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Advancements in Distributed Computing and Internet Technologies

Trends and Issues

Al-Sakib Khan Pathan, Mukaddim Pathan & Hae Young Lee

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Trends and Issues

Al-Sakib Khan Pathan
International Islamic University Malaysia, Malaysia

Mukaddim Pathan
Australian National University, Australia

Hae Young Lee
Electronics and Telecommunications Research Institute, South Korea

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Chapter 8
Data Gathering with Multi-Attribute Fusion in Wireless Sensor Networks

Kai Lin
Dalian University of Technology, China

Lei Wang
Dalian University of Technology, China

Lei Shu
Osaka University, Japan

Al-Sakib Khan Pathan
International Islamic University, Malaysia

ABSTRACT

This chapter addresses the problem of data gathering with multi-attribute fusion over a bandwidth and energy constrained wireless sensor network (WSN). As there are strong correlations between data gathered from sensor nodes in close physical proximity, effective in-network fusion schemes involve minimizing such redundancy and hence reducing the load in wireless sensor networks. Considering a complicated environment, each sensor node must be equipped with more than one type of sensor module to monitor multi-targets; hence, the complexity for the fusion process is increased due to the existence of various physical attributes. In this chapter, by investigating the process and performance of multi-attribute fusion in data gathering of WSNs, we design a self-adaptive threshold to balance the different change rates of each attributive data. Furthermore, we present a method to measure the energy-conservation efficiency of multi-attribute fusion. Then, a novel energy equilibrium routing method is proposed to balance and save energy in WSNs, which is named multi-attribute fusion tree (MAFT). The establishment of MAFT is determined by the remaining energy of sensor nodes and the energy-conservation efficiency of data fusion. Finally, the energy saving performance of the scheme is demonstrated through comprehensive simulations. The chapter concludes by identifying some open research issues on this topic.

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