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## Artificial Intelligence in Defence Sector of India

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### ORIGINAL ARTICLE



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### ABSTRACT

AI in the India's defence sector is revolutionizing military capabilities through enhanced situational awareness, autonomous systems (drones, vehicles, Lethal Autonomous Weapon Systems - LAWS), improved cyber defence, smarter logistics, and advanced predictive maintenance, enabling faster, data-driven decisions, better resource allocation, and reduced human risk in complex operations. Key applications include AI-powered ISR (Intelligence, Surveillance, Reconnaissance), autonomous border patrols, target recognition, and AI-driven command support systems for superior battlefield insights.<sup>1</sup>

### KEY WORDS

ISR, LLMs, DAIC, Artificial Intelligence, C2ISR, Defence.

### INTRODUCTION

India is rapidly integrating AI into its defence sector for enhanced surveillance (border security via smart systems), predictive maintenance (aircraft health), logistics, and autonomous systems (drones/robots), focusing on indigenous development through initiatives like DAIC/DAIPA (Defence AI Council/Agency) and private partnerships, aiming for self-reliance and faster decision-making in modern warfare. Its applications include AI-driven C2ISR, autonomous border patrols, intelligent training simulators, and indigenous LLMs (Large Language Models) like Neurelix AI's offering for real-time threat analysis, supported by significant government funding and a growing startup ecosystem.<sup>2</sup>

### Key Applications of AI in India's Defence

- **Surveillance & Reconnaissance:** India is rapidly adopting AI for national surveillance in defence (border patrol drones, satellite analysis), approximately 140 smart surveillance systems, have been deployed along India's borders with Pakistan and China to monitor for intrusions using

video analytics and sensor data. Internal security (predictive policing, facial recognition, crowd control), and public health (disease outbreak detection, TB screening), using it to enhance efficiency and pre-empt threats, though this expansion raises significant privacy concerns and debates over regulatory frameworks for state control versus individual rights.<sup>3</sup> AI drones and satellites autonomously detect objects, analyze terrain, and provide real-time intelligence, speeding up target acquisition.



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(Source: <https://www.johnnette.com/blog/post13.html>)

- **Autonomous Systems:** AI powers unmanned vehicles for patrols, reconnaissance, logistics, and casualty evacuation, especially in dangerous zones.



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(Source: <https://www.timesnownews.com/india/ai-on-the-frontlines-how-the-indian-army-is-deploying-ai-for-security-cyber-warfare-beyond-article-118148040>)

- **Decision Support:** AI fuses massive data (sensors, intel) to offer commanders rapid, actionable recommendations for response strategies. India's defence sector is rapidly adopting AI for enhanced decision support, focusing on C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance, Reconnaissance) via smart surveillance, drone swarms, predictive analytics, and cyber defense, aiming for faster, data-driven insights and autonomy, leveraging both public (DRDO, PSUs) and private players for indigenous tech like AI-driven clouds (Akashteer) and secure data systems (ACOM AI), though challenges remain in ethical frameworks and policy integration.<sup>6</sup>
- **Cyber Defence:** AI detects network anomalies, counters intrusions, and simulates attacks to test resilience. Artificial intelligence (AI) is a transformative force in the cyber defence sector, primarily acting as a force multiplier to automate threat detection, analysis, and response at speeds and scales beyond human capabilities. However, the same technology is also used by adversaries, creating an ongoing "AI arms race"<sup>7</sup>

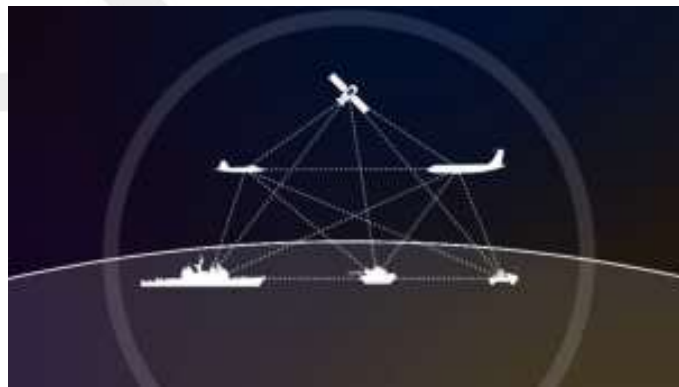


(Source: <https://data-flair.training/blogs/ai-and-cyber-security/>)

- **Predictive Maintenance:** India's defence is quickly adopting AI for predictive maintenance, using sensors and machine learning to analyze real-time data for critical assets like aircraft and ships, aiming to reduce downtime, cut costs, and boost operational readiness, with key players like BEL and HAL developing indigenous solutions for the Army and Navy, shifting from reactive to proactive, data-driven upkeep.<sup>9</sup> Algorithms are used to forecast equipment failures (aircraft, tanks, ships), increasing operational readiness.
- **Border & Base Security:** Artificial Intelligence is shaping India's defence landscape providing a potential advantage in operations while also enhancing border security. Facial recognition and behavioral analytics secure perimeters and critical infrastructure.
- **Logistics & Resource Management:** Optimizes supply chains for efficient delivery of resources.

### Key Initiatives in India

- **India's 'AI in Defence' Initiatives:** India's AI in Defence initiatives focus on self-reliance (Atmanirbhar Bharat) through institutional bodies like the Defence AI Council (DAIC) & DAIPA, funding (₹ 100 Cr/year), R&D by DRDO (CAIR), & industry-startup collaboration (iDEX), developing indigenous solutions like Ekam AI & AI-in-a-Box, and applying AI in predictive maintenance, autonomous systems, cyber defense, and training for enhanced operational capabilities and security.[10] The Indian MoD launched 75 AI products, including smart surveillance, robotics, and AI-enabled training simulators.
- **AAM AI (Ekam AI):** India's Ekam AI is an indigenous, secure artificial intelligence (AI) platform developed for the Armed Forces to ensure data sovereignty and provide tailored AI solutions for military applications. The platform supports intelligence automation, real-time situational awareness, and decision support without reliance on foreign systems.
- **Project Swarm Drone:** An autonomous drone for urban intervention and counter-terrorism. The Indian military has demonstrated AI-enabled swarm drones for surveillance and area denial, showcasing the potential for enhanced operational efficiency.
- **Project SAMBHAV:** A portable communication system using satellite support, demonstrating how defence innovation strengthens national infrastructure in remote areas.
- **Project Overmatch (US Navy):** Creates a "network of networks" for instant data exchange among assets.



(Source: <https://www.defensenews.com/outlook/project-overmatch->)

## Institutional Framework<sup>12</sup>

- **Defence AI Council (DAIC):** Chaired by the Defence Minister, the DAIC provides overall guidance and strategic direction for AI projects.
- **Defence AI Project Agency (DAIPA):** This agency is responsible for the implementation of AI initiatives and setting technology development benchmarks.
- **iDEX (Innovations for Defence Excellence):** This program funds startups and MSMEs to develop AI, advanced imaging, and autonomous systems for defence use.
- **DRDO (Defence Research and Development Organisation):** Through its Centre for Artificial Intelligence and Robotics (CAIR), DRDO has developed over 75 AI products, including autonomous platforms and cyber defence systems. DRDO is developing numerous AI-based products for India's military, focusing on AI-powered data fusion for situational awareness, advanced robotics (UGVs, UAVs like TAPAS, Daksh), AI-guided missiles, electronic warfare tools, and soldier support systems.

## Impact

- **Enhanced Speed & Precision:** AI enables decisions and actions at speeds beyond human capability.
- **Force Multiplication:** Autonomous systems reduce personnel needs in dangerous situations.
- **Strategic Advantage:** Offers superior situational awareness and intelligence-led operations.

## Operation Sindoor and AI based Indian weapons<sup>13</sup>

Operation Sindoor showcased India's advanced AI in defense, using systems like ECAS, TRINETRA (integrated with Sanjay for data fusion), weather AI for artillery, and AI-guided drones (SkyStriker) for enhanced surveillance, precision targeting, and decision-making, minimizing soldier risk through "code-native" remote strikes using smart munitions like SCALP, BrahMos, and Hammer bombs, with claims of high precision and minimal collateral damage.

## Key AI-Powered Systems & Tools

- **ECAS (Electronic Intelligence Collation and Analysis System):** Real-time AI software to identify and prioritize threats.
- **TRINETRA & Sanjay (Battlefield Surveillance System):** Fused multi-sensor data (drones, satellites) for a common battlefield picture, using Edge AI for local processing.



(Source: <https://www.youtube.com/watch?v=uZauiKE6jX4>)

- **Weather AI:** Provided 72-hour forecasts for precision artillery planning.
- **AI-Guided Drones (Loitering Munitions):** Indian-made suicide drones (like SkyStriker) used for autonomous reconnaissance and strikes, featuring real-time object detection.



(Source: <https://www.bhaskarenglish.in/originals/news/indias-skystriker>)

The SkyStriker drones were co-developed by Israeli Elbit systems and Adani Group's Alpha Design Technologies in a manufacturing facility in Bengaluru.

- **AI for Misinformation:** Tools to counter deepfakes and enhance transparency.

### AI-Enabled Weapons & Munitions

- **SCALP Missiles:** French-origin, air-launched cruise missiles used by Rafale jets, featuring infrared seekers for deep strikes.



(Source: <https://www.facebook.com/Indiaourhome/posts/the-scalp-is-recognized-for-its-advanced-targeting-capability>)

- **BrahMos Missiles:** Supersonic cruise missiles with advanced guidance for pinpoint accuracy.



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(Source: <https://defenceupdate.in/brahmos/>)

The BrahMos is a world-leading supersonic cruise missile, jointly developed by India's DRDO and Russia's NPOM (NPO Mashinostroyeniya), named after the Brahmaputra and Moskva rivers. Known for its speed (up to Mach 3), precision, and "Fire and Forget" capability, it's launched from land, sea, air (Su-30MKI), and submarines, serving the Indian Armed Forces and attracting export interest. It features stealth technology, multi-trajectory flight, and significant kinetic energy for powerful strikes against ships and land targets.

- **Hammer Bombs:** Smart munitions with AI guidance for GPS-jammed zones, used via satellite coordination.

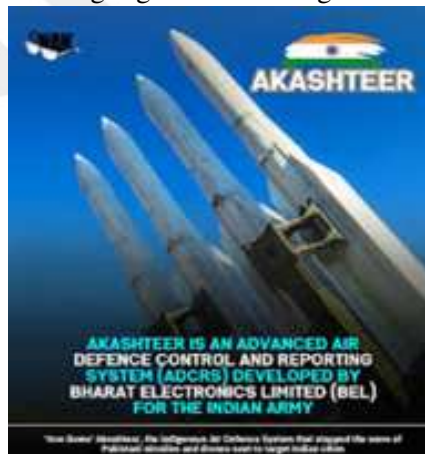


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(Source: <https://www.spsmai.com/features/?id=363&q=IAF-orders-HAMMER-smart-bomb-kit-for-LCA-fleet>)

"Hammer bombs" refer to the AASM HAMMER (Highly Agile Modular Munition Extended Range), a French-developed smart munition kit that turns standard bombs into precision-guided weapons with GPS, laser, or infrared guidance, offering extended range (up to 70km) and resistance to jamming, used by forces like Ukraine and India for accurate strikes against fortified targets. It's modular, fitting different bomb sizes (125kg-1000kg) and featuring a range-extending tail and nose-mounted guidance, making it versatile for close air support and deep strikes

- **Akashteer:** An indigenous system highlighted for intelligent warfare in strikes.



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(Source: <https://www.instagram.com/p/DJbbJjlo4-H/>)

- **Akashteer** (Sky Arrow) is India's advanced, indigenous, AI-enabled, automated Air Defence Control & Reporting System (ADCRS) for the Army, integrating radars and sensors to provide real-time battlefield awareness, detect/track aerial threats (drones, missiles), and coordinate ground-based weapons for swift, precise engagement, forming a key part of India's joint air defense network with the Air Force and Navy, enhancing national security and 'Atmanirbhar Bharat' (self-reliant India).

### Core AI Application

- **Data Fusion & Decision Support:** AI integrated data from satellites (Cartosat, Riset) and sensors for live terrain mapping and target validation, supporting "silicon-first, soldier-last" strikes.

### CONCLUSION

AI is very useful in the field of war and defence sector. Our India adapting its advanced technology to improve precision and range of its weapons. The world is now looking towards us to fulfil their security needs by our AI based missiles and other weapons. Government is funding enough to its relative organisations. We are now becoming self dependent in the field of defence.

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