MILITARY DRONE – THE WEAPON OF THE 21ST CENTURY

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Abstract:

This article is dedicated to the emergence and development of civilian and military drones, in the context of armed conflicts, especially in recent times. The military field has undergone profound changes through the diversity of combat actions and weapons. It has been demonstrated that the use of all means and forces in an armed confrontation significantly changes the physiognomy of the battle and the armed operation/conflict as a whole. The content and the nature of security threats. Armed conflicts are increasingly showing their dependence on artificial intelligence, profoundly changing the art of war. Technological advantages, especially those related to artificial intelligence (AI), have become decisive, and military superiority is no longer determined by the number of troops and the power of conventional weapons. Drones and AI-guided missiles are omnipresent in combat operations. Thus, drones in the near future will be equipped with increased artificial intelligence, which will ensure a maximum degree of efficiency. It is possible that drones will have unlimited access and the ability to changes (adapts), so that it can move from one environment to another or move on the ground. The drone may become the symbolic weapon of the 21st century.
But, as soon as a new type of combat weapon has appeared, new changes must immediately appear in the doctrines and tactics of conducting combat operations.

Keywords: *military drone, artificial intelligence, armed conflict, security, threat, military doctrine, interoperability.*

1. Introduction

Recently, threats to global, regional or national security have undergone the greatest change. Previously, during the Cold War, threats and challenges were launched by states, and large armies were preferred. Thus, they were based on conventional weapons, to which nuclear weapons are also added. These armies are inadequate to the current challenges, because currently conflicts are usually fought between states and other non-state actors, such as, for example, terrorist organizations or other rebel factions and organizations [5]. The beginning of the century and the millennium highlights new concepts of conducting military conflicts. The military field has undergone profound changes through the diversity of combat actions and weapons. It has been demonstrated that the use of all means and forces in an armed confrontation significantly changes the physiognomy of the battle and the armed operation/conflict as a whole. The content and nature of threats to security have also changed significantly. Armed conflicts increasingly show their dependence on artificial intelligence, profoundly modifying the art of war. Technological advantages, especially those related to artificial intelligence (AI), have become decisive, and military superiority is no longer determined by the number of troops and the power of conventional weapons. The concepts of the use of forces and means, as well as the way of conducting battles in the classic version of a symmetrical war "army against army" are outdated, revolutionary changes appear in the military field. At the same

time, as Admiral Rob Bauer, NLD-N, Chairman of the NATO Military Committee, noted in his Address to the Allied Chiefs of Defence, 18-19 January 2023, - "The war [in Ukraine] has also shown us that we must be able to fight the battles of tomorrow as well as those of yesterday [...] today. Modern warfare is as much about 'bits and robots' as it is about "mud and blood" [3].

Depending on several factors and methods of sensing combat technologies, categories of weapons, their chronology, etc., the classification of changes differs. For example, Krepinevich, a senior researcher at the Hudson Institute, deputy senior researcher at the Center for a New American Security, identifies ten such military changes, which he calls "military revolutions".

2. "Military revolutions"

We propose to refer to only a few of them, namely: – the revolution at the level of infantry, in which its role increased in relation to cavalry; – the revolution in the field of artillery; – the revolution in the field of firearms; – the Napoleonic revolution in logistics and organization; – the revolution in the way of conducting naval warfare (the emergence of the submarine); – the nuclear revolution [6]. Based on current armed conflicts, we propose to analyze some new characteristics of the battlefield in future armed conflicts: – the leadership process will be dominated by the informational/decisional element for the permanent coordination of all categories of forces and types of weapons, both vertically and horizontally;

– hostilities will be a true confrontation between human intelligences and will no longer be just a clash between forces and means;

– tactical structures will be flexible, mobile, with a great capacity for striking and maneuvering;

– action procedures will diversify until the decisive role of surprise is achieved and the initiative and supremacy are ensured;

– the front precisely delimited between "own troops" and "enemy troops" has disappeared;

– combat actions will increase in the urban environment;

– "surgical" actions will be carried out based on precise information;

– special importance will be given to support, even for small groups;

– combat actions will be carried out in areas still inhabited by civilians, where specific measures must be taken to reduce or even eliminate collateral damage.

Thus, in the joint defense operation, Ukrainian commanders used the new Military Security Strategy, approved in 2021, by developing territorial defense forces, modernizing weapons systems, and using asymmetric defensive actions (Zaniewicz 2021). This doctrine Modern military technology, amplified by the use of allied anti-tank and anti-aircraft missiles, together with Turkish Bayraktar TB2 drones [7], has truly changed the fate of war, as happened in Afghanistan (in 1978) and Nagorno-Karabakh (2020) [2].

Artificial Intelligence (AI) and Armed Warfare

The war in Ukraine also demonstrates the main transformations that AI brings to the conduct of armed warfare, namely:

1. The emergence of autonomous weapon swarms – Drones and AI-guided missiles are ubiquitous;
2. Self-learning weapons – Each weapon transmits data to other units to improve its effectiveness;
3. Camouflage becomes impossible – Image analysis algorithms can detect any change in terrain almost instantly;

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4. Radio jamming becomes useless – AI can generate perfectly credible imitative communications, eliminating the traditional advantage of electronic warfare;
5. Electronic warfare loses its meaning – Combat units become completely autonomous;
6. Real-time communications interception – Captured conversations are instantly translated and analyzed;
7. Battlefield reconstruction from passive signals – AI can determine the position of artillery from the noise captured by troop microphones;
8. Rapid adaptation to enemy tactics – Any strategy only works once.

Thus, we see that drones and AI-guided missiles are omnipresent in combat operations. According to Dex, a drone is an unmanned aerial vehicle (UAV), guided from a distance. They can be guided by remote control from a ground control center or by a digital autopilot located in another piloted aircraft.

History shows us that, before new technologies were applied in the military field, they were used in civilian life, for example, railways or dynamite. Drones are also used in the civilian and military fields. Civilian drones can be used to perform various missions for commercial or recreational purposes, and military drones are used for combat missions, such as: surveillance, reconnaissance, espionage or for combat purposes. Depending on the purpose, they have the necessary equipment and/or weapons as their payload.

4. Civilian and military drones. The history of their emergence and development

We propose to analyze the emergence and evolution of drones, as well as the characteristics of some military drones. For the first time a drone in the modern sense flew in 1975. This was an Israeli drone of the Tadiran Mastiff type, which had a data transmission system, and the ability to transmit live video images to the base from where it was coordinated and had a long-term flight capacity. (fig.1).

Fig. 1 Tadiran Mastiff drone

Currently, drones are increasingly sophisticated, assembled with various physical components, which do not differ from manned aircraft. The difference is in the space where the pilot of the aircraft and the environmental control system or life support systems are located. Some civilian drones are designed to carry a payload, for example a video camera, which obviously weighs less than an adult human and, as a result, can be very small. Such drones do not need life-critical systems and therefore can be built and assembled from lighter but less resistant materials and can use weaker, but very well-tested electronic control systems. Another model of drone is the **quadcopter-4-rotor design**, which has become popular, even if it is rarely used for manned aircraft. For these aircraft, it is necessary to equip them with electric motors and batteries, and the miniaturization of drones offers the possibility of using new, cheaper and weaker propulsion technologies.

Technologies in this field are constantly developing. Currently, the **Phantom 1** drone has reached the 4th generation, which will be put into use - from 2026. It belongs to the category of quadcopters. It has a flight time of about 15 minutes, can be equipped with an optional support for transmitting video images and uses an autopilot system, which allows it to hover stably in the air. Another type of combat weapon is a medium-altitude unmanned aerial vehicle **Northrop Grumman Bat**, which was originally intended for use by the United States Armed Forces. It has a wingspan of 4.3 m and can carry a weight of up to 45 kg. This aerial vehicle has an autonomy of 18 hours and can reach an altitude of 5.2 km above sea level.

The Bayraktar TB2 drone stands out from other drones with its flight range of up to 27 hours. It has a maximum speed of 220 km/h and a flight ceiling of 5,500 meters, with the ability to carry a weight of up to 150 kg, including weapons, on its attachment points. Equipped with automatic navigation systems, multiple sensors and semi-automatic flight functions, the drone is designed for various missions, from surveillance and reconnaissance to directing artillery fire and ground attacks. Another combat weapon of this type is the **Northrop Grumman MQ-8 Fire Scout** drone. This is an autonomous unmanned helicopter, developed by Northrop Grumman for use by the United States Armed Forces. The drone is designed for combat missions such as reconnaissance, air fire support, etc.

One of the larger models expected for the near future is the BAE Taranis drone. This is a British demonstration program for unmanned combat aerial vehicle (UCAV) technology, being developed primarily by defense contractor BAE Systems Military Air & Information. The aircraft, named after the Celtic god of thunder Taranis, first flew in 2013. As an unmanned warplane, the Taranis is designed to fly intercontinental missions and would carry a variety of weapons, allowing it to attack both air and ground targets. It uses stealth technology, giving it a low radar profile, and is controllable via satellite link from anywhere on Earth [1].

Military technologies are not limited to aerial drones (ships). They tend to develop in all environments.

According to YDN News, on March 25, 2025 CSBC Corporation announced the introduction of Taiwan's first unmanned surface military ship, called **"Endeavor Manta"**. (fig.2). This is a trimaran-type drone ship measuring **8.6 meters by 3.7 meters**, built of fiber-reinforced plastic.

Fig. 2 The **"Endeavor Manta"** drone ship

This ship was unveiled by a Kaohsiung-based shipbuilder. In the vision of its designers, it is ideal for operations in the dangerous Taiwan Strait, according to Focus Taiwan. The president of CSBC Corp., Taiwan, Huang Cheng-hung, said that his company began development of the military USV in early 2024. The ship has a maximum speed of 35 nautical miles (65 km/h – ed.) and can carry a load of more than one metric ton. The maritime drone is equipped with a multi-modal communications system, including 4G, radio frequencies and satellite. It also has artificial intelligence for targeting, anti-piracy systems and an autonomous group navigation system with collision avoidance function. According to Huang, the **Endeavor Manta** can carry explosives and light torpedoes.

The use of military drones continued at the end of the 20th century. They were designed, manufactured and tested, some directly in military confrontations in several increasingly high-performance variants. The trend continues in the 21st century.

The war in Ukraine also demonstrates the emergence of new combat weapons, which are much more affordable, but at the same time can replace aviation and artillery with a high degree of success in destroying enemy targets. In particular, we are referring to **kamikaze drones**. Colonel-General Oleksandr Sirsky, commander of the armed forces of Ukraine, announced on January 5, 2025, that Ukraine in December 2024 "hit over 54,000 Russian targets", 49% of which were carried out with the help of kamikaze drones.

Another novelty and modification of combat weapons, reaching performance, used in the Russian-Ukrainian war is the **"wired" drone**. Unlike classic drones, they are controlled by fiber optic cables, making them impossible to jam electronically. The control cables can reach a length of up to 15-20 kilometers and can carry a load of about 5 kilograms. According to data from a Ukrainian company that produces such drones, they cannot be located or detected by any electronic system. Moreover, neither the place of launch of the drone nor the operator who controls it can be detected. For radio waves, they are invisible.

Conclusion

Currently, military drones are present and very important in the arsenal of any strong army, having the ability to penetrate enemy territory unnoticed, to monitor the deployments and actions of combat units in different weather and seasonal conditions, as well as to transmit the information in detail and in a short time. Another purpose of these drones is to destroy important enemy targets. These unmanned aircraft are also used for precise attacks on armored vehicles and enemy units.

In addition to Western countries, which produce and own drones, there are other states, such as: Israel, Pakistan, India, Turkey, China, Russia and Iran, which produce and own various types of drones.

According to Global Data Plc, a London-based data analytics and consulting firm, the global market for unmanned aerial systems (UAS), which forms a significant part of the UAV industry, is expected to grow at a compound annual growth rate of 4.8% over the next decade. This represents a nearly doubling of the market size, from $12.5 billion in 2024 to approximately $20 billion by 2034. The effective use of drones in the wars in Afghanistan, Iraq and Ukraine highlights the expansion of their role in the future, representing a priority for the world's states.

Thus, drones in the near future will be equipped with increased artificial intelligence, which will ensure their maximum efficiency. It is possible that drones will have unlimited access and have the ability to change (adapt), so that they can move from one environment to another or move on the ground. Drones will be able to solve complex situations, both civilian and military, if necessary. The drone may become the symbolic weapon of the 21st century.

But, as soon as a new type of combat weapon has appeared, new changes must immediately appear in the doctrines and tactics of conducting combat operations, and interoperable standards of forces, as well as adequate capabilities for the production and use of such weapons, such as modern combat drones, must be developed and implemented. Interoperability standards are very important in providing industry with guidelines for the production of its equipment [4].

These would imply ways of using the armed forces, with which they are equipped, taking into account the technological capacity of the weapons and the equipment used.

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