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From Sindoor to Spider's Web, the age of drone warfare is here

Will drones be to 21st century warfare what gunpowder was to the First Battle of Panipat, when Babur trounced Ibrahim Lodi with his cannons? Or what bomber planes were to WWII – a game-changing piece of technology that not only won a hard-fought victory, but also rewrote the existing rules of war? From the astounding, blinding, and audacious Operation Spider's Web that Ukraine launched with its drones on Russia on Sunday, it certainly seems so. And crucially, there are lessons here for India in the aftermath of Operation Sindoor.

According to emerging reports, Ukraine launched over 150 first-person view (FPV) drones from hidden mobile cabins deep inside Russia, targeting five strategic Russian air bases, some as far as 4,000 km from the Ukrainian frontlines. The strikes reportedly destroyed 41 aircraft, including rare and irreplaceable strategic bombers like the Tu-95 and A-50 early-warning planes. It wasn't a stealth bomber or a hypersonic missile that caused this damage. It was an army of compact, unmanned drones.

This attack did more than disable Russian air power. It shattered assumptions about how war is waged, how deep territory is protected, and how deterrence is conceived. As the two sides sat across the table in Turkey for fractious peace talks on Monday, it was clear that Ukraine had pushed Russia back after bearing the brunt of recent attacks. The operation was a masterclass in modern asymmetric warfare. Planned over 18 months and executed with surgical precision, it demonstrated how a militarily smaller nation can punch far above its weight using innovation and technology. The drones used were small, FPV-guided machines, carried discreetly into Russia in wooden cabins mounted on trucks. The drones took off remotely, targeting valuable military infrastructure without risking a single pilot.

This is not just about low-cost fighting; it's about high-impact strategy. The fact that Russia's most secure airbases – some located in Siberia – were breached reveals just how porous modern defences can be in the face of distributed, semi-autonomous threats. India, which traditionally relies on fighter aircraft, tanks, and manned surveillance platforms, must take note. As Operation Sindoor against Pakistan showed, the nation is quite capable of using drones inside enemy territory and also neutralising those directed at Indian soil, but the eyes of the defence establishment has to be on the future – aggressively developing, procuring and deploying this tech to stay ahead of the game.

The Ukrainian operation has confirmed that drones are not merely support tools; they are frontline offensive assets. India's success in using drones during Operation Sindoor was promising, but it was limited in scope and ambition. Going forward, India must treat unmanned systems as foundational – not supplemental – to its war doctrine. The idea that geographical distance, air superiority, or static defences can insulate high-value assets is outdated. Just as Russia moved aircraft thinking they'd be safer in remote bases, India too must rethink how and where it stations its military platforms. Aircraft parked in the open are vulnerable. Every base must now consider hardened shelters and automated counter-drone systems as essential infrastructure.

Operation Spider's Web used civilian infrastructure – trucks, cabins, and even local mobile phone networks. This kind of innovation is critical for India's own strategic thinking. Our adversaries, particularly Pakistan and China, are watching and learning. So must we. Counterintelligence and unconventional warfare readiness must now include civilian logistics, satellite surveillance, and drone countermeasures. India must urgently scale up its indigenous drone production, especially loitering munitions, AI-powered UAVs, and swarm drones. Ukraine's success relied on hundreds of drones operating simultaneously across thousands of kilometres. India cannot afford to develop this capability slowly. Public-private partnerships, startups, and defence PSUs must work in concert with DRDO to ensure rapid development and deployment.

Strategic imagination is as important as military hardware. The Indian defence establishment must adopt doctrines that prioritise mobility, deniability, and layered defences. The Ukrainian attack fits Admiral McRaven's classic formula for special operations: simplicity, secrecy, speed, and surprise. India, with its history of bold operations like 1971's Operation Jackpot, must revive this spirit for the drone era.

Just a few years ago, drone warfare was seen as an emerging trend. Today, it is the dominant reality. From the Armenia-Azerbaijan war to Houthi attacks on Saudi oil fields, and now Ukraine's strike into Russia's strategic heart, the message is clear: the battlefield is borderless, and the weapons are lighter, smarter, and unmanned. Ukraine's drone blitz was not just a tactical success – it was a seismic moment in global military thinking. As Russia reels from the loss of a third of its strategic bomber fleet, the rest of the world must absorb the lessons with clarity and urgency. The age of drone warfare has arrived, and India must now lead, not lag, in this new domain of conflict.

comment

SIDDHARTH DESAI

Sky wars: The evolution of air defence in modern warfare

As warfare evolves, the skies have transformed into a new battleground. Drones, cruise missiles, and hypersonic weapons are no longer distant threats; they are reshaping how nations defend themselves. In response, countries worldwide are investing heavily in advanced air defence systems designed to protect borders and safeguard populations and critical infrastructure against complex aerial threats.

India's transformation in this arena has been rapid and remarkable. Once reliant on imports, the nation is emerging as a hub for indigenous innovation in defence technology. The air threat landscape is not new; however, the rise of unarmed aerial systems presents unique challenges. Conventional air defence systems, designed to counter advanced threats like fifth and sixth-generation aircraft, often struggle to detect small drones due to their minimal radar signatures.

Operation Sindoor showcased India's capabilities, with the Akashteer system demonstrating exceptional precision in intercepting coordinated aerial threats. Building on this success, India is advancing with Raksha Kavach, a next-generation multi-layer defence shield equipped with long-range surveillance and a mix of hard kill and soft kill technologies, providing a robust homegrown solution to neutralise modern threats.

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The significance of our achievements during the 88 hours of Operation Sindoor cannot be overstated. Although the S-400 system procured from Russia has not performed as effectively in the Ukraine conflict, our strength lies in integrating various air defence systems. By combining assets from Israel, Russia, and indigenous sources, we have created a cohesive air defence network. The integration of the Akash missile system and linking sensor shooters to the IACCS has proven particularly effective.

Air defence battles are dynamic, requiring long-range radars and sensors to assess threats quickly, determine their nature, prioritise them, and ensure effective engagement—all within seconds. The air command and control system is integrating with the army's battle management system, Akashteer, and the navy operates a similar system called TRIGUN. This integration has matured, yet much work remains to be done.

The impact of drones on modern warfare is profound. For example, Armenia's loss to Azerbaijan can be attributed to its inability to defend against drone attacks, demonstrating that large-scale drone deployment can be countered through technological investment. Automation, smart munitions, and multi-sensor systems have reached maturity, providing nations with new defence tools.

Our advancements stem from consistent efforts to develop capabilities, often in collaboration with foreign nations, exemplified by systems like Barak and BrahMos. The Mehar Baba Swarm Drone Competition of the Indian Air Force has also driven innovations in swarm technologies, with many systems now in use resulting from integrated counter-UAS initiatives by Indian startups.

The progress seen in indigenous systems like Akash and other medium- and long-range missiles is the result of decades of work by Defence Public Sector Undertakings (DPSUs) and the DRDO. While public-private collaboration has set a strong foundation, the future will likely see increased reliance on unmanned systems, making the development of low-cost counter-drone technologies crucial.

For instance, we have tested the Bhargavastra counter-drone system, which employs multiple micro-rockets. Enhancing these systems is vital, especially in multiple-front scenarios where defending against determined adversaries will be challenging.

During initial conflicts, we faced substantial air activity from adversaries. However, by targeting their critical infrastructure—airfields and radars—we applied significant pressure, highlighting the importance of active defence through offensive strikes and establishing a dual-layered defence strategy.

Innovations have emerged from various sectors, including the private industry. The Indian Air Force developed the SAMAR system, adapting surface-to-air missiles into effective counter-air systems. Following the Mehar Baba initiative, the BRD Base Repair Depot successfully converted air-to-air missiles into surface-to-air systems, showcasing notable ingenuity.

Looking ahead, the future of warfare will involve beams, drones, algorithms, and interceptors. The United States and Israel have invested heavily in these technologies, especially given ongoing drone threats. The Indian government and private sectors have also collaborated effectively to integrate these systems.

Artificial intelligence will play a pivotal role in sensor-to-shooter integration, determining which operator engages specific targets at precise ranges, processed in microseconds. Real-time data transfer will be crucial across all platforms. Although not all S-400 systems have been delivered, they have already proven to be significant assets in recent conflicts.

I would like to acknowledge two individuals no longer with us: Dr. APJ Abdul Kalam, credited with the successes of BrahMos and Akash, and Manohar Parrikarji, who fought tirelessly in Parliament for the S-400 and Rafale deals. Since they arrived in 2021, the S-400 systems have made a substantial impact on our defence capabilities.

Moving forward, we must prioritise the development of command and control systems, sensor fusion, and the integration of air defence radars with shooters via satellite. The DRDO is also exploring laser and directed energy weapons, which represent the future of defence. Investing in low-cost weapons should be avoided; instead, we need to focus on developing soft kill capabilities and advanced technologies.

The DRDO is working on projects like 'Aditya' and exploring hypersonic concepts through wind tunnel tests of HSDTV. Additionally, systems like the SMASH 2000 swarm drone and the Anti-Drone System (ADS) are under development. Advancements in Indian satellite technology are also critical; while we have made significant progress, much work remains. The integration of RISAT, Cartosat, and collaboration between DRDO and ISRO will be essential in the coming days.

Joint developments with Israel, including the Barak series, SPYDER, Heron, and other drones, must accelerate alongside the integration of artificial intelligence in defence. This path is essential for our nation as we prepare for future conflicts, although the timeline for these challenges remains uncertain.

Finally, we must address the critical gaps that exist. While we have made significant strides in developing homegrown systems over the past decade, there is an urgent need to better integrate research and development, startups, and private sector innovation into air defence technology. This approach will ensure we are not only reactive but also competitive on a global scale in shaping the future of warfare.

(The author is an advocate by profession.)

people's*edit*

WHAT CONTROLS YOU, MIND OR INTELLECT?

IBONIO D'SOUZA

The decisions we make can make our lives heaven or hell to live in because everything in this world is subject to the law of cause and effect, also known as Law of Causation. We know what happens when we decide to drink too much alcohol one night. The next morning, we feel sick, tired, and most likely have a headache. We won't be able to function optimally and we suffer. Yet, even with this knowledge of the effect, people still decide to drink too much alcohol all too often. In order to understand why people do this to themselves, we have to break down the types of equipment we have as humans and better understand their functions.

Body, mind and intellect: As humans, we are made up of matter and spirit. Spirit is the consciousness that gives rise to our matter. Spirit is the highest Truth. Without Spirit, there would be no matter. Our matter is comprised of three types of equipment; the body, the mind, and the intellect. The body is, of course, your physical manifestation with our organs, limbs, skin, bones, etc. This is what makes you tangible. Your mind is the home of all your emotions like love, hate, anger, jealousy, joy, etc. It is also the home of your desires, likes and dislikes. Your mind is where your preferences live.

And, the intellect, your third and most important equipment, is your ability to be objective and discern what is truth and what isn't true based on knowledge and wisdom. Your intellect is the mature reasonable part of you that can question and think for itself when there's adversity and when others are imposing their opinions and ideas on you. Your intellect stays centered regardless of the chaos happening externally.

How mind and intellect work: You might have already deduced that the mind is where your impulsive decisions live based on a whimsical emotion, which we all know those come and go rather quickly. Your intellect is what makes you think twice about that impulsive decision and hopefully stops you before you or someone else gets hurt. The mind wants satisfaction now while the intellect understands that sometimes satisfaction may not happen now but, there will be satisfaction later with the right action, clarity, and patience.

Our minds are the home of our emotions and desires. If this equipment is strong, it means that we are controlled by our emotions and desires first. We allow these emotions and desires to take over. This means our ability to rationalize and be objective isn't strong enough hence our intellects are weak. With a weak intellect, you'll be tossed and turned in all directions by the impulses of your senses.

Imagine a horse and carriage, with its driver controlling the reins and the passenger inside the carriage. The horse represents our five senses going in all directions . The reins represent the mind because wherever the senses go the mind goes, too. The driver represents the intellect. So the intellect has to be strong to control the reins attached to the horse in order to arrive safely to their destination.

When you make a decision you use one of the following methods: a) Just your mind, b) Just your intellect, b) Both your mind and your intellect. If you only use your mind, you could be pulled by your senses before you make the decision. You'll feel confused and doubt about your decision. You'll then have suffering involved with the outcome of the decision. Whereas, if you use your intellect, you'll remain calm before, during, and after the decision has been made. And, if you use your mind and your intellect together, then both your emotions and your thought processes are in agreement and you'll feel at peace knowing that you've made the right decision.

letterstotheeditor

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Industrial Estate bane for Cuncolkars

Residents of Cuncolim are reportedly on the war- path again over the failure to cart away the hazardous zinc waste from the Cuncolim Industrial Estate. The hazardous waste has reportedly left the water bodies including drinking water wells and rivulets polluted and contaminated. It is learnt that local leaders have called for an urgent inspection of the hazardous waste dump by officials of the Goa State Pollution Control Board (GSPCB) and IDC. It needs to be noted that the people of Cuncolim have been waging a sustained struggle over decades in support of their demand to end both air and water pollution at the industrial estate.

Ever since it was commissioned in November 1992, Cuncolim Industrial Estate has been a bane for locals. Incidentally both the steel units and now the fish meal and fish processing unit located at this industrial unit have come under the scanner. It is learnt that a host of health issues are affecting the locals. These include respiratory to skin allergies, asthma and kidney diseases. Over the years people have been suffering from sinus problems, tuberculosis, psoriasis, dust allergy and burning sensation in the eyes and even chronic obstructive pulmonary disease.

Following repeated complaints from locals of air and water pollution GSPCB has reportedly begun the work of odour monitoring of some units of the industrial complex. There is a need of installing an ambient air quality monitoring system, conducting a check of hazardous waste dumping and conducting a survey of groundwater and surface water in and around the Cuncolim IDC in order to ensure compliance with environmental norms.

Adelmo Fernandes, Vasco

World in turmoil

After the holocaust of Hitler and end of World War 2 by the atom bomb on Hiroshima, it marked a turning point in history! Towards this end, the UNO was created to ensure universal justice, human rights, stop/mediate in conflicts, utilize human resources for the benefit of all mankind. But today, the whole world is in turmoil, wars everywhere have become absolutely destructive, inhumane, where might is right with the UNO rendered impotent!

In India, we have just stepped back from the brink of war and are at an uneasy truce with Pakistan. China and Turkiye are openly arming Pakistan who is determined to terrorise and wrest Kashmir from India no matter what!

Whilst Trump calls Putin crazy for continuing bombing Ukraine, he is assisting Israel to continue bombing Gaza and the Palestine civilians mercilessly, whilst Hamas is holding on to hostages. In India, we have sent many all party united delegations abroad, having to justify operation Sindoor to the world, whilst at home, Opposition parties and the BJP are sniping at each other, no holds barred.

The Modi government in our democracy preaches sab ka saath etc, but keeps polarising the country on religious, caste and intolerance for any other view/ opinion. The CBI has arrested a top ED official on graft charges. In Goa, a BJP cabinet minister makes serious allegations about corruption in the CM held tribal department and instead of investigating this, the party wants to shoot the messenger! Whilst religious places, maha rituals and massive melas thrive and proliferate, it appears we have lost our humanity and moral compass! Many of our sages have asked "What does it profit a man to gain the whole world and suffer the loss of his own soul?"

John Eric Gomes, Porvorim

Champion and a true sportsman

Carlos Alcaraz offered a standout moment of sportsmanship on Sunday during his fourth-round match against Ben Shelton at the French Open where he called a foul on himself at a crucial moment at the start of the second set. Serving at 7-6, the defending champion approached the net off a forehand and placed a volley into the open court. Shelton scrambled and fired a powerful crosscourt forehand, forcing Alcaraz to stretch fully for the reply. The Spaniard managed to make contact and appeared to hit a clean volley winner. The point was initially awarded to Alcaraz, but the 22-year-old immediately alerted the umpire that he had lost his grip on the racquet mid-stretch and had made contact with the ball while it was no longer in his hand.

As per extant rules, the point belonged to Shelton and the chair umpire reversed his decision. Just goes to show that Carlos is a champion in every sense of the word but more than that he is a true sportsman. He is a great role model for sport , much on the lines of his idol and fellow Spaniard Rafael Nadal.

Rekha Sarin Trehan, Benaulim

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