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AQ	SAFETY AND HEALTH PROTECTION, SAFETY IN OPERATING MACHINERY

THE POTENTIAL AND PROSPECTS OF ARTIFICIAL INTELLIGENCE USE IN STRATEGIC PLANNING: ISSUES OF SECURITY AND DEFENSE

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Abstract: The subject of the study is the most promising technological solutions using artificial intelligence and global trends in their use by the armed forces of technologically advanced countries of the world. The main areas of AI technologies application by a number of countries (USA, China, and Israel) are identified. The article is an attempt to conduct a comprehensive analysis of the current world situation in the field of determining the prospects and dangers of using AI technologies in the field of defense and in the area of ensuring national security of modern states.

Keywords: artificial intelligence, strategizing, strategic planning, security, warfare, defense sphere, public sphere, national security.

1 Introduction

The field of military and national security is still being shaped by artificial intelligence, which presents both new and exciting potential as well as a host of challenges. The predictive powers of AI are a great help for developing national security plans and strategies. Artificial intelligence (AI) models are able to predict possible security issues, geopolitical changes, and new threats by evaluating past data and present patterns.

Crisis management and national security are changing as a result of artificial intelligence and machine learning. But significant issues come up. These worries may be seen, for instance, in the historical record when considering the topic of how crisis decision-making would be impacted by the integration of AI/ML throughout a state's national security environment. At machine speed, for instance, how could the Cuban Missile Crisis appear?

The integration of artificial intelligence into military plans is a paradigm shift that is revolutionizing the tactical environment and strategic requirements of defense. Using AI strategically has the potential to totally change the nature of battle in the digital age, in addition to increasing the precision and efficiency of military operations [53]. Moreover, the incorporation of artificial intelligence (AI) into security policy offers a fresh perspective, emphasizing the necessity of autonomous systems and algorithmic decision-making for maintaining global stability and national security [24].

On the other hand, as we move toward these bright futures, society will also need to face the myriad issues raised by this ground-breaking technology. Gaining a thorough grasp of these possible obstacles is just as important as seizing the chance to guarantee the safe, ethical, and well-rounded use of AI in defensive systems [22].

The growing use of artificial intelligence for military purposes raises questions of deep concern for humanity. The armed forces are investing heavily in AI systems. There are already examples of their use on the battlefield to provide information support for military operations or as part of various weapons systems.

The technologies can help handle and comprehend the massive amounts of data created in modern combat using intelligent

systems for command and control. By giving commanders a thorough, almost instantaneous image of the battlefield, this can support their strategic planning and decision-making.

AI technologies are the most promising direction for re-equipping the armed forces of the leading military powers of the modern world. Developments are being carried out in various areas, ranging from unmanned vehicles to lethal autonomous weapons. Experts note both the pronounced positive prospects for using AI in the field of national security and the possible negative consequences of its use [44].

Autonomous weapons pose an especially dangerous risk. Despite almost ten years of diplomatic attempts at the UN, nations around the world are unable to come to a consensus on a ban on lethal autonomous weapons. Military must discriminate between troops and civilians in accordance with international humanitarian law, and the Pentagon has long maintained that human decision-making must be included when deciding whether to use force [16]. However, there are other circumstances (like guarding against approaching missiles) in which human assistance is just not feasible.

There is a dangerous regulatory vacuum when it comes to military artificial intelligence (AI) since there is no comprehensive global governance structure in place. Due to this vacuum, a potent technological category remains uncontrolled, increasing the threats to global peace and security, accelerating the spread of weapons, and undermining international law. Globally, governments are vying for the top spot in the emerging and disruptive technologies (EDTs) space while also attempting to comprehend the deep and revolutionary effects of artificial intelligence. Corporate tech companies are competing for venture capital investment in foundation models by entering a trillion-dollar generative AI arms race. The stakes are enormous and the global balance of power is unstable in the struggle for dominance in the economy and morality. The issue of replacing humans with artificial intelligence in the military field should be as acute as possible and resolved with the utmost caution.

2 Materials and Methods

The scientific and methodological basis of the work was a complex of various methods of cognition, research, description, and explanation of the thematic horizon under study. The methodological basis of the study was the systemic, activity-based approaches, the hermeneutic method of research and the principle of historicism. The study also uses traditional general scientific methods (analysis, synthesis, deduction, induction, etc.).

3 Results and Discussion

We are seeing an unparalleled escalation in recent history due to the growing tensions between countries, ranging from the Middle East to the Pacific, and the spread of ongoing conflicts throughout the world, like the war between Russia and Ukraine. The consequences of these conflicts extend beyond borders and, given the speed at which technology has advanced recently, even into the realms of internet and space. Lately, artificial intelligence (AI) has emerged as a key component in shaping both the military industry and combat in the future. For instance, the French Navy said that it will use artificial intelligence (AI) to analyze signals in underwater acoustics warfare [47]. In a similar vein, the Italian defense behemoth Leonardo forecast that by 2028, its space, cybersecurity, and artificial intelligence efforts will increase fourfold at a presentation to analysts a few weeks ago. This demonstrates unequivocally a trend in which artificial intelligence (AI) is becoming fundamental to the idea of war and the military industry at large. This implies that determining the future of the military industry and combat will need a knowledge of AI. The increasing widespread integration of AI into numerous processes has extended well beyond cyberspace, as

addressed in recent findings [17]. Understanding AI's integration and influence beyond what is now known is essential. AI is facilitating the gradual mixing of security factors in this setting.

The main competitors in the fight for leadership in the field of artificial intelligence today are the People's Republic of China and the United States, which define strategic steps to ensure superiority in a number of conceptual documents.

In particular, in July 2017, the State Council of the People's Republic of China, the top administrative body in China, released the country's strategy for the development of artificial intelligence, called "The new generation Artificial Intelligence Development Plan" (AIDP) [23]. The strategy outlines goals and steps to ensure the country's global leadership in AI by 2030, to make AI a trillion-yuan (about \$150 billion) industry, and to define ethical norms and standards for AI.

The new generation Artificial Intelligence Development Plan acts as a single document outlining China's AI policy goals. In 2018, Chinese media called it "the first year of China's AI development strategy" The overall policy goal articulated by the AIDP is to make China a global hub for AI innovation by 2030, with intelligence serving as the main driver of the country's modernization and driving military and economic transformation. The AIDP also calls for standards and ethics for the use of AI. Overall, the Plan represents a comprehensive AI strategy and challenges other leading countries in many key areas.

The desire to overtake the United States is reflected in statements by China's political and military leadership.

For example, President Xi Jinping stated back in 2017 that "in an increasingly fierce international military competition, only innovators win" [42]. This view was shared by Lieutenant General Liu Guozhi, a member of the 19th National Congress and director of the Science and Technology Committee of the Central Military Commission, who stated in a public interview that AI represents a rare opportunity to shorten the path to innovation and outperform competitors [42]. In parallel, military scientists in China's People's Liberation Army (PLA) emphasize that AI will be used to predict battlefield situations and determine optimal approaches to "win before the war" [20]. Some PLA members go further, expecting a battlefield "singularity" in which AI outpaces human decision-making. These statements highlight the widespread belief in Chinese military circles on the importance of using new technologies, including AI, to achieve a competitive military advantage.

It is known that cyberspace has been a new theater of military operations in NATO for over ten years. Since the development of AI technologies, theorists and practitioners have been working on the issue of their implementation in the combat sphere [6-10]. This is reflected not only in numerous studies and the creation of samples of the latest weapons, but also in doctrinal documents of NATO, the United States, Great Britain, and other leading countries of the world.

Thus, on October 21, 2021, NATO defense ministers agreed the first-ever NATO strategy on artificial intelligence. NATO Secretary General Jens Stoltenberg said that the new strategy was formed in response to the race of authoritarian regimes in the field of new technologies development. The document covers data analysis, imagery, and cyber defense. To this end, the alliance plans to create a \$1 billion fund for "future defense." The strategy notes that AI is changing the global defense and security environment and provides an unprecedented opportunity to strengthen technological advantage. "This foundational technology is likely to affect the full range of activities carried out by the North Atlantic Alliance in support of its three core tasks: collective defense, crisis management, and cooperative security" [16].

The National Security Commission on Artificial Intelligence (NSCAI) released its final report on March 1, 2021, which presents an unprecedented strategy for the nation to win in the

era of artificial intelligence [15]. According to the Commission members, AI warfare will no longer depend on the emergence of a single effective new weapon, promising military technology, or operational-tactical technique. Rather, success will be determined by the integration of AI technologies into all aspects of combat operations [1-3]. AI will change the way war is waged in all areas: on land, at sea, in the air, in space, in cyberspace, and in all ranges of the electromagnetic spectrum. AI will change all attributes of war: the level of control over the theater of military operations (battlefield); the quality of reaction to events; the level of influence on the enemy, taking into account political, social, and religious factors; the accuracy of hitting a target; the reliability of building a defense; the speed and scale of the use of force; the relationship between personnel and equipment (man and machine), etc.

The 16-chapter strategy outlines steps the United States should take to responsibly use of AI for national security and defense, defend against threats, and advance innovation. The report makes dozens of recommendations to U.S. President Joe Biden, Congress, companies, and institutions. The 15-member committee, chaired by former Google CEO Eric Schmidt, advocates for expanding and democratizing AI research with an annual investment of \$40 billion. The commission plans to create a multi-tiered ecosystem that will ensure the widespread development and adoption of AI technologies at all levels, from the C-suite to the tactical level.

The U.S. military is also integrating AI systems into warfighting through a lead initiative called Project Maven, which uses AI algorithms to identify insurgent targets in Iraq and Syria. The goal of Project Maven, according to Air Force Lt. Gen. John N. T. Jack Shanahan, director of defense intelligence for the warfighter, "is to turn the vast amount of data available to the DoD into actionable intelligence and insight" [56]. AI is expected to be particularly useful in intelligence activities due to the large amounts of data available for analysis. For example, the first phase of Project Maven involves automating intelligence processing in support of the counter-ISIS campaign. Specifically, the Project Maven team is using computer vision and machine learning algorithms in intelligence collection cells that will analyze footage from unmanned aerial vehicles and automatically identify hostile activity for targeted investigation. In this way, artificial intelligence (AI) aims to replace human analysts' labor, which now requires hours of 'sifting through video' in order to extract pertinent data [12-14]. The theory behind this is that analysts who could be freed up would be able to use the data they get to make faster and more informed judgments.

In April 2022, NATO foreign ministers endorsed the Defence Innovation Accelerator for the North Atlantic (DIANA) Charter, which commits national AI test centers to supporting NATO's ambitious AI projects. DIANA brings together defense personnel, promising start-ups from NATO countries, academic researchers, and technology companies to address key security challenges.

This program focuses on deep technologies - those emerging and disruptive technologies that NATO has identified as a priority, including Big Data, Artificial Intelligence, Autonomy, Quantum Technologies, Biotechnology, Energy and Propulsion, New Materials and Advanced Manufacturing, Hypersonics and Space, particularly where they are dual-use (commercial and defense) and deep-tech and where they can be used to address complex defense and security challenges [54]. The first DIANA regional office was opened on 30 March 2023 at the Imperial College London Innovation Centre (in partnership with Estonia).

Figure 1 below presents comparison of military spending and share of GDP across selected countries.

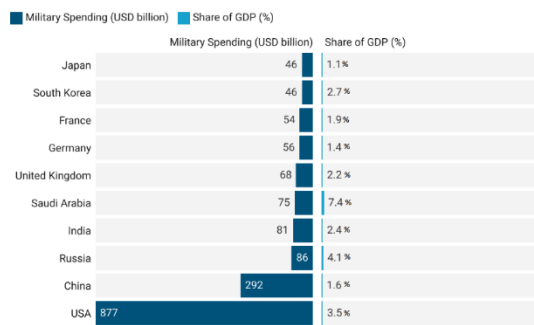


Figure 1. Spending in USD billion and share in percentage [43]

In 2023, the worldwide artificial intelligence market for the military generated \$8.9 billion in sales. The software, hardware, and services sectors are predicted to generate USD 10.52 billion, USD 8.00 billion, and USD 6.18 billion in revenue, respectively, by 2032, when the market is predicted to grow to USD 24.7 billion (see Figure 2).

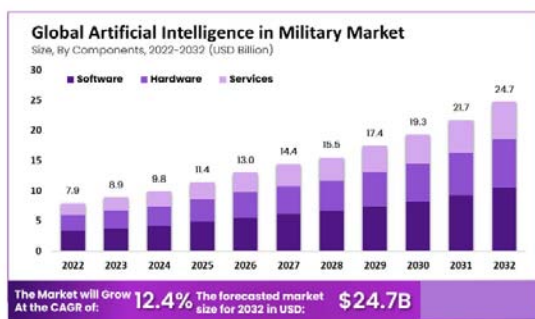


Figure 2. Global AI in military market, with forecast up to 2032 [49]

Another competitor in the defense/security AI market is Israel. Although Israel is only 70 years old, it has one of the most modern armed forces in the world. Despite Israel's small size and budget (compared to the world's major superpowers), about 4.5% of its GDP is spent on defense research and development, almost double the OECD average [11].

Military applications of AI at Israel's top 4 defense contractors cover the following four areas:

- Elbit - autonomous loitering drone
- IAI - autonomous perimeter patrol drone
- Rafael Advanced Defense Systems - missile guidance
- IMI Systems - autonomous vehicles

Elbit - Israel's top defense contractor - offers Sky-Striker, an autonomous loitering munition technology that is claimed to help the military conduct stealthy and precise airstrikes on targets using an AI-powered autonomous device.

Artificial Intelligence is becoming more and more prevalent in all areas of combat, including cyberspace, space, air, sea, and land. It is increasingly a factor that needs to be taken into account when making strategic decisions, not just in relation to cyberwarfare but also, for instance, by ground troops [44-45]. Because of its growing impact, artificial intelligence must be better understood and incorporated into different military plans and actions. For instance, commanders may need to come up with new strategies for unit deployment and concealment as a result of AI being integrated into weapon and recognition systems. Furthermore, by incorporating AI into their operations, military structures and procedures might be redesigned to increase operational efficiency, necessitating a new use of labor [18]. This macroscopic viewpoint allows us to see AI's transversal and progressively more widespread reach. With AI acting as their common denominator, this trend indicates that the

many sectors of combat are becoming more intertwined than before.

Rethinking and updating the idea of the domains of warfare is imperative, with the human/policy domain being included as an essential transversal element that AI has brought to bear on the concept of defense policy. This shift suggests that new weaknesses will also surface, along with new interactions between an organization and AI. AI that manages automated military procedures, for instance, may be used to afflict military institutions and people that rely on it, decreasing effectiveness or producing disability [24-28]. By taking advantage of the U.S. military's reliance on policies, this might result in a rise in unpredictability. On the other hand, AI may take advantage of the individual-centric strategy in the majority of European armies by controlling people's emotions and leading them to make poor or self-destructive choices.

The increasing interplay between AI and humans is the source of these serious vulnerabilities, which have the potential to make AI the most deadly insider threat. When thinking about the future of defense strategy and the core of a military organization, this vulnerability needs to be taken into account [29-31]. It is crucial to proactively reinterpret what defense means in addition to responding to these potential future events. We may better prepare for the integration of AI in defense by recognizing and resolving these challenges and ensuring that technology and human aspects are harmoniously balanced for the best results.

Additionally, the use of AI to military operations modifies the process of formulating and carrying out strategic choices. Since AI systems by their very nature rely on preprogrammed algorithms and data inputs, any data tampering or corruption might result in serious mistakes in the formulation and implementation of strategic plans [33-36]. This may have a domino effect, causing errors in the scheduling of crucial activities, supply chain management, and military movements. These weaknesses emphasize the necessity of strong cybersecurity defenses and the creation of AI systems resistant to both internal and external mistakes [33].

This specific circumstance would enable Iran to conduct strikes that are far more extensive than what is currently thought to be feasible while momentarily eluding Western military capabilities. In addition, it may enable Iran's proxies - despite their smaller size and inferior equipment - to develop their capabilities, interfere with or disrupt air supplies to US military installations in the Gulf, modify drone routes, and carry out strikes [38-40]. This is a serious strategic risk that military leadership must address with a new understanding of strategic dynamics and a revised strategy for cybersecurity and military operations.

Furthermore, using AI in military operations has geopolitical ramifications that go beyond simple tactical issues. Depending on their own military capabilities and use of military assets, nations may perceive AI-enhanced capabilities as a danger or an opportunity [47; 58]. This means that the integration of AI into defense policies might have an impact on international relations. The competitive character of AI development in the military sector may cause security dynamics to escalate as local and national players constantly compete to surpass one another in AI capabilities, thus complicating the dynamics of global security [20]. This emphasizes even more how crucial it is for nations to work together and have open communication in order to control the risks posed by AI in military settings and to set standards and laws that can stop tensions from rising and encourage stability.

AI's influence on military tactics and national security has already been demonstrated by Russia's continuing conflict in Ukraine. The battle has seen civilian tech companies explore with AI technologies and play crucial roles in military operations. Dubbed by Time's Vera Bergengruen [4] an "AI war lab," the conflict has led to civilian tech firms experiment with AI tools and play critical roles in military operations. Due to their provision of data analytics for drone strikes and monitoring, private enterprises like as Palantir and ClearviewAI have

emerged as crucial players in the war [49-51]. These initiatives give rise to questions concerning the growing militarization of AI and the moral and legal obligations of the commercial tech industry in times of war. Israel has demonstrated the ethical, legal, and strategic challenges associated with military AI through its algorithmic warfare and its employment of AI targeting systems in Gaza with minimal human control.

The capacity of artificial intelligence (AI) to swiftly and effectively handle and analyze enormous volumes of data is one of its most important benefits for national security [53; 55]. Massive amounts of data are produced by intelligence services from a variety of sources, such as open-source intelligence, satellite photography, and communications intercepts. These data may be sorted through by AI-powered systems, which can spot trends, abnormalities, and possible risks that human analysts would overlook.

Machine learning algorithms, for instance, are capable of analyzing satellite photos to find anomalous troop movements or changes in military sites. Millions of social media postings may be scanned by natural language processing (NLP) models to find new security concerns or monitor the propagation of misinformation campaigns. Security services are able to react to possible threats faster and with greater informed decision-making because to this improved analytical capabilities [38].

Planning and strategy formulation for national security can benefit greatly from AI's predictive powers. Artificial intelligence (AI) models are able to predict possible security issues, geopolitical changes, and new threats by evaluating past data and present patterns. This makes it feasible for security organizations to prepare scenarios more intricately, foreseeing potential assaults or crises and becoming ready with the right answers [5]. AI systems may, for example, simulate how different variables, such political upheaval, economic volatility, and climatic change, would affect regional security. This would assist decision-makers in creating longer-term security plans that are more successful.

AI can quickly analyze changing circumstances during a crisis or battle, assisting political and military leaders in making deft judgments under duress. Real-time data from several sources may be processed by machine learning algorithms to provide a complete image of the battlefield or crisis area [57-59]. This may result in less casualties and more strategic decisions being made.

However, all these advantages have 'mirror' risks, and this should be understood by world political and military establishment.

Powerful nations like the US and China are engaged in a fierce race for superior military technologies. China's 2019 white document on national defense promoted the idea of "intelligentized warfare", according to which the PLO's modernization goals depend on utilizing AI. In the meanwhile, out of concern that Beijing might strengthen its cutting-edge military AI capabilities, the United States has concentrated on limiting China's access to sophisticated semiconductors that are essential for AI models. However, it is unclear if these initiatives advance global peace, U.S. national security goals, or both. One thing is for sure: efforts to regulate AI by limiting exports of advanced chips have been compared to nuclear nonproliferation tactics.

However, it is not easy to adapt models from the Cold War era to the digital era. Global leader in AI research OpenAI has advocated for an AI monitoring organization akin to the International Atomic Energy Agency, which keeps an eye on nuclear activity. UN Secretary General António Guterres has endorsed this idea. Theoretically, there is validity in a worldwide multilateral convention like to the Nuclear Nonproliferation convention that would stigmatize states seeking strategic gains from risky military AI technologies [60-61]. However, AI technologies are much more flexible than nuclear weapons, which begs serious concerns about the idea of an AI safety research and development program modeled after the Manhattan

Project, which was launched during World War II to create the first nuclear weapons. The capacity of nuclear nonproliferation regimes in general to adapt is called into doubt by the fast growing nature of AI. Furthermore, it is significantly more difficult to regulate AI for military and civilian purposes than it is for controlling tangible goods like nuclear weapons since AI is a general-purpose technological category.

In overall, "ratio" of key advantages, disadvantages/risks, and challenges in implementing AI in national security is presented in Figure 3 below.

Advantages of AI in National Security	Disadvantages and Risks	Challenges in Implementing AI for National Security
<ul style="list-style-type: none"> Enhanced Intelligence Gathering and Analysis Predictive Analytics and Threat Assessment Cybersecurity and Network Defense Autonomous and Semi-Autonomous Systems Decision Support in Crisis Situations 	<ul style="list-style-type: none"> Vulnerability to Adversarial Attacks Potential for Autonomous Weapons Systems Over-reliance on AI and Erosion of Human Expertise Data Privacy and Civil Liberties Concerns Potential for Escalation and Misunderstanding 	<ul style="list-style-type: none"> Ethical and Legal Frameworks Data Quality and Bias Interoperability and Standardization Workforce Development and Adaptation Adversarial AI and the AI Arms Race Explainability and Transparency

Figure 3. Key advantages, disadvantages/risks, and challenges in implementing AI in national security [18]

Thus, modern military and the defense industry are unleashing a Pandora's box with the increasing adoption of AI. This new technology is unexpected because of its quick development, adaptability, and incomplete knowledge of the consequences of its use. The factors that will dictate the kind and degree of impact it will have on wartime dynamics and the agencies implementing it, however, are gradually coming into focus. Furthermore, it is clear that this significant shift will need for updated perspectives on cybersecurity, military strategy, and geopolitical dynamics in order to properly account for the advances brought about by artificial intelligence.

Moreover, the incorporation of AI systems signifies a fundamental shift in military strategy and doctrine, not merely a technological or operational adjustment. To effectively use the potential of AI, extensive training programs for staff members and major modifications to command-and-control structures will be necessary [62]. Furthermore, as the application of AI in combat scenarios raises concerns about decision-making, accountability, and the possibility of unexpected effects due to AI pollution, ethical considerations will become more and more important.

Finally, as it is seen with the hypothetical scenario of an attack on the U.S. military capabilities in the GCC [48], the integration of AI systems will bring about a change in the balance of power between nations and militaries, which will redefine the various regional security complexes and the concept of security in the near future [63]. This change will probably result in new alliances and rivalries as various entities try to use or undermine AI capabilities. Keeping a strategic advantage in this shifting environment will be crucial, requiring constant innovation and adjustment to the quickly advancing technical development of artificial intelligence.

In conclusion, artificial intelligence (AI) has a great deal of promise to improve military capabilities, but it also brings new risks and weaknesses that need to be properly considered. In addition to concentrating on successfully incorporating AI into their operations, military leadership needs to design all-encompassing plans to reduce the hazards that come with it. This entails making investments in cybersecurity, encouraging staff to be more watchful and less dependent on predetermined procedures, and participating in global initiatives to control and oversee the application of AI in military settings. The only way to fully profit from AI while lowering the possibility of a military escalation is to take a diverse strategy.

It is vital that the international community takes a truly human-centered approach to the development and application of AI in conflict-affected areas. It is necessary to start by taking into account the obligations and responsibilities placed on the individual and the necessary measures to ensure the compatibility of the use of these technologies with international law, as well as social and moral values.

The following are some significant worries about the use of AI in defense:

1. The process of ensuring that the goals and actions of an AI system correspond with human intent is referred to as "alignment". The intricacy of AI, its ability to learn on its own, and the potential lack of transparency in its decision-making process all contribute to alignment issues. Misaligned AI may have unintended repercussions that cause harm to humans while achieving its intended purpose. The repercussions might range from significant disruptions in defense supply chains to collateral damage during combat operations. Transparency in decision-making, the explicit programming of human values, and the implementation of feedback mechanisms to adjust the AI's behavior are necessary to counteract this.
2. The worry of "enfeeblement" stems from an over-reliance on AI, which may eventually lead to a loss of essential human abilities and talents. As AI assumes more duties, military personnel may become less proficient in some areas, which might impact their readiness for operations. This needs a well-balanced approach that uses AI to enhance human skills rather than to replace them. Regular training and skill refreshment are necessary for human effectiveness in AI-assisted military missions.
3. The possible degeneration of knowledge systems brought on by an over-reliance on AI is referred to as "eroded epistemics", or the erosion of our knowledge systems. Poor strategic and national security judgments may result if the defense industry adopts AI system outputs without thoroughly examining or comprehending how those outputs were produced.

Defense personnel need more AI knowledge and training in order to counteract this. This entails teaching students about the fundamental decision-making processes of AI systems in addition to how to use them. In addition, it is vital to cultivate an environment where people are prepared to question AI results, respect critical thinking, and see human intuition and machine intelligence as complementary forces. Additionally, creating more transparent systems that offer intelligible justifications for their choices might guarantee greater inspection and comprehension, assisting in preventing the notion of AI as a "black box."

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