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THESE

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Par

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Thème

**Data Management in Wireless Sensor
Networks**

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Abstract

A wireless sensor network is typically composed of many tiny computers that feature a low frequency processor, some flash memory for storage, a radio for short-range wireless communication and limited energy source. Applications of wireless sensor networks have emerged in many domains ranging from environmental monitoring to structural monitoring as well as industry manufacturing. In all these applications, the primary task of a wireless sensor networks is to collect useful information by monitoring phenomena in the surrounding environment. Typically, in a wireless sensor network, sensor nodes generate data about a phenomenon and disseminate streams of data to a special device, namely a data sink, for analysis and processing.

Data management in wireless sensor networks has been an area of significant research in recent years. Many existing sensor data management systems view sensor data as a continuous stream that is sensed, filtered, processed, aggregated and disseminated from sensor node to users.

This thesis focuses on the efficient data extraction and dissemination in wireless sensor networks with energy awareness to extend the lifetime of the network. Energy is a critical factor as sensor nodes once deployed cannot be recharged. These sensor nodes majorly depend on batteries for energy, which get depleted at a faster rate because of the computation and communication operations they have to perform. Communication protocols can be designed to make efficient utilization of energy resources of a sensor node. As first part of our research, we start with studying and analyzing the main sources of energy consumption in wireless sensor networks. We present an overview of some well known existing solutions. We propose a set of algorithms to organize the Medium Access Control and minimize energy consumption. In this first part, we propose two MAC protocols both for asynchronous and synchronous communication mode. We evaluate the parameters of performance and we investigate the problems of energy consumption with extensive simulations.

We study in the second part, the problem of data dissemination in wireless sensor networks. We propose a mechanism to disseminate the sensed data form sensor node to the sink with minimum resource requirements. We extend this mechanism to support sink mobility, as in large sensor network, the communication between the sensors and the stationary sink can lead to high energy consumption, and consequently reduce the lifetime of the network. In our sink mobility scheme, the mobile sink selects its next destination based on the data dissemination frequent. We evaluate with extensive simulations and we compare the communication and the traffic cost of the proposed data dissemination with other approaches.

Keywords: Wireless sensor networks, Energy consumption, MAC layer, Data dissemination, Mobile sink.

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