

AN ADAPTIVE DATA STORAGE AND HISTORICAL QUERY PROCESSING FOR STORAGE-CENTRIC SENSOR NETWORK

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ABSTRACT. *In this paper, we propose an adaptive data reduction scheme and historical query processing technique based on a proxy architecture for the storage-centric sensor network towards efficient energy consumption. In our approach, sensor nodes maintain the collected data based on a novel three-phase summarization strategy. The major idea is that for a specific time period if all sensor reading values are not too much different from each other, appropriate representative values will be generated. As for query processing, we employ a proxy to transform user queries whose range criteria overlap into simpler fragment queries, each with a distinctive spatial and/or temporal predicate. In this way, only queries that have never appeared before are disseminated to sensor network. Consequently, the cost of communication and processing queries in sensor network is remarkably diminished. Furthermore, the experimental results validate that in spite of approximate sensor values obtained by the data summarization method responses to queries are still highly accurate.*

Keywords: Storage-centric sensor network, Proxy architecture, Historical query processing, Fragment query, Data reduction scheme, Query dissemination

1. **Introduction.** The advances of sensor network and modern hardware technologies have made it possible to introduce the concept of ubiquitous computing to the real world applications such as geophysical monitoring, movement tracking, medical monitoring, and environmental monitoring [1,3,20,22,24,28]. Over the past few years, the key challenges in these areas are how to manipulate data incoming from distributed sensor network with the limited energy resources on the sensor nodes. Battery-powered Sensor nodes gather data in natural phenomena (e.g., temperature, light, sound and pressure) and transmit them to a base station to answer the queries issued by users via cooperation with their neighbor nodes. The base station provides an interface for flooding user's queries to the sensor network and for responding results to users so that the sensors can save their energy by the optimized communication methods.