ISRG Journal of Engineering and Technology (ISRGJET)

ISRG PUBLISHERS
Abbreviated Key Title: ISRG J Eng Technol.
Journal homepage
Volume – I Issue -IV (November-December) 2025
Frequency: Bimonthly

The United States and China compete over the use of artificial intelligence in the military sector.

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| **Received:** 03.11.2025 | **Accepted:** 12.11.2025 | **Published:** 16.11.2025

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Abstract

Artificial intelligence (AI) refers to a set of technologies capable of simulating intelligence and performing tasks such as perception, understanding, inference, and decision-making autonomously. Drawing upon computer science, electronics, mathematics (particularly statistics), neuroscience, and cognitive science, AI has rapidly expanded in scope and application. Its influence is now evident across diverse scientific, industrial, and strategic domains.

Among these, the military sector stands out as one of the most significant arenas where AI applications are transforming capabilities. With advancements in machine learning and deep learning, modern warfare is experiencing a paradigm shift in both strategy and execution. Accordingly, the central question of this research is: What are the applications of artificial intelligence in the military sector? The objective is to analyze how AI is being integrated into defense systems, with a particular focus on the competition between the United States and China.

This study employs a qualitative, descriptive-analytical approach, using case study and sampling techniques to examine the military AI capabilities of these two global powers. Findings suggest that the role of AI in military affairs is rapidly expanding, reshaping not only the conduct of wars but also their ultimate outcomes. Furthermore, the research highlights that regulating and managing the degree of autonomy granted to intelligent military systems remains a critical challenge requiring urgent attention.

Keywords: Artificial Intelligence, Military Applications, Defense Technology, United States, China

Introduction

When people hear the term *artificial intelligence* (AI), the first image that often comes to mind is that of robots. However, intelligent robots represent only a small portion of the vast and ever-expanding field of AI. Structurally, the term consists of two parts: *intelligence*, which refers to the ability to understand and perform tasks, and *artificial*, which indicates that it is created by human effort rather than occurring naturally. In this sense, AI refers to machines that can learn from past experiences, adapt, and apply knowledge to new tasks in ways that resemble human intelligence.

The significance of this research becomes clear when we recognize the role and influence of AI technology across nearly every aspect of human life. Among its many advantages are saving time and money, improving reliability, replacing humans in difficult or

DOI: 10.5281/zenodo.17622217

dangerous environments, enhancing accuracy, increasing access to information, performing complex computational tasks, and enabling rapid responses. These capabilities have led to AI's widespread adoption in diverse sectors such as robotics, communications, supercomputing, medicine and healthcare, agriculture, e-commerce, security and defense, transportation, space exploration, and identity recognition. Given this breadth, it is widely acknowledged that AI will profoundly shape the future of human societies. Military science and industry, in particular, are undergoing constant transformation through innovation. The study of military innovation is a central theme within strategic studies, and global powers are persistently seeking to integrate the latest technological advances into defense capabilities. AI, often described as the engine of the "Fourth Industrial Revolution," stands out as a driving force of change in modern military affairs.

Accordingly, this research addresses the following question: **What are the applications of artificial intelligence technology in the military sector?** The central hypothesis is that AI can be applied in autonomous military systems—including unmanned aerial vehicles (UAVs), unmanned ground vehicles (UGVs), autonomous underwater vehicles (AUVs), and autonomous weapon systems—alongside weapon targeting, surveillance, and espionage operations.

Methodologically, this study employs a qualitative, descriptive-analytical approach. As a case study, it examines the military AI capabilities of two major global powers, the United States and China, to analyze both the applications and strategic implications of AI in the defense sector.

1. Background

In the Persian-language literature, there are very few sources directly addressing the subject of artificial intelligence and its military applications. However, in the English-language literature, several related studies have emerged in recent years. These can generally be divided into two main groups:

First Group: Studies on artificial intelligence and global power competition

1. Horowitz (2018), in *Artificial Intelligence, International Competition, and the Balance of Power*, highlights the historical importance of technology and its transformative role in shaping societies. He argues that artificial intelligence will significantly affect the future balance of global power, particularly in the rivalry between the United States and China. The strength of this work lies in demonstrating how AI innovation can reshape international relations. However, it does not sufficiently examine the *specific applications of AI in military equipment and battlefield operations*.

2. Miailhe (2018), in *The Geopolitics of Artificial Intelligence: The Return of Empires?*, discusses the rise of digital empires led by the United States and China, as well as Europe's relative lag. Beyond hard (military) power, the article also considers soft power—cultural, political, and commercial influence—and highlights the ethical and governance challenges of AI. Although insightful, the article lacks coherence and tends to jump across topics without fully developing them, leaving its main arguments fragmented.

Second Group: Studies on AI applications in the military sector

1. Svenmarck et al. (2018), in *Opportunities and Challenges of Artificial Intelligence in Military Applications*, examine ongoing projects such as surveillance systems, underwater mine warfare, and cybersecurity. They also explore challenges like transparency, system vulnerabilities, and inadequate training data for machine learning. While informative, the article does not sufficiently address AI integration into physical military equipment.

2. Szabadföldi (2021), in *Artificial Intelligence in Military Applications – Opportunities and Challenges*, provides an overview of AI's potential in situational awareness, decision support, logistics, operational planning, and war simulations. While technically advanced, the article's broad scope and overemphasis on specialized concepts make it difficult to follow, limiting its practical value for readers seeking operational insights.

Position of the present study

The present research seeks to fill these gaps by focusing specifically on the operational and equipment-related applications of artificial intelligence in the military sector. Unlike prior studies that remain abstract or overly technical, this article takes a descriptive-analytical approach to clarify the functionality of AI-based military systems in a structured and comprehensible manner. Furthermore, by examining the ongoing competition between the United States and China, the study highlights the latest capabilities and achievements of these two global powers in military AI. In this way, the article offers an innovative contribution that not only synthesizes theoretical debates but also grounds them in practical, equipment-oriented realities of modern warfare.

2. Conceptual Framework

To provide a clear foundation for this study, it is necessary to define and explain the key concepts.

3.1 Artificial Intelligence

Artificial intelligence (AI) refers to technologies that enable machines to operate with enhanced levels of intelligence and to emulate human capabilities in perception, understanding, reasoning, and decision-making. AI encompasses a wide range of disciplines, methods, and technologies that replicate human-like intelligent behavior and are capable of performing complex tasks autonomously. Its applications span numerous fields, including military and security systems, aerospace, healthcare, agriculture, transportation, software engineering, and robotics.

The concept of artificial intelligence was first introduced by John McCarthy at the Dartmouth Conference in 1956. At that time, its potential was recognized by only a few scholars. Over the decades, AI has made remarkable progress—for example, defeating world chess champions—demonstrating its capacity for sophisticated reasoning and problem-solving. Some researchers even speculate that AI could eventually lead to a technological singularity, although this remains a subject of debate.

Artificial intelligence is typically categorized into three types:

1. **Artificial Narrow Intelligence (ANI)** – Also known as weak AI, ANI refers to systems designed to perform specific tasks autonomously without human intervention. Examples include machine vision, speech recognition,

DOI: 10.5281/zenodo.17622217

and language translation systems such as Google Maps, Siri, Google Translate, and virtual assistants.

2. **Artificial General Intelligence (AGI)** – Also called strong AI, AGI refers to machines that possess cognitive abilities comparable to human intelligence, capable of reasoning, decision-making, and problem-solving across a wide range of domains. AGI systems can perform any intellectual task that a human can accomplish.

3. **Artificial Superintelligence (ASI)** – ASI represents a hypothetical stage in which AI surpasses the collective intelligence of the smartest humans in all domains, including scientific creativity, logic, reasoning, and social skills. While the concept is theoretically possible, its development remains uncertain, and many scientists debate the feasibility and timeline for achieving superintelligent systems.

In summary, AI technology is not only expanding human capabilities but also reshaping multiple sectors, including the military, where it has transformative potential for operational efficiency, strategic planning, and decision-making.

3.2 Machine Learning

Machine learning (ML) is one of the most widely used subfields of artificial intelligence. As NATO Science (2020) notes, AI is not a single technology but rather a collection of technologies, with machine learning being a critical component of AI research.

Machine learning allows computers to learn from data and improve their performance without being explicitly programmed for every task. Instead of instructing computers step by step, ML enables them to process large datasets, identify patterns, and extract meaningful features autonomously. This is achieved through algorithms capable of self-modification as they are exposed to structured data, improving system performance over time.

In simple terms, machine learning uses mathematical models and algorithms to analyze large volumes of data, recognize patterns, and make predictions or decisions based on the identified patterns. This capability forms the foundation for many AI applications in diverse fields, including the military, healthcare, and finance.

3.3 Deep Learning

In recent years, machine learning has undergone a significant evolution through the advent of deep learning (DL). Deep learning is an advanced subset of machine learning that employs multi-layered computational models to analyze and interpret complex datasets.

Typically, deep learning models are structured as artificial neural networks, designed to emulate the human brain's processing mechanisms. These networks consist of interconnected nodes (neurons) that evaluate input data, assign weights to features, and process information hierarchically through multiple layers. When provided with large volumes of data—often referred to as "big data"—deep learning models can identify patterns and solve problems that would be difficult or impossible for humans to address.

Artificial neural networks, the core of deep learning, are highly effective in recognizing patterns, performing complex analyses, and making predictions. Their layered architecture enables the network to capture intricate relationships within the data, which enhances decision-making and problem-solving capabilities.

3.4 Human-Machine Interaction in AI Systems

When considering AI applications, especially in military or operational contexts, it is crucial to understand the relationship between humans and machines. This interaction is typically categorized into three types:

1. **Human-in-the-loop (HITL)** – The machine performs tasks and provides recommendations, but the human retains ultimate decision-making authority. Such systems are often referred to as semi-autonomous.

2. **Human-on-the-loop (HOTL)** – The machine can operate and make decisions autonomously, but humans monitor its behavior and intervene if necessary. These are considered supervised autonomous systems.

3. **Human-out-of-the-loop (HOOTL)** – The machine operates entirely independently, making decisions without human oversight. These systems are fully autonomous and operate without direct human control.

Understanding these modes of interaction is essential for evaluating AI applications, particularly in critical environments such as military operations, where the degree of autonomy can have profound ethical, strategic, and operational implications.

4. History

Many experts, including Klaus Schwab, President of the World Economic Forum, consider artificial intelligence (AI) to be a defining feature of the Fourth Industrial Revolution. Technology expert Kevin Kelly has even compared AI to electricity, stating: *"Just as electricity gives life to the objects around us with power, artificial intelligence gives them life with intelligence"* (Scharre, 2018: 16).

Given its transformative potential, global powers have increasingly prioritized AI as a strategic technology capable of reshaping economic, industrial, and military landscapes. In 2018, Chinese President Xi Jinping emphasized that *"China must develop, master, and utilize artificial intelligence (AI) to secure the country's future in the next technological and industrial revolution"* (Chi-yuk, 2018; Xin). Similarly, Russian President Vladimir Putin remarked in 2017:

"AI will shape the future of humanity and present the world with great opportunities, but also unpredictable threats. Whichever country becomes dominant in this domain will dominate the world" (Vincent, 2017).

These statements underscore the central role of AI in the strategic competition among major powers, particularly in its military applications. Historically, the development of new technologies has often been driven by military needs, with innovations later diffusing into civilian applications. A notable example is the Internet, which originated within the U.S. Department of Defense before becoming a global communication platform.

Artificial intelligence follows a similar trajectory. Its military applications—ranging from autonomous systems to intelligence analysis—have become a major area of research and investment, reflecting both the strategic importance and the transformative potential of AI in modern warfare.

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become a major area of research and investment, reflecting both the strategic importance and the transformative potential of AI in modern warfare.

5. Application of Artificial Intelligence in the Military Sector: United States of America and China

The design of intelligent military equipment requires a sophisticated integration of sensory instruments to capture environmental data. Typically, a combination of sensors—including multi-lens cameras, range-finding lasers, and advanced computing systems—is coordinated to allow artificial intelligence (AI) to model and interpret the surrounding environment effectively. High-level cognitive capabilities are essential for accurately analyzing events, predicting future conditions, and making informed operational decisions.

The deployment of AI in military systems also depends on advanced control mechanisms, guidance systems, communication links, and overall system integration. A critical question arises regarding the level of autonomy these AI-based tools should possess. Specifically: To what extent should intelligent military systems have decision-making authority? How should humans interact with these systems? How can AI distinguish between combatants and non-combatants? Addressing these questions requires ongoing research and development to achieve maturity in the deployment of such tools—a process that has seen substantial progress in recent years.

Horowitz (2018: 43) asserts, *"One could argue that AI has the potential to enable a number of military innovations, but it is not a military innovation itself."* Similarly, Svenmarck et al. (2018: 1) note that *"AI in the military sector has the potential to be applied across all domains (land, sea, air, space, and information) and at all levels of warfare (political, strategic, operational, and tactical)."*

Currently, the primary applications of AI in the military sector include:

1. **Autonomous Vehicles with Military Applications** – UAVs (Unmanned Aerial Vehicles), UGVs (Unmanned Ground Vehicles), and AUVs (Autonomous Underwater Vehicles) equipped with AI for reconnaissance, surveillance, and operational support.
2. **Autonomous Weapons and Weapon Targeting** – AI-assisted systems capable of enhancing targeting accuracy, threat assessment, and engagement decision-making.
3. **Security and Espionage** – AI technologies applied in intelligence gathering, cybersecurity, data analysis, and monitoring operations.

The United States and China, as global powers, are actively developing and deploying these AI-based military technologies, reflecting both the strategic importance of AI and its transformative potential in modern warfare.

5.1 Autonomous Vehicles with Military Applications

Autonomous and unmanned vehicles represent one of the most significant applications of artificial intelligence in the military sector. These vehicles include Unmanned Aerial Vehicles (UAVs or drones), Unmanned Ground Vehicles (UGVs), and Autonomous Underwater Vehicles (AUVs), all of which rely on AI technology to perform complex tasks without direct human intervention.

5.1.1 Military Drones

UAVs, commonly known as drones, are central to the revolution in artificial intelligence and wireless technologies within aviation. Military drones perform a wide range of functions, including: reconnaissance, surveillance, intelligence gathering, precision strikes, border patrol, target identification, civil security, environmental monitoring, disaster management, traffic control, cargo transportation, and emergency search and rescue operations (Nikitas et al., 2020: 9).

Drones are generally classified based on their operational altitude:

1. **Low-altitude drones:** Capable of flying below 1,000 meters.
2. **Medium-altitude drones:** Operate between 1,000 and 10,000 meters.
3. **High-altitude drones:** Operate above 10,000 meters.

The United States has extensive military experience with drones, particularly in Afghanistan, Iraq, and Syria, while Russian forces have deployed drones in the war in Ukraine. Notable U.S. developments include:

- In the 1990s, the **General Atomics MQ-1 Predator** drone was used for strikes against al-Qaeda in Afghanistan. After September 11, 2001, President George W. Bush authorized drones to carry missiles for targeted airstrikes; 44 such strikes occurred between June 2004 and January 2009 (Frizon, 2022: 9–10).
- In 2011, the **X-47B** conducted its first test flight and, by 2013, achieved autonomous carrier landings.
- In April 2015, the U.S. conducted the first fully autonomous aerial refueling test off Maryland's coast.
- In 2016, 103 autonomous drones flew simultaneously, coordinated as a collective organism with a distributed decision-making "brain," analogous to the movements of bees (Gibbons-Neff, 2017).
- The **RQ-4 Global Hawk** and **Reaper attack drones** are examples of high-altitude UAVs.
- The **Phoenix Ghost**, designed for tactical operations and target engagement, was provided to Ukraine to support its defense efforts against Russia.

China's military drone program began in the 1950s, initially relying on foreign procurement and reverse engineering. Early Soviet assistance included the La-174 target drone, followed by the indigenous **Chang Kong-1** in the 1960s. The PLA later reverse-engineered the American **AQM-34 Firebee** to produce the **WZ-5** drone (Jian, 2001: 82). Since the 1980s, China has focused on domestic production and research & development. Prominent Chinese drones include:

- **WJ-700 Falcon:** Reconnaissance and attack drone.
- **WZ-7:** Combat drone.
- **CH-4:** Armed reconnaissance drone.
- **TYW-1** and **ASN-216:** Smart drones for tactical operations.

DOI: 10.5281/zenodo.17622217

- In 2022, China unveiled the **Wing Loong-3**, an intercontinental military drone equipped with air-to-air missiles, capable of flying up to 10,000 kilometers at medium altitude (Wang, 2022).

Both the U.S. and China continue to invest heavily in drone technology, demonstrating the strategic importance of AI-driven autonomous vehicles in modern warfare.

5.1.2 Unmanned Ground Vehicles (UGVs)

Unmanned Ground Vehicles (UGVs) perform a wide range of military functions, including border patrol, surveillance, reconnaissance, logistics support, weapons platform deployment, explosive disarmament and transport, navigation guidance, and movement of personnel and equipment in difficult terrain. These vehicles are equipped with numerous sensors that, using artificial intelligence, can either make independent decisions by analyzing the environment or transmit collected information to a remote human operator.

It is important to note that autonomous ground robots used in combat scenarios are also considered part of the UGV category.

Historically, the development of intelligent ground robots began in the 1960s. Charles Rosen, head of the machine learning group at Stanford Research Institute, proposed building a robot with abilities previously seen only in science fiction. Rosen's team developed **Shakey**, the first mobile robot with sufficient AI to reason about its actions, as part of a research project for the Defense Advanced Research Projects Agency (DARPA). DARPA continued developing ground robots for military purposes, eventually producing the first UGV capable of fully independent movement.

Intelligent robots began to see real military deployment in operations such as Iraq. Published reports indicate that the number of robots used in Iraq increased from 150 in 2004 to 5,000 by 2005, successfully defusing over 1,000 roadside bombs (Gudgel, 2007: 1–6; Carafano).

Notable American UGVs

- **Boston Dynamics** has developed robots such as the **BigDog**, **Spot**, and **Atlas**, which have been used in military operations in Iraq, Syria, and Afghanistan.
- **Ghost Robotics** provides semi-autonomous robotic dogs integrated at Tyndall Air Force Base in Florida. These UGVs can be **remotely controlled or programmed to follow specific paths** (Lindholm, 2022: 12–13).
- **Ripsaw M5**, a wheeled UGV, performs reconnaissance, cross-country missions, cargo transport, fire support, and convoy protection, among other military tasks.

Notable Chinese UGVs

- **A1**, a quadruped robot featuring dynamic balancing algorithms and pre-programmed movement sequences.
- **Sharp Claw 1**, used for reconnaissance and combat missions, particularly in Tibet and the Himalayan border regions with India.
- **Horse II & Dragon Vehicle**, utilized to transport ammunition and supplies.
- **Mule-200**, unveiled in 2020, is capable of carrying heavy loads across difficult terrain and supporting infantry units with ammunition transport and close-range fire.
- **Smart Combat Vehicle**, a dual-purpose amphibious vehicle developed by China South Industrial Group (CSGC), integrates advanced AI, machine learning, and deep learning technologies. It was showcased at the 2022 Zhuhai Air Show.

Both the U.S. and China continue to invest heavily in UGV technology, reflecting its strategic importance in modern military operations where autonomous ground systems can enhance combat effectiveness, reduce risks to human soldiers, and operate in environments otherwise inaccessible to conventional forces.

5.1.3 Autonomous Underwater Vehicles (AUVs)

Autonomous Underwater Vehicles (AUVs) are a subset of **Unmanned Underwater Vehicles (UUVs)**. UUVs are generally divided into two categories:

1. **Remotely Operated Underwater Vehicles (ROUVs):** These are controlled directly by human operators from a remote location.
2. **Autonomous Underwater Vehicles (AUVs):** These operate independently, without direct human input, and can make decisions autonomously.

The first device classified as an AUV was **SPURV**, built in 1957 at the Applied Physics Laboratory, University of Washington, for research in Arctic waters (von Alt, 2003: 2). After SPURV's successful deployment, a modified version, **SPURV II**, was developed to enhance underwater operational performance.

In 1974, the **Scat AUV** was introduced, which later evolved into **L-1 and L-2 models** based on operational testing. By the early 2000s, various types of AUVs were developed, including **screw-driven AUVs, underwater gliders, and bionic AUVs** (Klochkov, 2015: 142; Gafurov).

Operational Uses of AUVs

AUVs serve multiple operational roles in the military sector:

- Reconnaissance and surveillance
- Identification and mapping of the seabed
- Measurement of hydroacoustic conditions
- Location and neutralization of underwater mines
- Exploration and extraction on the ocean floor
- Submarine navigation and cargo delivery

For example, underwater object detection and mine clearance are typically conducted using AUVs equipped with synthetic aperture sonar (SAS), which provides centimeter-resolution acoustic images of the seabed (Svenmarck et al., 2018: 3). More advanced types, such as underwater gliders, use variable buoyancy propulsion instead of traditional propellers.

Notable Military Applications

- The **United States** first operationally deployed UUVs during the **2003 Iraq War**, using the REMUS system to clear sea mines around the port of Umm Qasr. DARPA

DOI: 10.5281/zenodo.17622217

continues to develop advanced robotic underwater systems.

- **China** has also adopted AUVs for military purposes, primarily focusing on data collection and target identification in recent years.

AUVs, like other autonomous military systems, enhance operational efficiency, reduce risk to human personnel, and extend the reach of naval capabilities in both reconnaissance and combat scenarios.

5.2 Autonomous Weapons and Weapon Targeting

Autonomous weapons are equipped with sensors and software that match environmental data to a predefined target profile. These systems, also known as Slaughter Bots, autonomous weapon systems (AWS), or killer robots, utilize artificial intelligence to identify, select, and engage human targets without direct human intervention.

These weapons are pre-programmed to neutralize specific target profiles. Once deployed, the AI analyzes sensor inputs—such as facial recognition, thermal imaging, or movement patterns—to locate and engage the target autonomously. When a target matches the predefined profile, the weapon automatically fires.

Risks and Ethical Considerations

The development of fully autonomous weapons poses serious threats to humanity, global security, and even the biosphere. Effective control and management of these systems is a critical task, requiring:

- Public awareness and global consensus
- Adherence to universal values and ethical principles
- Intervention and regulation by international organizations
- Adoption of restrictive laws to prevent misuse

Weapon Targeting Systems

Autonomous weapon systems are evaluated primarily based on the accuracy and speed of their targeting capabilities. Advances in electronic targeting systems, machine learning, and computer vision have enhanced the effectiveness of these operations.

For instance, the **40 mm multi-purpose artillery system** developed by Thales and Nexter (France) demonstrates autonomous targeting capabilities. Its combination of rapid response time and precision firing allows it to protect naval vessels from air and surface threats. Moreover, this system is **versatile**, capable of integration across naval, land, and air forces.

Autonomous weapons, therefore, represent a significant military innovation, offering enhanced operational efficiency while raising ethical, legal, and strategic challenges that require careful oversight.

5.3 Security and Intelligence Issues

Artificial intelligence (AI) plays a significant role in security, border control, cybersecurity, and military intelligence. Its applications in these areas have enhanced operational efficiency and expanded the strategic capabilities of states.

Border Security

In border management, AI is used to:

- Recognize behavioral patterns and identify travelers with high accuracy
- Improve scanning systems through computer vision and machine learning for baggage screening
- Enhance physical patrols and monitor migration patterns
- Perform data mining on transit activities and demographic data
- Match travel documents accurately to individuals
- Conduct large-scale surveillance and track smuggling scenarios

These applications increase border security efficiency while minimizing human error and operational delays.

Intelligence and Espionage

AI has also transformed the field of espionage by:

- Detecting patterns and trends in vast datasets
- Enabling cross-border cyber operations without physical warfare
- Enhancing the capabilities of intelligence agencies in strategic decision-making

Many strategists argue that acquiring sensitive information through AI-driven intelligence can be **more consequential than traditional warfare**. Recognizing this, leading powers are heavily investing in AI to maintain strategic advantage.

Case Studies: United States and China

The U.S. intelligence community, particularly the CIA, has launched over **130 AI projects**, often in collaboration with Silicon Valley firms. Notable examples include:

- **Palantir**: Uses AI to detect threats, forecast outcomes, and track terrorist activity
- **Cylance**: Employs machine learning to counter cyberattacks and malware
- **Orbital Insights**: Performs geographic analysis using machine vision and satellite imagery

Meanwhile, **China** is leveraging AI for intelligence operations, including:

- Monitoring citizens in regions like Taiwan
- Using AI to collect, analyze, and exploit large datasets
- Promoting military-civilian integration as outlined in China's 2017 AI Roadmap and Special Plan on Military-Civil Integration

Strategic Implications and Market Trends

AI contributes to:

- Optimizing combat strategy, including timing and targeting
- Enhancing radars, automatic recognition systems, and other military equipment
- Expanding the military market; the global AI military market reached **$7.93 billion in 2022** and is projected to

DOI: 10.5281/zenodo.17622217

reach **$22.62 billion by 2032**, with a CAGR of **11.05%** (PrecedenceResearch, 2023)

The **Asia-Pacific region** is expected to witness the fastest growth due to rapid military developments and rising AI adoption in emerging economies such as India and China (Vantagemarketresearch, 2022).

The **United States** continues to invest heavily in AI-enabled military systems to maintain global dominance, allocating nearly **$1 billion in 2020** for AI research in defense. AI integration spans nuclear weapons, cyber operations, aerospace technologies, and environmental monitoring.

For **China**, military AI development is a strategic avenue to challenge U.S. military hegemony. By integrating private sector innovations with military applications, the People's Liberation Army (PLA) leverages AI to enhance its operational capabilities and counterbalance U.S. advantages.

Conclusion

Artificial intelligence (AI) encompasses advanced technologies that enable machines to sense, understand, act, and learn. **Machine learning**, a subset of AI, allows computers to analyze large datasets, extract key features, and solve complex problems without being explicitly programmed for every task. **Deep learning**, a more advanced form of machine learning, employs hierarchical algorithms to model high-level abstractions in data, enabling machines to recognize patterns and make sophisticated decisions.

Today, AI—particularly machine learning and deep learning—plays an increasingly significant role across sciences and industries, emerging as a key driver of societal progress. Unfortunately, as with many technological innovations, the military sector has become a primary domain for AI applications. Major uses in this sector include:

- **Autonomous vehicles**: UAVs (drones), UGVs (unmanned ground vehicles), and AUVs (autonomous underwater vehicles)
- **Autonomous weapons and precision targeting**
- **Security, intelligence, and espionage operations**

These applications are reshaping modern battlefields in ways that differ fundamentally from traditional warfare.

The **United States**, as the leading global military power, continues to invest heavily in AI-enabled systems to maintain its strategic dominance. In contrast, **China** views military AI development as a strategic tool to challenge U.S. hegemony. A key aspect of China's approach, as outlined in the **2017 AI Roadmap**, is the integration of military and civilian institutions, leveraging private sector capabilities to enhance the People's Liberation Army (PLA) and counter U.S. influence.

A critical consideration in this evolving landscape is the degree of autonomy granted to AI-based military systems. Determining the appropriate balance between machine independence and human oversight is essential to ensure operational effectiveness while mitigating risks. To address these challenges, states, international organizations, and human rights bodies must establish clear regulatory frameworks, adopt effective control mechanisms, and promote responsible development and use of AI technologies.

Ultimately, the hope is that humanity will harness these powerful technologies exclusively for peaceful purposes, fostering global reconciliation and cooperation rather than conflict.

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