

LAWS (Lethal Autonomous Weapons Systems) and their effects on the security environment

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Introduction

AI (Artificial Intelligence) is playing and will continue to play a fundamental role in the future of Warfare. Researchers agree that when we speak about the future of Warfare we are referring to technologies like: Drones that are increasing their levels of autonomy, robotic systems that are functioning alongside manned platforms, coordination between human decision-makers with semi-autonomous robots. Autonomous software is already integrated into robots that can select and engage a military target. Autonomous Technologies is one of the most important and discussed futures of military Warfare.

Referring to these autonomous technologies, this paper will study some of the AI behind LAWS (Lethal autonomous weapon system), asking the question: **What effects will LAWS have on our security environment?** At the present, there is no agreed definition of LAWS mainly due to the lack of general consensus on the definition of “autonomy” in AI and robotics. AI is fundamental for achieving higher levels of autonomy, the trend in Warfare is having each time more and more autonomous weapons, so we can conclude that AI plays the main future roll in future Warfare technologies.

The general idea about LAWS is that once activated they would be able to identify, search, select and attack targets without the need of human intervention. AI is currently creating software which can “learn” entirely on its own and even “learn” to “learn” on its own. (Surber, 2018).

In order to try to answer the research question of the present paper we will, analyze three AI techniques used in LAWS and we will give examples of their applications. This analysis will help us understand what possible consequences this type of technology can have in our security environment.

Chapter 1: Some AI Techniques and applications used in LAWS. -

Some of the **AI techniques** that allows technological systems to perform actions autonomously without human intervention are:

1.1 Deep Learning (DL). -

Software tries to imitate the activity of layers of neurons in the human brain. Through inflow of vast amount of data, the software is able to recognize patterns in this data and “learn” from it, this is key for “autonomous” systems reaction to unanticipated changes: due to new data inflow, the software can recognize new patterns and adapt to a changing environment. This is not as simple as it sounds in the sense that “Deep Learning” mechanisms are very complex and we cannot comprehend why a technological process based on deep learning creates the outcome it does. In essence outputs of autonomous systems may come as a surprise and it is impossible to locate the technological trigger for a certain output. (Surber, 2018).

Some of the Pros of this type of AI is: once trained its predictions are fast, can model data with large number of inputs. Some Cons are: Its unpredictable also known as “Black Box” you cannot predict the results it will have. They also require a lot of training for real life situations (data and time) and overfitting.

Some of the **applications** that this technique can have in LAWS for example is for detection of soldiers or vehicles, battlefield situational awareness and missile guidance.

1.2- Artificial Neural Networks (ANN). -

A neural network differs from a traditional computer system because it comprises millions of nodes arrayed in layers, this allows for vastly increased processing powers in certain applications. This technique has a high potential of application in the military field. In for example systems that could identify enemy personal, precise weapon system, systems that could predict hostile actions, robots that could navigate complex terrain and systems that could map out enemy networks. (Farrant, 2017).

The Pros and Cons of this Type of AI are similar to the ones of DL: Pros, once trained its predictions are fast and it can also model data with large number of inputs (example images). Cons: can't predict the how or why of an output, so it can become unreliable and even dangerous when fully autonomous. They also require a lot of training for real world problems.

ANN is used in LAWS in **applications** like: processing information (digital brain of LAWS) and making decisions.

1.3 -Support Vector Machines (SVMs). -

SVMs are basically algorithms that produce classifiers with large margins. A real application of SVMs for synthetic aperture radar automatic target recognition (SAR/ATR). SVMs have been tested for classification both in closed and open sets (recognition). Experimental results showed that SVMs outperform conventional classifiers in target classification. (Zhao, 2001).

Target Recognition (fundamental function of LAWS) as mentioned above is only one of its **applications** SVMs can also be used in: Image Recognition/ Face recognition.

Chapter 2: Chapter 2: Implications of LAWS for the Security Environment, Cyber and Military. Other governmental and political aspects

AI in the present times affects almost every aspect of our lives. Many AI researches agree that “intelligence” measures an agent’s ability to achieve goals in a wide range of environments, this general ability includes the ability to understand, to learn and to adapt, since those are the features that enable an agent to solve a problem in different types of environments.

Autonomous Technologies (AT) are not only present in LAWS but also in autonomous cyber weapons for example. So, the discussions on policies regarding these technologies might be very similar in both Cyber and AI.

Researchers also have identified the risks of Autonomous Technology (AT) for a global society. AT are the essence of LAWS, which have triggered a policy and legal debate within the international arms control framework of the United Nations Convention on Certain Conventional Weapons (UN CCW). LAWS challenge International Humanitarian Law because of their capacity of replacing a human operator on a weapons platform. This conventions task is ensuring that accountability and human responsibility are not forgotten, and assessing whether LAWS are legal under IHL (International Humanitarian Laws), (Surber, 2018).

LAWS from a military perspective have many advantages over classical automated or remotely controlled systems: LAWS would not depend on communication links; they could operate at increased range for extended periods; fewer humans would be needed to support military operations; higher processing speed is better in combat situations; by replacing human soldiers, lives will be saved, and there will be an absence of emotions such as self-interest, fear and vengeance, the decisions would be “objective” leading to

outcomes that are less harmful. But the risks will be that LAWS can also be a threat because they can change how humans exercise control over the use of force and its consequences, humans may no longer be able to predict who or what is made the target of an attack, or explain how and why the targets were chosen by LAWS. This fact raises legal, ethical, humanitarian and SECURITY concerns, they can be imperfect and malfunction. (Surber, 2018)

If we also analyze the implications of this type of technology from a moral point of view as well as to put ourselves in the position of the soldiers and operators that will use this type of technology. We should consider the limitations that this technology can have for meaningful moral action, decisions in wartime are morally complex for the actors involved. The soldier or military operator confronting moral dilemmas must bear the psychological burden of the decisions they make with respect to the use of lethal force, and as the incidence of PTSD (Post Traumatic Stress Disorder) among drone operators clearly indicates, new technologies might further add to their psychological stress. Research also suggests that Autonomous weapon systems may also cause anxiety and concerns among military personnel, as such systems may act in unwanted and unpredictable ways (Schwarz, 2021)

Conclusions. -

Trying to answer our research question we can affirm that according to what was studied in this paper, LAWS are a risk and there should be Security concerns in the use of this type of fully autonomous technology, we think that more research and study is necessary in order to lower our security risks concerning LAWS. It is also important to study more in depth that these fully autonomous technologies can also be hacked and used against us.

Researchers are studying examples from military history to assess the potential development and deployment of LAWS, as well as their influence in the arms races, the stability of deterrence, the risk of crisis instability and wartime escalation. (Horowitz, 2019)

It is also necessary to understand that it is possible like we mentioned in class, to create systems that are autonomous and control processes that are aimed on harming people, like malicious biotechnology among other things. Although this is not part of the study in this paper, it's part of autonomous emerging bio technologies and its of high concern. Perhaps this can also be considered as part of the future of Warfare technologies.

With these Autonomous Technologies like LAWS our main concern is that we will **NOT UNDERSTAND** the logic behind the decisions taken, we will **LOSE CONTROL** of the outcomes and we will not understand how these technologies **ADAPT** to the changing environment. Will they be able to adapt at all? Adaptation is fundamental because it's a trait not all humans have and in our opinion part of an essential characteristic of human intelligence. Intelligence has much to do with a person's capacity to adapt to different circumstances and environments.

Perhaps LAWS will achieve the capacity to adapt. It is also important not to forget the positive aspects of LAWS, one of them being: less human intervention that if well used can lead to less human lives lost. This will all depend on how this technology is developed and applied.

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