

Term Research Paper Project

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IDS 300W: Interdisciplinary Theory & Concepts

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Abstract

Technological innovations have led to the development of Lethal Autonomous Weapon Systems (LAWS). Militaries are increasingly adopting LAWS for use in conflicts around the globe. What are the major reasons to be concerned with LAWS used in combat? This question is analyzed using the interdisciplinary collaboration of disciplinary perspectives from computer science, international law, and ethics. The concern from computer science is the fact that the Artificial Intelligence used for autonomy may not work as designed and lead to erroneous uses of lethal force. Law of Armed Conflict violation will result from these events, international law does not have adequate laws or precedence to hold military leaders, soldiers, or the manufactures accountable. Last, ethical questions arise from the idea of autonomous machines executing lethal force against people in combat and if society has deemed this action acceptable. After developing common ground, the perspectives are fused and show that LAWS have concerns that require a comprehensive solution. The comprehensive solution will require governing doctrine that addresses the development of reliable LAWS that minimize unlawful use of force. It will also require laws implemented to govern their usage in combat. Finally, societies will need to determine if their benefits outweigh the risks of machines independently discharging lethal force. These concerns must be addressed as international tensions are rising in Europe, the Middle East, and Asia. If these tension breakout into full scale conflicts, militaries will employ LAWS to minimize friendly force casualties and cost, along with maximize impacts to adversaries.

Keywords: lethal autonomous weapon systems (LAWS), Law of Arm Conflict (LOAC), ethics, international law, artificial intelligence

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Introduction

Militaries are increasingly employing Lethal Autonomous Weapon Systems (LAWS) in combat to minimize casualties and costs during conflicts. These LAWS, commonly referred to as killer robots, have the independent ability to use lethal force against people without the direct input from a human-operator (Bills, 2014). What are the major reasons to be concerned with LAWS used in combat? Utilizing an interdisciplinary approach, this question is examined from the disciplinary perspectives of computer science, international law, and ethics. Computer science innovations are powering the development of LAWS at a rapid pace. In addition, international law governs the use of lethal force and the Law of Armed Conflict that must consider the legalities of LAWS. On the other hand, ethics accesses the moral implications of machines autonomously dispensing lethal force against human beings and its impact to society. By using the interdisciplinary approach, a more comprehensive understanding is gained of the concerns with LAWS usage in combat. War is a complex process and LAWS add an additional layer of complexity, which increases the need for a more comprehensive understanding for these concerns. As the defense industry continues to develop LAWS for military adoption, an interdisciplinary approach is required to understand their impact during conflicts. This paper seeks to achieve that understanding to ensure LAWS are created responsibly and used ethically in the future.

Artificial intelligence (AI) algorithms, AI opacity, distinction, proportionality, and meaningful human control (MHC) are among the key topics discussed in this paper. *AI algorithms* are decision matrix software that allow for cognitive task completion by machines (Longpre et al., 2022). *AI opacity* is the lack of understanding an AI decision due to the sheer

complexity of the underlying process (Christie et al., 2023) Distinction and proportionality are principles under the Law of Armed Conflict (LOAC) that governs military actions during combat that nations must follow. *Distinction* is the requirement that militaries distinguish between military combatants and non-combatant civilians, directing their operations towards the latter. *Proportionality* states that indiscriminate acts that result in incidental collateral damage to civilians is prohibited if the gain is inconsequential to the military objective (Egeland, 2016). Finally, *meaningful human control* is the concept that a human is in the decision loop of a LAWS to validate a request to use lethal force (Wyatt & Galliot, 2021).

Computer Science

By their nature, LAWS rely upon the fundamental studies within computer science such as artificial intelligence algorithms and sensor hardware for situation awareness. Advancements in computer processing has moved artificial intelligence out of the realm of science fiction and into reality. Although, today's AI algorithms are not sentient, human-like intelligence, but rather a complex deep learning network that consists of over a million decision matrix nodes that process input data to predict a desired output (Longpre et al., 2022). Due to the deep learning networks complexity, AI opaqueness renders understanding the reason why an AI decides to output a certain action as unknowable. There is a push to design AIs that produce explanations for their outputs to ease the understanding of how an AI decides. However, their current results are only numerical values that don't semantically spell out the reasoning and cannot be easily understood (Christie et al., 2023). Additionally, LAWS and the AI algorithms rely upon input data from sensors, such as cameras, microphones, or radio frequency receivers, to understand their environment. Even the most advanced sensors can suffer from malfunctions or noise, sensor hallucinations, that can distort reality and corrupt the input data being feed to the algorithms

(Longpre et al., 2022). This corrupted data could lead to the algorithm erroneously targeting non-combatants or protected entities resulting in war crimes. Due to the complex nature of AI, it is difficult to predict how an AI will operate in a combat situation. A lot more work needs to be accomplished before pure automation that produces reliable and predictable results can be achieved.

International Law

The international community has developed the Law of Armed Conflict (LOAC) to govern how wars are fought and seeks to reduce unnecessary suffering. LAWS will need to obey the key principles of distinction and proportionality as defined by the LOAC to adhere to international law. Currently, soldiers, commanders, and nations can be held accountable under international law since these entities would be directly or indirectly responsible for discharging lethal force and any violations could be attributed to their actions (Egeland, 2016). However, these international laws have yet to define how to govern LAWS. If a soldier or commander deploys a LAWS into battle and, for example, selects a hospital as a target and attacks, a LOAC violation of the distinction principle would have occurred. In this scenario, no one's actions are directly responsible for the violation of LOAC since the soldier or commander did not select the hospital as a target. Also, if the LAWS identifies an enemy combatant on the roof of a civilian building and decides to engage, it could destroy the entire building if it is carrying large amounts of explosives. This example would be a violation of proportionality because the LAWS inflicts collateral damage that would incur unnecessary suffering. Due to the previous situations, international law needs to establish a chain of responsibility attributing the violations to the soldier, commander, or nation for employing the LAWS, or the manufacture, who designed and

built the LAWS, if it was defunct. Due to the international law's insufficiencies, adversaries using LAWS against each other can escape accountability if the LOAC is violated (Bills, 2014).

Ethics

Society tends to accept the casualties of war if the victims were humanely terminated with dignity. However, society has not determined if casualties suffered at the discretion of LAWS undermine human dignity, even lawful combatants, since they were effectively reduced to just ones and zeros in computer software (Blanchard & Taddeo, 2022). Currently, a LAWS cannot be programmed to understand the moral consequences of its actions (Blanchard & Taddeo, 2022). Thus, it would be considered an immoral agent on the battlefield. In addition, the employing nation would be removed from harm's way leading to a disconnect from the LAWS impacts. These conditions remove any hesitations a soldier would normally experience if they felt morally responsible for using lethal force and remorse for any casualties. With the consequences reduced, a nation will be more willing to deploy LAWS to achieve the desired goals, regardless of the moral impact (Skerker et al., 2020). Militaries that don't have to contend with moral ramifications of lethal actions on the battlefield, coupled with zero risk of being harmed, will be more inclined to engage in conflicts.

Common Ground

There are three major concerns to address by this interdisciplinary research regarding the usage of LAWS. First, LAWS development presents legal challenges due to AI algorithm complexity and erroneous sensor data. Computer science seeks to design LAWS with MHC, which will prevent LAWS from using lethal force without approval from a human operator (Wyatt & Galliot, 2021). This will minimize LOAC violations and eliminate the ethical concerns

of machines killing humans. Second, LAWS usage is not governed by international law and does not establish accountability or responsibility for misuse or malfunctions. International law can address this issue by mandating that MHC is required in the design of LAWS (Egeland, 2016). This would ensure that a human is ultimately responsible for the use of lethal force and would be held accountable for misuse. It could also mandate the use of transparent algorithms that would eliminate the AI opaqueness issues (Christie et al., 2023). Third, LAWS using lethal force against humans presents ethical concerns over the harm and suffering they inflict. International law's established LOAC define the boundaries of military engagements within distinction and proportionality. Computer science can design ethical AI that accounts for LOAC principles to safeguard ethical violations and prevent unnecessary suffering during conflicts (Skerker et al., 2020). Concerns over LAWS is complex and highlight the need for a collaborative insight between disciplines that can develop a comprehensive understanding (Repko & Szostak, 2021). Interdisciplinary research is required to achieve not only a comprehensive understanding, but a comprehensive solution as well.

Disciplinary Conflicts

Conflict arises with LAWS when trying to establish accountability for their actions. International law's LOAC is designed to hold people accountable for actions during conflicts (Egeland, 2016). If international law is revised to mandate ethical AI without MHC, then a person would not be directly responsible for any LOAC violations (Wyatt & Galliot, 2021). Additionally, AI is supposed to possess intelligence equivalent to a human that enables the automation of these weapons systems. Computer science's solution of MHC displays that AI is not adequate to replace a human in using lethal force. If LAWS cannot process the ethical

considerations like its human counterpart, then they are unethical agents and would always pose a LOAC concern (Skerker et al., 2020).

Ch. 12 “Constructing a More Comprehensive Understanding or Theory”?

By using the multicausal integration method, a more comprehensive understanding of LAWS concerns is gained (Repko & Szostak, 2021). All three of the disciplines have overlap when considering the design and deployment of LAWS. Society must determine if there is any benefit to allowing machines to kill humans and in which circumstances such an act is permissible. The international law needs to assess the ethical uses for such machines and the required features that ensure they adhere to LOAC to prevent unnecessary suffering. LAWS developers must implement “ethical governs”, such as MHC, to meet international law’s mandate that bolster distinction and proportionality principles (Wyatt & Galliot, 2021). Once international law defines ethical usage and LAWS are developed with “ethical governs”, responsibility for misuse can be transferred to the soldiers, commanders, and nations. Once this framework is in place, LAWS could then be considered ethical to deploy in combat with the ability to adhere to LOAC and prevent unnecessary suffering (Egeland, 2016).

Ch. 13: “Reflecting On, Testing, and Communicating the Understanding or Theory”?

LAWS are a complex topic that has many layers. This interdisciplinary paper only used computer science, international law, and ethics to develop a more comprehensive understanding. To advance this understanding further, LAWS will also need to be analyzed from an economics and geopolitical perspective as well. LAWS can be developed relatively cheap at roughly one hundred thousand dollars per unit, compared to the four-million-dollar unmanned ariel vehicles they seek to replace (Coyne & Alshamy, 2021). Nations will have financial incentive to expedite

their fielding to reduce cost. Additionally, in terms of geopolitics, who will benefit the most?

Nations that have the advanced technology and financial means to develop LAWS may benefit the most. However, if the reduced cost of LAWS makes them affordable to non-state actors, society could suffer from increased conflicts across the globe (Coyne & Alshamy, 2021).

Shifting focus back to the three disciplines used, adequacy between them showed that the research was disciplinarily grounded. LAWS development and usage are all determined by the ethical design, laws, and moral impacts to society. Ethical concerns are woven throughout each layer and shows that all three disciplines must be considered when developing a comprehensive understanding (Repko & Szostak, 2021).

Conclusion

Concerns over LAWS usage in combat has been shown to be a complex topic that requires an interdisciplinary approach to develop a comprehensive understanding. Computer science has technical challenges that can only be solved by applying MHC to offset AI algorithm and sensor hallucination malfunctions. International law must mandate that “ethical governs”, such as MHC, are built into LAWS to ensure LOAC is followed in combat and establish a chain of responsibility for misuse. Finally, society needs to determine if LAWS killing people is ethical and benefits society. Fusing these finding together produces a framework that requires LAWS development to be ethical driven by international law. As countries continue to seek strategic advantages around the global, conflicts will increase. Countries engaging in the conflicts will seek to minimize casualties and costs, thus turning to LAWS to reduce both. Until this framework is in place, LAWS should be considered unethical actors and not allowed for use in combat today.

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