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A Review of Cognitive UAVs: AI-Driven Situation Awareness for Enhanced Operations

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1. Round 1

1.1 Reviewer 1

Reviewer:

In the first paragraph, you discuss the diverse applications of UAVs. It would strengthen the argument to provide more recent examples of civilian applications beyond those listed, particularly in emerging areas like smart cities or telemedicine delivery.

The phrase "AI methodologies, including machine learning, deep learning, computer vision, natural language processing, and data fusion" is broad. It may help to briefly explain how each methodology contributes uniquely to situational awareness in UAVs.

The section on SAR missions mentions "real-time data fusion." It would be beneficial to explain which types of data are most commonly fused and how this fusion process enhances mission outcomes.

The claim that AI "supports environmental protection efforts" could be expanded by specifying which types of environmental data (e.g., pollution levels, biodiversity metrics) are most effectively monitored using AI-enhanced UAVs.

The discussion of urban applications could be enhanced by mentioning any existing case studies or pilot projects that demonstrate the effectiveness of AI-enabled UAVs in these scenarios.

The sentence "Key issues include data quality and availability; sensor limitations, noise, and the lack of labeled training data can undermine AI model accuracy" should provide examples of how these limitations have affected specific UAV operations or missions.

Author revised the manuscript and uploaded the updated document.

1.2 Reviewer 2

Reviewer:

The sentence "Situational awareness is critical in UAV operations, enabling the vehicle to understand and interpret its environment to make informed decisions" could benefit from additional specificity. Consider specifying what types of environments or decisions are most critical.

The criteria for selecting literature should be more explicitly defined. For example, how were relevance and contribution to the field quantitatively or qualitatively assessed?

The description of the multi-layer perceptron (MLP) neural network and fuzzy inference system is clear, but it would benefit from more detail on how these systems specifically enhance situational awareness compared to traditional methods.

The discussion of "cluster situational awareness technology" should include a brief explanation of what makes it distinct from individual UAV situational awareness, particularly in terms of operational advantages or challenges.

When discussing the comparison between multi-UAV and UAV swarm operations, consider including a brief explanation of why swarm intelligence is particularly advantageous in military applications.

In the discussion of military applications, the claim that AI improves "the accuracy and efficiency of target acquisition" would be stronger with specific metrics or examples from studies that quantify these improvements.

The issue of real-time processing constraints is mentioned but not elaborated upon. Including a discussion of potential solutions or existing technologies that mitigate these constraints would be valuable.

The mention of "adverse weather" and "complex terrains" as challenges could benefit from further explanation of how these factors specifically impact UAV sensor performance or AI decision-making processes.

The section discussing advancements in AI, such as "more sophisticated machine learning algorithms," could be improved by identifying which specific advancements (e.g., reinforcement learning, generative models) are most promising for UAV applications.

Author revised the manuscript and uploaded the updated document.

2. Revised

Editor’s decision after revisions: Accepted.

Editor in Chief’s decision: Accepted.

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