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ARTIFICIAL INTELLIGENCE IN DRONES AND ROBOTS FOR WAR PURPOSES: A BIOLEGAL PROBLEM

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Abstract

The ever-increasing use of drones as war weapons is not a concern that is simply left to the news; it is a problem that involves the entire humanity, especially as an aspect that needs to be studied rigorously from biolaw. Among the nuances that this issue entails, the use of artificial intelligence is perhaps the one that, nowadays, receives the most attention, due to the idea of providing a significant level of autonomy in the selection of targets, and the same moving ability that they can reach. to have. This article aims to contribute to this debate, by reviewing artificial intelligence from a bioethical approach, in relation to the persistence of the responsibility that a human being has as a drone operator in a war context.

Keywords

Artificial Intelligence, Drones, War, Legal Responsibility, Bioethics.

Resumo

O uso cada vez maior de drones como armas de guerra não é uma preocupação que fica apenas nos noticiários; é um problema que envolve toda a humanidade, especialmente como um aspeto que precisa ser estudado com rigor pelo biodireito. Dentre as nuances que essa questão comporta, o uso da inteligência artificial talvez seja a que, atualmente, recebe maior atenção, devido à idéia de proporcionar um nível significativo de autonomia na seleção dos alvos, e a mesma capacidade de movimentação que eles podem alcançar. Este artigo pretende contribuir para este debate, revendo a inteligência artificial a partir de uma abordagem bioética, em relação à persistência da responsabilidade que um ser humano tem enquanto operador de um drone em contexto de guerra.

Palavras chave

Inteligência artificial, drones, guerra, responsabilidade jurídica, bioética.

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Introduction

Over the past few years, the insertion of drones in everyday life has become more and more frequent and, in the same way, there is also a growing concern about the limits and restrictions that these could have, in light of the immense possibilities of, one day, achieving a level of automation ostensibly uncontrollable.

Although the help that can be obtained through these devices is undeniable, it is no less true that, in war scenarios, their lethality has a significant potential that could exceed expectations, especially when artificial intelligence and robotics have shown great progress that makes us to ask ourselves whether a clear and precise legal framework, in which the human factor is not disregarded in its operation, is necessary.

1. Artificial intelligence as a bioethical category

In the book *Life 3.0*, the author Max Tegmark explains that life's development has gone through three stages, in which he highlights the conjunction of factors that have allowed life to design itself. These phases have been distinguished as:

Table 1 – Three stages by Max Tegmark

STAGE	FACTORS
Life 1.0 (biological stage)	Evolution of its *hardware* and *software*
Life 2.0 (cultural stage)	Evolution of its *hardware*, with the ability to design a great part of its *software*
Life (technological stage)	Full ability to design its *hardware* and *software*

Source: Mark Tegmark (2017: 35)

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On the first level, life is incapable of redesigning itself. The author takes bacteria as an example, since its scenario of existence lies in mechanical, predisposed activities, where there is a non-existent initiative. There, programming and formal configuration are given by evolution and not by design.

The second phase points out that configuration is given by evolution, but programming refers to some type of design. The author, in this regard, understands software as the set of algorithms and knowledge used to process the information provided by the senses, and make decisions, from the ability to recognize faces, to activities such as walking, reading, writing, singing or telling jokes (2017: 32).

This is the result of the learning process that is incorporated into the brain, allowing the creation of an interconnected relationship with the environment itself; thus, the influence of social relations contributes to programming design. Therefore, Life 2.0 has the capacity to design its own software, being superior to Life 1.0, through learning from the moment one is born. From that categorization, the second stage, that was the one which involved the evolution of human beings on Earth, has allowed them to be much more intelligent compared other beings, becoming more flexible and having higher levels of adaptation (Tegmark, 2017: 33- 3. 4).

The third level, Life 3.0, involves artificial intelligence in an unavoidable and significant way, as well as the effects of adjusting to new ways of conceiving the interaction between human beings and his environment, in different contexts. Beyond the fears of this technological advance, it is a new step in which there will be possibilities of redesigning the software and achieving an unusual form of transcendence.

Ian Morris, Professor of History at Stanford University, argues that human development is linked to four components: energy capture (calories per person, obtained through the environment for food, home and business, industry, agriculture, and transportation), organization (the size of the largest city), war capacity (number of troops, power, speed of weapons, logistic capabilities and information technology), sophistication of the tools available to share and process information and scope of their use (Brynjolfsson and MacAfee, 2014: 21).

In his work *The Measure of Civilization* (2013), Morris carried out a research, in order to explain why the West ended up leading the exercise of power, regarding the rest of the world. To do this, he supports his arguments in the aforementioned components, highlighting that there is an accordance between energy consumption and war capacity, a situation that continues to this day.

This argument is interesting, since in this century the scope of these approaches seems to be manifested with special profusion, in the face of the constant risk of seeing ourselves, as humanity, doomed to wars that exceed any yesteryear expectation.

Paul Scharre, in the book *Army of None*, argues that the emergence of artificial intelligence will transform military confrontations in the same way as the industrial revolution, at the beginning of the 20th century, transformed the concept of war with the creation of weapons with a greater lethal capacity, such as such as tanks, planes and machine guns, and inserting unprecedented levels of devastation. In this way, once,

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mechanization originated machines that exceeded human potential; today, although AI has provided artifacts to improve logistics, cyber defense and robots for medical evacuation, resupply or surveillance, it is the question of automation that makes a dent in the possibility that one day it will not be human beings who choose targets and pull triggers (2018: 11-12).

In this sense, when speaking about artificial intelligence, according to the Spanish Ministry of Defense it is necessary to consider that it is related to areas of great complexity, whose importance is consolidated in front of the panorama of new trades, occupations and professions, among which stand out machine learning, intelligent robotics, natural language processing, intelligent perception, neuromorphic computing, among others, which represent an undeniable challenge for science, and the ethical and legal situations that can emanate from them (2018: 41).

In the book *Our Final Invention: Artificial Intelligence and the End of the Human Era* (2014), the writer James Barrat exposes the main fears that society harbors, in both present and future, around the notorious technological advance of the so-called "intelligence explosion" that have the creations arising from this scenario can have. It exposes that the power and sophistication of AI increases daily; it is enough to see that there is something of it in every computer, smartphone, car, or in powerful programs such as Watson and others derived from organizations such as Cycorp, Google, Novamente, Numenta, Self-Aware Systems, Vicarious Systems and DARPA (acronym for the Defense Advanced Research Projects Agency); it is also in "cognitive architectures", whose creators hope that they will reach human-level intelligence, and some believe that it will happen in little more than a decade (Barrat, 2014: 24).

Lasse Rouhiainen in *Artificial Intelligence: 101 Things You Must Know Today About Our Future* (2018), expresses the need to delve deeper into debates and educational proposals on this topic, in order to seek effective benefits from AI, as well as fully understand the transformations that it will bring in all fields.

Faced with this, it raises three fundamental issues on which it is urgent to dive into:

> *1. Re-education of millions of people who will be unemployed due to AI, robots and automation. 2. The ethical and moral use of AI and robotics technologies, so that they promote the general well-being of human beings, and not the other way around. 3. Work on the prevention of possible technological addictions, and other disorders generated by the excessive use of AI and technology, such as anxiety, loneliness, etc.* (2018:11).

For this reason, he defines AI as "the ability of machines to use algorithms, learn from data and use what they have learned in decision-making just as a human being would" (Rouhiainen, 2018: 14), and it is clear that it can be used in many of the tasks performed by individuals.

Therefore, nowadays, the best research scenarios for the development of AI are the following:

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recognition of static images, classification and labeling, improvements in the performance of commercial algorithmic strategy, efficient and scalable processing of patient data, predictive maintenance, content distribution on social networks, protection against cybersecurity threats (Rouhiainen, 2018: 14-16).

From this point of view, it is unavoidable to include AI applied to military purposes, which is conceived as "the sum of three elements. Information processing (logical), warfare and weaponry platforms (physical), and continuous threat and situational awareness (human)" (IEEE, 2017: 84).

Faced with this scenario, law needs to be linked to the debate in order to accurately identify aspects such as liability for damages, the role of artifacts with a certain level of autonomy, the conceptualization of guilt in the actions of a robot, the different causal relationships, among others, and also detail the situations arising from the robotics industry, for example, how to manage the immunity of manufacturers, the predictability of behavior, the details in the design of artifacts, the possible risks that may affect to the consumer (Tirado, Oliveros, Laverde, 2021: 34).

2. The estimation of drones as weapons of war

Christopher Coker, professor at the London School of Economics and Political Science, stated that drones, as artifacts integrated into the dynamics of contemporary wars, offer new problems and challenges for ethics, politics and law. In a conversation held at Chatham House, London, in 2013, he highlighted five points that supported the insertion of said technology into the panorama of war:

a) Drones, without necessarily being robots yet, once they acquire autonomy, they will achieve that condition and, consequently, will accentuate the complexity in the management of situations of war.

b) They are the result of the reduction of the human space of war, which is increasingly becoming more cerebral:

> *To be a warrior in the 21st century is to essentially be somebody behind a screen, whether it's a cyber screen, a cyber warrior or what the Americans call cubicle warriors – drone pilots, analytical warriors, people whose job is to process data. People who have three particular attributes which are now required of warfare in the 21st century, compared with, say, a hundred years ago: mental agility, communication skills and multitasking. A particular generation – and most drone pilots in the United States are between the ages of 19 and 21, precisely the generation that is very good at these particular things. But a generation that has difficulty coping with stress, a generation that does get traumatized by what they see on their screens, and a generation that may not be able to cope with stress as much as the ideal age for coping with stress on a battlefield, which is still around 23* (Coker, 2013: 3).

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c) War increasingly resembles a video game. With this, among drone operators, arises the tendency to dissociate their sensitivity and not be sufficiently aware of the effects of their behaviour and the damage they may be causing. This is a problem of empathy.

d) Can drone pilots be considered real warriors? Because their function, so impersonal and distant, differs ostensibly from the idea of the soldier on the battlefield. Therein lie ethical and moral issues, not only from the individuality of the operator but also from the institutional context, from the perception of those who consider military work from traditional perspectives.

e) War diminishes its operational paraphernalia. Real heroic personalities tend to fade away. Today conflicts are remote controlled.

In the book *Warrior Geeks: How 21st Century Technology is Changing the Way We Fight and Think About War* (2013), Coker analyses the technological dependence and the critical scope of these points. He argues that the new profile of the soldier who face the war is not far from that of hackers, who will ultimately have in their hands the fate of devastating attacks which they cannot fully understand, driven by the great advance of cyber technologies.

Likewise, in his book *The Warrior Ethos: Military Culture and the War on Terror* (2007) highlighted the progressive instrumentalization of war and how both, the behaviours and thoughts of soldiers, are subject to greater follow-up and monitoring, putting their agency role in crisis and a kind of disenchantment with the military profession. (Larraín, 2018).

Thus, the leading role that drones are obtaining in the new war tensions was already anticipated in popular culture narratives. For example, John Updike, in the novel *Toward the End of Time* (1997), shows a future marked by a war between the USA and China, carried out by combatants who do not understand the real world and whose role is immersed in the abstraction of computer graphics. Similarly, Don DeLillo, in the tale *Human Moments in World War III* (1982), narrates the task of a drone pilot who attacks anything that is a threat to the planet. An individual who does not even need to put on a uniform and who carries out his task without knowing the magnitude of what he is doing. (Coker, 2013: 6-7).

From another perspective, the film *Eye in the Sky* (Gavin Hood, 2015), offers a clear example of the dilemmas that military drone operators must face under the tenor of a mission ordered by higher spheres.

In the narrative, the plot places the viewer in the perspective of those who decide in political, legal and military terms, to generate a lethal attack with a remotely piloted drone in foreign territory. Added to the operation, is the bioethical dilemma related to determining the percentage of the critical hit in the area, the estimation of damage by an expert using the ISTAR procedure, and the consequent steps until the effective shot against the adversary is calculated. The events take place in Kenya where a team constituted by American, British and Kenyan personnel contribute to the elimination of a

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terrorist group in which there are two foreign subjects who, once detected, are preparing a large-scale attack (GIASP, 2016).

The matter is not so easy to handle, from the legal point of view: note that there are people of different nationalities, therefore, their own State is the one that has the competence to judge them. There is also a transcript linked to violating the principle of non-intervention, since the mission goes from being a simple detection task leading to a capture, to a task of elimination.

There is a whole chain of command, from the management of the British Prime Minister (Jeremy Northam), his subordinates Lieutenant General Frank Benson (Alan Rickman), Colonel Katherine Powell and drone operator Steve Watts (Aaron Paul). The situation is very clear until a little girl is located next to the target of attack. At that moment, an ethical dilemma shines: neutralize the enemy at the cost of imminent collateral damage or let them go and later attack at least 80 civilians in a place of mass gathering.

The dilemma lies in acting and assuming responsibility for the incidents. Make the right military decision or win a media war? The film deals with a theme of throbbing topicality, as they ponder about how many times have similar events happened. If, from the outset, a difficult situation is shown for a power that is fully dependent on human will, how willing will be the institutions to leave such a decision to an artifact with programmed autonomy?

Human Rights Watch, in the 2014 report on lethal autonomous weapons systems (LAWS), indicated that the use of weapons outside the war scene has not been addressed as it should be and, therefore, the potential use of these artifacts in local situations that affect public order, such as the fight against crime, riots and public demonstrations, are still understood under the aegis of a significant risk to the civilian population, since beyond the legitimate or illegitimate purposes, the violation of the right to life, physical integrity, the condition of the victims, etc., could insult human dignity (Del Valle, 2016: 232-233).

Thus, the implications of the use of drones, become a prospective dilemma due to the accumulation of doubts produced by formulating hypotheses about their operation in war scenarios. The same report emphasizes that there is legality in the act of killing as long as three conditions are met: that it is essential to protect the life of individuals, that the absence of other means or resources is evident, and that there is proportionality between force and threat. to conjure. Therefore, these variables are linked to particular situations, as well as to the corresponding and necessary qualitative evaluation of the case. In this aspect, the concern about the risk of an unprogrammed attack system to deal with each situation and, consequently, carry out arbitrary assassinations derived from unforeseen circumstances shines forth (Del Valle, 2016: 233).

Because on the battlefield, situations are not always very clear; sometimes drone attacks occur in places where there is no military presence and the estimated number of victims depend on subjective assessments provided by the press or local leaders distinguished by a certain tendency to hyperbolize or underestimate the circumstances. Hence, the veracity of the events is subject to unreliable data, as has been questioned, for example, in the publication in July 2016 of the records on civilian victims regarding the use of drones in the Middle East by the United States (Rushby, 2017: 25).

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Therefore, given the plurality of asymmetric confrontations, it is necessary to evaluate each context based on variables such as origin, quantity, legal nature of the parties in dispute, duration and intensity levels, in order to analyze the relevance, legality and morality of the use of unmanned aerial vehicles that show lethality and precision. Consequently, specify: the need to resort to drones, the proportionality of the use of weapons, discrimination between combatants and non-combatants, which government unit – civilian or military – will make the decision to identify legal responsibility and establish the neatness of the process for making the respective decision (Haluani, 2014).

The foregoing does not stop involving great difficulties; for example, identifying possible terrorists is not an easy thing; personal and behavioral patterns, such as nationality, ethnicity, place of residence, family patterns, attitudes, places of travel, allow having a particular profile, but not a definitive degree of certainty, which leads to "plausible suspicions" (Zenko, 2012). In addition to the above, it is very difficult to specify the number of victims distinguished between defined targets and collateral damage, which generates indignation and resentment among the affected population (Haluani, 2014).

3. The persistence of the human factor as a bioethical category for the use of drones in war

Paul Scharre comments the subject studied has motivated us to think that granting autonomy to an armed robot is giving free rein to dystopian nightmares; especially, those weapons which search for the target, detect it and attack it, it is not equivalent to messing around with games. Avoiding human intervention in this process is risking too much. But it does not underestimate the relevance of applying this technology to avoid civilian casualties in war, for example, by making use of facial recognition, the detection of non-combatants, although the fact that the machines cannot make context interpretations still remains as a major obstacle (2018: 12).

That is an approach in which many academics converge; technology allows the development of automated weapons, with which the problem increases its dimension by not knowing if the armed forces will cross that line (Sánchez, 2018). Scharre, among his experiences, highlights the research around swarm warfare, to cite an example. Unlike Predator drones, which are controlled individually by humans, swarm drones are controlled *en masse* (2018: 16) and according to programming, it is already possible that in minor aspects they can detect peer adversaries and eliminate them without a command order.

States are interested in automating their systems; at least thirty countries make use of supervised autonomous armed systems and have been adapted to ships, defense bases, etc. For example, Lockheed Martin's Aegis anti-missile system has an intelligent brain that interfaces with a ship's radars to attack targets. It claims that more than ninety countries use drones to patrol the skies, and at least sixteen have weapons, such as Egypt, Turkey, Saudi Arabia, United Arab Emirates, Israel, United Kingdom or China (Sánchez, 2018).

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So, it is inevitable to ask ourselves what could happen if the human controller is dispensed with, and the weapon is left to act on its own. There is already a drone with this tendency, manufactured by *Israel Aerospace Industries* (Sánchez, 2018), the *Harop*, which is an unmanned aircraft in which the platform itself acts as ammunition, although it only carries limited quantities (less than 10 kg. or 5 pounds) of explosives on its nose. It acts as a kind of suicide plane, rocket or cruise missile, but differs from it in its ability to hover over a target, which then attacks by self-destructing (Kreps, 2016: 9). This device has the capacity to be in the air for two and a half hours, can detect radar systems within a radius of 500 kilometers and even select the target to destroy (Sánchez, 2018).

On the other hand, the *Defense Advanced Research Projects Agency* – DARPA, based in Arlington (Virginia, United States), has two programs: FLA (Fast Lightweight Autonomy), which develops algorithms designed to give drones autonomy of flight through rooms and corridors without there being any type of communication with the operator, and CODE (Collaborative Operations in Denied Environment), a system designed to generate collaboration between unmanned aircraft under the supervision and control of a single person. So far, the DARPA projects do not consider developing weapons with full autonomy or that can be reprogrammed to make decisions on their own; they are in favor of the fact that they should be directed by human beings permanently (Sánchez, 2018).

Now, there is already a certain talk about a "mosaic war" as DARPA's response to the increase in military artillery by China; "Like Lego blocks that almost universally fit together, Mosaic forces can be integrated in ways that create packages [or structures] that can effectively target an adversary's system with enough overlap to be successful," says one study. from the Mitchell Institute (pdf), published in September" (The Epoch Times, 2020).

From his point of view, James Barrat explores the possibility that control of the future could be lost by mankind as it will be the machines that determine outcomes in terms of developing unexpected behaviors as levels of that unpredictable and powerful force of the universe, which is intelligence, increase. that we cannot even reach and put into our survival (2014: 19). And it is that robots are machines with abilities to perceive their environment and recognize changes in it, process this information and make decisions in response, as well as act on it without constant human direction. (Grossman, 2018: 4).

Therefore, it is undeniable that the center of the debate lies in lethal autonomy. I.e., in the possibility that at some point can be granted to the machines in terms of surpassing the volitional sphere without the need of human monitoring or control. Some scientific figures, such as Stephen Hawking, Elon Musk and Steve Wozniak have expressed their disagreement on this issue, indicating that it could trigger a global AI arms race (Scharre, 2018: 13).

Following Max Tegmark again, it is necessary to create artificial intelligence that is always beneficial, one aimed at maintaining the human factor as the basis of activities in an attempt to improve and not worsen the situation of individuals, because robots have a great disadvantage. By removing the human being from the vehicle, they lose the most advanced cognitive processor on the planet: the human brain (2017: 33).

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The activity of the human being should not be eluded –because this could denote attempts to exonerate responsibility; *contrario sensu*, advances must be managed to avoid real harm, both by legal and by technological means. New inventions must be civilized and tamed in their details, but only with a deep commitment, giving precedence to first-hand experience and constant vigilance (Kelly, 2016: 5), since these are objects that do not need or require to assume by themselves entire suppressive roles or substitutions of a determined subject.

The French philosopher Grégoire Chamayou in his book *A Theory of the Drone* (2016), identifies the problems that the distancing of the human factor can bring about granting high levels of autonomy to drones. He points out that the most representative advantage of LAWS is to demonstrate power by reducing vulnerability. For this reason, removing the human body from the task of piloting and leaving it out of reach fulfills that ancient desire, conceived since the creation of ballistic weapons, in terms of allowing it to extend its path and finish off the enemy from considerable distances;

> *"However, the specificity of the drone allows it to act in another segment of distance. Thousands of kilometers now stand between the trigger, on which the finger is placed, and the barrel, from which the bullet is going to come out. To the range distance -between the weapon and its target- is added that of the telecommand - between the teleoperator and his weapon"* (2016: 18).

In this sense, the strategic purpose of reducing own damage is also fulfilled, since the capacity for destruction is unidirectional; Whoever uses this type of weapon no longer runs the risk of dying by killing, the unilateral prevails, the war is no longer sustained by fighting but by massacres. From this, the drone can well be understood under the idea of an "unidentified violent object", which forces us to rethink basic notions of a geographical and ontological nature such as area or place, of an ethical order when speaking of virtue and courage and, likewise, the concepts of war and conflict, in the strategic, legal and political sense (Chamayou, 2016: 19).

For this reason, evading the principles of responsibility and reciprocity in the context of a conflict questions the military function of States, focused on rights such as honor, making the drone a coward's weapon. Of course, that has not prevented this transmutation of values from being defended, but it is one of the aspects most studied in military ethics (Chamayou, 2016: 23), which is not an ideal ethic insofar as it poses rights and duties in a context where some part is missing from those that are basic (Rivera, 2017), that is, someone attacks, intimidates, threatens or attacks and, with it, alters the proportions of balance in terms of coexistence.

Professors Kristin Bergtora Sandvik and Bruno Oliveira Martins, in the article *Revisitando el espacio aéreo latinoamericano: una exploración de los drones como sujetos de regulación*, indicate this task must be done based on the identification of public uses, interests and concerns, the analysis of regulatory approaches, the way in which in which specific tasks are assigned and the study of airspace to establish its parameterization possibilities. In this order, knowledge of the context is indispensable for its local use (2018: 77).

But the discussion advances mostly in areas of legal theory. A war without risks through the use of drones is, at the same time, a risk for the Law itself, since it introduces a kind of legalization of selective assassination, with which IHL is subverted, to the point of converting, paraphrasing Archbishop Silvano M. Tomasi[2], technological instruments are scapegoats for the sins of those who handle them, because they are neither good nor bad, but the way they are used is the determining factor of their value (Chamayou, 2016: 29- 30), especially when its critical aspect shines in the impossibility of responding to moral dilemmas about life and death and attending to everything that concerns the concept of humanity (Rossini and Gerbino, 2016: 28).

In that order of ideas, the Argentine professor Adriana Margarita Porcelli (2021), argues that the debate is served and the law must anticipate events before lamenting their consequences, because it is human dignity that is at stake. Any test in this regard that does not guarantee it, must be preventively prohibited, as happened with the creation of blinding laser weapons.

Under this categorical affirmation, there are several tasks: participatory conjunction of the States, industry, AI programmers, international organizations and academic and scientific institutions, to formalize an ethical instrument that guides the use of AI and robotics towards bioethical principles, with highlighting restrictions and prohibitions, giving prominence to significant human control (Porcelli, 2021).

It is urgent to emphasize the responsibility of high government and military officials, representatives at the political and social level, so as not to fall into a trivialization of violence that, consequently, ignores IHRL and turns people into expendable pieces in the game of the war (Oliveros, 2021: 28).

Conclusions

Artificial intelligence has consolidated perspectives and achievements that have gradually given rise to a new industrial revolution, contributing to the modification of the environment and its different power factors.

The combinations of these objectives has allowed the development of robotics to reach levels of assumption and interpretation of the current world that once were just ideas provided by science fiction.

Among many of these obtained purposes, the implementation of drones stands out for the fulfillment of activities and tasks that denoted great human efforts and delay in time. However, the difficulty lies in their use for war purposes.

In this aspect, bioethics scrutinizes in detail the ins and outs that may question the responsibility of those who operate drones in war situations. The film Eye in the Sky (2017) is a good example of the dilemmas involved in the use of this technology.

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[2] Permanent Representative of the Holy See to the United Nations and other international organizations in Geneva, who presented these ideas on the occasion of the annual meeting of the States Parties to the Convention on the Prohibition and Limitation of the Use of Certain Conventional Weapons that can Produce Traumatic Effects excessive or indiscriminate.

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The international academic community agrees that facing up to this problem is an urgent task, under penalty of avoiding what has been achieved in areas such as IHRL and IHL. To prevent the threats warned of in dystopian narratives from materializing, the human factor should never be replaced by programming derived from the indiscriminate use of AI and robotics.

Although the concern about the autonomy of these creations remains, the principle of international morality needs to inspire nations and States to structure a normative manual with clear bioethical guidelines that seek to avoid the outrage of war and the advent of equal or worse disasters than those caused by the world wars.

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