International Journal of Advance Interdisciplinary Research
Vol. 2, Special Issue 1, (Jan-March) 2026, pp. 86-92, e-ISSN: 3107-913X
DOI: https://doi.org/10.66095/ijair.2026.v2.S1.9

Integrating AI-Powered Drones in Military Operations:Opportunities for the Indian Army

Ayush Srivastava[1] and Dr Ajay Pratap[2]
[1]Amity Institute of Information Technology, AUUP Lucknow-226018, India
[2]Amity Institute of Information Technology, AUUP Lucknow-226018, India
E-mail: ayush.srivastava3@s.amity.edu

Abstract: The introduction of Artificial Intelligence (AI) in Unmanned Aerial Vehicles (UAVs) has caused a rapid shift in the way Defense Operations are carried out around the world today. This report will identify the key advantages of utilizing AI drones to the Indian Army and how they may be used to develop a new Military Doctrine and to increase Operational Effectiveness. The information was obtained from an extensive amount of research and analysis of the key technologies that enable autonomous drone operation, the historical development of AI in warfare, and the status of India's indigenous capabilities and Strategic Framework until 2025. In addition, the report identifies the key Ethical and Strategic Challenges including Lethal Autonomy, Algorithmic Bias, and the increasing AI Arms Race. The study provides a Strategic Roadmap for the Large-Scale Integration of AI Drones by 2040 with a heavy emphasis on Human-Centered Design. The overall goal of the study is to assist Defense Policymakers with the implementation of a Balanced Approach to Technology Development and Ethical Responsibility and National Security Objectives.

Keywords: AI Drones, Indian Military, Swarm Technology, Defense Strategy

1. Introduction

The integration of Artificial Intelligence (AI), Machine Learning, and other advanced technologies into unmanned aerial vehicles (UAVs) is leading to a fundamental change in modern warfare. The UAVs, which were originally developed for gathering intelligence at the battlefield level, have evolved into a full-fledged combat system, with capabilities to carry-out precise strike missions, conduct electronic warfare, and autonomously complete various missions. The integration of AI and Machine Learning has enabled significant improvements in areas of navigation, targeting, mission planning, as well as the ability to transform Command Structures and accelerate the decision-making process while minimizing the limitations of humans. However, this transition is not simply a matter of advancing technology, but rather it signifies a paradigmatic shift in the manner in which conflicts are waged, necessitating a review and update of Military Doctrine, Training Practices, and Ethical Guidelines. Warfare is increasingly "Intelligentizing," and therefore, it

requires a comprehensive adaptation of the entire military system, as opposed to simply incorporating new tools.

As a nation with expansive land borders and a complex security environment, the development and utilization of AI-powered drones present both an imperative and an opportunity for India. The utilization of AI-powered drones will allow the Indian Army to obtain improved Situational Awareness, increased operational precision, and greater operational efficiency, while minimizing the risk to human personnel. These capabilities will be critical in the deterrence and mitigation of emerging threats and the enhancement of national defense preparedness. As India pursues its strategy for the adoption of this technology, it will be guided by strategic objectives, ethical obligations, and cooperative efforts with nations around the world, thus providing a balance of prudence and national security interests. The purpose of this study is to illustrate how the Indian Army can utilize AI-driven drone technologies to achieve maximum benefit through indigenous innovation and strategic planning, and ultimately, to outline a prospective roadmap toward 2040 to guide systematic integration and long-term military readiness.

2. Literature Review

Advancements in artificial intelligence (AI) have significantly expanded the military capability of unmanned aerial vehicles (UAVs). Studies have shown that AI-enabled UAVs provide better surveillance and reconnaissance by allowing for the processing of real-time data and the identification of intelligent targets, resulting in less human involvement in high-risk missions [1]. Autonomous navigation and decision-making mechanisms also provide improved reliability of missions through AI-based path planning and obstacle avoidance techniques [2]. Overall reviews of AI-powered UAV applications have identified reconnaissance, target identification, and logistical support as some of the most promising military applications of AI-powered UAVs, and have emphasized the need for compatibility with existing military infrastructure [3]. Studies have demonstrated the use of reinforcement learning in multi-agent UAV systems to significantly improve coordination and decision-making in complex operational scenarios [4]. Models for autonomous attack and defense decision-making have also been proposed and have highlighted the potential of AI in tactical combat roles, while raising questions about accountability and the role of human oversight in lethal autonomous systems [5]. Research has focused on integrating advanced AI models into UAV platforms for mission planning and control. The application of large language models

in UAV operations has shown promise in improving human-machine interfaces and simplifying command structures [6]. Deep learning-based surveillance systems have also demonstrated superior performance in detecting and tracking targets when compared to traditional image processing methods [7]. Security assessments of AI-driven drones in modern warfare have identified risks related to the misuse, data breaches, and adversarial attacks, and have emphasized the need for robust security architectures and policy frameworks [8]. The innovations in military technology based on AI and autonomous systems have been shown to greatly improve operational speed and decision-making efficiency, changing the nature of traditional combat strategies [9]. At a national defense level, the adoption of armed drones remains heavily influenced by ethical and legal considerations. Research has emphasized the importance of compliance with international humanitarian law, and the establishment of regulatory mechanisms for responsible deployment in military operations [10]. These studies have also illustrated the strategic value of AI-powered drones for applications such as border surveillance, counterterrorism, and disaster response.

3. Proposed Defense Manufacturing Hubs: Powering the Future

India has been working on an Indigenous Defense Manufacturing program to create industrial corridors and regional innovation hubs. The state of Uttar Pradesh is developing production and testing facilities for its Brahmos missile systems, and drones and anti-drone systems. Specifically, the state is establishing Aligarh as a drone hub, which will be focused on drone research and training, while Lucknow will support advanced drone research and testing. Additionally, the state of Odisha has established the Deep Neural Network Laboratory, which is focused on supporting defense innovation using Artificial Intelligence (AI) and collaborative work with DRDO and IIT Bhubaneswar. This allows for innovative solutions to be developed at the local level and then scaled nationally.

Table 1: Comparative Analysis of Countries for Drone Innovation

International Journal of Advance Interdisciplinary Research
Vol. 2, Special Issue 1, (Jan-March) 2026, pp. 86-92, e-ISSN: 3107-913X
DOI: https://doi.org/10.66095/ijair.2026.v2.S1.9

Major Power	Key AI Drone Innovations/Programs	Strategic Focus/ Doctrine	Current Status (up to June 2025)
United States	Replicator Initiative, Collaborative Combat Aircraft (CCA), MQ-9 Reaper	Attainable autonomous systems, loyal wingman concept, reducing human involvement, creating unfavorable cost-exchange ratios.	Replicator 1 aims to field thousands of systems by Aug 2025; CCA programs ongoing; MQ-9 with enhanced autonomous targeting.
China	Wing Loong, CH-4, Intelligent Precision Strike System,	Integrating real-time battlefield awareness, precision strikes, psychological operations.	Key player with advanced capabilities; integrated into combined arms operations;
Russia & Iran	Shahed-136/Geran-2, Geran-3 (jet-powered), Tyuvik light attack drones	Drone alliance, bypass sanctions, full-fledged drone production on Russian soil, asymmetric warfare, rapid scaling of operations.	Russia aims to build 6,000 drones annually by mid-2025; serial production of Tyuvik drones
Israel & Turkey	Harop loitering munitions,	Demonstrated lethality in	Proven instrumental

Bayraktar TB2, Yiha, Songar drones	conventional warfare, precision, autonomy, scalability, counterterrorism.	conflicts; Significant impact on battlefield dynamics.

3.1. Cyber Resilience as a Foundational Pillar: Protecting AI Systems

Military drones, as they become increasingly connected and autonomous, become increasingly vulnerable to cyber and electronic attacks. Therefore, protecting AI systems in the area of national security, requires strong defenses to protect against adversaries who attempt to attack AI systems via various types of threats including but not limited to data poisoning, evasion and inference attacks that could compromise the reliability of the system and its decision-making processes. It is essential to secure the training data and AI models used to protect them from being modified by unauthorized parties and to maintain their integrity and accuracy. AI based cyber threat intelligence provides real time identification and response to emerging digital threats.

3.2. Mitigating Algorithmic Bias: Ensuring Fairness and Reliability

The performance and trustworthiness of all AI-based military systems are directly dependent upon the quality and balance of the training data. If the training data is incomplete or biased, the AI models may produce incorrect intelligence and make unsafe operational decisions in a defense environment that could result in significant risks. Ethical AI development, therefore, must include transparent algorithm design supported by Explainable AI (XAI), methods to evaluate bias and test the robustness of AI models against cyber and electronic threats. In addition, ongoing evaluation of the system and feedback mechanisms are required to allow AI to adapt to new threats and reduce unintended bias.

4. Result and Analysis

Fig 1 illustrates sector-wise analysis of drone technology applications and clearly demonstrates that the majority of drone applications exist in the infrastructure sector with 35.5% of the total, indicating the critical role that drones have played in construction monitoring, bridge and road inspections and large-scale development projects. Fig 2 shows a

International Journal of Advance Interdisciplinary Research
Vol. 2, Special Issue 1, (Jan-March) 2026, pp. 86-92, e-ISSN: 3107-913X
DOI: https://doi.org/10.66095/ijair.2026.v2.S1.9

strong growth trend, with market size rising from USD 1,550.2 Mn in 2024 to USD 5,574.6 Mn by 2032, indicating rapid expansion over the period.

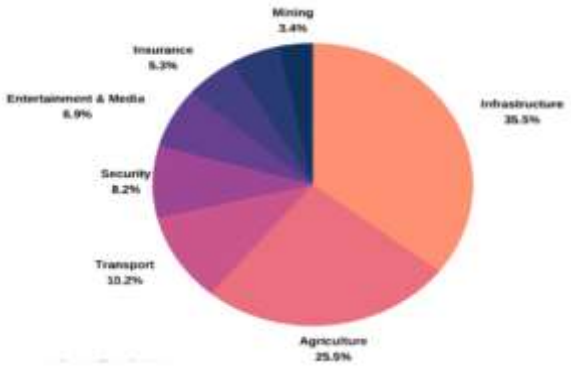

Figure 1: Percentage share of Drome Market in different Sectors

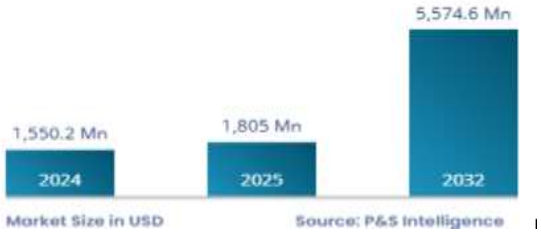

Figure 2: Indian Military Drone Market Analysis

5. Conclusion

The study of drone applications in multiple sectors and their respective market growth trends illustrate the growing importance of drone technology in both civilian and defense areas. Infrastructure and agricultural sectors are the leaders in terms of adoption, highlighting the potential for drones in construction oversight, precision farming and sustainable resource utilization. The transport and security sectors demonstrate moderate levels of adoption for surveillance, logistics and law enforcement. Entertainment, insurance and mining are emerging areas of application. Moreover, the anticipated growth rate of the drone market from 2024 to 2032 indicates rapid advancements in artificial intelligence, autonomous systems and data analytics. Overall, the study's results suggest that continued investment in AI-based drone technologies could improve efficiency, promote sustainability and increase national defense capabilities in countries such as India.

References

1. Singh, A., Kumar, R.: Artificial intelligence enabled unmanned aerial vehicles for military surveillance and reconnaissance. In: Proceedings of the International Conference on Defence Technology and Systems (ICDTS), pp. 45–53 (2023)
2. Joshi, A., Spilbergs, A., Mikelsone, E.: AI-enabled drone autonomous navigation and decision making for defence security. In: Proceedings of the 15th International Scientific and Practical Conference on Engineering Technologies, pp. 112–120 (2024)
3. Pal, O.K.: Review of AI-enabled unmanned aerial vehicles for modern warfare applications. In: Proceedings of the International Conference on Artificial Intelligence and Defence Systems (ICAIDS), pp. 98–106 (2024)
4. Yang, C., Li, J., Zhao, H.: Decision-making strategies for multi-agent UAV systems using reinforcement learning. In: Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), pp. 1560–1568 (2025)
5. Ruiz Estrada, M.A.: Autonomous artificial intelligence in military drones' attack and defense decision-making. In: Proceedings of the International Conference on Security and Emerging Technologies (ICSET), pp. 77–85 (2025)
6. Javaid, S., Saeed, N., He, B.: Large language models for UAV control and mission planning. In: Proceedings of the IEEE International Conference on Intelligent Systems and Control (ISC), pp. 410–418 (2024)
7. Singh, A.V., Verma, P.: Drone-based intelligent surveillance systems using deep learning techniques. In: Proceedings of the International Conference on Advanced Computing and Communication Technologies (ICACCT), pp. 501–509 (2024)
8. Kao, T.F., Lin, S.Y.: Security analysis of drones and artificial intelligence in modern warfare. In: Proceedings of the International Conference on Global Security and Emerging Technologies (ICGSET), pp. 150–158 (2024)
9. Phadke, P., Mishra, S.: Innovations in military technology: role of AI and autonomous systems in modern warfare. In: Proceedings of the International Conference on Strategic Defence Studies (ICSDS), pp. 220–229 (2024)
10. Singh, A., Sharma, N.: Ethical and legal perspectives of armed drones in Indian military operations. In: Proceedings of the International Conference on Law, Technology and National Security (ICLTNS), pp. 95–103 (2023)