DRONES IN THE UKRAINIAN WAR: WILL THEY BE AN EFFECTIVE WEAPON IN FUTURE WARS?

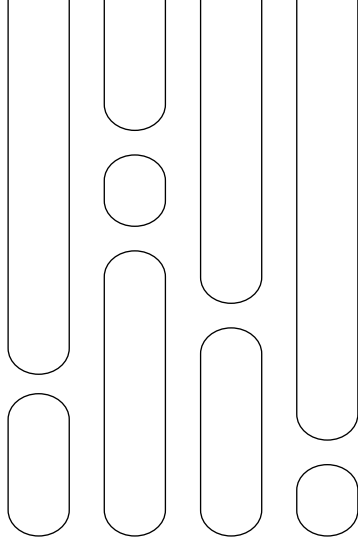August 30, 2022

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Introduction

Unmanned Aerial Vehicle (UAV) (drone) technology has rapidly proliferated in recent years, emerging as an essential component of armed conflicts all over the world. Drones have been used in warfare for over two decades, with the United States deploying drones to target Taliban leaders in Afghanistan. Drones are now used by governments, anti-government rebel groups, terrorist groups, criminal gangs, and even individuals in both conventional and unconventional battle theaters.

Drones appear to be a critical piece of military hardware in modern warfare. As a result of their sophistication and widespread use, they have become a source of concern for countries involved in any military conflict anywhere in the world. The interest of weapons-producing countries in manufacturing drones grows by the day. They intend to use them for a variety of missions, including early warning, reconnaissance, spying, destroying land and aerial targets, and intelligence gathering. They are even used by amateurs and media personnel to monitor the battle theater from above, posting pictures and video footage to project military victories in order to boost national resolve, as one sees in the Ukrainian battleground. Drones have played critical and decisive roles in five major wars in the last five years (Syria, Libya, Nagorno-Karabakh, Yemen, and Ukraine). Their success was aided by their ability to avoid detection and destruction by conventional air defense systems. This is because defense systems are mostly designed to detect and intercept aircraft and ballistic missiles that have a large radar cross-section (RSC).

Drones have played a larger role in the conflict between Russia and Ukraine than in any other military conflict. This means that the country with the most powerful drones will most likely have an advantage. In this protracted conflict, both sides have used drones, most notably Ukraine, which used Turkish-made Bayraktar TB-2 drones, drones manufactured in the United States and China, and even locally made drones, as well as amateur and commercial drones. These drones have served a variety of purposes including guiding artillery bombardment, reconnaissance, and surveillance missions, as well as targeting and bombing sites, and even video recordings feeding directly into information operations. The strategic and tactical impact of drones compels military experts to examine and forecast their use to provide convincing and logical answers to questions such as: what role have drones played in the Ukraine war? What are their particular capabilities? Could they impact the military balance between the two sides? What impact will drones have on future warfare?

A Leap in Concept and Performance

It is important to understand that drones are simply radio-controlled aircraft. They have the ability to fly in any direction and at any height. They are remotely operated and controlled. They can be launched from the ground, from a ship, or dropped from other aircraft. After completing their mission, some drones can be returned to the location from which they were launched or to any other location.[1] Some drones are detonated at the target site.

The performance of the Turkish drone Bayraktar TB-2 has been remarkable. The effectiveness of this drone was first witnessed in Syria. In February 2021, a Syrian air strike killed 36 Turkish soldiers operating near the northern Syrian province of Idlib, prompting Ankara to use Bayraktar drones to destroy dozens of tanks, air defenses, and armored vehicles. Hundreds of Syrian soldiers were killed as a result. During Operation Peace Storm, Turkish TB2s were also critical in breaking the military stalemate in Libya. These drones attacked the positions of the Libyan National Army forces, led by General Khalifa Haftar, and supported the advance of the Fayez al-Sarraj government's ground forces. This helped drive Haftar's forces out of Tripoli, leaving their stronghold in Tarhuna behind.[2]

Additionally, these drones fared well in the war between Armenia and Azerbaijan over the disputed Nagorno-Karabakh region. Although the dispute was short, the drones proved their pivotal role. The war showed how UAVs could be integrated into advanced combined arms operations. Indeed, Azerbaijan's large and sophisticated arsenal of armed drones has been the cornerstone of its military success. Experts and the defense community, including the Pentagon, have used the Nagorno-Karabakh war as a case study to demonstrate the impact of drones and how they have changed the nature of conflicts in the modern era.

According to a number of military reports, the TB2s, which Turkey supplied to Azerbaijan, destroyed 120 tanks, 53 armored vehicles, 143 artillery pieces, and numerous other Armenian targets during their recent conflict.[3] In terms of use, these TB2s have proven to be efficient and practical. The TB2s have flown over 420,000 hours and carried out missions in Iraq and Syria, and against Armenian militias in Nagorno-Karabakh, and Haftar's army in Libya. Even in Ethiopia, 58 civilians were killed by TB2s in January 2022.[4]

Interestingly, in all of these military encounters, the Turkish-made TB2s outperformed Russian weapons and defense systems, particularly the Pantsir defense system, which is described as Russia's most powerful mobile air defense system. Turkey posted several videos showing the destruction of some of these defense systems in Syria. These systems appeared to be completely incapable of repelling the TB2s. This reflected a failure not

only of the defense system but of the Russian defense industry in general. At the time, Moscow claimed that the Pantsir units were still in the testing phase and not fully operational — but could detect and shoot down Turkey's Bayraktar drones.[5]

The exception to all of these drone-related air defense system failures is the success of Saudi air defense systems, which have effectively repelled the drones supplied by Iran to Yemen's Houthi militia. Since the beginning of the conflict in Yemen in September 2015, the Houthis have launched over 430 ballistic missiles and 851 drones at the Kingdom of Saudi Arabia. Nearly 95 percent of these missiles and drones have been intercepted by the Royal Saudi Air Defense Forces.[6] This is the largest interception by air defense systems of ballistic missiles and drones in the history of modern warfare. The US Patriot defense system and China's anti-drone Silent Hunter laser weapon, which Riyadh purchased from China's Poly Technology Co. Ltd during Operation Storm of Resolve, deserve credit for this success. The anti-drone Silent Hunter has a 4-kilometer range. To counter the threats posed by drones, Riyadh also used other methods to strengthen its integrated air defense network. Drones secured a reputation as asymmetric and irregular tools of war during the US War on Terror. The US military was able to take out many leaders of al-Qaeda and Daesh (also known as ISIS) from long distances in Syria, Iraq, Yemen, and Afghanistan. Recently, the US military via drones killed al-Qaeda leader Ayman al-Zawahiri in Kabul.

The United States and other global powers no longer have an exclusive cutting-edge over UAV technology. Smaller versions of drones (miniature UAVs), including commercial ones, can be easily and cheaply produced and adapted for military use. This allows less powerful nations, rebel groups and terrorist groups to compete on an equal playing field. Now, at least 38 countries have drones as part of their military arsenals, including Iran, Iraq, Nigeria, and Pakistan.

The war in Ukraine — the first major military conflict between Russia and Ukraine — has put on display all the capabilities, strengths and limitations of UAV technology, prompting military experts to reiterate that it will not be the last war in which drones will play a game-changing role.

Bayraktar Drones Achieve Combat Effectiveness in the Ukrainian War

The Russia-Ukraine conflict has led to the emergence of new insights regarding the role of drones in modern disputes. A country with the most powerful drones will be more capable of exhausting its adversaries. During the early days of the Ukrainian conflict, Turkey's Bayraktar drones emerged as an unexpected source of victory and destruction of Russian units and

tanks. These Turkish-made drones have been crucial in the Ukrainian war. This success awakened the interest of military experts in aerial warfare. Ukraine purchased nearly 50 Bayraktar drones in 2019, but the actual number of these drones that it possesses, as well as whether or not Turkey has delivered on all recent Ukrainian orders, are unknown. However, if one was to suppose that Ukraine has received all its ordered drones from Turkey, could this change the outcome of Kyiv's war with Russia?

The TB2 drone has a range of 190 miles, and it flies at medium altitudes with two anti-tank missiles and laser-guided ammunition on board. It does not cost more than $1 million to produce. The drone was produced by Baykar, a private Turkish defense company specializing in UAVs. From 2006 to 2021, this company's exports increased sevenfold. It sold its drones in 16 countries, including Ukraine, Azerbaijan, Morocco, Tunisia, Qatar, Kyrgyzstan, and Turkmenistan. Poland was also the first NATO member country to announce the purchase of 24 TB2 drones in 2021. In Ukraine, TB2 drones have carried out several successful attacks against Russian forces. Until the end of April 2020, TB2s were responsible for the destruction of nearly half of all Russian surface-to-air missiles. They also annihilated six armored vehicles and five towed pieces of artillery. Three TB2 drones were also involved in the sinking of the Russian cruiser Moskva in the Black Sea. The drones jammed and confused Moskva's defense system, locating it and homing in on it with two Neptune missiles made in Ukraine.[7]

As part of Ukraine's propaganda campaign, drones have played an important role by providing images and video footage of Ukrainian strikes. Furthermore, Ukrainians have written a song celebrating the success of TB2s, given their importance in their victories to date. Despite the foregoing, a single-category drone cannot significantly alter the course of a war, especially when foes develop new military methods, tactics and weapons to counter it. The Russian army has shot down a large number of TB2s. To exhaust an enemy, a country must have a large and diverse number of drones that can evade hostile air defense systems, fly in all skies, and strike hostile targets from multiple directions. This appears to be what Ukraine and even Russia are planning at the present time. This implies that the use of drones will increase as the Russian-Ukrainian war continues.

Allies Support Ukraine With Drones

The success of TB2s appears to have increased Ukraine's reliance on drones, given the country's lack of warplanes and ballistic missiles that are capable of destroying Russian ground targets.

Washington has provided Ukraine with one-time-use Phoenix Ghost drones. They can be launched vertically and operate at night with infrared

sensors. These drones are very effective at targeting mid-sized ground targets. The Pentagon announced the delivery of more than 120 Phoenix Ghost drones, which have been designed specifically for Ukraine's needs as the war with Russia escalates. The Phoenix Ghost drone is the newest US drone, small enough to fit in a backpack and can be easily launched and detonated once it has reached its target. The United States also intends to provide an additional 580 of these drones.[8] It seems that Washington customized the capabilities of these drones to fit the sort of fighting which the Pentagon expects will continue in Donbas in eastern Ukraine.

Additionally, the United States has agreed to supply Ukraine with at least 700 Switchblade drones. They are simpler, single-use kamikaze drones. There are two types of these drones: Switchblade 300, which has a range of 6 miles, and Switchblade 600, which has a range of 25 miles and fires intensified ammunition at ground targets.[9]

Ukraine has also purchased 300 reconnaissance drones from Latvia. The Ukrainian armed forces are currently using reconnaissance drones manufactured by the German company Quantum Systems as well as by Japanese companies. [10]

Ukraine also produces a variety of domestic drones, including the Spectator-M1, as well as drones like the UJ-22 and Punisher, which are capable of striking ground targets, the latter depends on a Specter companion drone to locate targets. The Ukrainian army also employs domestically manufactured UAVs, particularly the Leleka-100, which weighs about 5 kilograms and is manufactured by Production-Innovative Company DeViRo, which is based in the central Ukrainian city of Dnipro.[11] Another Ukrainian-made drone, the A1-SM Furia, is used to search for targets, each costs around $25,000 to produce. A Russian multiple rocket launcher system (Uragan) was recently destroyed by the Furia drone.[12]

These small, off-the-shelf UAVs have supported intelligence, surveillance and reconnaissance missions across the country. According to some estimates, Ukraine has close to 6,000 non-military drones that are used by a variety of actors, including the country's official security forces, paramilitary groups and non-combatants in addition to the military.[13]

We do not have exact figures regarding the number of drone strikes carried out by Ukraine's army. The number of drone strikes may be limited. But nevertheless, drones have supported the gathering of information on the locations of Russia's missiles and artillery, its combat formations and armor, as well as supporting Ukrainian military movements. Drones have allowed Ukrainian forces to strike at the right time (of movement), track and disrupt Russian supply lines, air defense systems, and ships. They also have helped in military planning.

In general, drones are sold at low prices on e-commerce platforms, which makes it easy to expand their number and use. It is clear now that Ukraine, out of necessity, turned these off-the-shelf UAVs — which can be purchased for $5,000 and $10,000 — into kamikaze self-explosive weapons (loitering munitions) against Russian tanks.[14] Ukrainian volunteer engineers have been working to modify commercial drones for military purposes since Russia's invasion of the Crimean Peninsula in 2014.These drones can be shot down just as easily as their military-designed counterparts. But due to their low cost, this is not much of a problem.

All of the aforementioned facts indicate that drones will play an increasingly important role if the Ukrainian war drags on. Accordingly, it is likely that they will pose a real threat to Russia's air fleet, as well as destroying more Russian ground targets. However, because a drone can only attack one target at a time, such as a tank or artillery piece, the Ukrainians will need a large number of drones.

Russian Drones Gradually Enter the War

Russia's army did not depend heavily on drones at the start of its invasion of Ukraine. However, as the war progressed, there was an increasing demand for them, as Russian skills improved. Russia has flown as many drones as Ukraine, if not more, for intelligence, monitoring, and reconnaissance purposes. The Ukrainians lack the necessary weapons and systems to find and shoot-down drones, as well as to hide from them.

Russia uses drones to either quickly and directly destroy Ukrainian forces or to identify their positioning coordinates for attack using its long-range weapons, such as howitzers and mortars. Russia's military campaign in Donbas, a region in eastern Ukraine, has shifted to targeting Ukrainian artillery with its counterfire and drones.

Russia's army possesses several types of drones, but there is no evidence that it has availed of all of its drone fleet in Ukraine. Perhaps the Russian army is concerned that the drones will be destroyed by Ukrainian defenses, or that it does not have enough of them. The Russians have several drones in their arsenal, the most common of which is the Orlan-10 multipurpose drone. It is a small reconnaissance and surveillance drone designed to track distant and local objects in difficult-to-reach regions. The Special Technology Center in Saint Petersburg produced the drone, which costs between $80,000 and $120,000 depending on its category and specifications. Moscow only deployed this combat drone in Ukraine on a limited scale in March 2022.[15] According to some reports, the Ukrainian army shot down 50 drones of this type, particularly through using the Khortytsa anti-aircraft artillery.[16]

Yet the Russians also possess the KUB-BLA suicide drone, which was used in Syria and Libya. This Russian kamikaze drone is capable of locating targets using artificial intelligence and has been spotted by images in the Ukrainian theater. One of the features of this drone is its small size which makes it hard for conventional air defense systems to detect it. It has cutting-edge capabilities in terms of diving onto a target; blowing itself up into ground targets at different altitudes. The drone was designed by the ZALA AERO Group. The drone weighs 3 kilograms and can fly for up to 30 minutes. When compared to similar small drones, it has a record speed of up to 130 kilometers per hour and is capable of performing a vertical dive onto a target.[17] According to video footage posted on social media, this kamikaze drone was used in carrying out an air raid on Ukraine's Ministry of Finance headquarters in central Kyiv.

The Russians have also developed a drone with built-in capabilities and artificial intelligence known as Lancet. It is a drone especially designed for ground-based destruction as well as for air booby-trapping to destroy hostile drones through launching airburst ammunition. The Lancet drone is said to have a diving speed of 300 kilometers per hour, which is double that of existing UAVs. The drone can be launched from the ground or sea. It has a maximum range of 40 kilometers — 30 minutes — with a speed ranging from 80 kilometers per hour to 110 kilometers per hour. The drone contains a multichannel guidance system which can be equipped with a TV camera to transmit the image of a target. This drone was spotted hitting ground targets in Syria's Idlib.[18] Video footage showed Ukrainian soldiers shooting down four drones of this type as they attempted to attack Ukrainian military positions in the Zaporozhye region.

Some believe that Moscow is lagging behind the United States in UAV technology, but the veracity of this information cannot be verified. Perhaps Russia has not developed drones to advanced levels because it has more trust in its missiles and fighter jets, which have cost it a lot of money and it believes they can destroy anything flying in the air or on the ground. On the contrary, Turkey's TB2 drone costs only $5 million, and its MAM-L missile, which was used in the Nagorno-Karabakh war and caused massive destruction, costs only $100,000.[19] The Russians may have misunderstood this calculus and it surely will be among the important lessons learnt and Moscow will take it into consideration in the present Ukrainian war and future wars as well.

Russia entered the war with a massive arsenal of drones, but it lost a large number of them, particularly the reconnaissance drones, due to Ukrainian air defenses or technical failures that caused them to crash or jam. Regardless of its veracity, the US media claims that Russia has exhausted

most of its precision-guided weapons, as well as several drones used to assist long-range artillery in striking targets in Ukraine. Furthermore, the US missiles supplied to Ukraine destroyed a large number of Russian ammunition depots, increasing Moscow's need for more drones to defend against these missiles.

This is why Russia's defense industry is working hard to build armed drones on a large scale or import them from allies such as Iran. It is possible that Iran will hand over hundreds of armed and unarmed drones to Russia. It will assist the Kremlin in renewing its fleet, which suffered heavy losses during the current Ukrainian military campaign, which may be prolonged.

The White House revealed in the first week of July 2022 that Russia is seeking hundreds of armed and unarmed reconnaissance drones from Iran for use in the Ukraine war. This reflects Moscow's desire to close a critical gap on the battlefield and secure a long-term supplier of critical combat technology. According to US officials, Iran is planning to supply up to 300 drones and will begin training Russian forces on how to use them. According to a statement issued by the White House and reported by CNN, a Russian delegation visited an airport in central Iran at least twice between June 8 and July 5, 2022, to inspect the drones that can be purchased. According to satellite images provided by the White House to *The New York Times*, the Russians reviewed the Shahed-191 and Shahed-129 drones. [20]

The Institute for the Study of War, a US-based policy research organization, quoted Oleksiy Arestovych, advisor to the Office of Ukrainian President Volodymyr Zelenskyy, as saying that Iran has delivered 46 Shahed-129 drones to Russia. He also added that the Ukrainian government has already pointed to their use in the Ukrainian theater, and Russian forces could deploy them to defend against the HIMARS system, a highly mobile artillery missile system supplied by the United States to Ukraine. [21] If this is what has really happened, it could mark a watershed moment in Russia-Iran relations, whose military cooperation has sparked concern among countries, particularly the Gulf countries.

Russia has denied reports that Iran has supplied it with drones, possibly to avoid exposing its weakness or to imply that it has a sufficient number of drones. However, Iran's expertise in drone assembly and manufacturing increases the likelihood of such a deal occurring between Tehran and Moscow. Iran has a long history of supplying drones to its allies. It provided drone technology to the Lebanese Hezbollah, as well as to the Houthi militia which has launched attacks against Saudi Arabia and the UAE, and to Shiite militias in Iraq that have carried out strikes against Iraqi and US forces.

The Effectiveness of Air Defense Systems Against Drones

Russia has been preparing for anti-drone warfare since 2015, with early efforts in electronic warfare and developing new military methods and tactics to detect and destroy drones. The Russians have also learnt from recent wars and conflict zones in which drones were deployed, such as in Syria, the Nagorno-Karabakh region, and Yemen. They have also drawn lessons from the conflict in Libya between the Turkish-backed Government of National Accord and Haftar's Libyan National Army. Russia's state-of-the-art Pantsir-S1M surface-to-air missile system has been upgraded to detect and destroy all types of enemy drones. The weapons system has been modified to counter aerial threats, particularly strike drones. It has also been equipped with hypersonic missiles to boost its strike range from 20 kilometers (12 miles) to 30 kilometers (18 miles). The upgrade is also said to have improved the Pantsir's stealth and jamming resistance, as well as its rate of fire.[22]

Nonetheless, the Russians have been slow to study the types and capabilities of Ukrainian drones and to deploy anti-aircraft defenses against them in appropriate locations. However, as the war progressed, Russia modified and improved its air defense systems, shooting down and jamming a large number of Ukrainian drones. Russia has improved the organization and positioning of its ground-based air defense in the Donbas region, where the focus of the war has shifted, so that its electronic warfare and air defenses are better organized and deployed on the battleground than at the start of the war.

According to the Russian Ministry of Defense, approximately 1,188 Ukrainian drones have been shot down since the start of the so-called Russian "special military operation" in Ukraine until June 13, 2022, including 12 Turkish-made Bayraktar UAVs. Ukrainian drones have become less effective in this new phase of the war.

Recently, Russia increased its use of early warning radars to identify drones, as well as incorporating some electronic warfare systems to jam drone communications. The Russians have used a variety of jamming systems on the battlefield, including the Borisoglebsk-2 and Krasukha-4, which are effectively operational. They have also used machine guns and missile systems, such as the Tor missile system, to shoot down drones. They likewise have utilized artificial intelligence for the same end.[23]

However, the Russians are having difficulty in detecting small electric Ukrainian drones such as the Switchblade and Spectator, which use battery-powered electric engines. Both categories are difficult to detect because

they lack an infrared heat signature, making it difficult for Russian radar to spot them.[24]

It appears that the Russian electronic warfare system is designed to locate, jam and disable Ukrainian drones from up to 4 kilometers away.[25] The Russians lacked this capability at the start of the war, but their jamming systems have improved over the course of the war.

The Russian army has improved the effectiveness of its air defense systems, which include cannons, missiles, and electronic warfare (by modifying them) against Ukrainian drones. They also hint that they have a laser weapon capable of dealing with Ukrainian drones more effectively. Using lasers to blind satellites previously existed only in the realm of science fiction, but the United States, China and Russia have been working on various types of such weapons for years.

Russian President Vladimir Putin revealed a Russian laser weapon for air defense and anti-satellite defense in 2018. The Russians revealed that they have a number of laser systems, the most notable of which are the Zadira and Peresvet systems. Russia claimed that it can burn a drone from 5 kilometers away in 5 seconds, and that these weapons, which have been deployed in Ukraine for use in the conflict, are designed to burn Ukrainian UAVs.[26] However, there are no credible reports or sources that show the Russians used laser systems to destroy Ukrainian drones, but rather that they were destroyed by conventional air defense weapons. If these Russian laser weapons are capable of destroying drones in practice, the Ukrainians may lose their drone-edge, allowing Moscow to achieve air superiority and secure its ground targets. The proliferation of these laser weapons may provide an advantage to ground-based air defenses against drones. However, not all countries will be able to obtain this technology, which will continue to be monopolized by countries that develop them, in order for drones to remain an effective air and ground threat in the future of warfare.

The Russians and Ukrainians are deploying UAVs in new and innovative ways, whether they are the expensive versions of drones supplied to Ukraine by Western governments or inexpensive, off-the-shelf drones customized for military use. The war in Ukraine has already demonstrated that drone warfare is now an integral part of all types of wars. Dozens of countries now have access to these lethal weapons. Armies all over the world should adapt to this new development in modern warfare.

The Impact of Drones on the Future of Wars

The conflict in Ukraine no doubt has provided a plethora of early lessons that will influence the mindset of strategists, military policymakers, leaders,

and manufacturers when it comes to the future use of drones in wars. The lessons learnt, and new ones as the war continues, are discussed below.

First, because of the low cost of drones in comparison to the massive military benefits they provide, countries will race to buy them from militarily advanced nations or manufacture them locally. Drones are thought to be far less expensive than fighter jets that can be easily intercepted and destroyed. When fighter jets are destroyed, countries lose pilots who they have spent a large sum of money on during their training, and it is difficult to compensate for their loss quickly. Drones are also considered inexpensive in comparison to ballistic missiles, the majority of which — particularly those with speeds below the speed of sound — can be easily intercepted by dedicated air defense systems.

Second, drones can perform multiple missions and can be used in both peacetime and wartime. Drones allow for engagement with enemy front lines in order to support ground advances and minimize personnel and equipment losses, and they can be used to lob missiles and bombs. Furthermore, drones are used as an alternative to traditional reconnaissance planes to perform unique and different missions. They have the ability to "forward sense," which means they can fly ahead of manned vehicles to survey the battleground and gather information about the enemy forces stationed there. Drones can carry out electronic warfare at the same time by jamming and fooling the enemy's radar, electronic systems, and air defenses.

Third, the performance of drones during the Ukrainian war will alter the concept of air supremacy over a battleground's skies. Drones will play a larger role in denying the enemy air superiority over the battlefield. Without a doubt, Russia has struggled to maintain air superiority over Ukraine. However, it appears that the drones, together with the air defense systems supplied by the West to Ukraine, have prevented Russia from achieving complete air supremacy over Ukraine's skies. This has obviously complicated close combat support missions for Russian ground forces, particularly in Kyiv, forcing the Russian air force to fly at high altitudes. Drones have the advantage of not needing well-equipped airports to take off and can fly from anywhere, even if the enemy destroys all of the runways. As a result, countries that have advanced in the development of drones are likely to contribute to the creation of air minefields. They will fly and launch a barrage of explosives and shrapnel at nearby aircraft of all types, making air minefields an effective flying air defense system.

Fourth, some countries have developed air defense systems specifically for drones. However, air defenses will have to keep pace with the developments in UAV technology in the future. So far, most drones have been handled by

traditional defense systems such as the Patriot or THAAD systems, which are expensive in comparison to the cost of drones. As a result, investing in the development of anti-aircraft missiles to counter drones is likely to be on the agenda of the global defense industry in the coming years. Most likely, lasers will be the next generation of weapons technology developed by militaries to counter the growing threats posed by drones, in which China appears to be way ahead.

Conclusion

The Ukrainian war is the first large-scale war in which both military and commercial drones have been extensively deployed. While UAVs are being used extensively and effectively in the conflict in Donbas in eastern Ukraine, they are expected to play a critical role for both the Russian and Ukrainian armies if the war continues. This means that the war will continue to provide ideas for the development of drone technology and their future impact on warfare in the 21st century.

The Gulf countries are concerned with understanding Iran's technological ambitions, concepts and capabilities, particularly when it comes to the use of drones, whether directly from its soil or through handing them over to its proxy militias in Yemen, Syria, Iraq, and Lebanon. There is no doubt that Saudi Arabia is the largest country in the world in terms of intercepting Houthi militia drones. Riyadh has refined its methods and techniques in this confrontation. Saudi Arabia continues to purchase and develop additional defense capabilities to counter Iranian drones, which Iran will continue to use to target key Saudi facilities, whether from its own territories or through supplying its proxies operating throughout the region.

Additionally, the Gulf countries face the risk that Iran-backed terrorist groups with sectarian orientations may use these drones to attack key targets in their territories. Terrorist outfits can easily use drones because of their simple technology, assembly and operationality, or even obtain fully-assembled drones from countries such as Iran and Turkey. Furthermore, it is inexpensive for terrorist outfits, with some types of drones costing less than $15,000. We have seen how Iran, the number one sponsor of terrorism in the world, has provided its militias deployed throughout the region with large and various numbers of drones to advance and support its foreign policy. Moreover, Daesh used drones in the years that followed 2013.

In summary, the global order may soon witness a new round of disputes in which drones are heavily and effectively used. This means that the world needs clear guidelines and principles governing the use of drones in accordance with international humanitarian law. Amendments to the international rules of war are also needed.

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