

适于井下 WSN 节点的故障诊断算法研究

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摘要: 井下传感器分布的特点对 WSN 节点分簇式 DFD 故障诊断算法的分簇方式、簇头节点选择方法及各簇稳定后信息传递方式等做了改进, 提出一种适合井下无线传感器网络特点的节点故障诊断算法. 由于井下环境相比普通应用环境有其特殊性, 所以环境监测传感器一般为呈长条形的链式分布在巷道内, 不能按照普通的随机分布网络结构进行诊断. 本算法符合井下无线传感器网络节点的故障诊断对故障定位精度、算法低耗能和高度稳定的要求. 最后并通过仿真验证相比普通算法其能耗更小, 精度较高, 从而拥有更强的生存能力.

关键词: 井下无线传感器网络; 节点故障诊断; 链式布局 WSN; 改进的分簇式 DFD 诊断算法; 能量阈值; 簇头通信链

Research on Node Failure Diagnosis Algorithms for

Coal Mine Wireless Sensor Networks

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Abstract: This paper puts forward a suited wireless sensor network node fault diagnosis algorithm to the characteristics of the underground wireless sensor network, according to the characteristics of the distribution of downhole sensor fault diagnosis algorithm for WSN node clustering DFD clustering way, cluster head node selection method, as well as improving on the stable ability after the clustering. Aimed at the specialties of the downhole application environment: the environment monitoring sensor is usually a long chain distribution within the roadway, cannot be carried out in accordance with the normal random distribution network structure. This algorithm meets the underground wireless sensor network node fault diagnosis algorithm for fault location accuracy, low energy and high stability. At the end, this paper compares between common algorithm and the improved algorithm by computer simulation and verifies the advantage of the improved algorithm: less energy consumption, high precision, thus have a stronger ability to survive.

Key words: The coal mine wireless sensor network (WSN); node fault diagnosis; chain layout WSN; the improved clustering type DFD diagnosis algorithm; energy threshold; cluster communication chain

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