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RESEARCH ARTICLE

IMPROVING THE LIFETIME OF THE WIRELESS SENSOR NODES USING PPSS PROTOCOL

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Abstract—

Target tracking is one of the most important applications of wireless sensor networks that involve long-term and low-cost monitoring and actuating. In these applications, sensor nodes use batteries as the sole energy source. Therefore, energy efficiency becomes critical. When nodes operate in a duty cycling mode, tracking performance can be improved if the target motion can be predicted and nodes along the trajectory can be proactively awakened. However, this will negatively influence the energy efficiency and constrain the benefits of duty cycling. In this dissertation, Probability-based Prediction and Sleep Scheduling protocol (PPSS) to improve energy efficiency of proactive wake up is used. In PPSS, traffic is only forwarded to the predicted sensor nodes, and the rest of the sensor nodes turn off their radios to save energy. The rotation of multiple predictions make sure that the energy consumption of all sensor nodes is balanced, which fully utilizes the energy and achieves a longer network lifetime compared to the existing techniques. Since the PPSS problem is NP-hard, the proposed approximation algorithms based on the Schedule Transition Graph (STG).

Designing a target prediction method based on both kinematics and probability is started. Based on the prediction results, PPSS then precisely selects the nodes to awaken and reduces their active time, so as to enhance energy efficiency with limited tracking performance loss.

Keywords— WSN, Energy conservation, prediction, Target tracking, Sleep Scheduling, Target Prediction

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