Random traveling wave pulse coupled oscillator (RTWPCO) algorithm of energy-efficient wireless sensor networks

ABSTRACT

Energy-efficient pulse-coupled oscillators have recently gained significant research attention in wireless sensor networks, where the wireless sensor network applications mimic the firefly synchronization for attracting mating partners. As a result, it is more suitable and harder to identify demands in all applications. The pulse-coupled oscillator mechanism causing delay and uncharitable applications needs to reduce energy consumption to the smallest level. To avert this problem, this study proposes a new mechanism called random traveling wave pulse-coupled oscillator algorithm, which is a self-organizing technique for energy-efficient wireless sensor networks using the phase-locking traveling wave pulse-coupled oscillator and random method on anti-phase of the pulse-coupled oscillator model. This technique proposed in order to minimize the high power utilization in the network to get better data gathering of the sensor nodes during data transmission. The simulation results shown that the proposed random traveling wave pulse-coupled oscillator mechanism achieved up to 48% and 55% reduction in energy usage when increase the number of sensor nodes as well as the packet size of the transmitted data compared to traveling wave pulse-coupled oscillator and pulse-coupled oscillator methods. In addition, the mechanism improves the data gathering ratio by up to 70% and 68%, respectively. This is due to the developed technique helps to reduce the high consumed energy in the sensor network and increases the data collection throughout the transmission states in wireless sensor networks.

Keyword: Wireless sensor network; Pulse-coupled oscillators; Self-organizing; Energy-efficient; Synchronization