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The Algorithmic Shield: Assessing the Impact of AI on the Indian Defence System

Dr. Ashok Kumar Verma

Assistant Professor, Department of Defence & Strategic Studies, Pratap Bahadur Snnatkottar Mahavidyalay, Pratapgarh City, Pratapgarh (UP)
Affiliated to Prof. Rajendra Singh (Rajju Bhaiya) University, Prayagraj (UP)

Abstract**-- Through data analytics, self-governing systems, and improved monitoring, the Indian Defence System's integration of AI is transforming capabilities and moving from experimental to operational deployment. Aiming to improve situational awareness, logistics, and combat effectiveness, key initiatives are spearheaded by Department of Defence Production programs like DAIPA and AI in Defence.**

Keywords **– AI, Algorithmic Warfare, Security, Strategy, Technology.**

I. Introduction

India's defense strategy has historically placed a strong emphasis on using a lot of manpower. The emphasis is now on "algorithm warfare," in which the winner is determined by speed and accuracy. Acknowledging this, the Ministry of Defence (MoD) established organizations like the Defence AI Project Agency (DAIPA) and the Defence AI Council (DAIC) to institutionalize AI. By 2026–2027, the MoD has a clear plan to incorporate AI into every aspect of the armed forces.

II. The Strategic Shift: From Manpower To Mind Power

Using a large number of people has always been a key component of India's defense strategy. These days, the main focus is on "algorithm warfare," where speed and accuracy determine the winner. The Ministry of Defence (MoD) has recognized this and institutionalized AI through groups like the Defence AI Council (DAIC) and the Defence AI Project Agency (DAIPA), with a clear plan to integrate AI into every facet of the armed services by 2026–2027.

III. Key Domains Of Impact

A. Intelligence, Surveillance, and Reconnaissance (ISR)

The borders of India are where AI is having the most direct effects. AI-driven systems that never sleep are supplementing the conventional "eyes on the ground" approach.

Smart Borders: The Indian Army has sent AI-based Intrusion Detection Systems (AI-IDS) to areas that are unstable, such as Kashmir and the Northern borders. These systems use feeds from thermal imagers and sensors to tell the difference between a person and an animal, which cuts down on false alarms and operator fatigue.

Satellite Intelligence: AI algorithms now swiftly analyse satellite imagery to detect changes in enemy troop build-up or infrastructure development (such as new roads or airbases) in nearly real-time, whereas it used to take days for human analysts to do so.

B. Autonomous Systems and Robotics

India is actively moving towards unmanned platforms to minimize risk to human soldiers.

Swarm Drones: Indian startups and DRDO are creating swarm drone systems that can communicate with one another to overwhelm enemy air defences as part of the Atmanirbhar Bharat initiative.

Unmanned Ground Vehicles (UGVs): For low-intensity conflict operations, DRDO's Centre for Artificial Intelligence and Robotics (CAIR) has created autonomous robots that can enter dangerous buildings and identify improvised explosive devices (IEDs) without the need for human assistance.

C. Predictive Maintenance and Logistics

For a military as large as India's, logistics is a massive cost center. AI is turning this into an efficiency engine.

Asset Availability: Predictive maintenance tools supported by AI are used by the Indian Air Force (IAF) and Navy. AI analyses vibration and sensor data to predict precisely when a part will fail, significantly reducing downtime and expenses, as opposed to repairing a ship engine or fighter jet after it breaks (reactive) or on a set schedule (preventive).

D. Cyber Warfare and Encryption

As warfare moves to the digital domain, AI acts as both a sword and a shield.

Defensive AI: Artificial intelligence (AI) systems are used to quickly identify possible cyberattacks or data breaches in secure military networks.

Cryptography: Strategic orders are protected from interception thanks to the development of unbreakable encryption standards for military communications using advanced AI.

IV. The Ecosystem: DRDO And Private Sector Collaboration

The monopoly of state-run enterprises is breaking. A vibrant ecosystem has emerged, driven by the iDEX (Innovations for Defence Excellence) framework.

DRDO's CAIR: serves as the nodal lab for AI research, focusing on net-centric warfare systems and intelligent decision support systems.

Private Sector & Startups: Companies like Zen Technologies (anti-drone systems) and various deep-tech startups are now integral suppliers, providing agile and cutting-edge AI solutions that large PSUs often struggle to develop quickly.

V. Challenges and Risks

Despite the progress, the path is not without obstacles:

Data Infrastructure: AI is only as good as the data it feeds on. Creating a unified, high-quality dataset across the tri-services (Army, Navy, Air Force) remains a logistical challenge due to legacy systems.

Ethical Dilemmas: The use of Lethal Autonomous Weapons Systems (LAWS) raises profound ethical questions. India maintains a "human-in-the-loop" policy for lethal force, ensuring that while AI can identify a target, a human must pull the trigger.

Talent Gap: There is a critical shortage of specialized AI talent within the armed forces, necessitating deeper collaboration with academia (IITs) and the private sector.

Loss of Human Control and Escalation Risks – Autonomous systems may act at machine speed, triggering unintended conflict before human intervention is possible—especially dangerous in nuclear scenarios.

Cyber Vulnerabilities and AI Hacking – AI systems can be spoofed or hacked, leading to misidentification, system failure, or even turning weapons against their operators.

Unintended Civilian Harm – AI errors in complex environments may result in wrongful targeting and civilian casualties, especially due to unpredictable “black box” behavior.

Bias and Authoritarian Misuse – AI trained on flawed or biased data may discriminate, misidentify targets, or be misused for domestic repression and unlawful killings.

Arms Race and Strategic Instability – A global AI arms race could lead to rushed deployments, accidents, and heightened tensions due to miscalculation or lack of transparency.

Lack of Defence-Specific Data Ecosystem: AI systems require large, clean, and mission-oriented datasets, but military data in India is fragmented, often classified, and lacks standardisation. This limits AI training for object recognition, threat prediction, or battlefield simulations, especially in Indian terrain and conflict conditions.

VI. Future Outlook

The future of Indian defence is "intelligent." We can expect to see the rise of Man-Machine Teaming (MUM-T), where human pilots fly alongside autonomous "wingman" drones. Furthermore, the convergence of Quantum Computing and AI will likely render current encryption and stealth technologies obsolete, pushing India to invest heavily in quantum-resilient defence mechanisms.

VII. Conclusion

AI is not a "plug-and-play" tool for the Indian military; it is a paradigm shift. It promises a leaner, faster, and more lethal defence force. As India faces a two-front threat environment, the ability to harness the power of AI will likely be the deciding factor in ensuring national sovereignty in the 21st century.

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