ABSTRACT

This work aims at proposing algorithms for energy conservation in a Wireless Sensor Network (WSN) applied to monitoring a smooth process $f(x, y, t)$, modeled as function of sensor nodes coordinates x and y, and time t, to increase the network autonomy. The proposed algorithms are developed for single and multihop networks. The algorithms work in the application layer of each node, and aim at saving node energy by managing the need of transmissions. After the first transmitted sample, only samples with a percentual variation greater than an innovation threshold are transmitted. Furthermore, each node can stay in a sleep mode (saving energy) between these transmissions. For single hop WSNs, two algorithms are proposed: one source-based, in which sensor nodes make all data processing and decisions, and another sink-based, in which all data processing and decisions are performed by the sink node. Furthermore, an extension of the source-based algorithm is proposed for multihop WSNs. Simulation results show that the algorithms lead to a significant reduction in the amount of transmissions, that leads to an increase of the network lifetime and an increment in its autonomy. Finally, an analysis of the trade-off between network lifetime and reconstruction error is presented. In this way, one can conjugate the relationship between maximum lifetime and minimum reconstruction error.

Keywords: Wireless Sensor Networks. Energy. Innovation threshold. Reconstruction. Lifetime. Application layer.