



REVIEWER'S REPORT

Manuscript No.: IJAR- 57563

Title: Design and Optimization of Autonomous Mountaineering Logistics Drone for High-Altitude Operations

Recommendation:	Rating	Excel.	Good	Fair	Poor
Accept	Originality	Yes			
	Techn. Quality	Yes			
	Clarity	Yes			
	Significance		Yes		

Reviewer Name: Dr. Ashish Yadav

Detailed Reviewer's Report

Reviewer's Comment for Publication.

Acceptance Comment are mentioned below suitable for the paper titled "Design and Optimization of Autonomous Mountaineering Logistics Drone for High-Altitude Operations"

Reviewer Comments: Accept

Reviewer Comments –

Introduction

The proposed research on the Autonomous Mountaineering Logistics Drone addresses a highly relevant challenge in modern high-altitude expedition support. The study presents an innovative UAV platform designed specifically for mountainous terrains where human endurance, oxygen availability, and rescue accessibility are critically limited. The integration of autonomous navigation, adaptive control systems, and altitude-resilient propulsion demonstrates a strong understanding of operational requirements in extreme environments. The concept of combining VTOL capability with fixed-wing efficiency is technically sound and suitable for long-range logistics missions. Overall, the introduction clearly establishes the need, motivation, and significance of the proposed system in improving climber safety and operational efficiency.

Literature Review

The literature review adequately reflects existing advancements in autonomous UAV systems, VTOL aircraft, and high-altitude drone applications. Previous studies on logistics drones, aerial rescue systems, and hybrid propulsion technologies are appropriately connected to the proposed work. The review successfully identifies limitations in current mountain rescue and supply-delivery methods, particularly concerning payload capacity, endurance, and environmental adaptability. The discussion on low-density air operations and aerodynamic challenges demonstrates good technical awareness. Furthermore, the

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inclusion of adaptive navigation and autonomous decision-making concepts strengthens the academic relevance of the proposed research framework.

Solution Approach

The proposed solution approach is innovative and technically feasible for high-altitude logistics operations. The hybrid VTOL fixed-wing architecture, supported by ducted fan propulsion and deployable wings, provides a balanced combination of hovering stability and efficient cruise performance. Retractable landing stands further enhance the drone's practicality for uneven mountain terrain. The emphasis on adaptability and autonomous decision-making is commendable, as these capabilities are essential in unpredictable weather and terrain conditions. Additionally, the proposed operational range and service ceiling align well with realistic mountaineering support requirements, making the system suitable for emergency response and supply transportation missions.

Results and Discussion

The expected outcomes of the research indicate substantial improvements in mountaineering logistics, emergency medical delivery, and climber safety. The drone's ability to autonomously optimize routes and carry essential supplies can significantly reduce physical strain on climbers and minimize risk exposure during expeditions. The discussion effectively highlights the importance of reliable performance under low-temperature and low-pressure conditions. The hybrid aerodynamic configuration is expected to improve endurance and payload efficiency compared to conventional multirotor drones. Overall, the results demonstrate strong practical applicability and indicate that the proposed system could contribute meaningfully to future autonomous rescue and logistics technologies.

Conclusion

The research presents a well-structured and forward-looking solution for autonomous high-altitude logistics support. The proposed drone combines advanced aerodynamic design, intelligent autonomy, and environmental adaptability to address critical challenges faced in mountaineering operations. The work demonstrates both technical innovation and practical relevance, particularly in improving emergency response efficiency and reducing risks to human life. The methodology is clear, the objectives are achievable, and the proposed applications have significant real-world impact. Based on the technical merit, originality, and societal relevance of the study, the work is recommended for acceptance with appreciation for its innovative contribution to autonomous aerial systems research.