Autonomous Weapons
AI & Society

Anonymous

Vrije Universiteit Amsterdam, De Boelelaan, Amsterdam 1081 HV, NL

Introduction

Autonomous weapon systems (AWS) are transforming modern warfare, blending advancements in artificial intelligence with military strategies to create powerful, unmanned combat technologies. The integration of these systems has sparked significant interest from governments, militaries, and technology companies, eager to harness their potential to reduce human risk, enhance precision, and bolster operational effectiveness. However, as these technologies reshape military engagement, they have also raised critical ethical, legal, and strategic concerns. This report highlights intersection of societal debate and scientific inquiry.

Impact of AI-based automatic decision making systems in warfare

The integration of AI-based automatic decision-making systems in warfare fundamentally transforms modern military strategies, operations, and ethical considerations. These systems enable rapid data analysis, precise targeting, and autonomous execution of combat decisions, offering unprecedented operational efficiency. For instance, AI-driven reconnaissance drones and target detection algorithms have allowed militaries to conduct high-stakes missions with greater accuracy and reduced human casualties on the battlefield. However, these advancements also come with significant implications. AI systems can process vast amounts of data in real time, enabling rapid decisions that outpace human reaction times. Although this improves combat effectiveness, it also raises the risk of unintended escalations, as AI systems might misinterpret complex scenarios or act unpredictably in the absence of robust safeguards. Other concerns regarding safety and control with the use of automated decision making systems in warfare are centered on accountability challenges, and difficulties in establishing international regulations.

Popular press perspective

In recent years, militaries around the world have been rushing to integrate autonomous weapons systems that can reduce human life risk in combat, enhance performance by potentially reducing collateral damage in targeted operations. As a result, technology companies are showing an increased interest in warfare systems. These autonomous weapons have already begun to reshape global military strategies.

The article in The Guardian [10] describes some of the main current applications, such as target detection systems used in airstrikes in Syria and Yemen or software used to predict potential militants during the war in Gaza. Other developments mentioned include lethal autonomous drones, unmanned drones, fighter jets and underwater vehicles. According to the article, on the one side the military companies providing the technology are booming. On the flip side, critics warn about ethical implications such as lack of transparency and accountability, difficulties in establishing international regulations, and risks associated with those systems.

The article by Frank Pasquale [9] also explores the integration of several machines using AI in modern warfare. The article mentions that some experts argue that these tools could help reduce human error thanks to the elevated precision associated with these technology over humans. Other experts interviewed argue that it is impossible to train a machine how to behave in combat situations due to the nature of war not being an objective matter of what might be considered good or bad actions in response to specific incidents. The article further highlights other concerns such as difficulties in weighing actions against potential civilian casualties counts, challenging in distinguishing combatants from non-combatants, risks of technological escalation and arms race and limited international consensus.

In the BBC report on drone warfare in Ukraine [2], autonomous weapon systems demonstrate a significant operational evolution in modern military engagement. Ukrainian drone operators utilize sophisticated technologies including virtual reality headsets and thermal imaging to deploy First Person

View (FPV) drones, capable of precise targeting and payload delivery. These systems allow them to execute missions with high precision, achieving reported daily casualty rates of approximately 100 enemy personnel. Moreover, the drones are challenging to block due to their autonomous capabilities and communication frequencies. The article notes that drone-jamming equipment can block approximately 75% of drone communication frequencies, but some advanced models like the Russian Lancet drone are particularly resistant. The Lancet, for instance, becomes entirely autonomous after initial target marking, making it extremely difficult to intercept or disrupt once launched. The shift towards increasingly autonomous and algorithmically guided combat strategies allows for rapid, targeted engagement over traditional infantry maneuvers.

The Haaretz [8] opinion piece article critically examines the Israeli Defense Forces' use of artificial intelligence in targeting methodologies during the Gaza conflict. The investigation lead by [5] into the 'Lavender' machine reveals a troubling pattern of AI-assisted targeting that includes overly permissive target marking, minimal human verification, and algorithmic decision-making processes that contribute to high civilian casualty rates. The research suggests that extensive reliance on AI technologies may fundamentally alter warfare's moral landscape, introducing a "secularization of catastrophe" where algorithmic systems replace human judgment, potentially erasing compassion and proportionality in military engagement.

Scientific perspectives

The paper [4] explores the conceptualization and use of the term AWS (autonomous weapon systems) within military strategies of the United States and China as two countries competing for economic, military, and geopolitical advantages. The authors argue that the AWS term lacks a clear and consistent definition, leading to varied interpretations in political and military contexts. These differing interpretations transform specific understandings of artificial intelligence into strategic assets, complicating the establishment of common ethical standards and legal regulations. The paper suggests that through the military doctrines and public statements of the countries, it can be observed that the AWS terms functions as a signifier employed to foster political legitimacy or to create deliberate confusion and deterrence, and detract attention from their own "development of highly automatic and destructive weaponry".

Another perspective, mentioned in the article [7] considers the nuanced impact of drones in modern warfare, particularly in the context of the Ukraine conflict. Kunertova argues that while drones have become integral to military operations, their effectiveness is contingent upon various factors, including the specific military objectives, the adversary's capabilities, and the operational environment. In Ukraine, both sides have utilized drones for reconnaissance, targeting, and propaganda purposes. However, the extent to which drones can be considered "game-changing" varies based on how they are employed and the countermeasures in place. Their success and influence depend on how well they are integrated into broader military strategies and how adversaries adapt to or counter their use. Thus, while drones offer significant advantages, their role as decisive factors in warfare is complex and context-dependent.

The article [3] provides an overview of the ethical and legal debates regarding warfare systems and proposes suitable approaches to support technological systems that "remain under meaningful human control (MHC)". Firstly, they stress the need for AWS (automated weapons systems) to comply with principles of distinction, proportionality, and necessity as mandated by the International Humanitarian Law (IHL). Secondly, they raise accountability difficulties that artise with the delegation of lethal decision-making to machines. They argue that doing so complicates the assignment of responsibility for unlawful acts, posing challenges to traditional legal frameworks. Then, they content that allowing machines to make life-and-death decisions could undermine the inherent value of human life, and thus human dignity. Lastly, they worry that the proliferation of AWS could destabilize international relations, leading to arms races and unintended escalation.

Similarly, the paper [6] analyze the role of trust in Lethal Autonomous Weapon Systems (LAWS) and proposes a framework for supporting ethical decision-making in their deployment. One highlighted aspect by the authors centers on the human cognitive limitations. Some argue that operators have to make ethical decisions with high-stakes scenarios under time pressure, which can overburden them and lead to them making morally or legally questionable choices. The authors advocate for the development of AI tools designed explicitly to guide human operators in adhering to ethical and legal standards during the use of force. For this to work, they further emphasise the need for trustworthiness to be embedded in the design, testing, and deployment of AI systems. The authors also mention a call made by many prominent scientists and entrepreneurs to collaborate towards establishing international treating banning the use of "offensive autonomous weapons beyond meaningful human control" [1].

Comparative Analysis

The claims presented in the popular press about autonomous weapon systems (AWS) align partially with the findings in the scientific literature, but there are notable differences in focus and depth. Both sources share concerns with regards to transparency and accountability, ethical and legal concerns, as well as lower barrier to enter conflict and operational risks. Both perspectives also explore potential merits in the use of automated AI systems, such as enhanced precision, efficiency and capabilities, deterrence, decreased risk to human life. However, the popular press emphasizes anecdotal evidence and highlights the risks, while the scientific literature examines already observed issues or potential issues that may arise more thoroughly and proposes potential frameworks, legislative changes to address them.

There are a few gaps in the two perspectives that emerge. One such difference refers to the depth and solutions proposed; the media articles focuses on raising issues as they arise and may broadly speculate on solutions. The scientific literature, on the other hand, may elaborate on challenges not previously addressed (such as the difficulty with the inconsistent definitions of AWS across geopolitical standards and thus establishing international standards) and propose more encompassing solutions. Another gap refers to the potential bias of the papers for a negative view on AWS through a focus on an unfavorable view on the systems.

Conclusion

In conclusion, while AI-based automatic decision-making systems in warfare hold the promise of transforming military operations, their implications necessitate careful consideration of ethical, legal, and strategic frameworks to mitigate risks and ensure their responsible use.

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