

应用

基于分簇结构无线传感器网络的高效无源定位方法

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摘要:

针对基于节点通信能力和能量受限的无线传感器网络实现高精度无源定位的问题, 首先, 在分簇结构网络中, 通过折中单个簇的TDOA定位精度和运算复杂度, 确定了簇规模; 其次, 基于直达波环境中TDOA定位误差是按布站GDOP对测量误差放大的原理, 提出第一轮定位先使用网内所有节点以RSSI定位方法粗估计目标辐射源位置, 并根据各簇在该粗估计位置处的布站GDOP和测量误差估算TDOA定位标准差, 第二轮定位选择具有较低TDOA定位估计标准差的部分簇参与TDOA定位, 最后将这些簇的TDOA定位结果按估算的定位估计标准差加权平均, 求得最终定位解。仿真结果证明该方法有效的去除了冗余节点, 实现以半数节点接近使用全部节点的定位精度。

关键词: 无源定位; 簇规模; 到达时间差; 接收信号强度; GDOP

An efficient passive location method based on clustering structure wireless sensor network

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Abstract:

This paper presents an efficient method to optimize the passive location accuracy base on communication and energy constrained wireless sensor network. Trade off the location accuracy and the computational complexity by set the scale of single cluster; based on the theory of the target position estimation variance is scaling the measurements error by GDOP (geometry dilution of position), propose a two rounds passive location method : the first round, using RSSI location (Received Signal Strength Indicator) scheme by employ the whole sensor set to give the coarse estimation of target location.To estimate the TDOA location estimation variance by the product of GDOP (geometry dilution of position) of cluster and the measurements error;The second round, select a part of clusters which have lower variance in the coarse estimation of target location, then using these selected sensors' TDOA (Time Difference of Arrival) location solution weighted by location estimation variance to give the fine estimation of target location. Simulation results verify this method get rid of the redundant sensors efficiently, use half of sensors approach to the location accuracy of use all sensors.

Keywords: passive location; scale of cluster; Time Difference Of Arrival; Received Signal Strength Indication; Geometry Dilution Of Position

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