

Node Re-localization for Anchor Drifting Scenarios of Post-Disaster in Coal Mines

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Abstract: To determine the locations of trapped miners after an accident is the prerequisite for scientific making and implementation of rescue strategies. However, a coal mine accident may cause beacon nodes to deviate from the original position, i.e. beacon drift occurs, leading to significant increase of positioning error or even complete failure. In the case of beacon drifting, it is the key of post-disaster re-localization to determine the degree of beacon drifting and select the beacon without drifting or with little drifting as post-disaster beacon nodes. This paper puts forward a novel algorithm called ATRL(AHP-TOPSIS Re-Localization), which comprehensively utilizes the advantages of the Analytic Hierarchy Process(AHP) and the Technique of Order Preference by Similarity to an Ideal Solution(TOPSIS). ATRL takes the selection of re-localization anchors as a model of multiple decision criteria, and judges the reliability of beacon drifting from three aspects, namely node drift amount, environment factors, and node energy. Finally, some nodes with highest reliability are selected as re-localization beacons. Simulation results show that ATRL has strong re-localization ability and can meet the needs of post-disaster rescue.