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Abstract

The paper introduces an efficient energy optimization technique for multi-drones through path planning using Genetic Algorithm (GA) and Gradient Descent (GD). This approach minimizes energy consumption and avoids obstacles by optimizing path-planning decisions based on real-time drone velocity and obstacle proximity. GD complements GA by refining path fitness through distance measurements, allowing drones to dynamically adjust their routes amid environmental and energy constraints. Experimental results demonstrate that the hybrid GA/GD approach significantly reduces energy usage while maintaining safe navigation and optimizing path costs. Compared to GA alone, the hybrid method achieves a remarkable 22.62% average reduction in energy consumption, highlighting its superior performance in energy-efficient multi-drone path planning. © 2024 IEEE.

Author Keywords

Energy Efficiency; Energy utilization; Genetic Algorithm; Gradient Decent; Multi-drones; Path Planning Optimization

Index Keywords

Genetic algorithms, Optimization algorithms; Energy, Energy efficient, Energy optimization, Gradient decent, Gradient-descent, Multi-drone, Optimisations, Optimization techniques, Path planning optimization

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