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**A Hybrid Grey Wolf and Crow Search Optimization Algorithm-Based Optimal Cluster Head Selection Scheme for Wireless Sensor Networks**

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**Abstract**

Clustering is considered as one of the most primitive technique that aids in prolonging the lifetime expectancy of wireless sensor networks (WSNs). But, the process of cluster head selection concerning energy stabilization for the purposed of prolonging the network life expectancy still remains a major issue in WSNs. In this paper, a hybrid grey wolf and crow search optimization algorithm-based optimal cluster head selection (HGWCSOA-OCHS) scheme was proposed for enhancing the lifetime expectancy of the network by concentrating on the minimization of delay, minimization of distance between nodes and energy stabilization. The grey wolf optimization algorithm is hybridized with the crow search optimization algorithm for resolving the issue of premature convergence that prevents it from exploring the search space in an effective manner. This hybridization of GWO and CSO algorithm in the process of cluster head selection maintains the tradeoff between the exploitation and exploration degree in the search space. The simulation experiments are conducted and the results of the proposed HGWCSOA-OCHS scheme is compared with the benchmarked cluster head selection schemes with firefly optimization (FFO), artificial bee colony optimization (ABCO), grey wolf optimization (GWO), firefly cyclic grey wolf optimisation (FCGWO). The proposed HGWCSOA-OCHS scheme confirmed minimized energy consumption, improved network lifetime expectancy by balancing the percentage of alive and dead sensor nodes in the network.

**Keywords:**

Optimal cluster head selection, Lifetime expectancy, Grey wolf optimization, Crow search optimization, Energy stabilization, Firefly cyclic grey wolf optimisation

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