

## Accepted Manuscript

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PII: S1574-1192(17)30588-6

DOI: <https://doi.org/10.1016/j.pmcj.2018.06.007>

Reference: PMCJ 945

To appear in: *Pervasive and Mobile Computing*



Please cite this article as: G.B. Tayeh, A. Makhoul, D. Laiymani, J. Demerjian, A distributed real-time data prediction and adaptive sensing approach for wireless sensor networks, *Pervasive and Mobile Computing* (2018), <https://doi.org/10.1016/j.pmcj.2018.06.007>

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# A Distributed Real-Time Data Prediction and Adaptive Sensing Approach for Wireless Sensor Networks

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## Abstract

Many approaches have been proposed in the literature to reduce energy consumption in Wireless Sensor Networks (WSNs). Influenced by the fact that radio communication and sensing are considered to be the most energy consuming activities in such networks. Most of these approaches focused on either reducing the number of collected data using adaptive sampling techniques or on reducing the number of data transmitted over the network using prediction models. **In this article, we propose a novel prediction-based data reduction method. furthermore, we combine it with an adaptive sampling rate technique, allowing us to significantly decrease energy consumption and extend the whole network lifetime. To validate our work, we tested our approach on real sensor data collected at our offices. The final results were promising and confirmed our theoretical claims.**

*Keywords:* Wireless Sensor Networks; Data estimation; Data reduction; Data prediction; Adaptive Sampling; Energy saving.

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## 1. Introduction

A Wireless Sensor Network (WSN) consists of a base station (Sink) and a number of small, wireless electronic devices called sensor nodes. These nodes react to inputs from both the physical or environmental conditions of a monitored area, such as pressure, temperature, humidity, motion, light, etc [1], and they cooperatively pass data through the network to the Sink for further processing. In recent years, efficient design of Wireless Sensor Networks has become a leading area of research for scientists. Several challenges needed to be addressed for a realistic implementation of WSNs, such as localization, deployment, coverage, data integrity, reliability, etc. All of these challenges are subject to many constraints that sometimes might be incompatible. However, the most important constraint is the limitation in energy resources.

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