煤炭学报 2012, 37(08) 1401-1407 DOI: ISSN: 0253-9993 CN: 11-2190

论文

基于物联网感知的煤矿安全监测数据级融合研究

王军号，孟祥瑞

1.安徽理工大学 计算机科学与工程学院，安徽 淮南 232001；
2.安徽理工大学 能源与安全学院，安徽 淮南 232001

摘要：

针对煤矿安全监控的复杂性和不确定性，把物联网感知应用到安全监测系统中，在物联网感知层中构建了分布式星状无线传感器网络（DSWSN），深入研究了物联网应用层中感知煤矿安全的数据级融合算法。运用置信距离测度与采集数据的时间戳相结合的动态限幅滤波算法对数据进行预处理以消除疏失误差，采用最优加权估计算法完成数据级融合，不需要具备传感器测量数据的任何先验知识，依据传感器方差的自相关和互相关估计，就可融合出均方误差最小且满足无偏性的数据融合值。仿真结果表明，本算法具有权值分布合理，绝对误差波动平稳，动态响应特性好，收敛速度快，能有效滤除干扰数据等特征，体现了算法的合理性和较强的鲁棒性，能够满足安全监测的需求。

关键词： 物联网；感知；煤矿安全；数据级融合

Reasearch on the data levels fusion of mine safe monitoring based on the perception of Internet of Things

Abstract:

With respect to the complexity and uncertainty in coal mine safety monitoring，Internet of Things(IoT) perception was used in the safety monitoring system.Distributed Star shaped Wireless Sensor Network (DSWSN) was constructed in perception layer of IoT and the data levels fusion algorithm for perceiving coal mine safety in application layer of IoT was studied in depth.Dynamic amplitude limiting filtering algorithm，which was combined with confidence distance measure and data timestamp was used to pretreat data for elimination of any blunder errors.Optimal weighted estimation algorithm was applied to complete data level fusion，without requiring any priori knowledge of sensor’s measurement data.According to self correlation and cross correlation estimations of sensor variances，the fusion values with minimum mean square errors and meeting unbiassedness requirements were obtained.The simulation results show that the algorithm is characterized with rational weight distribution，stable absolute error fluctuations，sound dynamic response characteristics，fast convergence speed and the ability to effectively filter out interference data.Such results have demonstrated its rationality and strong robustness and can satisfy safety monitoring requirements.

Keywords: Internet of Things；perception；mine safety；data levels fusion

收稿日期 2011-12-01 修回日期 2012-02-10 网络版发布日期 2012-09-04

DOI:

基金项目:

国家自然科学基金资助项目（51074005）；安徽高校省级自然科学研究重点资助项目（KJ2010A084）

通讯作者: 王军号

作者简介: 王军号（1970—），男，江苏赣榆人，博士研究生

作者Email: wjh123-123@163.com

参考文献：

本刊中的类似文章