)](#) [localization](#) [received signal strength indicator](#) [rank sequence](#)

DOI: 10.3724/SP.J.1004.2010.00199

通讯作者 邓志东 michael@tsinghua.edu.cn

作者个人主页 裴忠民; 邓志东; 徐硕; 许潇

扩展功能

本文信息

▶ [Supporting info](#)

▶ [PDF \(3736KB\)](#)

▶ [\[HTML全文\]\(OKB\)](#)

▶ [参考文献\[PDF\]](#)

▶ [参考文献](#)

服务与反馈

▶ [把本文推荐给朋友](#)

▶ [加入我的书架](#)

▶ [加入引用管理器](#)

▶ [复制索引](#)

▶ [Email Alert](#)

相关信息

▶ [本刊中 包含“无线传感器网络”的相关文章](#)

▶ 本文作者相关文章

· [裴忠民](#)

· [邓志东](#)

· [徐硕](#)

· [许潇](#)