高精度无线传感器网络时间同步算法研究

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摘　要：泛洪式时间同步算法通过对发送节点和接收节点的时标对进行线性拟合，估计接收节点相对于发送节点的时间同步参数，从而修正接收节点的本地时间.线性拟合算法的选择直接影响了同步的精度.因此采用有限加权最小二乘法实现算法中的线性拟合.有限加权最小二乘法相对于传统的最小二乘法，增加了对旧数据点所带来的观察噪声的处理，降低了观察噪声对同步精度的影响，此外算法增加了对异常数据的处理，避免了异常数据对同步精度的影响.实验表明提出的算法有效地提高了同步精度.

关键词：　无线传感器节点；时间同步；FTSP；高精度

Time Synchronization Algorithm of High Accuracy for Wireless Sensor Networks

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Abstract：In Flooding Time Synchronization Protocol, several pairs of timestamps of the sender and receiver are collected to do linear regression at each synchronization period. Then it calculates related parameters including clock skew and clock offset, which are used to adjust the local clocks of the sensor nodes under synchronization. The choice of the linear regression algorithms has a direct influence on the accuracy of synchronization. The proposed algorithm replaces the common Least Square method with the Finite Weighted Least Square one to do linear fit, which realizes high-precision synchronization with observation noise of old timestamps considered. Besides, detection for abnormal time stamps is introduced, which avoids the influence of abnormal data points after filtering them. The experiment shows that the proposed algorithm effectively improves the synchronization accuracy.

Key words：wireless sensor node; time synchronization ; FTSP; high accuracy

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