Artykuły / Articles

Maciej Tołwiński

ORCID: 0000-0002-6655-1476
mtolwinski@ajp.edu.pl

The Jacob of Paradies University
Department of Law and Security

Ethical Dilemmas of Responsibility for the Actions of Artificial Intelligence Systems in Warfare

Etyczne dylematy odpowiedzialności za działanie systemów sztucznej inteligencji na wojnie

Abstract: This article analyzes the key ethical dilemmas associated with the use of artificial intelligence (AI) systems in modern armed conflicts. In recent years, AI has gained prominence in the military sector, encompassing technologies such as autonomous combat drones, intelligence data analysis systems, and battle simulations. The introduction of these advanced technologies brings significant ethical challenges, including responsibility for decisions made by autonomous systems, the risk of errors and misuse, compliance with international humanitarian law, and the potential risk of conflict escalation. The article provides an in-depth analysis of these issues, proposes practical recommendations to mitigate risks, and identifies areas requiring further research. The hypothesis that the use of AI in the military introduces significant ethical dilemmas requiring new regulatory frameworks and compliance with international humanitarian law is confirmed.
Keywords: artificial intelligence, autonomous combat systems, conflict, ethical dilemmas, law

Abstrakt: W artykule przeanalizowano kluczowe dylematy etyczne związane z zastosowaniem systemów sztucznej inteligencji (AI) w nowoczesnych konfliktach zbrojnych. W ostatnich latach AI zyskała na znaczeniu w sektorze militarnym, obejmując takie technologie, jak autonomiczne drony bojowe, systemy analizy danych wywiadowczych oraz symulacje bitewne. Wprowadzenie tych nowoczesnych technologii niesie ze sobą znaczące wyzwania etyczne, w tym odpowiedzialność za decyzje podejmowane przez autonomiczne systemy, ryzyko błędów i niewłaściwego użycia, zgodność z międzynarodowym prawem humanitarnym oraz potencjalne ryzyko eskalacji konfliktów. Artykuł przedstawia analizę tych problemów, proponuje praktyczne rekomendacje mające na celu minimalizację ryzyk oraz wskazuje obszary wymagające dalszych badań. Potwierdzono hipotezę, że użycie AI w wojsku wprowadza istotne dylematy etyczne, wymagające nowych ram regulacyjnych oraz zgodności z międzynarodowym prawem humanitarnym.
Słowa kluczowe: autonomiczne systemy bojowe, dylematy etyczne, konflikt, prawo, sztuczna inteligencja

Introduction

In recent years, artificial intelligence (AI) has gained significant importance across various fields, including the military sector. The development of AI technology encompasses a wide range of innovations, such as autonomous combat drones, intelligence data analysis systems, battle simulations, and advanced decision support systems. These modern technologies are becoming increasingly prevalent in military operations, offering potentially revolutionary capabilities in terms of efficiency, precision, and speed of combat actions[1].

One of the most significant applications of AI in the military are autonomous combat drones which can perform missions without direct human supervision. These devices can execute a wide range of tasks, from reconnaissance to direct attacks, with unprecedented precision and speed of response. Other key technologies include intelligence data analysis systems, which utilize AI to process vast amounts of information to identify threats and support strategic planning[2].

However, the development of AI in the military sector brings not only operational potential but also serious ethical dilemmas. The introduction of autonomous combat systems on the battlefield raises questions about responsibility for their actions, the risk of errors, and compliance with international humanitarian law. There is a concern that decisions made by algorithms could lead to unintended consequences, such as civilian casualties or conflict escalation. Furthermore, the lack of clear regulatory and legal frameworks regarding the use of AI in military operations could lead to abuses and unethical practices. The use of AI in the military also raises concerns about accountability for decisions made by machines. Traditional structures of accountability in the context of warfare are based on the assumption that humans make key decisions and bear responsibility for them. In the case of autonomous combat systems, decisions are made by algorithms, which raises the question of who is responsible for potential errors or violations of international law[3].

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[1] M. Zarka, *Artificial Intelligence in the Military Domain: Technical, Legal, and Ethical Perspectives*, https://vcdnp.org/ai-military-domain/ (access date: 02.06.2024).
[2] Vide: W. Fehler, A. Araucz-Boruc, A. Dana, A. Lasota-Kapczuk, *Systemy sztucznej inteligencji jako wyzwanie dla sfery bezpieczeństwa i obronności RP*, „Zeszyty Prawnicze" 2021, nr 2, s. 273-298.
[3] Ibidem.

Moreover, the development of AI in the military sector is associated with the risk of a technological arms race, where states strive to achieve technological superiority at any cost, potentially leading to the destabilization of global security. As AI becomes increasingly advanced, there is also a growing risk that these technologies may be used unethically, for instance, to conduct cyberattacks or destabilize political systems. In the context of international humanitarian law, questions arise as to whether existing regulations are sufficient to govern the use of AI in armed conflicts. International humanitarian law was developed during times when wars were primarily conducted by humans, not autonomous machines. Therefore, there is a need to update these regulations to account for new technologies and ensure the protection of civilians and the respect for human rights in the age of artificial intelligence.

The aim of this article is to provide a detailed analysis of the ethical dilemmas associated with the use of artificial intelligence systems in armed conflicts. The article seeks to identify the main ethical issues that may arise from the application of AI in the military and to propose recommendations that can help minimize these risks. Modern armed conflicts are becoming increasingly complex, and AI technology plays a key role in their conduct[4]. Autonomous combat systems, which can operate without direct human supervision, introduce a new dynamic to the battlefield. On the one hand, AI can increase the efficiency and precision of military operations, while on the other hand, its application brings forth challenging ethical issues. The absence of clear legal and regulatory frameworks, accountability for decisions made by machines, and the potential risk of conflict escalation are just some of the challenges we face.

The research problem that forms the core of this article is the identification and analysis of the main ethical dilemmas associated with the use of artificial intelligence in military operations. The key questions to be addressed include: Who is responsible for the decisions made by autonomous combat systems? What are the potential risks associated with errors and the misuse of AI on the battlefield? Is the existing international humanitarian law sufficient to regulate the use of AI in armed conflicts? The research hypothesis is as fol-

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[4] K. Mirończuk, *Sztuczna inteligencja: możliwości, niebezpieczeństwa i odpowiedzialność*, https://tech.wp.pl/sztuczna-inteligencja-mozliwosci-niebezpieczenstwa-i-odpowiedzialnosc,6953440815664064a (access date: 04.06.2024).

lows: The application of artificial intelligence systems in military operations introduces significant ethical dilemmas that require new regulatory frameworks and thorough analysis regarding compliance with international humanitarian law. It is assumed that without appropriate regulations and control, the use of AI in the military could lead to conflict escalation and unpredictable ethical and legal consequences.

Applications of AI in Modern Military Conflicts

Modern applications of artificial intelligence in the military domain constitute a highly significant topic of study. Over the past year, the utilization of AI has greatly advanced, especially in the field of generative AI, which poses new challenges for the military in terms of security and technological superiority. AI in the military encompasses not only autonomous combat systems but also advanced data intelligence analysis, battle simulations, and strategic decision support systems[5].

Combat drones are one of the most visible examples of autonomous combat systems used in modern conflicts. These unmanned aerial vehicles can perform a wide range of missions, from reconnaissance to precision strikes. Equipped with advanced sensors and navigation systems, combat drones are capable of operating in difficult terrain and climatic conditions, minimizing risks to human crews. Land-based combat robots, such as bomb disposal robots and combat units, are used for tasks that are too dangerous for human soldiers. Examples include defusing explosives, patrolling areas, and providing logistical support. These autonomous platforms can be remotely controlled or operate independently, enhancing their versatility on the battlefield. Autonomous underwater and surface vessels are employed in naval operations, such as mine countermeasures, reconnaissance, and securing communication lines. Thanks to advanced AI algorithms, these units can perform complex tasks without the need for constant human supervision, allowing for more efficient naval operations.

AI is utilized for analyzing vast datasets collected from various sources, such as satellites, drones, and sensors on the battlefield.

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[5] *Artificial Intelligence in Electronic Warfare*, https://www.te.com/en/industries/defense-military/insights/ai-in-warfare-and-military-applications.html (access date: 04.06.2024).

Machine learning algorithms assist in identifying patterns and anomalies, enabling faster and more accurate strategic decision-making. AI supports military intelligence by analyzing satellite images, monitoring communications, and predicting enemy movements. These systems can process massive amounts of data in real time, providing valuable information that is crucial for military planning. AI also aids commanders in decision-making by offering simulations of various scenarios and suggesting optimal solutions. As a result, decisions based on AI analysis are better-considered and take into account multiple variables, increasing the chances of operational success. Artificial intelligence is used to create advanced battle simulations that allow for realistic military training. These simulations can replicate different combat scenarios, enabling soldiers to practice their skills in a safe environment.

Training programs utilizing AI offer interactive and adaptive exercises tailored to the participants' skill levels. AI can also analyze training results and provide detailed feedback, accelerating the learning process and improving combat skills. Virtual simulators, leveraging virtual reality (VR) and augmented reality (AR) technologies, are increasingly used for training military personnel. AI in these systems allows for the dynamic creation of training scenarios that can be modified in real time, enhancing the effectiveness of training and preparation for actual combat operations[6]. The application of artificial intelligence in modern military conflicts appears to be crucial. Advanced technologies transform both the conduct of warfare and the preparation for it. While these innovations increase operational efficiency, they also bring significant ethical dilemmas, as technology should be helpful to humanity rather than causing unjustified fear and concerns.

Major Ethical Dilemmas Associated with AI in Warfare

The introduction of artificial intelligence into military operations brings many benefits, such as increased efficiency and reduced risk to human personnel. However, these benefits come with serious ethical dilemmas. In this chapter, we will examine the major ethical dilemmas associated with the use of AI in military conflicts, focusing on responsibility for autonomous decisions, the risk of errors and

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[6] *The most useful military applications of AI in 2024 and beyond*, https://sdi.ai/blog/the-most-useful-military-applications-of-ai/ (access date: 04.06.2024).

misuse, compliance with international humanitarian law, and the potential escalation of conflicts[7].

One of the most controversial and complex ethical dilemmas associated with the use of artificial intelligence systems in warfare is the issue of responsibility for the decisions made by these systems. Traditionally, responsibility for military decisions rests with commanders and soldiers. In the case of autonomous combat systems, which can operate independently, the problem of responsibility becomes more complicated and multidimensional. The introduction of autonomous combat systems leads to a diffusion of responsibility on several levels. At least three main entities can be considered responsible for the actions of such systems: programmers and engineers, manufacturers and equipment suppliers, political decision-makers, commanders, and equipment operators. The creators of algorithms and software responsible for the operation of AI systems face the question of how accountable they should be for the consequences of the actions of their software, especially if an algorithm error leads to unethical decisions. Companies producing autonomous combat systems may be held accountable for the quality and safety of their products, particularly if the systems do not operate as intended or contain design flaws. Finally, the individuals supervising and utilizing these autonomous systems in military operations could also be held responsible, even if the system operates autonomously.

Assigning responsibility for decisions made by AI becomes more challenging with autonomous systems that can act independently of direct human supervision. AI can make decisions in a fraction of a second, responding to dynamically changing conditions on the battlefield. The speed and autonomy of these decisions can complicate the identification of the specific moment or person responsible for potential errors. AI algorithms may lack full contextual awareness, which is crucial for making ethical military decisions. For example, AI might not be able to distinguish between a soldier and a civilian in a complex combat situation, leading to ethical dilemmas. The creators of autonomous combat systems must face many ethical dilemmas at the stage of programming and algorithm design. AI algorithms need to be programmed with specific values and priorities, such as minimizing civilian casualties or adhering to international humanita-

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[7] *The Pros and Cons of Using AI in Military Divisions Worldwide*, https://blog.peigenesis.com/the-pros-and-cons-of-using-ai-in-the-military (access date: 05.06.2024).

rian law. The challenge, however, is that these values can be subjective and interpreted differently. For machine learning-based systems, training data plays a crucial role. If the data is biased or incomplete, the algorithm might learn inappropriate patterns, leading to unethical decisions in practice.

Several scenarios illustrate the complexity of assigning responsibility:

- Technical failure: If an autonomous combat system makes an error due to a technical failure, responsibility may lie with the manufacturers or engineers responsible for its design and maintenance.
- Improper use: If an AI system is used inappropriately or beyond its competencies, responsibility may rest with the commanders or operators.
- Decisions in combat conditions: In dynamic combat situations where the autonomous system makes decisions independently, responsibility for the outcomes of these decisions is difficult to assign and may require multi-level analysis.

To effectively manage responsibility for decisions made by autonomous combat systems, clear regulations and legal frameworks are necessary. This pertains to both international law and ethical standards. There is a need to create international regulations concerning the use of autonomous combat systems, clearly defining the responsibility for their actions. The technology and military sectors should develop ethical standards for creating and implementing AI systems to ensure that decisions made by these systems are aligned with humanitarian values. The issue of responsibility for decisions made by autonomous combat systems is another complex and multifaceted problem that requires collaboration across multiple fields, including law, ethics, technology, and the military[8]. Clear regulations, appropriate ethical standards, and further research are essential to effectively manage these challenges and minimize the risks associated with the use of AI in armed conflicts[9].

The risk of errors and misuse of artificial intelligence (AI) systems in warfare is one of the key ethical and operational dilemmas that modern armies and policymakers must confront. Autonomous

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[8] T. Zieliński, *Dylematy użytkowania autonomicznych systemów bojowych w odniesieniu do podstawowych zasad międzynarodowego prawa humanitarnego*, „Humanities and Social Sciences. HSS" 2018, nr 1, s. 219-230.
[9] R. Weissman, S. Wooten, *A.I. Joe: The Dangers of Artificial Intelligence and the Military*, https://www.citizen.org/article/ai-joe-report/ (access date: 10.06.2024).

combat systems, like any advanced technology, are susceptible to various errors that can lead to tragic consequences, both on and off the battlefield. AI systems can experience different types of technical failures, which may arise from hardware or software problems. Common technical errors include hardware failures such as mechanical damage, sensor malfunctions, and power issues, as well as software errors such as coding bugs, software update problems, and system incompatibility. Additionally, AI algorithms can make erroneous decisions due to faulty training data. If the data used to train the algorithms is biased, incomplete, or outdated, the algorithms may draw incorrect conclusions. Faulty models are another issue: the mathematical models used in AI may not accurately reflect reality, leading to incorrect decisions. Operational errors present another area of potential risk. These can result from the improper use of AI systems by humans, including incorrect configuration-setting system parameters in a way that is inappropriate for the given mission-and misinterpretation of results, where operators might incorrectly interpret data and outputs generated by AI systems, leading to improper actions. There are many documented cases where combat drones have made errors, resulting in unintended casualties. For instance, in 2019, a NATO drone mistakenly killed nine members of a pro-government militia in Afghanistan[10].

AI systems used for target identification can misclassify objects, leading to attacks on incorrect targets. An example could be the erroneous identification of an ambulance as a combat vehicle, resulting in its unauthorized attack. Furthermore, there is a risk that AI systems may be deliberately used for actions that violate international law or war ethics. For instance, they might be employed to conduct precise attacks on civilian targets as part of terrorist operations. AI systems could also fall into the hands of unauthorized entities, such as terrorist organizations or rogue states, which may use them to achieve their objectives while disregarding humanitarian principles. Additionally, improper use of AI systems can lead to the escalation of armed conflicts. For example, an erroneous AI attack on an opponent's military infrastructure could be perceived as an act of aggression, leading to retaliation and further escalation.

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[10] *Dron NATO omyłkowo zabił dziewięciu członków prorządowej milicji w Afganistanie*, https://forsal.pl/artykuly/1399941,dron-nato-omylkowo-zabil-dziewieciu-czlonkow-prorzadowej-milicji-w-afganistanie.html,komentarze-popularne,1 (access date:10.06.2024).

With the increasing use of artificial intelligence (AI) in military operations, significant challenges related to the risk of errors and misuse of these technologies are also emerging[11]. To effectively manage these threats, it is necessary to develop and implement appropriate countermeasures and risk mitigation strategies. It is also important to mention the possibilities of preventing errors. Various approaches and solutions can help secure AI systems against failures, operational errors, and potential misuse. First and foremost, to minimize the risk of errors, AI systems must be thoroughly tested and validated before deployment. They should undergo simulations of various combat scenarios to ensure their reliability and safety. The introduction of international ethical standards and regulations regarding the use of AI in the military is also crucial. Such standards should include principles for testing, deploying, and monitoring AI systems. Proper training of operators is essential as well. AI system operators should undergo specialized training to understand how these systems work, how to interpret their results, and how to respond in emergency situations. Proper training can significantly reduce the risk of misuse.

Introducing oversight and control mechanisms for the use of AI in military operations also proves effective. There should be clear procedures for auditing and monitoring the actions of AI systems to quickly identify and correct any errors or misuse. The risk of errors and misuse of AI systems in warfare poses a serious ethical and operational challenge. To minimize this risk, it is necessary to implement appropriate countermeasures, including rigorous testing, international standards, specialized training, and oversight mechanisms. Only through a comprehensive approach can we ensure that AI systems operate in accordance with humanitarian principles and international law, minimizing the risk of unintended consequences. The escalation of conflicts is one of the most concerning potential outcomes of using artificial intelligence in warfare. AI systems, with their ability to rapidly process information and make decisions, can lead to unintended consequences that contribute to increasing the intensity and scope of armed conflicts[12].

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[11] A. Prus, *Uwarunkowania wykorzystania sztucznej inteligencji w przyszłej wojnie*, „Cybersecurity and Law" 2024, no 2, s. 48-66.
[12] *Project Artificial Escalation*, https://futureoflife.org/project/artificial-escalation/ (access date: 11.06.2024).

AI systems are programmed to respond to specific signals and situations. In wartime scenarios, these automatic reactions can lead to rapid escalation of conflicts, especially if AI systems misinterpret the intentions of the enemy. For instance, autonomous drones may mistakenly identify enemy troop movements as preparations for an attack, leading to a preemptive strike. One of the main advantages of AI systems is their ability to process data and make decisions quickly. However, this speed of reaction can paradoxically increase the risk of escalation, as it reduces the time available for diplomatic resolution of conflicts. In crisis situations, rapid decisions made by AI systems can prevent peaceful negotiations and escalate the situation further. Despite their advanced capabilities, AI systems can still make decisions based on incomplete or erroneous data. In the context of war, such decisions can lead to incorrect assessments of the situation and escalate conflicts. For example, an AI system might assess that the enemy is planning an attack when, in reality, they are preparing for defense.

Decisions made by AI are based on algorithms and data, not on human judgment and empathy. The lack of ability to consider humanitarian and moral aspects of decisions can lead to the escalation of conflicts. AI might carry out attacks that humans would reject due to potential civilian casualties or long-term political consequences. One of the key ways to prevent the escalation of conflicts is to introduce oversight and control systems over AI actions. These mechanisms should include human verification of decisions made by AI systems and the ability to intervene and halt actions if the risk of escalation is detected. Introducing international regulations and agreements on the use of AI in warfare can also help minimize the risk of conflict escalation. These regulations should outline principles for testing, deploying, and monitoring AI systems and establish accountability mechanisms for their use.

Additionally, AI system operators should be adequately trained in the potential threats related to conflict escalation and ways to minimize them. Training should cover both technical and ethical aspects to ensure operators are aware of the consequences of their actions. Testing scenarios and conducting simulations can help identify potential flashpoints and risks associated with the use of AI. These simulations can be used to refine algorithms and develop strategies for preventing escalation. The risk of conflict escalation associated with the use of AI in warfare is a serious issue that requires

attention and action. By implementing appropriate countermeasures, such as oversight systems, international regulations, operator training, and scenario testing, it is possible to minimize the risk of unintended consequences and ensure that AI systems operate responsibly and ethically. Only through such actions can we avoid conflict escalation and ensure international security in the era of advanced military technologies[13].

Recommendations and Future Research Directions

The application of artificial intelligence in armed conflicts brings numerous ethical dilemmas that require urgent and adequate solutions. There is a need to present practical recommendations aimed at minimizing ethical risks and identify key areas that require further research to better understand and manage the challenges associated with AI in warfare[14]. Implementing rigorous oversight systems for the use of AI in military operations is crucial. These systems should ensure the ability to monitor, audit, and intervene in case of irregularities. Oversight should encompass both decision-making and execution processes, with clear responsibility delineated at each stage. It is essential to establish transparent procedures that allow for tracking and documenting decisions made by AI systems and the humans overseeing them. Regular audits and inspections should be conducted by independent bodies to ensure objectivity and effectiveness of the oversight system. In cases where errors or abuses are detected, corrective mechanisms should be immediately implemented, and responsible parties must be held accountable.

International organizations, such as the UN and NATO, should develop and implement regulations regarding the use of AI in armed conflicts. These regulations should address aspects such as testing, certification, and compliance with international humanitarian law. It is also important to establish enforcement mechanisms for these regulations. Regulations should be developed in collaboration with various countries and stakeholders to incorporate global perspectives and prevent unilateral interpretations. An important element of these

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[13] Cf. K. Kowalczewska, *Sztuczna inteligencja na wojnie. Perspektywa międzynarodowego prawa humanitarnego konfliktów zbrojnych*, Warszawa 2021.

[14] E. Schwarz, *The ethical implications of AI in warfare*, https://www.qmul.ac.uk/research/featured-research/the-ethical-implications-of-ai-in-warfare/ (access date: 11.06.2024).

regulations should be the creation of international standards for the safety and reliability of AI systems that will apply to all countries. Additionally, oversight bodies must be established to monitor compliance with these regulations and impose sanctions in case of violations.

Military institutions and international organizations should develop ethical codes regarding the use of AI in warfare. These codes should define standards of conduct, including principles of proportionality, necessity, and humanity. Ethical codes can serve as a basis for operator training and as a tool for evaluating actions taken with AI. Ethical codes should be regularly updated to reflect technological advancements and changing conditions of armed conflicts. It is also crucial that these codes are clearly communicated to all involved parties, including soldiers, commanders, and AI technology developers. The development of ethical codes should involve extensive consultations with experts in law, ethics, technology, and the military to ensure the comprehensiveness and effectiveness of these documents.

The scientific and technological community should be actively involved in the development and implementation of AI systems used in the military. Collaboration between governments, military organizations, academia, and technology companies can contribute to a better understanding of potential risks and the development of safer and more ethical systems.

Joint research projects, conferences, and workshops can serve as platforms for exchanging knowledge and experiences, which will contribute to the faster development of safe technologies. Governments and military organizations should support AI research financially and logistically, particularly when it is focused on ethical and security aspects. Additionally, openness to criticism and suggestions from the scientific community can help identify potential problems and solve them more quickly.

AI system operators in the military should undergo intensive training covering both technical and ethical aspects. These trainings should include emergency scenarios, principles of responsibility, and methods of risk minimization. It is also important for operators to be aware of the potential consequences of their decisions and actions. Trainings should be comprehensive and regular to keep operators updated with the latest technologies and practices. Introducing realistic simulations and war games using AI can help operators better understand the dynamics of conflicts and prepare them for real com-

bat scenarios. Moreover, trainings should include psychological elements, such as coping with stress and pressure, to ensure that operators can make rational decisions in difficult situations.

The reliability of AI systems in the military context is a key area requiring further research. It is necessary to develop testing and verification methods that ensure AI systems operate as expected, even in complex and changing combat conditions. Research should include analyzing system resilience to disruptions, cyber-attacks, and other unforeseen situations. It is also important to create safety standards and emergency procedures that allow for rapid intervention in case of failures. Research on the ethical implications of autonomy in combat decisions should focus on identifying and analyzing the moral dilemmas associated with AI use. It is essential to examine how decisions made by AI impact human life, as well as the principles of proportionality and necessity in warfare. A significant aspect of this research is assessing the impact of autonomous decisions on human rights and compliance with international humanitarian law. It is also necessary to explore the possibility of embedding ethical mechanisms in AI algorithms that adhere to specific moral norms[15].

Understanding the interactions between humans and AI systems is crucial to ensuring that these systems effectively support military operations while minimizing the risk of errors and misuse. Research should analyze the dynamics of human-AI collaboration and develop user interfaces that support efficient and safe communication. An important aspect of this research is understanding how human perception and trust influence decisions made in collaboration with AI. It is also necessary to develop training techniques that enable operators to better understand and control AI systems. Examining the long-term effects of AI use in armed conflicts is essential, both in military and social contexts. It is important to understand how AI will impact future conflicts, military strategy, international stability, and societal perceptions of war. Research should include analyzing long-term scenarios that consider potential changes in the balance of international power and the development of new forms of conflict. It is also important to study the impact of AI on the psychological and social aspects of war, including the morale of soldiers and civilians.

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[15] Cf. M. Tegmark, *Life 3.0. being human in the age of artificial intelligence*, London 2018.

Regulations on the use of AI in the military have significant political and social implications. Scholarly reflection should focus on analyzing the political consequences of implementing such regulations, their impact on international relations, and the societal acceptance of military AI technologies. It is important to understand how different countries and cultures perceive the use of AI in the military, as well as their concerns and expectations. Research should also consider the impact of regulations on global technological competition and international standards and norms for AI use.

Recommendations and future research directions aim to ensure the safe and ethical use of AI in armed conflicts. By implementing oversight systems, strengthening regulations, developing ethical codes, engaging the scientific community, and educating operators, it is possible to minimize AI-related risks. At the same time, further research in key areas will allow for a better understanding and management of the challenges posed by AI technology in warfare.

Conclusion

This article has examined the key ethical dilemmas associated with the use of artificial intelligence systems in modern armed conflicts. Various applications of AI have been presented, including autonomous combat systems, data analysis and military intelligence, as well as simulations and training. The main ethical issues identified include responsibility for decisions made by autonomous systems, the risk of errors and misuse, compliance with international humanitarian law, and the potential risk of conflict escalation.

The goal of the article was to identify and analyze the main ethical issues related to the use of AI in the military and to propose recommendations aimed at minimizing risks. This was achieved through an analysis of various aspects of AI use in the military context, discussion of potential consequences, and formulation of practical recommendations and identification of areas requiring further research. The research hypothesis, which assumed that the use of AI in military operations introduces significant ethical dilemmas requiring new regulatory frameworks and analysis of compliance with international humanitarian law, was confirmed. Research findings indicated that without appropriate regulations and controls, the use of AI could lead to conflict escalation and unpredictable ethical and legal consequences.

The research problem, which involved identifying and analyzing the main ethical dilemmas associated with the use of AI in military operations, was addressed. The study results highlight the need for international regulations, development of ethical codes, oversight systems, and intensive training of AI operators.

Ethical dilemmas related to the use of AI in warfare are extremely important because they affect the conduct of contemporary conflicts and the future of international war law. Responsibility for decisions made by autonomous combat systems, the risk of errors, and compliance with humanitarian law are issues that have a direct impact on human life and international stability. International cooperation is necessary to develop comprehensive regulations and standards, enhance oversight and accountability systems, and create ethical codes. The scientific and technological community should actively participate in research on the reliability and ethical implications of autonomy in combat decisions. Through coordinated and conscious actions, we can ensure that AI technology development serves global peace and security while minimizing the risk of unintended consequences.

To minimize the risks associated with the use of AI in the military, it is essential to implement a series of countermeasures and strategies. Firstly, it is necessary to introduce oversight and accountability systems that ensure mechanisms for monitoring and controlling AI operations in military contexts. These mechanisms must be rigorous to effectively identify and respond to potential irregularities and provide clarity on responsibility for the decisions made. The next step is to strengthen international regulations by creating global standards and rules governing the use of AI in armed conflicts. International organizations such as the UN and NATO should play a key role in establishing these regulations, which must include testing, certification, and compliance with international humanitarian law.

Equally important is the development of ethical codes that establish clear ethical principles for AI actions. These codes should serve as the basis for operator training and as a tool for evaluating actions taken with AI. Clear and transparent ethical guidelines will help minimize the risk of unethical conduct. Engagement of the scientific and technological community is crucial for better understanding and managing the risks associated with AI. Collaboration

between scientists, engineers, and the military can contribute to the development of safer and more ethical AI systems and enable quicker responses to new technological challenges.

Education and training of AI operators are essential to ensure the responsible and safe use of technology. Operators should be well-prepared both technically and ethically, allowing them to better understand the potential consequences of their actions and minimize the risk of misuse. The use of AI in armed conflicts poses serious threats to humanity. One of the main threats is conflict escalation. AI, with its ability to rapidly process information and make decisions, can accelerate wartime decisions, leading to uncontrolled escalation of armed conflicts. Another threat is the loss of control over AI systems. There is a risk that autonomous combat systems may operate independently of human oversight, creating serious security threats. Unintended AI actions can lead to catastrophic consequences.

Dehumanization of war is another serious threat. Increased use of AI in armed conflicts can lead to situations where decisions about life and death are made by machines without considering moral and humanitarian aspects. This development could undermine efforts to humanize wars and protect human rights. Technological arms races are the last, but no less significant, threat. States may seek technological superiority at any cost, leading to global destabilization. The AI arms race could increase international tensions and undermine the stability of the global security system.

To ensure that AI technology serves peace and security, conscious and coordinated actions are necessary. Implementing oversight and accountability systems, strengthening international regulations, developing ethical codes, engaging the scientific and technological community, and educating AI operators are key steps that can minimize risks to humanity. Through these actions, we can ensure that the development and use of AI in the military are conducted responsibly, ethically, and safely, minimizing the risk of unintended consequences.

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