Cluster Formation of Wireless Sensor Nodes using Adaptive Particle Swarm Optimisation

Abstract

Hierarchical based clustering protocol for wireless sensor network is suitable to use in energy efficient environmental monitoring. In clustering protocol, sensor nodes that are cluster heads (CHs) have to collect information from cluster member and transmit to the base station. Strategic CHs location can significantly affect the network overall energy consumption. Therefore, selecting suitable CHs location becomes a challenging task. In this work, CHs distribution using adaptive particle swarm optimisation (APSO) is proposed. Particle swarm optimization (PSO) is one of the swarm intelligence methods that is designed to search for optimum solution by mimicking the behavior of bird flocking and fish schooling. Introduction of adaptive cognitive and social learning factor can achieve better convergence speed and particles reselection mechanism to reduce the chances of getting trapped at local maximum. The performance of the proposed method is compared with the low energy adaptive cluster hierarchical (LEACH) protocol. Simulation results show that the proposed method outperforms LEACH in terms of first node dies (FND) round, total data received at the base station and energy consumed per round.