

## Manta Ray Foraging Optimization (MRFO)-Based Energy-Efficient Cluster Head Selection Algorithm for Wireless Sensor Networks

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**Abstract:** Wireless sensor network (WSN) has become a very popular technology with a wide range of applications. It consists of several spatially distributed sensors that work collaboratively to monitor a given region of interest (ROI). The limited energy available for each sensor node is a crucial restriction that affects the overall performance of the network. Therefore, energy efficiency is a major concern in WSNs. Over the years, many techniques have been developed and used to reduce energy consumption in WSNs. Clustering is one of the most effective energy-saving techniques that significantly can improve the efficiency of WSNs in terms of the network lifetime, energy consumption, and the number of received packets. In this paper, an energy-efficient algorithm for cluster head (CH) selection based on a newly formulated fitness function and using the manta ray foraging optimization (MRFO) is proposed. The objective function for the proposed formulation takes into account different network parameters such as the average distance between the CH and the sensors in its cluster, the distance between CHs and the base station (BS), residual energy, and CH balancing. The proposed algorithm is tested by running many simulations under a variety of conditions. The simulation results showed that the proposed algorithm has a better performance than that of some other algorithms reported in the literature in terms of energy consumption, networks lifetime, and the number of received packets