

The Future Of Autonomous Weapons

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Abstract: Autonomous weapon systems are systems that can operate independently without being dependent on an operator and generally identify a target without the need for a human element and attack that target when necessary. An autonomous weapon system is pre-programmed to destroy a specific "target profile". These weapons are placed in an environment where the artificial intelligence searches for the "target profile" defined using sensor data. When the weapon detects that the algorithm matches the target profile or encounters something, it fires and destroys it.

Autonomous weapons are any device that automatically selects a target and activates the mission.

Keywords: Autonomous weapons, artificial intelligence, Sensor, killer robots, autonomous drones

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I. INTRODUCTION

Autonomous systems have an increasing demand for use in armed conflicts due to technological advances. In this way, the increasing interest in autonomous weapon systems in armed conflicts has created a new area of discussion and study in terms of international law[1]. The rise in the use of unmanned aerial vehicles (UAVs) – commonly known as drones – in both military and commercial settings has been accompanied by a heated debate as to whether there should be an outright ban on what some label 'killer robots'[2]. Such robots, which could be in the air, on the ground, or in and under water, theoretically incorporate 'artificial intelligence' (AI) that would make them capable of executing missions on their own[3-4]. The debate, which has many dimensions and stakeholders, concerns whether artificially intelligent machines should be allowed to execute such military missions, especially if there is a possibility that any human life could be at stake[5].

II. AUTONOMOUS SYSTEMS AND NEW GENERATION WARFARE

Figure 1. Otonomy drone



The most important military elements of the new generation warfare developing with artificial intelligence will be autonomous weapon systems. These weapon systems, which do not require any human intervention, can fulfill their duties without feeling any human emotion during operations.

III. DRONES AND THE NEXT GENERATION OF WEAPONS

Drones have been a mainstay technology among militaries, hobbyists, and first responders alike for more than a decade, and in that time the range available has skyrocketed. Drones are aiding search and rescue efforts, reshaping wars in Ukraine and Gaza, and delivering time-sensitive packages of medical supplies. And billions of dollars are being plowed into building the next generation of fully autonomous systems. Advancements in drone technology and sensors, falling prices, and easing regulations are making drones cheaper, faster, and more capable than ever. Here's a look at four of the biggest changes coming to drone technology in the near future.

The drone war in Ukraine has largely been one of attrition. Drones have been used extensively for surveying damage, finding and tracking targets, or dropping weapons since the war began, but on average these quadcopter drones last just three flights before being shot down or rendered unnavigable by GPS jamming[6].

IV. AI AND AUTONOMOUS WEAPON SYSTEMS

While we may be some way off from seeing ‘killer robots’ on the battlefield – lethal and fully autonomous weapons systems (AWS) with the capacity to identify, select and target humans – there is increasing autonomy in military equipment and operations. From claims of drones equipped with AI targeting systems in Ukraine to the Israeli Defence Force developing the ‘Lavendar’ and ‘Gospel’ AI systems to identify targets in Gaza, the use of AI in conflict is already a reality. Without procedures, norms or legally binding rules to regulate new technologies, there is nothing to constrain the development, proliferation and use of more advanced systems such as AWS. We will continue to see AI used in conflicts around the world and, given the rapid pace of technological development, we are likely to start seeing ever-more advanced and potentially more lethal weapons systems[7].

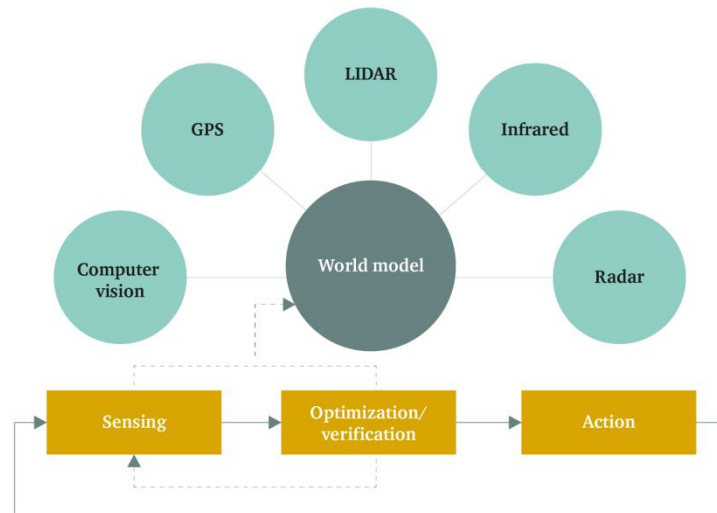
Figure 2. Semi or fully autonomous drones[7].



V. HOW ROBOTS THINK

An autonomous system is one that reasons probabilistically given a set of inputs, meaning that it makes guesses about best possible courses of action given sensor data input.

Figure 3. How AI of an autonomous system Works[8].



Autonomous weapons systems and military robots are progressing from science fiction movies to designers’ drawing boards, to engineering laboratories, and to the battlefield. These machines have prompted a debate among military planners, roboticists, and ethicists about the development and deployment of weapons that can perform increasingly advanced functions, including targeting and application of force, with little or no human oversight[9].

The way forward: A growing number of countries and regions have developed regimes to regulate the design, deployment and use of AI in the civilian domain. The UN is also working to establish a strong global AI governance framework. It is crucial that discussions to address the challenges of AWS do not lag behind[10].

VI. ARGUMENTS IN SUPPORT OF AUTONOMOUS WEAPONS SYSTEM

Support for autonomous weapons systems falls into two general categories. Some members of the defense community advocate autonomous weapons because of military advantages. Other supporters emphasize moral justifications for using them. Military advantages. Those who call for further development and deployment of autonomous weapons systems generally point to several military advantages.

First, autonomous weapons systems act as a force multiplier. That is, fewer warfighters are needed for a given mission, and the efficacy of each warfighter is greater. Next, advocates credit autonomous weapons systems with expanding the battlefield, allowing combat to reach into areas that were previously inaccessible. Finally, autonomous weapons systems can reduce casualties by removing human warfighters from dangerous missions[11].

The wars of the past, carried out with regular armies, will now be replaced by attacks shaped by the new generation war approach and supported by autonomous systems. In the new generation war, the effect of human operators will decrease, allowing states to make easy decisions about declaring war, as they will not suffer the loss of soldiers[12].

VII. BALANCING TASKS BETWEEN HUMANS AND ROBOTS

Over the past decades, the human-robot interaction (HRI) and human-robot collaboration (HRC) have acquired great interests among scholars and on the manufacturing assembly process [13,14]. Traditionally, the assembly process is performed manually by the labor in a repetitive manner. In some of the cases, the poor ergonomic design can result in a long run decrease of a work ability due to physical stress. This leads to health and productivity losses and other associated costs [15]. The industrial robots characteristics such as repeatability, precision, and high payload enabled industries such as automotive to adopt robots in assembly lines. It is important first to understand when systems can and should be supervised by humans. This is a decision involving clear technical questions (such as whether a computer vision system can generate an image of sufficient resolution to make an accurate decision) as well as ethical and policy considerations (such as whether a robot should be allowed to take the life of a human being).

VIII. ACCOUNTABILITY AND AUTONOMOUS WEAPONS SYSTEMS

Autonomous weapons systems pose a major challenge to the notion of human responsibility that is central to international humanitarian law and to the international criminal justice system that has been developed to support and enforce it. However, it is difficult to argue that an autonomous weapons system that can select and engage targets without human intervention once activated and does not assume full responsibility is not a valid argument. Accountability requires meaningful human control over all forms of force. There can be no meaningful accountability without meaningful human control, because responsibility requires controlled follow-up. As autonomy increases, humans will be relegated to a secondary position in decision-making, and the lack of control will eliminate the responsibility of the manufacturer/programmer/designer, the machine/robot, and the military commander[4].

IX. THE PROBLEM WITH LETHAL AUTONOMOUS WEAPONS SYSTEMS

The application of Artificial Intelligence (AI) in our daily lives has been steadily expanding in the last decade. Economic development, rapid industrialization and increased productivity all drive the quest for greater efficiency and accuracy in machines. Systems that employ facial recognition, image analysis, automated assistance and data entry and analysis all utilize AI to reduce processing times[16] Lethal Autonomous Weapons Systems (LAWS), as they have come to be called, are gaining attention due to prominent advances in advanced weaponry. Speed and efficiency are commonly identified as the primary benefits of equipping weapons systems with AI technology[17]. Proponents argue that precision can be very useful in the battlefield[18]. LAWS can identify the correct targets and defend combatants and non-combatants at a rate that far exceeds human capabilities and are also not susceptible to human error[19]. AI has already been used in weapons systems such as active protection systems, or systems that prevent missiles and projectiles from destroying a target such as a tank, and sentry robots, which are equipped with weapons that automatically fire at targets that its sensors detect[20].

X. CONCLUSION

Non-human controlled robots are robots that can select and power targets without any human input or interaction. Such robots are a source of much concern regarding killing machines. Researchers and experts have warned that the ethical, legal, and security implications of autonomous weapons are critically important to carefully consider.

As a result, if an agreement is reached to ban fully autonomous weapons and the tools to monitor them are developed, a step can be taken to limit weapons that are highly but not fully autonomous.

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