Abstract

Wireless Sensor Networks (WSNs) consist of a huge number of tiny, low-priced, and battery-powered devices with limited on board sensing, processing and communication capabilities. The batteries of sensor nodes of WSNs are usually with limited capacity; hence it is essential to conserve battery energy to prolonging the WSNs lifetime. Therefore, this paper deals with the matter of energy consumption minimization to maximize the overall network lifespan. In this research, a mathematical model for the lifetime of WSN is formulated based on several parameters to find out the optimal solution of the energy problem in the field of wireless sensor networks using the Modified Particle Swarm Optimization (MPSO) and Ant Colony Optimization (ACO) algorithms. The proposed system has been implemented using MATLAB 7.6.0 (R2008a) software environment. The computer simulation results show that the presented approach for power consumption minimization is faster than the previous works by 10 times, and the network lifetime is increased by at least 8 times. Furthermore, the conducted simulation indicates that the MPSO algorithm offers superior results in terms of accuracy (99.36%) in comparison with ACO algorithm (97.92%). In this regards, MPSO algorithm acts with much better efficiency as computational time minimizes, simple, has stable convergence
characteristics, and designed with adaptable inertial weight and acceleration factors than ACO algorithm.

References


Index Terms
Computer Science
Wireless

Keywords
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