



Artificial Intelligence in India's Military Sector: Efforts and Future Prospects

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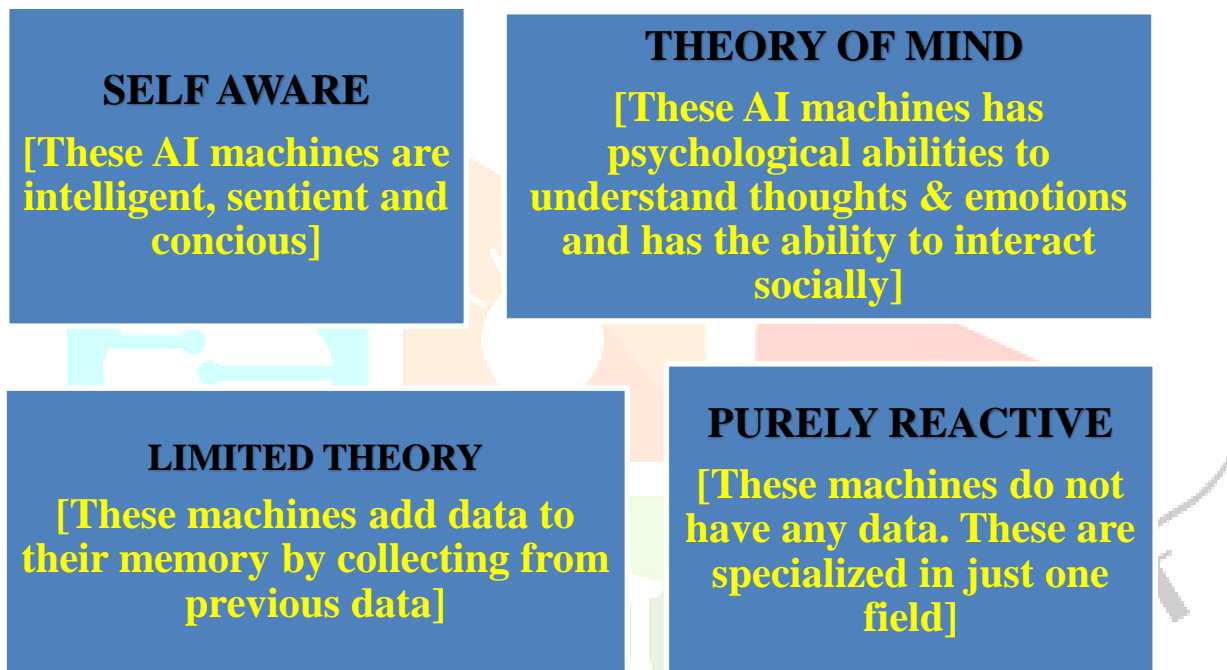
Abstract

Artificial intelligence is the result of developments in the technological sector. It is part of the Fourth Industrial Revolution (4 IR). Every sector in today's age is influenced by artificial intelligence, that is healthcare, agriculture, e-commerce, education, e-governance, transportation, etc. the significance of artificial intelligence for national security has grown rapidly. Hence the defence sector is also not detached from artificial intelligence. In the contemporary world where security is the main concern for every country, the role of artificial intelligence in the military sector has become significant. Countries like the USA, Russia, and China are actively inducing artificial intelligence in the military sector. They are leading competitors in this regard. India is far behind these countries in terms of artificial intelligence. However, India is now taking some steps toward ensuring the effective use of artificial intelligence in the military sector. This article investigates the role of artificial intelligence in the development of the military sector and examines India's effort in bringing innovation to the military field through artificial intelligence.

Keywords: Artificial Intelligence, Military Sector, Security, Development

Introduction:

Artificial Intelligence (AI) is a computer or computer-based robot that can think intelligently and do tasks like human beings. The term is used to designate a machine that mimics a human's intelligence and actions and executes the tasks. Artificial intelligence machines have the cognitive ability to think, learn, problems solving, decisions- making. Artificial intelligence feeds data into the machine to make it respond according to the situation. Artificial Intelligence is a complex technology that aims at developing self-learning patterns where machines can give answers to never answered questions. There are different types of Artificial Intelligence (Self-Aware, Theory of Mind, Limited Memory, and Purely Reactive).



(Fig. 1)

Artificial Intelligence includes technologies like Machine learning, neural networks, self-algorithms, pattern recognition, big data, etc. AI works by combining large data with intelligent, iterative processing algorithms. Each time an AI system performs a round of data processing, it tests and measures its performance and uses the results to develop additional expertise. There are different subsets of AI that are used to implement AI (Machine learning and Deep learning).

MACHINE LEARNING

- Under this, machines learn to complete certain task without programming.

DEEP LEARNING

- Deep learning is a sub- category of machine learning. it enables AI to imitate a human brain's neural network. it can sense patterns, noise and source of confusion in the data.

(Fig. 2)

AI can be divided into a weak and strong categories. The weak AI is designed to perform one particular task e.g. video games and personal assistants like Alexa, Siri, etc. Strong AI behaves like humans. They are designed to handle situations without the interference of a person, e.g. self-driving cars, etc. Today the world is witnessing the 4th IR (Industrial Revolution) and AI is the result of the 4th IR. The term AI has been coined by American Computer Scientist John McCarthy at the 1st AI Conference known as Dartmouth Conference (1956). In the 21st century, AI has become an essential part of the technology industry. It has influenced every sector such as healthcare, education, finance, business, and manufacturing banking. Space, mining, transportation, defence sector, etc.

Role of Artificial Intelligence in the Military Sector:

Artificial Intelligence plays an important role in ensuring the security of the country. It has now become a vital component of modern combat. The AI is deployed in every military operation:-

- **Training:** Simulation and training utilize system and software engineering principles to construct models. These models train the soldiers on combat systems deployed during actual military operations.
- **Arms and Ammunition:** Modern arms and ammunition used on land, naval, airborne, and space platforms are embedded with AI technology. AI weapons are efficient in warfare systems. The inclusion of AI into weapons enhanced the performance of warfare systems while requiring less

maintenance. AI-enabled arms examine the target for kill zones very easily without human intervention.

- **Surveillance:** AI techniques enhance the accuracy of surveillance. Artificial Intelligence with geospatial analysis allows defence forces in understanding the potential operation areas and to the extraction of valuable information from the complex environment. AI in surveillance systems helps in the detection of the position of the targets.
- **Battlefield:** AI-integrated robotics surgical systems (RSS) and Robotic Ground Platforms (RGPs) can provide surgical support and perform evacuation activities in war zones. These types of machines are trained to identify patients' medical records and their health problems.
- **Data Processing:** AI is very useful for processing large volumes of data to extract valuable pieces of information, AI aggregates information from various sources and enables military personnel to derive correlations.
- **Transportation:** Military activities also involve the transportation of goods, ammunition, armaments, and troops. AI machines can play crucial roles in military transportation. AI integration in military transportation reduces human operational efforts and lower transportation costs.
- **Drone Handling:** AI machines can assist a drone to take off and land without being handled by a human.
- **Cyber Security:** Cyber threat is one of the threats to the military system. The cyberattack can lead to the loss of indispensable military information and impose a threat to the security of the country. Systems equipped with AI can record the pattern of cyber attacks and develop counter-attack tools to tackle them. Hence, an AI-enabled web security system protects networks, computers, and data from unauthorized access.

Worldwide Application of Artificial Intelligence in the Military Sector:

Every country keeps security at the top-most priority. To protect its sovereignty and territorial integrity the country focuses on strengthening its military system. In the modern age, a country's development status does not only judge by the level of modernisation it has made in the healthcare, and industrial sectors but is also determined by the reformation a country has made in the military sector. The strength of the army and innovation in the military field ascertain the country's power. Besides, the increasing geopolitical and military tensions have raised concern among countries to modernise their military sector.

Hence, every country is now trying to upgrade its military system with the inclusion of new technology, arms, ammunition, etc. Artificial Intelligence now has become a major part of military systems. Military artificial intelligence has resulted in a new arms race between countries. The USA, Russia, and China are frontrunners in deploying AI in militaries to further strengthen their forces.

- ❖ The USA: In 2019 the Defence Department of the USA released its first AI strategy. It recommended the use of AI systems throughout the military, right from decision-making to problem-solving. Project Maven, Defence Advanced Research Project Agency's (DARPA) Squad X Experimentation Program, and the OFFSET Program are some AI-based projects that are deployed in the US military.
- ❖ Russia: In March 2018, the Russian government released a 10- point AI agenda that aims for establishing AI Big Data Consortium, an AI lab, a national Centre for AI, and a state-backed AI training and education program. It also creates a defence research organisation known as Foundations for Advanced Research Projects dedicated to autonomy and robotics. Russia uses AI for detection and debunking misinformation in defence. The Russian military is planning to merge AI into crewless aerial, naval, and undersea vehicles. Further, it is trying to use AI for remote sensing and electronic warfare.
- ❖ China: In 2017, China's State Council released AI plans and aims at creating an AI industry worth \$ 150 billion by 2030. Some of the AI-Based projects are Military-Civil Fusion National Defence Peak Technologies Laboratory, Bowlfish A2 Model, etc. China has developed and deployed various AI- integrated Vehicles like Unmanned Ground Vehicles (UGVs), Unmanned Underwater Vehicles (UUVs), AI-enabled Satellites, etc.

Apart from these countries the United Kingdom, Israel, and South Korea are working on an AI-based military system.

Artificial Intelligence (AI) and India:

India is significantly behind many other countries in terms of the application of AI in the defence sector. But India is now trying to enforce AI in the military sector. The Army, Navy, and Defence Research and Development Organisation (DRDO) all are focusing on ensuring the effective use of AI in decision-making, surveillance, weapon systems, etc. The Indian government in its 2018- 2019 budget directed NITI Aayog to establish National Program on AI and announced funds for the AI, Machine Learning Robotics, and IoT (Internet of Things) sector. At the 2018 Def Expo- Prime Minister Narendra Modi stated the importance of AI technologies in the defence force. He stated that in the future defence would be dominated by the unmanned system. In February 2018, the Ministry of Defence constituted a task force for the strategic implementation of Artificial Intelligence. The task force was headed by V. Kamakoti. Upon the recommendation of the task force, NITI (National Institute for Transforming India) 2018 presented a National Strategy for Artificial Intelligence. On 20th March 2019, NITI Aayog took a step toward establishing an AIRAWAT (Artificial Intelligence Research, Analytics, and Knowledge Assimilation Platform. According to Global AI Report 2019, India ranked 9th position in terms of the no. of AI specialists working in the field. In February 2019, the government established a Defence AI Council (DAIC) under the chairmanship of the Minister of Defence. The DAIC was entrusted with the task of ensuring the adoption of AI in defence. It aims at the formation of a Central Execution body known as the Defence AI Project Agency (DAIPA). DAIC will direct the partnership between the government and industry and review recommendations related to the acquisition of technology and startups. The Indian government is trying to replace traditional equipment with smart and intelligent robots and machines that possess human-like qualities. DRDO has a laboratory specially dedicated to Artificial Intelligence known as the Centre for Artificial Intelligence and Robotics (CAIR). Since robotics is one of the aspects of AI, the CAIR has developed legged robots, wheeled robots, wall-climbing robots, snake robots, Hexa- bots, etc. for surveillance and reconnaissance. CAIR has also developed a Project named Multi Agent Robotics Framework (MARF). The MARF will equip the Indian Armed forces with a series of robots that would function like soldiers. The private sector is also playing an important role in manufacturing robots for defence purposes. TAL manufacturing Sol Ltd., PARI Robotics, KUKA Robotics, etc. are some of the private sectors that are involved in robot making. India in collaboration with the USA launched USIAI (U.S India Artificial Intelligence Initiative) on March 17, 2021. The initiative was taken by India- U.S

Science and Technology Forum (IUSSTF). The initiative will provide a platform for stakeholders of both countries to share experiences, identify new Research & Development areas, discuss the emerging AI landscape and address the challenges of developing an AI workforce. At G20 Osaka Summit Prime Minister Narendra Modi emphasises the significance of AI. He gave an acronym of 5 'I's that stands for Inclusiveness, Indigenization, Innovation, Investment in Infrastructure, and International Cooperation in Digital Economy & AI.

Future Prospects of Artificial Intelligence in India:

Artificial Intelligence can contribute promising future for India's defence sector. AI can add \$957 billion to the present gross value of the Indian economy by 2035. AI can change the nature of warfare. Warfare in the future will be more technology-driven rather than military action. AI technology will play a key role in war management and control systems. The use of AI in logistics administration, training maintenance, and human resource management will facilitate better military operations. The application of AI in the military will enhance productivity, reduce institutional workload and operate faster than humans. AI-equipped military systems will handle volumes of data efficiently which will allow the commander to have deep strategic insights and help countries to reduce war losses. It will enhance decision-making capabilities which will help military leaders to take the majority of decisions during wars with greater efficacy. Further, AI will be significant in monitoring, diagnosing, and segregating the wounded on battlefields. It will be efficient and quick in organising medical aid.

Conclusion:

Artificial Intelligence in the current era is advancing exponentially. It has become the driver of change for mankind. No fields have been left untouched by AI. Similarly, it has dominated the military field. All major powers have made an effort to embrace AI technologies in the defence sector. India's effort at AI is comparatively nascent. India is trying hard in direction of an AI-based military system. Being a late entrant in the AI race India will have to be laborious in drafting policies, creating skills in AI software, alluring entrepreneurs to invest in AI software and hardware development, etc. to compete with its competitors like the USA, Russia, and China. However, India has still a long way to go in imbibing AI in the defence sector any further delay will make India's position weak in terms of AI in the military sector.

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