The Indian **EXPRESS**

JOURNALISM OF COURAGE

Drone warfare came home during Op Sindoor. Where does India stand?

Ukraine's Operation Spider's Web and the recent India-Pakistan hostilities in the wake of Operation Sindoor underline the salience of drones — specifically ones sent out in swarms — in modern warfare. Relatively low-cost, low-tech drones pose significant challenges to traditional militaries, one which countries, including India, are racing to overcome

Written by **Deeptiman Tiwary** (Follow)

New Delhi | Updated: June 12, 2025 07:34 IST

NewsGuard

🕐 8 min read

Unmanned aerial vehicles (UAVs) date back to World War II and the Korean War, where they were used to train anti-aircraft gunners and in specific offensive missions. Their modern military usage took off in the 1990s, especially after the Gulf War of 1991.

On July 1, 2021, then Army Chief General M M Naravane had warned: "While we pursue our quest for niche technologies, including AI, it would be prudent to remember that future wars will also involve low technology, which is easy to obtain but

difficult to defeat."

These words ring truer than ever in the context of two recent events.

On June 1, Ukraine bombed five airbases deep inside Russia using cheap First Person View (FPV) drones, underlining the need to fundamentally reimagine air defences in the age of asymmetric drone warfare.

Weeks earlier in May, during the hostilities in the wake of **Operation Sindoor**, Pakistan had attacked towns and military facilities across India's western front, from Baramulla to Barmer, with swarm after swarm of relatively low cost, low tech drones for four straight days. Apart from inflicting damage, these attacks were meant to overwhelm India's air defences, clutter radars, exhaust ammunition, gather intelligence, and probe for vulnerabilities.

Must Read | Operation Sindoor | How India's air defence shield works: Inside the IACCS command system

---

Drones, a brief history

Unmanned aerial vehicles (UAVs) date back to World War II and the Korean War, where they were used for training anti-aircraft gunners and in specific offensive missions. Their modern military usage took off in the 1990s, after being successfully deployed in the Gulf War of 1991.

The Nagorno-Karabakh conflict of 2020 marked a turning point in drone warfare: Azerbaijan's use of Turkish Bayraktar TB2 and Israeli Harop drones devastated Armenian defences, decisively shifting the conflict's dynamics in favour of Baku.

Since then, drones have played a key role in:

🔴 Yemen, where Houthi rebels targeted Saudi oil infrastructure using drone swarms;

🔴 Gaza, where Israel has deployed high-tech drones for surveillance and strikes, and Hamas has used drones for grenades and observation; and

🔴 Ukraine, where both Moscow and Kyiv have deployed commercial quadcopters (DJI drones), military drones (Bayraktar TB2, Orlan-10, Shahed-136), and loitering munitions.

Ukraine has notably used "first-person view" (FPV) racing drones to target tanks, chase individual soldiers and small units, and, most notably, bomb Russian air bases.

On June 1, Ukraine carried out Operation Spider's Web, one of the most sophisticated drone operations in history, using 100–150 FPV drones, transported clandestinely in trucks deep into Russia. The target: five key Russian airfields. Ukrainian officials claim to have hit more than 40 Russian aircraft, including strategic bombers like the Tu-22 and Tu-95, and inflicted losses of around $7 billion.

Meanwhile, Russia throughout the war has used Iranian-made Shahed kamikaze drones in swarms to overwhelm Ukrainian air defenses, and target critical infrastructure such as energy grids.

Not one, not two…

Swarm drones are autonomous or semi-autonomous UAVs that operate in coordinated groups, much like swarms of birds or fish. They communicate via wireless networks and adjust in real time to achieve shared objectives.

Swarms are more resilient than traditional drones due to in-built redundancy — even if one drone is intercepted, others can continue on the mission. Drone swarms are thus used to saturate air defences (a few payloads may sneak through even robust defences), gathering intelligence, and attacking high-value targets.

Countries are already developing even more lethal AI-driven swarm drones, capable of making real-time decisions, adapting tactics mid-mission, and coordinating more complex manoeuvres. These are expected to become integral to combined arms warfare, functioning alongside infantry, armour, and cyber units.

According to *Fortune Business Insights*, the global military drone market stood at $14.14 billion in 2023, and is projected to hit $47.16 billion by 2032.

Threat of swarms

Chief of Defence Staff General Anil Chauhan, in a lecture in Pune, flagged the rising drone threat: "Now we have drones as small as water bottles — and in swarms," he said, calling these "undetectable" and "untargetable".

Air Marshal Anil Chopra (retd), former head of the Centre for Air Power Studies, said that while drone swarms deployed by Pakistan were not particularly effective, the Ukraine example offers some major learnings.

"When you use very cheap drones that carry warheads barely weighing a kilo — like Pakistan did — nothing much happens. They're jammed easily… Only a fool would fire expensive missiles at them," Chopra told *The Indian Express*.

But swarm drone attacks can be carried out anywhere, and at any time. "If someone moves a truck full of drones near an airbase and launches them [like in the case of Op Spider's Web], defending becomes very difficult. In countries like India, with porous borders and diverse populations, the threat is real," he said.

Chopra emphasised upon the need for integration across the security establishment.

"Your intelligence setup, even the local police, matter. Even a traffic constable could make a difference," he said, adding that the success of the Ukraine op was predicated on Kyiv being able to transport its drones thousands of kilometres inside Russia undetected.

"Strategic thinking, inventory management — everything must evolve. A $1,000 drone damaging a $200 million aircraft is our new reality," Chopra said.

Countering drone threats

Defence against drones begins with detection. Modern systems employ a mix of AESA radars, electro-optical and infrared sensors, acoustic detectors, and AI-powered fusion systems.

Once detected, one option is for drones to be neutralised through kinetic means, that is, with missiles and anti-aircraft guns. But traditional kinetic air defences, especially surface-to-air missiles (SAMs), are costly, and less effective against swarms. Automated gun systems such as C-RAM and Phalanx, which track targets and fire autonomously, are preferred in this role.

Even more cost-effective alternatives include:

Directed Energy Weapons (DEWs): Lasers and microwave pulses that disable drones by damaging sensors or frying electronics;

Electronic Warfare (EW): Jamming GPS signals or communication links;

Spoofing: Misleading drones about their location or issuing false commands;

Cyber Attacks: Taking control of drones and crash them by exploiting software vulnerabilities; and

Interceptor drones & nets: For close-range neutralisation, protecting critical assets.

The asymmetry in cost remains the central challenge in anti-drone warfare. A drone swarm costing roughly $100,000 might take millions of dollars to neutralise with currently available technology. This is why nations, including India, are investing in more cost-effective solutions like EW and DEWs.

The ideal defence is a layered system, integrating multiple modes of interception for redundancy and cost-efficiency purposes. Examples include Israel's Iron Dome and the US's Directed Energy M-SHORAD.

India's capabilities

Since 2020, India has ramped up its counter-drone infrastructure, deploying a layered defence that blends indigenous technology, EW, and air defence systems. Key systems include:

Akashteer Air Defence Control System: Developed by Bharat Electronics Ltd, it integrates with the Indian Air Force's integrated command network for real-time tracking;

Bhargavastra: Solar Defence and Aerospace Ltd's weapon system fires 64 micro-rockets in salvos to eliminate drone swarms;

DRDO's Anti-Drone System: It offers 360-degree radar coverage, with both jamming (soft kill) and laser (hard kill) capabilities. Drones can be detected up to 4 km away, and neutralised within a 1 km radius; and

Indrajaal: An AI-powered grid from a Hyderabad startup that combines jammers, spoofers, and intelligence to protect areas up to 4,000 sq km. Already deployed at naval sites in Gujarat and Karnataka.

During the May 2025 swarm attacks, the IAF activated its Integrated Counter-UAS Grid, alongside conventional radars, guns, and missiles, neutralising attempted strikes on 15 military bases and several urban targets.

Looking ahead

There is currently a race to develop both drone and anti-drone capabilities. "Even the Iranians are producing more than 20 Shahed drones per day. And these are powerful. India too has set up an ecosystem with 550 startups in the field. Some tech is acquired, but we're developing our own tech too," Chopra said.

The future of warfare is here, and it's unmanned, AI-driven and asymmetric. India's response to the May 2025 drone swarms signals it is rapidly adapting to this future.

As CDS Chauhan put it: "We are at a cusp where war may be between humans and machines — and tomorrow, between machines themselves. Machines that are autonomous, intelligent, and make decisions. We may need a layered and resilient defence system [to counter] this."

With inputs from Amrita Nayak Dutta

This article went live on June twelfth, twenty twenty-five, at forty minutes past six in the morning.

TAGS: **Express Premium**   **Operation Sindoor**