INSS Insight

FPV Drones: From the Ukrainian Battlefield to the Middle East

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Drones have been a significant weapon in the hands of Hamas, the terrorist organization that has been fighting against Israel since October 7. Before the outbreak of the war, there was no real use in the Middle East for FPV (first-person view) drones. They are incredibly fast, precise, relatively simple-to-operate, inexpensive and lethal weapon that has started to be in widespread use in the fighting between Russia and Ukraine, especially in the second half of 2023. The IDF must study the use of these drones in Europe, both as an opportunity for the forces and as a threat against them. It must procure the necessary countermeasures and adapt its military doctrines accordingly.

From the very first minutes of the Hamas attack on October 7, drones have played a key role in the military arsenal that Israel's enemies have employed, from attacks on the observation stations and communication and energy centers on the border to intelligence collection prior to the attack, as well as during combat and subsequent attacks on IDF forces. The IDF has several methods of dealing with the threat that drones pose, including either jamming or detecting and mitigating the signals using various electronic means, including the use of the SMASH (Smart Shooter) targeting system, which allows forces to identify and intercept the drone kinetically. Despite the widespread use of drones, mainly by Hamas during combat but also by Hezbollah, it appears that the terrorist groups attacking Israel have so far refrained from using the same kind of lethal drone that has become very popular on the battlefield between Russia and Ukraine, namely, FPV (first-person view) drones.

An affordable, Precise and Lethal Weapon

FPV drones are operated by a person wearing augmented reality goggles, with an antenna, through which the operator sees the area of operation via the cameras of the drone. Before they were turned into weapons, these drones were used by hobbyists for drone races. They are capable of reaching speeds of up to 100 kilometers per hour within just seconds and they can perform complex aeronautical maneuvers and move through tiny spaces, such as windows and chimneys. They can also navigate precisely around challenging obstacles at speeds of up to 200 kilometers per hour. The cost of mass-produced FPV drones, such as those manufactured by the Chinese company DJI, is just a few hundred dollars and they can be purchased without a license or supervision in electronics shops as well as online. There are also self-assembly drones which are shipped in parts and assembled by the end user for a similar cost.
Last year, when these drones were first used in the war in Ukraine, they were equipped with explosive capabilities. Given their small size, their payloads are limited and most of them are capable of carrying no more than just a few hundred grams of explosive material, such as a hand grenade, which can only cause limited damage

when it explodes in open areas. However, these payloads are capable of killing a person in a direct strike and can cause extensive damage in closed areas, such as vehicles, cargo trucks, tanks and armored personnel carriers, which these drones manage to penetrate if the operator is a skilled navigator, amply evidenced by video footage of drone attacks from the battlegrounds in Ukraine and Russia. If a drone manages to penetrate a tank through a small opening, it can easily kill all the occupants. Other video footage has shown soldiers from the Russian army attempting to down one of these FPV drones using light firearms, only for the drone to target them in a suicide attack.

Drone technology has improved drastically in the past 2-3 years. These drones can now reach almost all locations and provide unprecedented accuracy in attacks. The dramatic drop in the price of component parts, the massive improvement in navigation, the addition of automatic stabilizing capabilities and the simplification of the overall process of control have made them precise, accessible and easy-to-use. Video footage from Ukraine shows that they are capable of killing soldiers inside a tank, a bomb shelter or other kinds of structures. Drones could be a highly relevant weapon for use in missions like pinpoint assassinations since their accuracy enables them to strike with relatively little collateral damage. In addition, when this option is compared to the precise munitions that are currently in use on combat helicopters, drones, and even among infantry divisions, some of them costing thousands or even hundreds of thousands of dollars, it is clear that FPV drones are a weapon that makes the other alternatives economically unviable. For example, the Ukrainian Minister for Digital Transformation claimed that in light of his country's successful use of these drones, they are sometimes even more effective than artillery.

Apparently, all of this explains why the Ukrainian government plans to manufacture one million FPV drones during the course of the coming year. Russia is not lagging behind and is manufacturing drones at six times this rate. Moreover, the Russian army is already making highly effective and lethal use of drones. According to recent reports, around 90 percent of the missions launched by Ukraine, using FPV drones, have been intercepted by Russian electronic jamming. At the same time, if just one in every 10 of the drones that Ukraine is planning to introduce this year hits its target, that means 100,000 potential strikes at a relatively inexpensive cost and with high levels of precision, compared to the alternatives.

FPV Dones in Israel: Taking Advantage of the Opportunity and minimizing Threats

According to recent reports, Israel has been using FPV drones, also known as racing drones, for several years, in part to neutralize the flammable balloons that Palestinians floated into the Western Negev from the Gaza Strip, by crashing into them and bursting them. The drones, however, were used only for this limited purpose. During the current war against Hamas in the Gaza Strip the IDF has primarily been using the drones to survey buildings and underground tunnels, given that this is the most precise method of navigating such spaces. Having said that, it is unknown whether there has been any additional IDF procurement of drones, whether they have been deployed more widely and whether troops have been specially trained in their use for

intelligence gathering or attacks, even though the IDF makes widespread use of other kinds of drones.

Unless it starts to address this issue in the very near future, the IDF could miss an opportunity with massive potential, especially given how suitable these drones are in challenging combat conditions such as underground and in densely populated areas. Therefore, Israel should consider wider procurement of FPV drones, training soldiers, creating appropriate military doctrines and thoroughly analyzing the lessons learned by others on the battlefield especially in Ukraine. Likewise, Israel should consider setting up mechanisms for manufacturing enough FPV drones for Israel's domestic use, given that the Chinese cannot be relied on to ensure a continuous supply of both drones and components.

More urgently, the IDF must prepare to defend against FPV drones, given the increased prevalence of these weapons across the world, especially in Russia, from where they could easily make their way to Iran and then to any of Tehran's terror proxies across the Middle East. The increased ease of self-assembly is a threat that the IDF must not underestimate in terms of its ability to cause harm in the near future. Therefore, the IDF must be ready before the threat appears, especially given that the current conflict has proven that it was previously underprepared. The size and speed of these FPV drones makes them a focused and effective weapon that is very hard to deal with and one which requires dedicated solutions. For example, the iron covering that the IDF has installed on tanks and other vehicles in the Gaza Strip could help protect them from attacks by drones carrying large payloads but are less likely to be effective against a small, fast FPV drone which comes in at a low altitude and is navigated to explode on or inside tanks.

In addition, Israel's ability to counter these FPV drones using its aerial defense systems is not sufficiently developed. The radars for these interceptor systems, such as the Iron Dome, are relatively large and cannot generally pick up these small drones. Even if they could, the interceptor missiles, which are three meters long, operate at a much higher altitude, making them irrelevant when dealing with a weapon that is just a few centimeters in size and can fly at almost ground level. At the same time, specialized aiming systems, such as the Smart Shooter, which is installed on the small firearms of some IDF soldiers, are not relevant when it comes to dealing with such a fast-moving threat.

The measures that can be taken to counter the FPV drone threat can be found in the world of electronic warfare, which disrupts communications between the device and its operator. However, many of the currently existing systems are not suitable. For example, there are systems that are capable of identifying and jamming drones from a distance of up to 5 kilometers but they have no certainty of being able to deal with a threat capable of flying at speeds of up to 200 kilometers per hour. In addition, if faced with improvised, 'homemade drones', instead of those manufactured by recognized companies, these systems could be ineffective.

Adopting a forward-thinking approach, Israel must also ready itself to deal with the autonomous versions of these drones, whereby interfering with communications between the drone and the operator is no longer relevant since the vehicle is flown using artificial intelligence alone. The resources needed to defend against this type of threat are not currently developed sufficiently among Israel's security forces.

Summary

FPV drones are an emerging technology. They are inexpensive, deadly and are rapidly spreading around the world. They carry enormous potential for armies, terrorist organizations and lone attackers, any of whom could carry out precise and targeted attacks on individuals or other targets. It is no coincidence that FPV drones are at the center of a current arms race between Russia and Ukraine, where they are already in widespread use. The IDF must accelerate and adopt this technology among its arsenal. It must develop relevant training programs and military doctrines and, at the same time, prepare itself to deal with this threat at the hands of its enemies. It must do everything it can to prevent them from successfully deploying them against IDF soldiers. Given that Israel has a large community of drone users, as well as one of the leading defense industries in the world, this is certainly a mission that can be accomplished. All that remains is for decision-makers in the political and military leadership to give this issue the attention it so clearly needs.

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