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Artificial Intelligence in Modern Warfare

Navdeep Dahiya[a]

[a]Campus Law Centre, Faculty of Law, University of Delhi, Delhi, India

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Nations have consistently improved military technology throughout history, with each development becoming more deadly and effective than the one before it. Military technology is advancing and becoming deadlier than ever, from bows and arrows to rifles and machine guns to nuclear weapons. Warfare has evolved from man without machines to man with machines and now machines without a man. With the development and deployment of autonomous weapon systems based on robotic engineering and algorithmic technology, the world's most powerful nations have sparked a new arms race. In this paper, the ethical dilemma surrounding the use of autonomous weapons systems is highlighted, and it is argued that as long as moral agency remains with human operators or as long as machines cannot form intent or account for the results of their deployment, the continued development and use of autonomous weapons systems create ethical, legal, social, economic and political challenges that the world needs to address to prevent disastrous outcomes.

Keywords: *artificial intelligence, modern warfare, ethical dilemma, economic challenges, military technology.*

INTRODUCTION

Vladimir Putin stated that "Artificial intelligence is the future, not only for Russia but for all humankind. It brings with it enormous potential as well as unpredictable threats. Whoever

dominates this sector will rule the world"[1]. Artificial Intelligence (AI) and related technologies have become today the fuel of the fourth industrial revolution[2], an event which has been described by the World Economic Forum as "unlike anything humankind has ever experienced"[3]. The history of warfare, according to Schwab, is the history of technological advancement. These technologies have continued to captivate our attention for the past few decades, but we are still unsure of how AI will impact warfare in the future. Post-modern militaries are more frequently involved in hybrid clashes that combine conventional military tactics with non-state entities.

Carl von Clausewitz himself emphasised in "On War" that failure to completely comprehend the nature of war inevitably results in catastrophe. The development and eventual deployment of (lethal) autonomous weapons systems serve as a growing autonomy that will eventually put human involvement in modern warfare in jeopardy, an illustration of this change like combat. The use of technology to wage war is nothing new because every technical revolution, from the discovery of gunpowder to the development of nuclear weapons, has always resulted in new problems with global security and ethical dilemmas. The primary distinction in the present is the potential loss of human control over autonomous machines via AI (and deep learning) over the operation of the war.

Lethal Autonomous Weapons Systems (LAWS), commonly known as "killer robots," are autonomous weapons capable of identifying and eliminating military targets without the assistance of a human[4]. This is true even if some proponents of AI development in the military, such as the U.S. It's interesting to note that some combat zones already have such autonomous weapons systems in place. The majority of contemporary weaponry is remote-controlled by humans, but some have already been made autonomous, such as the South Korean Samsung SGR-A1 which is stationed in the demilitarized zone (DMZ) at the border between North and

[1] RT News, 'Whoever leads in AI will rule the world': Putin to Russian children on Knowledge Day' (*RT News*, 2017) https://www.rt.com/news/401731-ai-rule-world-putin/> accessed 01 September 2022
[2] *Ibid*
[3] Schwab K, 'The Fourth Industrial Revolution: what is means, how to respond' (*World Economic Forum*, 2016) <https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/> accessed 01 September 202
[4] *Ibid*

South Korea. This specific system can recognise moving targets from a distance of kilometres, recognises identifiable voices and signals (such as waving hands or other motions that often denote surrender), and automatically transmits information back to Headquarters if a person has crossed the border.

This particular system also has a 5.53mm calibre machine gun and a 40 mm grenade launcher, and it only fires on enemies when instructed to do so by humans. However, it also has an "automatic" mode that theoretically may allow it to act alone without human supervision[5]. There is an indisputable shift despite the currently negligible employment of automatic systems in combat. One thing that is certain at the moment is that the use of AI in military research and the growing development of autonomous weaponry is opening a window toward uncertainty and the unknown. This could pose a serious threat to international law, laws about human rights, as well as to human life and security in general, if such technology were to one day come to decide the fate of a human being on its own, thereby redefining and altering the very nature of warfare[6]. The purpose of this article is to examine the current and possible uses of AI in the military sphere and also explore the ethical dilemmas associated with using AI in combat missions.[7]

Concerns about killer robots have come to the forefront of discussion at the United Nations, where states gathered in Geneva in 2018 for a treaty convention called the Convention on Certain Conventional Weapons (CCW) to propose a ban on lethal weapons.[8] This comes as big tech nations like the US, Russia, China, and Israel have gotten into a new arms race to develop autonomous weapon systems. This came after discussions and advocacy in academic and research circles, as well as in international forums, centred on ethical, legal, practical, and operational issues as well as from the perspective of global security[9].

[5] *Ibid*
[6] Ancelin J, 'Les systèmes d'armes létaux autonomes (SALA), 'Enjeux juridique de l'émergence d'un moyen de combats déshumanisé' [2016] La Revue des droits de l'homme
[7] *Ibid*
[8] *Ibid*
[9] Sharkey N, 'Staying in the Loop: Human Supervisory Control of Weapons' in Bhuta & Ors (eds), *Autonomous Weapons Systems: Law, Ethics, Policy* (Cambridge University Press 2016)

ARTIFICIAL INTELLIGENCE AND MILITARY APPLICATION

As with most innovative and sophisticated technologies, comes potential military use. Indeed, there are various ways that AI could be used in the military for modern warfare. Today, one of the numerous technologies is regarded as a favourable foundation for developing additional military advantages. The application of AI for military purposes, such as the expanding use and development of remotely operated and autonomous weapons in combat, poses a more urgent concern.

There are incentives for militaries all around the world to study and deploy AI applications that will eventually only serve to increase military efficacy. These incentives emerge from internal political calls for the development of autonomous weapons systems as well as an environment of rising military competition. Most governments will attempt to legitimise such research by stating that AI may indeed be capable of handling tasks that people typically perform at a reduced financial and human cost. According to the U.S. Department of Defence, the primary intellectual foundation for autonomy stems from Artificial Intelligence, the capability of computer systems to perform tasks that normally require human intelligence (e.g., perception, conversation, decision-making)". To avoid armies from sacrificing human lives in battle, autonomous or unmanned weapon systems were developed, starting with the use of drones for training, communication, and intelligence operations. They then acquired the form of predator drones and other remotely operated equipment, allowing individuals to be physically removed from the battleground while still deciding to hit the intended target.

Since the greater autonomy of armaments, warfare has evolved to the point where individuals can now be both psychologically and physically detached from the battlefield since computers determine how and when to launch an offensive. As a result, there is a plethora of emerging reservations about whether it is ethical to delegate the discretion to execute an individual to a computer that, once powered on, can trace, identify, and engage targets with lethal force without human supervision. Growing reservations about the ethical implications and ramifications of evolving military technology have been prompted by the utilization of lethal and autonomous weapon systems and their unintentional impact on civilian populations in the US War on Terror

in Iraq and Pakistan as well as during the Syrian Conflict. In contrast to most military projects and technological advancements, which typically take years or even decades before being deployed to conflict zones, the Pentagon's artificial intelligence programme, Project Maven, took only six months from the time it received funding to its implementation and is actively used by the Pentagon against the Taliban in Afghanistan and other terrorist organisations like ISIS in Iraq.

The US Department of Defence has recognised the need for greater efficiency and innovation in response to new threats and developing technologies and initiatives, which is why it has established a wide range of projects, such as the Algorithmic Warfare Cross-Functional Team, which gave rise to the Project Maven venture. The purpose of this specific project "is to turn the enormous volume of data available to the Department of Defence into actionable intelligence and insights" according to Air Force Lt. Gen. John Shanahan by "improving processing, exploitation, and dissemination of intelligence feeds"[10]. This ground-breaking programme, which enables the swift analysis of full-motion video data provided by Unmanned Aircraft Systems (UAS), like the MQ-9 Reaper and the MQ-1C Grey Eagle, facilitates artificial intelligence to analyse the data instead of a team of analysts meticulously trying to "exploit a fraction of one drone's sensor data" (Allen, 2017).[11] The project's targeting accuracy number rose from 60% to over 80% in its first week of deployment alone[12]. These technological advancements and investments represent the Third Offset Strategy, which the United States has been implementing since 2012.[13] According to Robert Work, a former U.S. Secretary of Defence, who vehemently argued in 2015 that "Early adoption will be a key competitive advantage, while those that lag in investment will see their competitiveness slip," this doctrine identifies five major pillars in the

[10] Lewis L, 'Insights for the Third Offset: Addressing Challenges of Autonomy and Artificial Intelligence in Military Operations' [2017] Centre for Naval Analyses
[11] *Ibid*
[12] Weisgerber M, 'The Pentagon's New Artificial Intelligence Is Already Hunting Terrorists' (*Defence One*, 2017) <https://www.defenseone.com/technology/2017/12/pentagons-new-artificial-intelligence-already-hunting-terrorists/144742/> accessed 01 September 2022
[13] *Ibid*

military application of AI[14]. Work himself coined these pillars the "Five Blocks," which are as follows:

(1) Autonomous deep learning machine systems for intelligence collection can react immediately and provide an early warning at "machine speed". Israel's Iron Dome System theoretically already employs this pillar because it can protect a military installation or city while operating at machine speed[15].

(2) Collaboration of humans and machines as a result of the promotion of "Centaur" war-fighting[16]

(3) Assisted human operations, such as the employment of wearable electronics, would improve human performance in combat.

(4) Advanced human-machine combat teaming, enables people to collaborate and make better decisions during combat operations. An example of this type of collaboration would be between the U.S. Army Apache helicopter and the MQ-1C Grey Eagle, which are made to work harmoniously. The "loyal wingman" idea can also be used to describe this idea.

(5) Network-enabled semi-autonomous weapons. The goal of AI is to use autonomy as efficiently as possible to protect nations from threats both at home and abroad. One such threat is from Russia, which has spent a lot of time and resources preparing for a potential robotic battlefield after Russian Chief of General Staff Gerasimov was quoted as saying,[17] "Shortly it is possible a fully robotized unit will be created, capable of independently conducting military operations"[18].

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[14] *Ibid*
[15] Horowitz M, "The promise and peril of military applications of artificial intelligence' (*Bulletin of the Atomic Scientists*, 2018) <https://thebulletin.org/2018/04/the-promise-and-peril-of-military-applications-of-artificial-intelligence/> accessed 01 September 2022
[16] *Ibid*
[17] Ma v, 'The Ethics and Implications of Modern Warfare, Robotic Systems and Human Optimisation' [2017] Harvard International Review
[18] *Ibid*

Our capacity to create autonomous systems directly affects the use of AI in the military in the future. Because the majority of military robots (or drones) are controlled directly by human interaction via a virtual extension cable, there are currently no such autonomous systems (officially) in operation or deployed in a combat scenario. However, current military land, sea, and air drones are becoming more progressive over time because they have a limited degree of autonomy that allows them to navigate, land, and take off without human intervention (which is thought to be the most challenging phase for pilots), but mission execution will always require human intervention[19]. Military organisations are still in the phase of development rather than the operational application of such systems. For example the U.S. Navy's recent creation of its X-47 Pegasus autonomous fighter/bomber aircraft, which despite numerous successful trials is currently being utilised as a tanker. This system is primarily intended to be used for support purposes, although they can act autonomously, but could in reality "threat the status quo if allowed to take the most prestigious 'tip-of-the-spear' jobs"[20].

AUTONOMOUS WEAPONS SYSTEMS

There is today still no widespread understanding of the term "autonomy" in the field of artificial intelligence, there is still no agreed-upon description of what autonomous weapons are. A prominent definition is autonomous weapon systems include drones, robots, and other lethal autonomous military technologies that are capable of self-propulsion, independent analysis of the environment, and independent response to the environment, and that can execute effectively military operations with minimal to no human interaction. Depending upon the degree of involvement by a man-in-the-loop, autonomous weapons can be non-autonomous, semi-autonomous, or fully autonomous. Some autonomous weapons perform fully independently in a non-lethal mode, such as surveillance and reconnaissance platforms. Autonomous weapons systems at the far end of the spectrum use machine learning logic to lethally engage targets automatically without a man in the loop by evolving new behavioural patterns in response to

[19] Cummings M, *Artificial Intelligence and the Future of Warfare* (Chatam House 2017)
[20] *Ibid*

newly identified data[21]. The United States separates autonomous weapons systems into three distinct categories:

(1) "Out of the loop" systems, which "once activated, can select and engage targets without further intervention by a human operator,"

(2) "on the loop" systems, which involve supervised autonomous systems that are "designed to provide human operators with the ability to intervene and terminate engagements, including in the event of a weapon system failure, before unacceptable levels of damage occur" lastly

(3) In the loop semi-autonomous systems of weapons systems of weapons "once triggered, are designed to engage only particular target groupings or specific targets that have been selected by a human operator"

ETHICAL ISSUES RELATED TO THE MILITARY APPLICATION OF ARTIFICIAL INTELLIGENCE

Since the creation of these military programmes has been the topic of extensive debate in recent years, myriad ethical and moral concerns are directly related to the militaristic application of AI through LAWS (Lethal Autonomous Weapon Systems). The development and use of autonomous weapons, as well as the potential (if not yet a reality) future use of LAWS that may locate, choose and neutralise targets on their raises multiple ethical and legal questions. These questions include how LAWS will be able to distinguish between military and civilian targets once deployed, who will be responsible for fatal errors made by AI (the designers, manufacturers, controller if there is one, etc.),[22] and how to create an "ethical" AI capable of reasoning instead of instantly neutralising a target among many others. These and other concerns gave rise to numerous movements that aim to prohibit the use of offensive AI. It is nonetheless important to remember that while many people think that AI has the potential to

[21] Royakkers L & Olsthoorn P, 'Military Robots and the Question of Responsibility' [2014] International Journal of Technoethics
[22] *Ibid*

be helpful to humanity, the weaponization of AI may damage that reputation by sparking a military arms race[23].

This grave concern is the reason why several theorists and engineers favour "a ban on offensive autonomous weapons beyond meaningful human control" rather than a complete ban on AI, as shown by the 2015 Open Letter from AI & Robotics. "3,978 AI/Robotics researchers and 22,540 others" signed a document that was presented by 13 researchers at the beginning of the IJCAI conference (personalities who signed the document included Elon Musk, Stephen Hawking, and Steve Wozniak)[24].

The assignment of responsibility for making life-or-death decisions to a computer programme rather than a human agent has remained one of the key objections to the creation of LAWS, which goes beyond the present legal framework, to this day. According to the U.S. Air Force Unmanned Aircraft Systems Flight Plan 2009–2047, AI advancements will eventually allow computers to make combat decisions without always needing human input. The assignment of responsibility for making life-or-death decisions to a computer programme rather than a human agent has remained one of the key objections to the creation of LAWS, which goes beyond the present legal framework, to this day.

According to the U.S. Air Force Unmanned Aircraft Systems Flight Plan 2009–2047, AI advancements will eventually allow computers to make combat decisions without always needing human input[25]. The delegation of such a significant decision to a nonhuman agent violates the Principle of Distinction because AI does not currently and most likely will not be able to distinguish a civilian from a combatant or recognise injured combatants shortly. We can only imagine the terrible collateral damage and innocent casualties that could occur from this lack of difference which also concerns humans. Moreover, giving autonomy over life-and-death decisions diminishes the sanctity of human life that way, "there is something inherently

[23] *Ibid*
[24] Janos Kramar, 'Autonomous Weapons: An Open Letter from AI & Robotics Researchers' (*Future of Life Institute*, 2015) < https://futureoflife.org/open-letter/open-letter-autonomous-weapons-ai-robotics/ > accessed 01 September 2022
[25] *Ibid*

immoral about developing and using autonomous drones"[26]. Many believe that even AI will never be able to emulate the human assessment and judgement essential for this particular notion.

We don't even fully comprehend what a military advantage entails[27], and proportionality will hinge on an indefinite number of variables and scenarios. The issue of accountability during the deployment of LAWS in combat operations is the second topic of discussion. Indeed, when humans make mistakes, they can be held accountable for their actions, which is essential during operations to win the hearts and minds of the local populace and encourage reconciliation. Sharkey and other theorists, however, contend that LAWS will never be held accountable for infringing human rights laws, because "there is no mechanism to reprimand a robot"[28] when they make mistakes. The only potential consequence may be the robot being turned off, which would be equally effective as "informing your washing machine that if it does not effectively remove stains, you will break its door off, argued Sharkey.

Indeed, even if some nations revised the jurisdiction of their laws to include machines, a judgement would not accomplish the primary objectives of punishment because LAWS would not "appreciate" being punished, rendering deterrence through condemnation completely ineffective[29]. The integration of AI into modern warfare and the absolute autonomy of weapon systems undoubtedly raises the ethical and moral concerns mentioned above. Furthermore, it appears to be at odds with the just war theory's underlying philosophy, which seeks to "provide a theoretical framework for debate about the morality of specific choices and actions about war" by establishing a set of principles. If an artificial mechanism is used to eliminate soldiers who have simply surrendered or were surrendering "because it calculated that the military costs of watching over them and keeping them prisoner was too high" or "to strike fear in the face of on looking combatants"[30], who would be accountable?

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[26] *Ibid*
[27] Sharkey N, 'Saying 'No!' to Lethal Autonomous Targeting' [2010] Journal of Military Ethics
[28] *Ibid*
[29] *Ibid*
[30] Sparrow R, 'Killer Robots' [2007] Journal of Applied Philosophy

Moreover, since the use of armed drones in Iraq and Afghanistan, which prompted further deployment in Asia, the Middle East, and Africa in counterinsurgency and counterterrorism operations by many nations possessing military drones, moral disengagement of humans from the area of operation has been a huge source of debate. The "pilots" who have been dictating these drones, stopped acting or thinking ethically, often thousands of kilometres distant from the fighting zone, and have almost lost all ethical consciousness of their conduct. Such moral disengagement can only be more persuasive when using LAWS as "developing technologies of this sort also have the potential to provide for the creation of moral buffers that allow humans to act without adequately considering the consequences"[31]. The application of AI in warfare, such as through LAWS, may very potentially enable a more liberal approach to the use of fatal force.

Indeed, adopting autonomous weapons systems instead of human troops will result in lower costs in terms of human casualties. Domestically, this is significant because war has always resulted in casualties and subsequent public outcry leading to further institutional constraints. Instead, there might be a relaxed governmental control over the way the government manages its war powers, which would further pose a serious threat to security and stability. The fact that applying lethal force in wartime without jeopardizing the lives of human soldiers (and the potential trend of systems using more aggressive postures) suggests that "these systems will lower the threshold of conflict and make war more likely"[32].

CONCLUSION

Military authorities have often moved to insist that the choice to use force will always be up to individuals. As stated by work, the military "will not delegate lethal authority to a machine to make a decision"[33]. However, there will only be one exception "when things happen faster than a human's reaction time." We must recognize that contemporary warfare is accelerating, just like any other revolution in it, and AI will not cease from more sophistication. We can only assume

[31] *Ibid*
[32] Sparrow R (n 30)
[33] *Ibid*

that individuals will gradually move from the capacity of operator to that of supervisor, becoming even more dependent on these systems and more secure in their judgement. However, one aspect that I think is worth highlighting is how unpredictable AI systems can be, just by looking at one well-known example: Lee Sedol's loss to the Alpha Go system.

Lee Sedol, one of the top Go players in the world, was defeated by an AI after it made a move in the second game that was so unique that Sedol had to take a long break to figure it out. The move was so extraordinarily unique that no (expert) human player would even consider making it, but the machine seems to have worked it out to some level. This ostensibly little incident proved that artificial intelligence has the huge potential to enhance decision-making processes. Such an event could be relayed to military dependability on AI and the potential unknown results we might confront in the future, as AI might "learn on the job" and improve itself to the point where human operators may lose control over such complicated and sophisticated systems possibly leading to fatal accidents. Artificial intelligence may sometimes fail at operations that seem to be simple and routine in ways that humans do not anticipate because of the different patterns of thinking of each human.

The potential risks associated with the employment of weaponized AI by militaries around the world are amply illustrated in this article. Such applications in contemporary combat raise several humanitarian, ethical, and moral concerns, but we still need to figure out how to build an AI that can think ethically before acting (if that is even possible). Furthermore, as Stephen Hawking once said, "unless we learn how to prepare for, and avoid the potential risks, AI could be the worst event in the history of our civilisation. It brings dangers, like autonomous weapons, or new ways for the few to oppress the many"[34]. We should embrace evolution and technological advancements, such as the development of efficient AI,[35] but underestimating this technology and attempting to deploy it before fully comprehending the risks and obstacles it may present will be the largest blunder in our planet's history.

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[34] Jean Patrick Clancy, 'Artificial Intelligence and Modern Warfare' (*Academia*) <https://www.academia.edu/37454857/Artificial_Intelligence_and_Modern_Warfare> accessed 01 September 2022

[35] *Ibid*