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Morph: Cognitive Clustering for Wireless Sensor Networks using Smart Materials

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Wireless Sensor Networks is a promising technology for Structural Health Monitoring thanks to its easy installation and low cost. However, an efficient SHM system requires numerous sensor nodes with high sampling rates resulting in huge amounts of data. Consequently, it leads to the short system lifetime of WSN, which is powered by limited battery. How to organize a large set of nodes efficiently for longer lifespan remains a big unsolved challenge.

Clustering algorithm with the capability of in-network information processing is a good method to reduce redundant data transmissions and save energy. However, most of existing solutions either form static topology or allow limited dynamics under a fixed duty cycle scheduling policy. Few clustering algorithm takes environmental conditions to consideration. In this paper, we propose a novel cognitive clustering framework to enable flexible, self-adaptive topology control for WSN. It uses smart materials to detect external events and switch on/off the hardware automatically. We explain how to select and employ appropriate kinds of smart materials. Cognitive clustering is elaborated and demonstrated in a case study of bridge monitoring.

Ключевые слова:

Содержание.

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