

Hybrid Hunger Games Search Optimization Based on the Neural Networks Approach Applied to UAVs

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Abstract : Using unmanned aerial vehicles (UAVs) for load transport has gained significant importance in various sectors due to their ability to improve efficiency, reduce costs, and access hard-to-reach areas. Although UAVs offer numerous advantages for load transport, several complications and challenges must be addressed to exploit their potential fully. Complexity relays on UAVs are underactuated, non-linear systems with a high degree of coupling between their variables and are subject to forces with uncertainty. One of the biggest challenges is modeling and controlling the system formed by UAVs carrying a load. In order to solve the controller problem, in this work, a hybridization of Neural Network and Hunger Games Search (HGS) metaheuristic algorithm is developed and implemented to find the parameters of the Super Twisting Sliding Mode Controller for the 8 degrees of freedom model of UAV with payload. The optimized controller successfully tracks the UAV through the three-dimensional desired path, demonstrating the effectiveness of the proposed solution. A comparison of performance shows the superiority of the neural network HGS (NNHGS) over the HGS algorithm, minimizing the tracking error by 57.5 %.

Keywords : neural networks, hunger games search, super twisting sliding mode controller, UAVs.

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