



Delhi Policy Group

Advancing India's Rise as a Leading Power



POLICY BRIEF

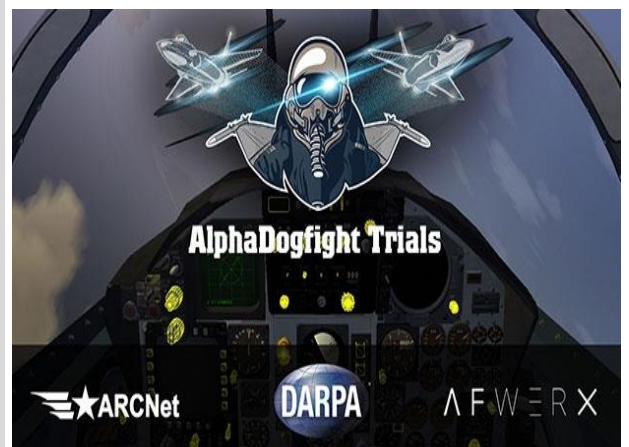
Implementing Artificial Intelligence in the Indian Military

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Cover Photographs:

Defence Minister Rajnath Singh inaugurating the "AI in Defence Symposium" on July 11, 2022 in New Delhi (Source: Official Twitter Account of Rajnath Singh)

DARPA's AlphaDogfight trials pitting a human pilot against AI. Source: DARPA website.

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Introduction

Artificial Intelligence (AI) is shaping and changing all industries across the world. Global spending on AI touched \$118 billion in 2022 and is projected to surpass \$300 billion in 2026.¹ Although we are still at the 'Narrow AI' stage, where AI can outperform a human in only a narrowly defined and structured task, it still has enormous utility and potential.

Similar to other industries, the power of AI has led to militaries around the world increasingly integrating AI into warfighting systems. AI is currently being incorporated into command and control, intelligence, surveillance, logistics, healthcare, information warfare, cyber warfare, training and simulation, autonomous systems, and lethal autonomous weapons.

In 2018, the U.S. Department of Defense (DoD) released its Artificial Intelligence Strategy, which warns that "failure to adopt AI will result in legacy systems irrelevant to the defense of our people, eroding cohesion among allies and partners, and reduced access to markets that will contribute to a decline in our prosperity and standard of living."² The DoD has spent 87 percent of the total U.S. federal expenditure on AI in the last five years.³

In 2017, China's State Council issued the Next Generation Artificial Intelligence Development Plan that set broad goals up to 2030. The plan envisages that by 2025, China will achieve major breakthroughs in basic theories for AI and, by

¹ IDC: The premier global market intelligence company. "Worldwide Spending on AI-Centric Systems Will Pass \$300 Billion by 2026, According to IDC." Accessed February 11, 2023. <https://www.idc.com/getdoc.jsp?containerId=prUS49670322>.

² Blackburn, R Alan. "Summary of the 2018 Department of Defense Artificial Intelligence Strategy," 2018. <https://media.defense.gov/2019/Feb/12/2002088963/-1/-1/1/SUMMARY-OF-DOD-AI-STRATEGY.PDF>

³ Denford, Gregory S. Dawson, Kevin C. Desouza, and James S. "Understanding Artificial Intelligence Spending by the U.S. Federal Government." Brookings (blog), September 22, 2022. <https://www.brookings.edu/blog/techtank/2022/09/22/understanding-artificial-intelligence-spending-by-the-u-s-federal-government/>.

2030, become the world's primary AI innovation center and lay the foundation for becoming a leading innovation-style nation and an economic power.⁴

An October 2021 report published by the Centre for Security and Emerging Technology (CSET) at Georgetown University estimated that the PLA was spending between \$1.6 billion and \$2.7 billion on AI research and procurement per year, which is approximately equivalent to that of the U.S. military.⁵ The priority areas for the PLA units and military laboratories are developing autonomous vehicles and surveillance systems in the undersea domain.

The Indian military is also looking to harness the potential of AI. On July 11, the Indian Defence Minister, Rajnath Singh, launched 75 newly developed AI technologies during the first-ever 'AI in Defence' (AIDef) symposium and exhibition organised by the Ministry of Defence in New Delhi. Speaking on the occasion, Rajnath said, "Timely infusion of technologies like AI and Big Data in the defence sector is of utmost importance so that we are not left behind the technological curve and are able to take maximum advantage of technology for our services."⁶

AI is undoubtedly a force multiplier, but its adoption has many challenges militaries must overcome to fully utilize its potential. This policy brief will look at some of the key requirements and recommend steps to be taken by the Indian military to harness the power of AI effectively.

Key Requirements for Effective Application of AI

Artificial Intelligence (AI) is a broad field that involves the creation of intelligent machines that can perform tasks that typically require human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages. There are several different approaches to creating AI systems, but the most common method is through the use of machine learning algorithms. Machine learning is a type of AI that involves training a computer program on a large dataset, allowing the program to learn from the data and make predictions or decisions based on that knowledge.

⁴ Air University (AU). "In Their Own Words: New Generation Artificial Intelligence Development Plan." <https://www.airuniversity.af.edu/CASI/Display/Article/2521258/in-their-own-words-new-generation-artificial-intelligence-development-plan/>.

⁵ Cranny-Evans, Samuel. "The Role of AI in the People's Liberation Army." Army Technology (blog), June 24, 2022. <https://www.army-technology.com/analysis/the-role-of-ai-in-the-peoples-liberation-army/>.

⁶ ANI. "Rajnath Singh Launches 75 Newly-Developed AI-Enabled Defence Products," July 12, 2022. https://www.business-standard.com/article/current-affairs/rajnath-singh-launches-75-newly-developed-ai-enabled-defence-products-122071200094_1.html.

Some of the critical requirements for the effective application of AI are given below.

Data

Quality data is the most essential requirement, as AI algorithms require large amounts of high-quality data to train on. ChatGPT, the AI chatbot that has taken the world by storm, was fed some 300 billion words systematically scraped from the internet.⁷ In military applications, this data would need to be obtained from various sources and would have to be cleansed, transformed, and aggregated to ensure that it is suitable for use. The data must also be specific to the operating environment; e.g., data for a desert region will not be relevant when creating an algorithm for high-altitude areas.

Interoperability

AI systems need to be able to exchange data and work seamlessly with other systems in order to be useful in military contexts. This may require the development of common data standards, Application Programming Interfaces, or other interoperability solutions. In addition, the three services will need to be fully networked with each other to ensure interoperability.

Computing power

AI algorithms require significant computing power to process and analyze large amounts of data. This may involve the use of high-performance computing systems, cloud computing, or other advanced computational resources. An added complication is that a large amount of data will have to be processed at the edge (at or near the user). Therefore, sufficient computing power will have to be made available for making decisions in a contested battlespace environment.

Security

AI systems used in the military need to be secure and protected against cyber threats and attacks. The adversary could use AI to probe for weaknesses in our systems and corrupt the integrity of the data on which our AI systems depend.

⁷ Uri Gal, The Conversation. "ChatGPT Collected Our Data without Permission and Is Going to Make Billions off It." Text. Scroll.in. <https://scroll.in>, February 15, 2023. <https://scroll.in/article/1043525/chatgpt-collected-our-data-without-permission-and-is-going-to-make-billions-off-it>.

This will require implementing measures such as encryption, firewalls, and secure data storage using AI solutions.

Ethics and Responsibility

The use of AI in the military raises ethical and legal concerns, particularly regarding the level of autonomy that can be granted to AI systems. There is a need to formulate and adopt strict ethical guidelines while ensuring that the implementation of AI does not get unduly delayed due to these considerations, and we fall behind our adversaries.

Expertise

Developing and applying AI will require a multidisciplinary team with expertise in areas such as AI, computer science, data science, cybersecurity, ethics, and military operations. Some of this expertise may not be available in-house in the military, and civilian talent may have to be imported.

Current Initiatives for AI Adoption in the Indian Military

In February 2018, the Department of Defence Production of the Ministry of Defence constituted a task force to study the future use of AI in defence applications. Known as the task force for 'Strategic Implementation of AI for National Security and Defence,' it submitted its report in June 2018.⁸ Based on the task force's recommendations, a Defence AI Council (DAIC) and a Defence AI Project Agency (DAIPA) were set up in 2019.

The DAIC is headed by the Defence Minister and comprises the three service chiefs, defence secretary, National Cyber Security Coordinator, and members from the DRDO, industry, and academia. The DAIC is supposed to meet twice a year and provide necessary guidance to enable and effect development or tailoring of the operating framework, policy level changes, and structural support.⁹

The DAIPA has the Secretary (Defence Production) as the ex officio head of the agency and members drawn from the services, Defence Public Sector Undertakings, DRDO, academia, and industry partners. The DAIPA will evolve and adopt standards for technology development and delivery process for AI

⁸ "National Initiatives on Artificial Intelligence in Defence." Accessed February 11, 2023. <https://usi.ofindia.org/publication/cs3-strategic-perspectives/national-initiatives-on-artificial-intelligence-in-defence/>.

⁹ <https://www.ddpmod.gov.in/sites/default/files/AI.pdf>

projects and review the adoption plan of AI-led and AI-enabled systems and processes with the user groups.¹⁰

It has also been decided that a budgetary allocation of Rs. 100 Crore (\$12 million) will be made by MoD each year for the next five years to DAIPA for taking up AI projects, setting up AI-related infrastructure, preparing AI-related data, and capacity building. In addition, each service shall earmark Rs. 100 crore per year for AI-specific application development for the next five years from their annual budgetary allocations.

These are reasonable steps at the Defence Ministry level but will have to be reinforced by planning, processes, and structural changes at the user level, i.e., the military. AI adoption will be patchy and suboptimal unless the military fully prepares to absorb this technology.

Implementation Plan for Adopting AI in the Indian Military

For effective implementation of AI, steps to be taken will have to be at the level of the Chief of Defence Staff (CDS) and the Headquarters Integrated Defence Staff (HQ IDS) so that a joint service approach can be adopted. These steps include the formulation of an AI strategy, creating organizational structures, and bringing in new processes.

Preparing an AI Strategy

The CDS must oversee the preparation of an AI strategy that will provide a strategic roadmap for AI development and fielding. The strategy will identify goals and objectives, the broad areas for the use of AI, the scale of application, organizational restructuring, and ethical issues. It will also look into the type of workforce required and the collaboration necessary with defence R&D, private technology companies, and academia.

Organisational Changes

To drive the effective application of AI, a Directorate of Artificial Intelligence (DAI) should be set up at HQ IDS. This directorate could initially start with three sections, as given below, with further expansion as AI adoption matures in the military.

- **Policy Section:** This section will make policies to develop, mature, and transition AI technologies into operational use. In conjunction with the

¹⁰ Ibid

Service HQs, it will conduct a comprehensive assessment of militarily relevant AI technologies and identify those that can be adopted in a reasonable time frame. The section will also ensure that there is no duplication of programmes in the three services.

- **Data Section:** Currently, the data held is in service silos and is not all machine-readable. The Data Section will be responsible for ensuring that data collected from various sources, including sensors, unmanned aerial vehicles, satellites, and ground-based systems, is stored in centralized data repositories to make it accessible to AI applications. In addition, the data must be platform and environment-agnostic and not depend on a particular hardware or software. The section will also look towards integrating the current service-specific networks so that data is available to all users, where required.
- **Acquisition Section:** The Service HQs will carry out most AI acquisitions, but the Acquisition Section will approve all high-cost programs to ensure that they are in accordance with policy directions and meet both technical and ethical standards. The section will also draw up a procurement policy for AI programmes. This policy will have to be different from traditional military procurements that are extremely time-consuming and unsuitable for acquiring the rapidly changing AI technology.

Managing the Human-Machine Interface

There are obvious ethical issues on the level of autonomy that can be granted to AI systems and the need to keep humans in the decision loop. Many AI systems currently in use operate as black boxes, meaning that their decision-making processes are not transparent and cannot be easily explained to human users. DARPA, the U.S. defense research agency, is working on an 'Explainable AI (XAI)' programme that aims to create AI techniques that produce more explainable models.¹¹ However, an attempt to introduce transparency and interpretability in the decision-making process can also limit the ability of the AI system to make the best decisions. AI would not have beaten Chess and Go champions if it had behaved like human players. Therefore, finding the right balance and establishing trust is a crucial area that needs greater debate and clarity within the military.

¹¹ "Explainable Artificial Intelligence." Accessed February 16, 2023.
<https://www.darpa.mil/program/explainable-artificial-intelligence>.

Cultivating the Workforce

The adoption of AI will require new skills and a workforce that would need to include talent from the private industry. Personnel policies would have to undergo a change to retain people in the AI field for long periods, in contrast to the rapid turnover that characterizes military tenures in an appointment. Appropriate incentives and security clearances would have to be provided to attract outside expertise. In addition, the services would have to create curated training programmes to ensure that the workforce keeps pace with AI developments in the private sector.

Partnership with the Industry

In recent years, the civilian industry has led the way in AI development and implementation across various sectors. Tech companies are spending billions of dollars on AI, and many of the applications developed can be utilized in the military. These include image recognition, language processing, predictive analysis, autonomous systems, and robotics. The DAI must engage closely with the industry to pick up dual-use technologies that can be adapted for military use. The issue of intellectual property rights (IPR) for AI applications is a contentious matter that will have to be addressed by balancing the interests of both the military and the civilian industry.

Funding for AI

The Indian military is devoting approximately \$50 million (Rs 400 crore) to AI spending each year. This is a good initial step, but clearly inadequate compared to our primary strategic challenger, China, which is spending more than 30 times this amount. If we are not to fall behind the technology cycle, greater investments will have to be made, primarily to promote the indigenous industry players.

Conclusion

There is still a lot of debate on whether AI will have an evolutionary or revolutionary impact on future wars. However, irrespective of future developments, AI is already having a dramatic effect on the tools of warfare. It is now at a stage where militaries that do not adopt AI will be rendered technologically inferior.

AI should not be considered similar to a plug-and-play technology that can be easily implemented in the military. Some elementary applications could fall into this category, but if the full potential of AI is to be realized, the Indian



military would have to look at its data management practices, network its systems, create suitable organizational structures, and prepare its workforce. The more significant challenge today is not the availability of technology but how to harness it to improve the effectiveness of our military force.



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