

Flying too Close to the Sun?

Lethal Autonomous Weapon Systems: New Laws Required

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Introduction

The development of warfare technology is outpacing the development of international structures of security governance. Specifically, the evolution of Lethal Autonomous Weapon Systems (LAWS) can fundamentally change how warfare is conducted, pose a threat to international security, may breach international humanitarian law (IHL), and carry considerable ethical concerns. Jivan Gjorgjinski, the Chairperson of the United Nations Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems (GGE), believes that LAWS represent the third revolution of warfare, after the development of gunpowder and nuclear weapons, and that it is naïve to think that militaries will willingly stop the development of this technology.¹ LAWS technology is evolving so rapidly that current IHL and institutions do not adequately govern its potential uses. The International Committee of the Red Cross (ICRC), the Human Rights Watch (HRW) and the United Nations being the primary international voices on LAWS. The current state of discourse on the matter is divided into two camps: those who advocate for restrictions and those who push for further development. The ICRC likens the thirst for military power through LAWS to the ancient Greek parable of Icarus, where man's drive for progress leads to death.² Our last significant military advancement, nuclear weapons, nearly led to humankind's destruction during the Cold War, and fears exist that the development of LAWS could be the next major threat to international security.

Lethal Autonomous Weapon Systems (LAWS)

1. *Overview*

¹ Gjorgjinski, "TRN409 Lecture 5," *University of Toronto*. (21 October 2020).

² Bernard, "New technologies and the modern battlefield: Humanitarian perspectives," *International Review of the Red Cross*. (2016).

The ICRC has defined autonomous weapons as, "any weapon system with autonomy in its critical functions—that is, a weapon system that can select (search for, detect, identify, track or select) and attack (use force against, neutralize, damage or destroy) targets without human intervention."³ Lethal Autonomous Weapon Systems, known to some as 'Killer Robots,' may hinder the ability to protect civilians by introducing an element of unpredictability into an attack's impact, while risking international security as a whole. LAWS will fundamentally alter the way war is perceived as it lowers the threshold for conflict and reduces the impact of morality as the human decision to kill another human is removed from combat for the first time. Increases in lethal autonomous technology will increase the remoteness of war from the attacker while simultaneously expanding weaponry's reach and effectiveness.⁴

It is no secret that major military players such as China, the United States, Israel, Russia and the United Kingdom are all heavily invested in developing autonomous weaponry. On the other end of the spectrum, since 2013, thirty countries have called for a total ban on fully autonomous weapons and the approximately 125 state strong Non-Aligned Movement has called for legally binding regulations and prohibition of LAWS.⁵ The pros and cons of LAWS are highly debated. Those supporting the continued development of LAWS point to significant military advantages and ethical benefits. The leading military advantages are that LAWS would act as a force multiplier (fewer war-fighters needed for missions). They would allow military engagement in previously inaccessible locations and reduce the engaging military force's casualties and cost considerably less once operational than a human soldier.⁶ For reference, an

³ "A legal perspective: Autonomous weapon systems under international humanitarian law," *International Committee of the Red Cross*. (2018).

⁴ Bernard, "New technologies and the modern battlefield: Humanitarian perspectives," (2016).

⁵ Wareham, "Stopping Killer Robots," *Human Rights Watch*. (2020).

⁶ Etzioni, "Pros and Cons of Autonomous Weapons Systems," *Military Review*. (2017).

average American soldier operating in Afghanistan costs approximately USD\$850k a year, whereas an armed TALON robot costs USD\$230k. Robots would be especially useful in removing human necessity from most "dull, dirty or dangerous missions," proving ethically beneficial as well.⁷ The argument that robots can act more humanely due to a lack of emotion or self-preservation instinct, and an ability to even report ethical infractions detected amongst human peers, attempts to paint the picture that "Killer Robots" are not only the militarily useful future of conflict, but the ethical one.⁸

On the other hand, there is considerable international opposition to the new technology. The main objections are the inability of LAWS to act within IHL, ethical considerations concerning the extent of meaningful human control of the systems and worry about their impact on international peace and security.⁹ The legal and ethical implications are expanded upon in Sections 3 and 4 of the report.

2. *Technological Synopsis*

Advances in artificial intelligence (AI), machine learning, and increased dual-use opportunities in civilian life, such as in autonomous cars or delivery services, ensures continued investment in autonomous weapons, at least until regulations are implemented. Recent conflicts are already seeing a spike in automated weaponry, such as US remotely piloted drones with automated flight paths, take-off and landing, processing capabilities and image taking. However, while automated, these systems are not autonomous as they still require direct control from

⁷ *Ibid.*

⁸ *Ibid.*

⁹ Sharkey, "Autonomous Weapons Systems, Killer Robots and Human Dignity." *Ethics and Information Technology* 21, no. 2 (2019).

humans.¹⁰ With further software updates, these drones may very soon be able to function autonomously, without human supervision, posing a threat to conflict management capacities. Autonomous capabilities can be applied to most existing weapons systems, including new technology such as 'swarms' of smaller robots. Entirely autonomous LAWS use machine learning to act in a closed-loop function, as opposed to human-in-the-loop. Closed-loop actions follow a sense-think-act pattern. The robot uses sensors to receive information, thinks independently through its software processing system and, based on its analysis of inputs, decides to act in a particular manner without requiring human intervention or authorization.¹¹ Machine learning systems build their knowledge over time as they learn from data inputs, potentially leading to unpredictable outcomes as developers do not know precisely what the system has learnt. Some difficulties stemming from LAWS operating through machine learning are the ability to deactivate the possibility of human override, exploit any human error in its assigned goal, or succumb to emerging behaviour unrelated to its initial task.¹² The most effective way to counteract these weapon systems' unpredictability is to preserve direct human control over the critical functions of the robot, such as target selection.

Two leading autonomous weapon systems at the forefront of development are loitering weapons and swarm technology. Loitering weapons are the intersection between drone and missile technology, with autonomous functions to target based on pre-programmed radio frequency signatures.¹³ These weapons, such as the Israeli Harpy, can hover at altitude above a pre-determined area in a fully autonomous nature until it identifies a pre-determined radio

¹⁰ Asaro, "On banning autonomous weapon systems: human rights, automation, and the dehumanization of lethal decision-making," *International Review of the Red Cross* 95. No. 886. (2012).

¹¹ "Autonomy, artificial intelligence and robotics: Technical aspects of human control," *International Committee of the Red Cross*. (2019).

¹² *Ibid.*

¹³ *Ibid.*

frequency and fires without any additional human intervention. The Israel Aerospace Industries Harpy is the first fully autonomous loitering munitions system, and it can strike targets in its pre-determined "loitering area" with high accuracy. Deployed from a ground-based launcher, the Harpy is a "fire and forget" weapon with a 200km range and up to 9 hours of fly-time at a maximum altitude of 15,000 feet; it can wait and autonomously strike targets at an accuracy of less than one meter with a 16Kg warhead.¹⁴ As loitering weapons develop, they can replace systems such as mortars and become more effective at autonomously destroying enemy targets. Second, swarm technologies are still mainly in the development stage and are progressing along with machine learning. Swarm technology refers to groups of co-operative autonomous drones that work together to overwhelm targets. Drawing inspiration from swarms of insects, this technology has the potential to fundamentally change future wars and impact humanitarian efforts, such as use during search and rescue missions.¹⁵ Rather than a single robot being controlled by a human, swarms of drones would make decisions based on data collected by their swarm, posing a risk of unpredictability.

3. *Legality*

Within IHL, the idea of distinction, proportionality and necessity are critical rules of conflict to protect civilian life. All states who possess, or intend to possess, LAWS must ensure that their weapons are lawful. LAWS, like weapons before them, must be included in mandatory weapon reviews to ensure that all weapons in a state's arsenal are produced and used in a manner compliant with international law. As per Article 36 of Additional Protocol I of the 1949 Geneva Conventions, weapon reviews are mandatory and will become ever more necessary as militaries

¹⁴ "HARPY - Autonomous Weapon for All Weather," *Israeli Aerospace Industries*.

¹⁵ McMullan, Thomas. "How swarming drones will change warfare," *BBC News*. (2019).

rapidly progress their development of LAWS.¹⁶ IHL dictates that a commander must be in charge of weaponry to distinguish between military combatants and civilians, to decide if incidental civilian casualties of an attack would be acceptable or excessive relative to the forecasted military advantage, as enshrined in the Rule of Proportionality.¹⁷ Human control is also necessary as a precautionary measure to cancel attacks, as explained by IHL rules on precautions.

Among the legal concerns revolving around LAWS, the ability to attach responsibility of an autonomous attack needs to be addressed to ensure that IHL can be applied, if necessary.¹⁸ The lack of accountability surrounding LAWS means that it is not exactly clear who will face punishment for the system's autonomous actions. The Law of State Responsibility posits that a State could be held responsible for IHL violations of an autonomous weapons system in their armed forces. Additionally, the limited human control of an autonomous weapon system's actions means that, under both IHL and International Criminal Law, those involved with the weapon's programming in its developmental stage could also be held liable for a weapons violation of IHL.¹⁹ The manufacturers and programmers are also potentially accountable for IHL violations and an autonomous weapon's error through product liability laws, add to the layers of accountability in the case of LAWS usage. Another factor to consider when analyzing LAWS is their potential use in illegal extraterritorial and extra-judicial killings and anonymous strikes. Only recently, the assassination of Iranian nuclear scientist Mohsen Fakhrizadeh has been

¹⁶ "Implementing Article 36 weapon reviews in the light of increasing autonomy in weapon systems," *Stockholm International Peace Research Institute*, (2015).

¹⁷ "A legal perspective: Autonomous weapon systems under international humanitarian law," (2018).

¹⁸ Garcia, "Future Arms, Technologies, and International Law: Preventive Security Governance," *European Journal of International Security* 1, No. 1 (2016).

¹⁹ "A legal perspective: Autonomous weapon systems under international humanitarian law," (2018).

rumoured to have been carried out by a satellite-controlled weapon using "automated intelligence," which allegedly fired automatically once locking onto Fakhrizadeh.²⁰

IHL is grounded in ethics through the Martens Clause, which is hugely relevant in the case of rapidly evolving LAWS, which are not strictly governed by current IHL. The Martens Clause dictates that, "in cases not covered by existing treaties, civilians and combatants remain protected by customary IHL, the principles of humanity, and the dictates of the public conscience."²¹ This clause is essentially a safety net that counters the assumption that anything not explicitly outlined in IHL is thereby acceptable. To comply with IHL, there must be limits to the level of autonomy of weapon systems and room for human judgment before engaging in combat.²² To prevent conflict and a dangerous arms race, states must concretely agree on where those limits lie in order to ensure that IHL is upheld.

4. *Ethical Concerns:*

The non-humanity of LAWS is the core ethical concern and the main differentiation from all previous weaponry.²³ The crucial question is whether or not the use of force and decision-making targeting of humans should be ceded to machines. Interestingly, as noted in Section 1, ethics are used as both arguments for and against LAWS. The argument that automatic weapons would ensure respect of values and law while acting without emotions and protecting a military's own forces from danger is the leading argument made in support of LAWS development.²⁴ The lack of compassion and intuition, vital human traits during combat, allow humans to make

²⁰ "Mohsen Fakhrizadeh: 'Machine-gun with AI' used to kill Iran scientist," *BBC News*. (2020).

²¹ "A legal perspective: Autonomous weapon systems under international humanitarian law," (2018).

²² Asaro, "On banning autonomous weapon systems: human rights, automation, and the dehumanization of lethal decision-making." (2012).

²³ Garcia, "Future Arms, Technologies, and International Law: Preventive Security Governance," (2016).

²⁴ "Ethics and autonomous weapon systems: An ethical basis for human control?," *International Committee of the Red Cross*. (2018).

judgment calls that LAWS could not. Keeping human agency in the decision to kill or destroy is the central pillar behind ethical arguments to ban LAWS, as worries about the erasure of human dignity increase.²⁵ Additionally, the use of autonomous weapons increases the physical and moral distance between the military and those engaged, further removing empathy between adversaries and potentially increasing the ease at which lethal missions are approved.²⁶ The ethical and legal debate over the development of LAWS intertwines over the desire to maintain human constraint over autonomy to ensure accountability, maintain control and an ability to deactivate the weapons. The removal of humanity from the decision to kill can erase human dignity and erode morality at the expense of a more effective military.

Institutions and Current Governance on the Issue

The ICRC, the United Nations GGE and Convention on Certain Conventional Weapons (CCW), and the HRW are the leaders on the global governance of autonomous weapon development. The ICRC has taken the lead role as the advocate for the necessity of immediate restrictions on LAWS development. The ICRC stance is that human control over weapon systems must be maintained to meet IHL and ethical parameters and that all states need to establish clear guidelines on the limits of autonomy.²⁷ Ensuring effective human control in all autonomous weaponry, predictability and reliability to comply with IHL and that all states agree on the level of human control required is the primary focus of the ICRC's work.²⁸

The GGE has determined that the important issues of ethics and safety that may appear through the development of LAWS must be examined in greater detail before the technology

²⁵ *Ibid.*

²⁶ Sharkey, "Autonomous Weapons Systems, Killer Robots and Human Dignity." (2019).

²⁷ "Ethics and autonomous weapon systems: An ethical basis for human control?," (2018).

²⁸ "Autonomy, artificial intelligence and robotics: Technical aspects of human control," (2019).

progresses, and a decision must be reached as to whether the technology acts within International Humanitarian Law (IHL).²⁹ The GGE is working to identify gaps in the regulation of emerging LAWS technologies, discuss the extent of human-machine interaction required to be compliant with IHL, and scrutinize the ethical concerns of autonomous weapons use.³⁰ At a GGE session on 25 March 2019, Chairperson Gjorgjinski discussed how states are obliged to adhere to IHL and ensure individual responsibility for LAWS usage while affirming the importance of human responsibility when operating weapon systems.³¹ The GGE clearly believes that increased cooperation in the world of lethal weapon development would contribute to greater international stability and security. In contrast, unclear rules on the matter may lead to an unpredictable and insecure future. In addition to the GGE, the UN has also hosted eight CCW meetings between 2014-19. Unfortunately, the 2020 meetings have been postponed to Covid-19.³² Notably, several military powers, such as Russia and the USA, have stymied efforts to regulate LAWS and have continued to invest heavily in their development. For his part, the UN Secretary-General, António Guterres, has called on states to ban autonomous weaponry, and he views the technology as "morally repugnant and politically unacceptable."³³ The UN continues to provide a platform to facilitate global LAWS regulation, which aligns with the UN Charter Article 26 which regulates armament.³⁴

The HRW calls on all nations to produce a binding international treaty to ensure the retention of human control over weapons and ban all autonomous weaponry while implementing

²⁹ Gjorgjinski, "Chair's non-paper on the way forward for the Group of Governmental Experts," *United Nations*, (2020).

³⁰ *Ibid.*

³¹ "Report of the 2019 session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems," *United Nations*. (2019).

³² Wareham, "Stopping Killer Robots," (2020).

³³ *Ibid.*

³⁴ United Nations, "Article 26," *Charter of the United Nations*. (2016).

national policies to halt the development or production of fully autonomous weapons.³⁵ The HRW views the development of LAWS in the same light as climate change, understanding it to be a dire threat to humankind that requires immediate action.³⁶ Several other non-governmental organizations have also pushed to get their voices heard in the fight to ban autonomous weapons. For example, the Campaign to Stop Killer Robots, which was formed in 2012, is a coalition of over 160 NGOs working in 65 countries working to ban autonomous weapons.³⁷ Furthermore, the highly publicized 2015 Open Letter from AI & Robotics Researchers concludes that a "military AI arms race is a bad idea, and should be prevented by a ban on offensive autonomous weapons beyond meaningful human control."³⁸

Canada's Position

Canada's position on LAWS has been noticeably lacking, especially considering Canada's attempt to portray itself as a defender and advocate of human rights. That said, Canada supported the proposal to engage in multilateral talks through the CCW in 2013 to discuss the field of LAWS and is keen to continue to monitor issues arising from their continued development.³⁹ Although Canada was a participant in every CCW meeting, it has not been vocal and has not actively supported the negotiations for an international treaty on the prohibition of LAWS.⁴⁰ The Canadian Armed Forces acknowledged in the 2017 publication of Canada's Defence Policy that the future of warfare will be significantly different, with an increased focus on autonomous weapon systems. In a manner aligned with the wishes of the ICRC, the Defence Policy states that "the Canadian Armed Forces is committed to maintaining appropriate human involvement in the

³⁵ Wareham, "Stopping Killer Robots," (2020).

³⁶ *Ibid.*

³⁷ "About Us," *Campaign to Stop Killer Robots*. (2020).

³⁸ "Autonomous Weapons: An Open Letter from AI & Robotics Researchers," *Future of Life Institute*. (2015).

³⁹ Wareham, "Stopping Killer Robots," (2020).

⁴⁰ *Ibid.*

use of military capabilities that can exert lethal force."⁴¹ Current Minister of Foreign Affairs, François-Philippe Champagne, was directed by Prime Minister Trudeau in his Mandate Letter to "advance international efforts to ban the development and use of fully autonomous weapons systems."⁴² The onus is now on Canada to follow through with this direction and begin to make a genuine impact by advocating for immediate universal legal guidelines on the development and use of LAWS.

A Way Forward: Commit to De-Armament and Preventative Governance

Canada should fully commit to the instructions given by Prime Minister Trudeau to Minister Champagne and actively advance efforts to halt the development of fully autonomous weapons systems. A Canadian policy of de-armament could springboard quickly into the public discourse by piggy-backing off the lasting legacy of the 1997 Convention on the Prohibition of Anti-Personnel Mines and on their destruction, better known as the Ottawa Treaty.⁴³ The Ottawa Treaty was ratified on 1 March 1999, and prohibits "the use of weapons which by their very nature do not discriminate between civilians and combatants or which cause unnecessary suffering or superfluous injury."⁴⁴ The Treaty was based mostly around IHL and all states participating in the Treaty are banned from developing, producing, stockpiling or using anti-personnel mines. The success of the Ottawa Treaty in halting the development and use of a weapon with devastating effects on civilians and combatants alike provides an excellent template from which to build an Ottawa Treaty 2.0: "The Convention on the Prohibition of *Lethal Autonomous Weapon Systems* and on their Destruction."

⁴¹ Government of Canada, "Strong, Secure, Engaged: Canada's Defense Policy," *Canadian Armed Forces*. p.73. (2017).

⁴² Government of Canada, "Minister of Foreign Affairs Mandate Letter," *Office of the Prime Minister*, (2019).

⁴³ United Nations, "1997 Convention on the Prohibition of Anti-Personnel Mines and on their Destruction," *International Committee of the Red Cross*. (1997).

⁴⁴ *Ibid.*

Additionally, Canada could organize conferences to provide information in the buildup to GGE meetings, helping to achieve a shared understanding of the latest critical legal, military and technological developments on the matter. At GGE meetings, Canada should endeavour to have its voice heard in discussion, advancing the likelihood of a treaty banning LAWS' development and use. In conjunction with general multilateral engagement, Canada should engage in discussion with its closest allies, such as our Five Eyes alliance (US/UK/Australia/New Zealand) and NATO, to grasp the realistic next steps in our partner's LAWS development. Although the US and the UK are currently moving forward with their own LAWS development and preventing an agreement from being reached, Canada should uphold its foreign policy objectives and proceed with advocacy to ban LAWS. The use of NATO to push forth our agenda would allow Canada to amplify its voice and engage in meaningful discussion with the US through a more neutral multilateral forum, rather than bilaterally where we have less sway and greater potential to harm relations. Commitment to enforcing new global norms restricting the development of LAWS, based in IHL, will enhance Canada's image as a supporter of international human rights. Should an Ottawa Treaty 2.0 come to fruition, it would provide Canada with a vital global leadership role and a strong legacy of protecting humankind's future.

Conclusion

Lethal Autonomous Weapons Systems have the potential to be the third revolution of warfare. They require significant effort by the international community to act quickly and regulate their development to ensure that IHL is upheld and ethical concerns regarding the lack of human input and destruction of human dignity are addressed. The technological development of LAWS has begun, but a clear path of preventative governance could clarify the uncertainty concerning the direction of the autonomous weapon evolution and fear over international

security. Current global discourse and diplomacy on LAWS are spurred through the ICRC, the UN, the HRW, and support from other non-governmental actors attempting to streamline the global discourse into one of restraint and restriction on the development of LAWS. Any further delay in creating a legally binding global framework to control the development and use of LAWS imperils civilians, international security and humanity as a whole.



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