

基于 RSSI 的改进加权质心定位修正算法

龙 佳 1,3, 卑璐璐 2, 李 轶 1,3, 张 申 1,3

(1 中国矿业大学 物联网(感知矿山)研究中心, 江苏 徐州 221008; 2 徐州工程学院 信电工程学院, 江苏 徐州 221111; 3 中国矿业大学 信息与电气工程学院, 江苏 徐州 221008)

摘要: 针对现有无线传感器网络中 RSSI 定位算法易受环境影响、定位精度低的问题, 提出一种基于 RSSI 的改进加权质心定位修正算法. 该算法先根据 RSSI 测距值, 利用极大似然法对未知节点位置进行初步估计, 根据估计坐标值计算未知节点与 RSSI 信标节点间的近似距离, 剔除误差较大的测量组, 然后根据“能与未知节点通信的三个信标节点构成的三角形三边相等时定位误差最小”这一理论, 得出权值公式, 利用加权质心定位算法, 结合 TDOA 信标节点计算未知节点的坐标并修正. 仿真结果表明, 该算法较传统的 RSSI 定位算法可有效减小定位误差, 提高定位精度.

关键词: 无线传感器网络; 接收信号强度指示; 极大似然法; 加权质心定位算法; 校正

Improved Weighted Centroid Localization Correction Algorithm

Based on RSSI

LONG Jia 1,3, BEI Lu-lu 2, LI Yi 1,3, ZHANG Shen 1,3

(1 Internet of Things Perception Mine Research Center, China University of Mining and Technology, Xuzhou 221008, China; 2 School of Information and Electrical Engineering, Xuzhou Institute of Technology, Xuzhou 221111, China; 3 School of Information and Electrical Engineering, China University of Mining and Technology, Xuzhou 221008, China)

Abstract: Aiming at problem that the RSSI localization algorithm is vulnerable to the environment and it has low localization precision in wireless sensor networks, this paper proposed an improved weighted centroid localization correction algorithm based on RSSI. The algorithm estimated roughly the coordinate of unknown node by using RSSI values through maximum likelihood estimation, then it used the coordinate to calculate the approximate distance between the unknown node and the beacon nodes. The algorithm removed the measurement group whose error were large and it got the weighted formula by the theory that the positioning had the least error when the triangle was trilaterally equal and consisted of three beacon nodes which can communicated with the unknown nodes. The algorithm calculated and corrected the coordinate of unknown node with the help of TDOA beacon nodes through weighted centroid localization algorithm. The simulation shows that the algorithm can effectively reduce positioning errors compared with traditional RSSI localization algorithm and it can also improve localization accuracy.

Key words: wireless sensor networks; RSSI; maximum likelihood estimation; weighted centroid localization algorithm; correction

作者简介:

龙 佳 男, (1991-), 硕士. 研究方向为无线传感器网络. E-mail:1530843361@qq.com.

卑璐璐 女, (1981-), 博士, 讲师. 研究方向为矿山通信与微波技术.