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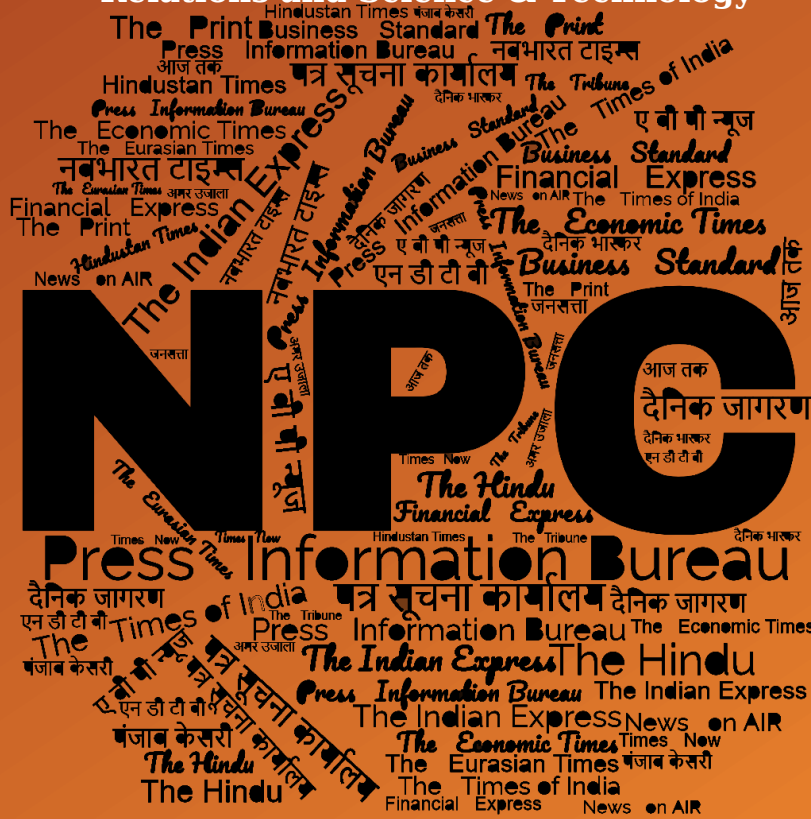
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# समाचार पत्रों से चयित अंश Newspapers Clippings

डीआरडीओ समुदाय को डीआरडीओ प्रौद्योगिकियों, रक्षा प्रौद्योगिकियों, रक्षा नीतियों, अंतर्राष्ट्रीय संबंधों और विज्ञान एवं प्रौद्योगिकी की नूतन जानकारी से अवगत कराने हेतु दैनिक सेवा

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# नवभारत टाइम्स

Fri, 10 Nov 2023

## Project Kusha: आसमान में दुश्मनों के मिसाइल, फाइटर जेट को कर देगा खाक, भारत के प्रोजेक्ट कुश के बारे में जानें सबकुछ

इजरायल के एयर डिफेंस सिस्टम आयरन डोम की चर्चा पूरी दुनिया में होती है। दुश्मन के हवाई हमलों को पल में ध्वस्त करने वाले इस सिस्टम ने दुनिया के देशों का ध्यान खींचा है। अब भारत भी एक ऐसे ही मिशन की तैयारी में जुट गया है। भारत स्वदेशी तकनीक से विकसित और दुश्मन की हर छोटी सी छोटी हरकत को भांपने की क्षमता से लैस लंबी दूरी की सतह से हवा में मार (LR-SAM) करने वाले मिसाइल सिस्टम को बना रहा है।

### 'प्रोजेक्ट कुश' के तहत बनेगा ये सिस्टम

भारतीय रक्षा एवं अनुसंधान संगठन (DRDO) इस मिसाइल का निर्माण प्रोजेक्ट कुश के तहत करने वाला है। अगर सब सही रहा तो 2028-29 में इसे सेना में शामिल किया जा सकता है। एक सूत्र ने बताया कि ये मिसाइल रूस के S-400 एयर डिफेंस सिस्टम जितना ही ताकतवर होगा। गौरतलब है कि रूस के S-400 सिस्टम को हाल ही में वायुसेना ने शामिल किया है। यह लॉन्ग रेंज सर्विलांस, फायर कंट्रोल रेडार और अलग-अलग तरह की इंटरसेप्टर मिसाइलों से लैस होगा, जिनकी मदद से यह 150 किमी, 250 किमी और 350 किमी तक की दूरी पर यानी यह सिस्टम तीन स्तरों पर दुश्मन के स्टेल्थ लड़ाकू विमानों, ड्रोन, क्रूज मिसाइलों और गाइडेड वेपन का पता लगाने और उन्हें नष्ट करने में सक्षम होगा।

### स्टेल्थ फाइटर को भी कर देगा ध्वस्त

प्रोजेक्ट कुश के तहत बनने वाले इस देसी मिसाइल सिस्टम के पास स्टेल्थ फाइटर्स, एयरक्राफ्ट, ड्रॉन्स, क्रूज मिसाइल को तहस-नहस करने की क्षमता है। ये सिस्टम 350 किलोमीटर दूर तक मार कर सकता है।

DRDO ने प्रोजेक्ट कुश को तेज कर दिया है। LR-SAM मिसाइल लंबी दूरी का सर्विलांस और फायर कंट्रोल रेडार से लैस होगा। इस मिसाइल में अलग-अलग तरह के इंटरसेप्टर लगे रहेंगे और यह 150 किलोमीटर, 250 किलोमीटर और 350 किलोमीटर की रेंज में अपने निशाने को नेस्तनाबूद करने की क्षमता रखता है। DRDO के अनुसार ये सिस्टम हाई स्पीड टारगेट्स के खिलाफ और लो रेडार क्रॉस सिस्टम को भी भेदने में सक्षम है।

### इजरायली सिस्टम से भी बेस्ट

गौरतलब है कि इजरायला का आयरन डोम 70 किलोमीटर के घेरे में ही दुश्मन रॉकेट को इंटरसेप्ट कर पाता है। आयरन डोम एक साथ कई मिसाइलों को गिराने में 90% एक्युरेसी रखता है। इस सिस्टम को अमेरिका और इजरायल ने मिलकर बनाया है। पहली बार 2011 में इसका इस्तेमाल किया गया था, तब हमास की मिसाइल को इसने नष्ट किया था। भारतीय सिस्टम में काउंटर-स्टेल्थ क्षमता होगी, यानी यह रेडार से बचकर आ रही चीजों को भी खोज कर उन्हें नष्ट करेगा, जो इजरायली आयरन डोम नहीं कर सकता।

<https://navbharattimes.indiatimes.com/india/what-is-project-kusha-drdo-long-range-air-defence-system-news/articleshow/105120806.cms>



**Press Information Bureau**  
**Government of India**

**Ministry of Defence**

*Fri, 10 Nov 2023*

## **India & Bangladesh Navies Undertake CORPAT & Ex-BONGOSAGAR**

The 4th edition of Bilateral Exercise between Indian Navy and Bangladesh Navy, BONGOSAGAR-23, and the 5th edition of Coordinated Patrol (CORPAT) by the two navies was conducted in the Northern Bay of Bengal from 07 - 09 Nov 2023. Ships and aircraft from both navies undertook joint patrolling along the International Maritime Boundary Line (IMBL), and subsequently conducted maritime exercises to enhance interoperability.

Indian Navy Ships Kuthar, Kiltan and Maritime Patrol Aircraft (MPA) Dornier participated in the exercise along with Bangladesh Navy Ships Abu Bakr, Abu Ubaidah and MPA. The ships undertook communication drills, surface gun-shoots, tactical manoeuvres and other exercises that culminated with a steam past. CORPAT-23 also included the maiden Humanitarian Assistance and Disaster Relief (HADR) drills conducted between the two navies wherein a Search and Rescue scenario at sea was exercised. Regular bilateral exercises and coordinated patrols have strengthened mutual understanding and cooperation between the two navies.

INS Kuthar is an indigenously built guided-missile Corvette, whereas INS Kiltan is an indigenously built anti-submarine Corvette. Both ships are part of the Indian Navy's Eastern Fleet based at Visakhapatnam, which functions under the operational command of the Flag Officer Commanding-in-Chief, Eastern Naval Command.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1976149>



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*Fri, 10 Nov 2023*

## **Raksha Mantri & US Secretary of Defence Discuss Wide Range of Defence & Strategic Issues During Bilateral Talks in New Delhi**

**Focus on enhancing defence industrial cooperation between India & US**

**Shri Rajnath Singh hands over parts of parachute, uniform & airplane of US forces from World War II recovered in Assam**

Raksha Mantri Shri Rajnath Singh held a bilateral meeting with US Secretary of Defence Mr Lloyd Austin in New Delhi on November 10, 2023. The two Ministers comprehensively discussed a wide range of defence and strategic issues. There was particular focus on enhancing defence industrial cooperation and getting the defence industries from both sides together to cooperatively co-develop and co-produce defence systems.

The Ministers explored ways and means to advance their defence technology cooperation with joint research in critical areas. They reviewed the progress of the India-US Defence Industrial Ecosystem, INDUS-X, which was launched in June this year and aims to expand the strategic technology partnership and defence industrial cooperation between the governments, businesses and academic institutions of India and US.

Secretary Austin welcomed India's decision to elevate to full membership of the Combined Maritime Forces, a multilateral construct headquartered in Bahrain.

The Raksha Mantri symbolically handed over to Secretary Austin some items recovered in Assam as part of the US Defence POW MIA Accounting Agency Mission. The items include parts of parachute, uniform and airplane of the US forces from the World War II-era. The Ministers, before concluding, drew up an agenda for future joint work for their teams.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1976128>



*Fri, 10 Nov 2023*

## **India, U.S. Hold 2+2 Ministerial Dialogue with Focus on Indo-Pacific, Critical Minerals and Global Challenges**

India and the U.S. on November 10 held extensive deliberations to further expand their global strategic partnership through greater defence industrial ties, enhancing engagement in the Indo-Pacific and boosting cooperation in key areas such as critical minerals and high-technology.

The U.S. delegation at the 2+2 ministerial talks was led by U.S. Secretary of State Antony Blinken and U.S. Defence Secretary Lloyd Austin. External Affairs Minister S Jaishankar and Defence Minister Rajnath Singh headed the Indian side.

"Our dialogue today will be an opportunity to advance the vision of Prime Minister Narendra Modi and U.S. President Joe Biden to build a forward-looking partnership and construct a shared global agenda," Mr. Jaishankar said in his televised opening remarks.

"We are exploring cooperation in new domains such as critical technologies, collaboration in civil outer space and in areas of critical minerals," he said.

In his remarks, Mr. Blinken said both sides are promoting a free and open, prosperous, secure and resilient Indo-Pacific including by strengthening the U.S.-India partnership through the Quad.

He said the focus is to bolster the partnership in international peace, security and specifically working to promote rules-based order, uphold principles of sovereignty, territorial integrity and independence.

In his opening comments, Mr. Singh said the India-U.S. bilateral relationship has seen a growing interest in strategic convergence and enhanced defence cooperation.

"Defence cooperation remains one of the most important pillars of our bilateral relationship," he said.

"We look forward to closely working with the U.S. across domains of capability building," Mr. Singh said.

U.S. Defence Secretary Austin, in his opening remarks, said in the face of urgent global challenges, it is more important than ever that the world's two largest democracies exchange views, find common goals and "deliver for our people".

"Our increasingly strong ties give us all hope for the future of this partnership and our common efforts towards a more secure world," he said.

<https://www.thehindu.com/news/national/india-us-hold-22-ministerial-dialogue-with-focus-on-indo-pacific-critical-minerals-and-global-challenges/article67520341.ece>



Sat, 11 Nov 2023

## **Defence Attaché Presence, Naval Exercise Among Steps by India, EU to Strengthen Cooperation**

As India and European Union (EU) look to expand defence and security cooperation, the EU's first Defence Attaché took charge earlier this month while the two sides also held the first naval exercise recently, while officials noted that the ambit of security cooperation is expanding especially with focus on the Indo-Pacific.

"We have increased number of maritime exercises between EU and India... especially France and Italy. EU is now not only a trade and investment partner but also a security partner," an EU official said on the sidelines of a discussion organised by the think tanks Council for Strategic and Defence Research and Konrad-Adenauer-Stiftung. "We are now focussing on security, energy, sensitive technologies..." the official said noting that there is lot of focus on digital connectivity.

Last week, Captain (Navy) Fabrizo Falzi who has earlier served as the Italian Defence Attaché in India took over as the first DA in the Delegation of the European Union in New Delhi. The EU has limited number of DA worldwide and the appointment in India shows the importance it attaches, another EU official noted.

"The Government of India, reserves the right, on the principle of reciprocity, to avail suitable reciprocal arrangement, as and when required," India's Ministry of External Affairs said in the letter accepting the appointment.

Recently, India and Italy signed a defence cooperation agreement. The official also noted the agreement between space agencies. India and Europe are the terminals of the India-Middle East-Europe Economic Corridor (IMEC) corridor, the official added on the ambitious initiative which was announced on the sidelines of the G20 leaders summit in September.

### **Maiden Naval exercise**

On October 24, India and EU conducted their first joint naval exercise in the Gulf of Guinea which saw the participation Indian Navy's INS Sumedha, an Offshore Patrol Vessel, joined by Italian Navy Ship ITS Foscari, French Navy Ship FS Ventôse, and Spanish Navy Ship Tornado, the Indian Navy said in a statement. The exercise followed the third meeting of the EU-India Maritime Security Dialogue on October 05 in Brussels.

The four ships practiced a series of tactical manoeuvres in international waters off the coast of Ghana, including a boarding exercise, a flying exercise using the helicopters embarked on French



Ship Ventôse and Indian Naval Ship Sumedha, and transfer of personnel between ships, the Navy said. "This exercise was followed by a knowledge sharing session in Accra, Ghana which built on the joint experience at sea to improve operational know-how. The session also helped deepen ties between Ghanaian officials and representatives of the Indian, EU and EU member states missions to Ghana."

The Navy stated that the activities underlined the shared commitment of India and the EU to supporting coastal States and the Yaoundé Architecture in ensuring maritime security in the Gulf of Guinea. "They reflected the breadth and dynamism of EU-India cooperation on maritime security, and signalled the common determination to uphold the United Nations Convention on Law of the Sea," the Navy said.

<https://www.thehindu.com/news/national/defence-attach%C3%A9-presence-naval-exercise-among-steps-by-india-eu-to-strengthen-cooperation/article67525013.ece>

## **BusinessLine**

*Sun, 12 Nov 2023*

### **India Fast Emerging as Global Player in Defence Sector, Capabilities of its Security Forces Constantly Rising: PM Modi**

India is fast emerging as a "big global player" in the defence sector and the capabilities of its security forces are constantly rising, Prime Minister Narendra Modi said on Sunday.

Addressing soldiers here after celebrating Diwali with security personnel stationed near the border, Modi said the circumstances of the world are such that the expectations from India are constantly rising.

"At such an important time, it is necessary that India's borders are protected and there is an environment of peace in the country and you have a big role in this," Modi, dressed in Indo-Tibetan Border Police (ITBP) fatigues, said.

"India is protected till the time my bravehearts are standing on the borders like the Himalayas," the Prime Minister said.

"After Independence, these bravehearts (Army personnel) fought so many wars and won the country's heart... Our jawans have snatched victory in the face of challenges," he said.

"It is said that 'parv' is where the 'parivaar' is. On festivals, being away from the family and deployed on the borders exemplifies the commitment to duty... The country is indebted to you," Modi told the soldiers.

"Therefore, on Diwali, one 'diya' is for your safety, and in every prayer, people wish for your safety," the Prime Minister said.

"Since 30-35 years, there has been no Diwali that I have not celebrated with you. When I was neither the PM nor the CM, I celebrated Diwali amongst you in border areas," Modi said.

India's soldiers have always walked ahead, risking their lives and have always proven that they are the "strongest wall" at the borders, he added.

"For me, a place where our security forces are deployed is no less than a temple," Modi said.

The Prime Minister also hailed the role played by the armed forces in evacuations in earthquake-hit areas and during other calamities.

"When we had to pull out people from Sudan, India's bravehearts completed the mission with courage... When there was an earthquake in Turkiye, they risked lives to save people," Modi said.

Wherever Indians are in danger, security forces are always committed to ensuring their safety, he asserted.

"We are proud of our forces and soldiers," Modi added.

<https://www.thehindubusinessline.com/news/national/india-fast-emerging-as-global-player-in-defence-sector-capabilities-of-its-security-forces-constantly-rising-pm-modi/article67527076.ece>

## THE TIMES OF INDIA

*Fri, 10 Nov 2023*

### **US and India to Co-produce Armored Vehicles to Counter China**

The US and India will co-produce Stryker armored vehicles, as the two countries push to counter China's rising military might in Asia.

The announcement, made by a senior US defense official, came during the annual 2+2 ministerial consultations being held between the countries' foreign and defense ministers in New Delhi.

The initiative "will strengthen the shared security of our countries by diversifying supply chains and supporting interoperability between our militaries," US Secretary of Defense Lloyd Austin said Friday in New Delhi.

The vehicles will help India push back against China along their disputed border, while also reducing New Delhi's long-term dependence on Russian weapons. The announcement comes as part of a multi-year effort to strengthen US-India ties through intelligence sharing, technology transfer and bolstered diplomatic ties. It also helps Prime Minister Narendra Modi's bid to expand India's industrial base.

An Indian official, speaking on condition of anonymity, said the majority of the vehicles will be deployed along India's border with China, where tensions have remained high after a clash in 2020 that killed soldiers on both sides. Some of the vehicles will also be deployed along India's border with Pakistan.

New Delhi is seeking thousands of co-produced vehicles, most of which will be armed with anti-tank missile systems. The rest will be used for battlefield surveillance or as command vehicles, the official said.

The Stryker, a wheeled combat vehicle produced by General Dynamics Land Systems Inc., is prized by the US Army for its versatility. There are more than two dozen variants, which serve as infantry carriers, reconnaissance platforms, medical and engineering support, among other missions.

The US Army, in recent years, has added a 30mm cannon to the vehicle and worked to integrate directed energy weapons on the Strykers for short-range air defense.

The Biden administration has sent Strykers to Ukraine to aid its defense against Russia, in addition to Bradley fighting vehicles and Abrams tanks.



In June, during a state visit by Modi to Washington, the two countries pledged to deepen defense-industry ties, including technologies for intelligence, reconnaissance and surveillance, as well as aircraft engines and munitions. As part of that push, the countries are working to streamline regulations, licensing and export controls, and to deepen ties between defense companies.

The US and India also plan to conduct more joint exercises across combatant commands and regions, according to a senior US defense official.

<https://timesofindia.indiatimes.com/india/us-and-india-to-co-produce-armored-vehicles-to-counter-china/articleshow/105125202.cms>



*Sat, 11 Nov 2023*

## **Chinar Corps Engineers Introduce Carbon-negative Silica Defence Shelters for Troop Comfort & Safety**

Chinar Corps engineers have unveiled a solution to enhance the comfort and safety of troops on the Line of Control (LoC) with the introduction of carbon-negative, infrared-heated silica defence shelters. The Indian Army Corps shared on X, "Capability Building in Forward Areas by Chinar Corps Engineers."

According to defence officials, the Silica Permanent Defense (PD) structures are self-sustainable, infraredheated constructions made from a silica mix with single-use recycled plastic, contributing to environmental sustainability. Designed for quick deployment, these modular shelters are claimed to be maintenance-free, durable, and insulated, providing a 'reliable' living option for troops.

The Army constructed and held trials at Razdan, situated at an altitude of 11,000 feet. This brought forth the Silica PD's features, including insulation, bullet resistance, and a snow-bearing load capacity of 20-25 feet. Furthermore, this eco-friendly solution combines an infrared electric heater for the thermal field and nano paint for universal weather resistance. The integration of this technology in combat engineering will, as per claims, offer a cost-effective solution for the deployment of troops in forward areas. In the future, these structures can act as forward operation observation posts.

<https://www.republicworld.com/defence/indian-armed-forces/chinar-corps-engineers-introduce-carbon-negative-silica-defence-shelters-for-troop-comfort-safety.news>



*Fri, 10 Nov 2023*

## **India Orders Hermes 900 for Army, Navy**

The Indian government has ordered Elbit Systems Hermes 900 StarLiner unmanned aircraft systems (UASs) for the Indian Army and Indian Navy, according to a defence source.

The Indian Ministry of Defence (MoD), however, said it could not comment on how many of the medium-altitude long-endurance (MALE) unmanned aerial vehicles (UAVs) are being procured. Janes was told that the acquisition is part of an emergency procurement tranche. Indian media has

reported that the contract covers the delivery of two Hermes 900 each for the Indian Army and Navy.

Janes understands that delivery of the UASs will start in 2024. Elbit Systems did not respond to a Janes query for information at the time of publication. However, it is possible that the acquisition is connected to a 7 March announcement by Elbit about the 120th order of its Hermes 900 UAS.

On its website, Elbit Systems describes the StarLiner as a derivative of the Hermes 900. The company has earlier said that the StarLiner can carry and operate multiple sensors simultaneously. Elbit Systems has also described the StarLiner as being a heavy-fuel, engine-powered MALE UAS optimised for operation in civil environments and in adverse weather conditions.

The UAS's payload options include laser designators or markers, the SkEye wide area persistent video surveillance system, the SPECTRO XR multispectral electro-optic (EO) payload, L3Harris Wescam MX-15/-20 EO imagers, Rafael VisionMap's MIST G dual-spectral airborne mapping and surveillance system, Ground Moving Target Indicator (GMTI)/maritime patrol/search-and-rescue (SAR) radars, and electronic warfare (EW) systems.

<https://www.janes.com/defence-news/news-detail/india-orders-hermes-900-for-army-navy>



*Fri, 10 Nov 2023*

## **MQ-9B Drone Acquisition: India's Letter of Request Sets Stage for Strategic Advancements**

Stage getting set for the finalisation of 31 MQ-9 Predator B Drones from the US soon.

Responding to media queries at a special briefing following the 2+2 India-US Ministerial Dialogue in New Delhi, Defence Secretary Giridhar Aramane said: "A Letter of Request (LOR) has been sent to the US (General Atomics) and are now awaiting their response." "The US companies have to take clearance from the government," he said.

### **How will India deal with imminent threats?**

The Indian Defence Secretary said: "We have the necessary capabilities to deal with the immediate threat."

The Indian Navy is the lead service in the deal of 31 Predator drones from the US based General Atomics. And the two countries are keen to close the deal before the end of FY 23-24.

Financial Express Online had previously reported that India is poised to secure a strategic advantage in acquiring MQ-9B long endurance drones, as negotiations reveal an estimated 27 percent cost reduction compared to other nations procuring from the US.

Following the Defence Acquisition Council's approval earlier this year, India has initiated the Letter of Request (LOR) process, projecting an indicative cost of USD 3,072 million for these advanced drones.

Each MQ-9B drone is anticipated to cost USD 99 million for India, significantly lower than the USD 161 million incurred by the UAE, a country with prior acquisitions. Notably, the 16 drones previously procured by the US at USD 69 each lacked essential components such as sensors, weapons, and certification, constituting 60-70% of the total cost.

India's substantial deal size and the manufacturer's potential recouping of initial investments from prior transactions contribute to this advantageous pricing. However, potential integration of indigenous radars and missiles may prompt a reassessment of costs, highlighting the complexities of such acquisitions.

Both the Indian Air Force and the Indian Army have consistently supported these acquisitions, stressing the importance of technological know-how. India seeks a 15-20 percent transfer of technology, with major components like engines, radar processor units, avionics, sensors, and software set to be manufactured domestically.

Pending final approval from both governments, India plans to procure 11 off-the-shelf drones immediately, with the remaining units assembled domestically. These MQ-9B drones, known for their high-altitude long-endurance capabilities, are instrumental in enhancing India's surveillance capabilities, monitoring land and maritime boundaries effectively.

In a strategic move, the Indian Navy, in 2020, leased two MQ-9B Sea Guardian drones from General Atomics for one year, focusing on surveillance in the Indian Ocean. This lease has been subsequently extended, underlining the drones' continued importance in bolstering India's maritime security.

<https://www.financialexpress.com/business/defence-mq-9b-drone-acquisition-indias-letter-of-request-sets-stage-for-strategic-advancements-3304375/>



Sat, 11 Nov 2023

## **‘Cheap’ Chinese Drones with Pak Terror Groups Biggest Security Risk; How can India Deflate the Threats?**

*By Air Marshal Anil Chopra*

Cross-border terrorism from Pakistan has been a scourge for India for many decades now. After Article 370 abrogation and greater control in Jammu and Kashmir, the incidents have been, albeit, on the decline.

However, the new phenomenon is the use of drones for cross-border intrusions. In the last three years, drone sightings across the international border have increased considerably.

Of the nearly 500 sightings, over 300 were in the year 2022 itself, an exponential increase from previous years. About 75 percent were in the Punjab sector, 15 percent were in Jammu, and 10 percent were in Rajasthan and Gujarat.

India's Line of Control (LoC) and International Border (IB) with Pakistan are well-fenced, surveyed, and manned. Yet Pakistani state and non-state players are upping the ante and using technology to smuggle illegal arms, ammunition, drugs, currency, propaganda pamphlets, and other items to their supporters and operatives.

Drones are cheap and available commercially off-the-shelf and have replaced human smugglers and even terrorists in some cases, as was the case in the Jammu airfield attack a few years ago.

The US has been extensively using drone strikes against targets as part of the 'War on Terror.' Drones have even been used for assassination. Ayman al-Zawahiri, al-Qaeda leader, was killed in a

US drone strike in early August 2022. On January 3, 2020, Qasem Soleimani, an Iranian major general, was killed by a US drone strike at Baghdad International Airport.

A significant terror plot by Pakistan's ISI was averted by the Special Operations Group (SOG) and Jammu police after they recovered a consignment of arms and ammunition dropped by a Pakistani drone along the IB in the RS Pura Sector in Jammu district in February 2022. The future is unmanned on many counts, including use for terrorism.

An unmanned combat aerial vehicle (UCAV) can carry ordnance such as rockets, missiles, and bombs. Small bomb-laden drones can make a Kamikaze attack.

Till recently, most drones were usually under real-time human control. However, Artificial Intelligence (AI) technology now supports more significant flight and decision-making autonomy levels.

### **Jammu Airfield Attack**

Pakistan-based Lashkar-e-Taiba (LeT) made a drone attack on IAF's Jammu airbase on June 27, 2021. This was the first reported use of drones to attack military facilities in India.

There were twin blasts, five minutes apart, around 1:35 a.m. The first drone dropped a bomb that damaged a building when it went through the roof, while the second exploded on the open tarmac at a little distance from a parked helicopter.

There was no damage to any operational asset or loss of life. It was later understood that the target was Air Traffic Control (ATC) tower and parked IAF helicopters. The two Improvised Explosive Devices (IED) weighed five to six kilograms, with RDX as the main explosive charge. The drop was made through stored location coordinates.

The two drones had flown from across the border, a mere 14.5 kilometers away. Drones have continued to be used in Punjab, Rajasthan, and Jammu & Kashmir sectors for Intelligence, Surveillance, and Reconnaissance (ISR). They are also used for smuggling drugs and small arms. The drones were assembled from Chinese-origin kits and thus increased deniability.

### **Drones, New Dimension To Border Security**

For long unmanned aerial vehicles (UAV) have been used for border surveillance and often through incursions into adversary's territory. Drones are also used for intelligence gathering, especially for military and BSF installations near the border.

Drones are small and have low visual, noise, smoke, and infrared (IR) signatures. They can fly ultra-low or at high altitudes, making it difficult to detect, intercept and neutralize.

Most conventional air defense radars cannot detect them. A few dedicated bird detection avian radars at airports monitor bird activity within the airfield zone and near the approach and take-off path.

Such radars will pick up drones, but it is not affordable to position such radars across the entire border. Sensitive IR sensors are required in large numbers at a considerable cost to detect the heat signature of drones. Small size and nearly no smoke signature means late visual detection. Even the drone sound can be heard very late.

Drones could be autonomous or remotely controlled and, because these are sourced from the open market, enable deniability. Drones could travel a few 100 kilometers deep, carrying a significant quantity of contraband payload. The types of cargo captured from the downed drones included substantial amounts of heroin, opium, pistols and revolvers, ammunition, detonators, and other explosives. More recently, they have been bringing even currency.

### **Pakistani Drone Production Ecosystem**

For years, Pakistan had been pushing the US to allow it to acquire the MQ-1 Predator, the primary UCAV system the US used as a strike platform. However, such requests were denied amid fear of technology proliferation.

Pakistan's National Engineering and Scientific Commission (NESCOM) and the Pakistan Air Force (PAF) jointly began developing its own Burraq UCAV. The initial variants were for surveillance and intelligence gathering.

In 2015, they had the first UCAV variant. Pakistan borrowed ideas from the Chinese CASC Rainbow CH-3A UCAV and may have received assistance, too. The Shahpar II is a UCAV built by Global Industrial Defence Solutions of Pakistan. It is currently in production following the completion of a test and qualification phase. It reportedly can fire missiles at both stationary and moving targets.

Pakistan is working closely with Turkey on Bayraktar TB2, medium altitude long endurance (MALE) drones for offensive and air defense use. They showcased these at the Pakistan Air Force (PAF) day event. Satellite images revealed the presence of one Bayraktar TB2 at PAF's Murid Airbase. Pakistan has thus raced ahead of India in indigenous MALE and UCAVs.

Pakistan also signed a contract with Turkey for the co-production of ANKA UCAV. Pakistan also acquired CH-4 and Wing Long UCAVs from China. The Pakistan Navy already operates several UAVs, such as Scan Eagle and Uqab, for surveillance.

The SATUMA Jasoos II is another indigenous drone in the PAF inventory, fulfilling dual purposes of ISR and training. The Pakistan military has claimed to have eliminated three high-profile Tehrik-i-Taliban Pakistan (TTP) terrorists using its indigenous Burraq combat drone during an operation in North Waziristan's Shawal Valley.

### **Pakistan's Drone Infiltration Mechanism**

Pakistan is following an all-of-the-nation approach with many government agencies, the armed forces, and Inter-Services Intelligence (ISI) supporting the covert operations. Their border security force, Pakistani Rangers, has reportedly set up drone centers to help drone crossings by smugglers and terrorists to send arms and drugs into India.

Pakistan's focus has been much higher in Ferozpur and Amritsar sectors. The BSF has seized about 1,150 kg of drugs at the Punjab border in the last three years. Also found on the intercepted drones were some AK series assault rifles, pistols, MP4 carbines, carbine magazines, high explosive grenades, as well as narcotics.

### **Pakistan's Chinese Off-The-Shelf Drones**

Most Pakistani drones are of Chinese origin. Da-Jiang Innovations (DJI), Shenzhen, is one of the major drone manufacturers. Several Chinese state-owned entities back it.

DJI manufactures commercial drones for aerial photography and videography. DJI accounts for around 70 percent of the world's consumer drone market. The company's products have also been used by militaries and police forces, as well as terrorist groups.

DJI drones have been extensively used in Ukraine. These drones could be of different sizes and have significant payload capacities. Some of those caught on the Indian border include the DJI Matrice 300 Quadcopter with RTK (Real-Time Kinematic) drone.

It can have a maximum take-off weight of nine kg, fly at 80 km/h, and have an endurance of 55 minutes on fully charged batteries. It can fly autonomously on pre-fed waypoints and transmit live mission recordings. It costs nearly INR 1,500,000.

The payload could be three to four kilograms. The operator in Pakistan could control the payload drop based on video feed from the drone. Alternatively, it could fly autonomously. The US government has prohibited DJI products because the drone is known to transmit all data to parent organizations in China.

### **Forensic Analysis Of Downed Pakistani Drones**

Most Pakistani downed drones give tell-tale signs. Knowing the flight path, the number of flights done recently, the quality of onboard equipment and sensors, and assessing their vulnerabilities is possible.

Also, it is possible to determine the communication equipment and frequencies, which could be jammed later. Sometimes, it is possible to burst into the recipient terrorist networks and find terror-related hardware, arms and ammunition, narcotics, and foreign currency. India's National Investigation Agency (NIA) has monitored and investigated all incidents.

### **Anti-Drone Measures**

Large UAVs and Kamikaze drones have been extensively used in the Ukraine War and earlier in the Azerbaijan-Armenia conflicts. These have become more sophisticated, accurate, and lethal. Security establishments worldwide are working on anti-drone measures and systems that include hard and soft kill.

The large UAVs will be tackled by the air defense units of the armed forces using missiles and air defense guns. The larger drones can also be shot down by fighter aircraft or UAVs with air-to-air ability. Attack helicopters like the recently inducted Light Combat Helicopter (LCH) 'Prachand' also have air combat missiles.

BSF or other border guarding force sniper rifles can shoot the smaller drones. Special nets can be fired from hand-held guns that will entangle the drone rotors and bring them down. The GPS signal of the drone can be jammed and send it off track or astray.

Also, drone communication links can be jammed. Special laser-beam firing guns can burn the drone electronics or dazzle the optical systems. There are cyber means to take control of the drone and bring it down at a place of own choosing, as was done by the Russians in Syria.

It is a good achievement even if the drone is forced to drop its load through counter-drone action. Even the drone warhead could be exploded in the air. With more drones being flown in a swarm, the complexity of neutralizing would increase.

### **Drone Ecosystem In India**

Indian armed forces are already flying Israeli Heron and Searcher UAVs and Harpy and Harop UCAVs. India will soon have MQ-9 Reaper or Predator B UCAVs from General Atomics of the USA.

For a long time, DRDO's Aeronautical Development Establishment (ADE) was responsible for UAV development in India. Lakshya and Nishant had little success. Indian DRDO's Stealth UCAV Ghatak project is being accelerated. The first flight of a scaled-down test-bed flying wing was carried out in July 2022. It may be inducted by 2026.

Tapas MALE is also progressing well. DRDO must find private production partners for UAVs. The Adani Group is making the Israeli Hermes UAVs in India through a joint venture with Elbit Systems at Hyderabad.

Meanwhile, the private sector has been rightly galvanized for mid-sized drones. Over 100 drone start-ups are operating, and many have started getting significant orders from armed forces and



other security agencies. Indian Air Force's 'Mehar Baba' competition helped identify drone and drone swarm start-ups.

Bengaluru-based start-up NewSpace Research and Tech is working with Hindustan Aeronautics Limited (HAL) to develop a futuristic air-launched swarm drone system as part of the Manned-Unmanned-Teaming project called the Combat Air Teaming System.

As per the Drone Federation of India, the manufacturing of drones and related systems is happening in India, but critical components like batteries, motors, sensors, semiconductors, GPS, and cameras are still being outsourced. Select countries have developed mass production capabilities against aggregated demand for such components. India needs to get into such mass production.

### **Anti-Drone Actions In India**

Notwithstanding the sporadic successes of shooting down a few intruding Pakistani drones, it must be understood that the initiative of timing and place is with the aggressor.

Considering that India's border with Pakistan and China is large, we have to be selective in providing anti-drone means to the border guarding forces.

Also, human intelligence (HUMINT) and other means must support anti-drone actions. Indian Army and BSF are acquiring large numbers of drones, some of which could be used for surveillance of borders to identify incursions timely. It all requires inter-agency coordination in India.

The BSF conducts round-the-clock surveillance through patrolling, checkpoints, and observation posts. Floodlighting of the fence enhances visibility during the night. India has invested in radars for detection.

Indian security forces also use drones for anti-drone operations. BSF has installed anti-drone systems using integrated surveillance technology equipped with cameras, sensors, and alarms with a command-and-control system at more sensitive points on the Punjab border.

They have also created 'drone hunting teams' to shoot down enemy UAVs. The success rate in downing drones is going up. BSF conducts awareness campaigns among the public in border areas to sensitize them about UAVs/drones. With many drone start-ups in India, anti-drone systems can be acquired easily in more significant numbers.

### **Way Ahead For India**

Pakistan's support of radical Islamic elements and the technological backing of China enhances the terror threat pan-India that sees the risk of drones being used for more lethal chemical or biological forms of terrorism.

The Indian government is giving the drone ecosystem in India a very high priority. India must promote more research and development in drones and unmanned systems to remain globally relevant.

As India becomes drone-friendly, there is a need to strengthen regulation and control over drones. Air defense procedures have to be evolved. More no-fly zones may be designated to make vital installations safer.

Sensors and weapons against drones would one day be integrated like the IAF's Integrated Air Command and Control System (IACCS). Inter-ministerial coordination would be significant with the proliferation of drones within the country.

Local police and the Intelligence Bureau (IB) must monitor drones more closely. The police and security personnel should be educated and trained to respond to drone transgressions.

India has to prepare to take on drone swarms. An anti-drone force may be created one day. The national drone policy would need continuous evolution, using global interactions and inputs. To counter the risk of embedded malware in drone electronic sensors, there is a need for greater indigenization of both platforms and sensors.

Drones are the future, and India must follow a facilitative proactive approach yet be conscious of security implications and prepare for it.

<https://www.eurasiantimes.com/cheap-chinese-drones-with-pak-terror-groups-biggest-security-risk-how-can-india-deflate-the-threats/>

## Science & Technology News



Sat, 11 Nov 2023

### Centre to Use ISRO Satellites for Pollution Monitoring

To better monitor pollution sources in northwest and central India and fix accountability on states contributing to high pollution levels, the ministry of earth sciences (MoES) in coordination with the ministry of environment will use satellite technology developed by the Indian Space Research Organisation (Isro) from next season, officials aware of the matter said on Friday.

A senior official of MoES said they are already working with Isro to identify stubble-burning hotspots in the agrarian states of Punjab, Haryana and Uttar Pradesh. This project will, however, amplify the ambit of pollution monitoring to all sources.

“Through satellite imaging, we will identify hotspots for vehicular and industrial emissions, open burning, construction activities, etc. It will act as a real-time pollution map of the region using which we will be able to keep states accountable,” the official said, requesting anonymity.

The official added that the government is hoping to roll out satellite monitoring of the region before the next winter season and make this a uniform model to monitor pollution sources.

A document by the National Aeronautics and Space Administration (Nasa) explained that satellites can measure the concentration of aerosols in the atmosphere by observing how much light reaches the surface of the earth and how much is reflected off the aerosols. The measurement is called aerosol optical depth (AOD) or aerosol optical thickness. It is the same measurement that may have been made from the ground using a sun photometer.

“Using the following procedures, you can compare the satellite measurement of aerosol optical depth to the ground measurement from the sun photometer. You can also compare the satellite measurements with visibility or ozone concentrations to see the correlation,” the document said.

A senior Isro scientist said that currently, the space agency’s imager payload on board the INSAT-3D and 3DR satellites is used to monitor AOD and detect PM2.5 and PM10 concentrations in the atmosphere.

“INSAT 3D and 3DR imager-based AOD, PM2.5 and PM10 spatial maps are made available on web portals including [airquality.iirs.gov.in](http://airquality.iirs.gov.in) and [mosdac.gov.in](http://mosdac.gov.in) along with other ancillary parameters for visualisation. Using medium resolution Indian Remote Sensing (IRS) satellite data, stubble

burnt area maps are generated at the end of stubble-burning activity in kharif season,” the official said.

<https://www.hindustantimes.com/cities/delhi-news/centre-to-use-isro-satellites-for-pollution-monitoring-101699639913676.html>



*Fri, 10 Nov 2023*

## **Chandrayaan-4 Mission: How NASA and ESA will Contribute to ISRO’S Lunar Project – Key Details**

The Chandrayaan-4 mission, also known as LUPEX, is a collaborative effort between ISRO and JAXA, aimed at studying the presence, quality, and quantity of water on the Moon. Following the Chandrayaan-3 mission, this marks a significant advancement for the Indian Space Research Organization (ISRO), as NASA and the European Space Agency (ESA) join forces to enhance lunar water research.

Scheduled for launch in 2025, Chandrayaan-4 has garnered attention for its inclusive approach, with NASA contributing the Neutron Spectrometer (NS) and ESA providing the Exospheric Mass Spectrometer for LUPEX (EMS-L). JAXA and ISRO are actively developing key payloads, reflecting the collective expertise involved in this mission.

The primary objective is to deepen our understanding of lunar water resources, a critical aspect for future space exploration. Success in this mission could pave the way for global space agencies to embark on exploration missions to more distant planets and assess the potential for habitability on the Moon.

This collaborative endeavor signifies a substantial leap for ISRO, demonstrating their growing role in broader international space projects. The rover, under development by JAXA, and the lander, being crafted by ISRO, underscore the joint efforts to ensure the mission’s success.

While details about the mission are yet to be fully disclosed, the involvement of multiple space agencies and their respective instruments emphasizes the comprehensive approach taken to unravel the mysteries of lunar water. The Chandrayaan-4 mission holds promise for advancing scientific knowledge and expanding the possibilities for future space exploration endeavors.

<https://www.financialexpress.com/life/science-chandrayaan-4-mission-how-nasa-and-esa-will-contribute-to-isros-lunar-project-key-details-bkg-3304480/>



*Sun, 12 Nov 2023*

## **Japanese Rover Tests on Track for Lunar Mission with India**

Months after India successfully landed a craft near the lunar south pole, the next moon mission of the Indian Space Research Organisation (Isro) in collaboration with Japan is progressing at a fast

pace, with the Japanese agency recently completing a series of tests for the rover that will traverse the lunar surface.

The tests to assess the rover's mobility are on track, Yuji Katsumata of the Lunar Polar Exploration Mission (LUPEX) of Japan Aerospace Exploration Agency (JAXA), said. JAXA has created multiple facilities to emulate the lunar terrain, with a dark room, sandy terrain with rocks and lunar lighting, to test the mobility and navigation abilities of the rover, he said.

“We have created a prototype rover used for the development of LUPEX's mobility system. The large wheels or the crawlers provide a firm grip on the ground, allowing the rover to traverse rough terrain with high reliability. The rover also has an independent driving and steering system. Each crawler can independently drive and steer, allowing the rover to perform various manoeuvres, including rotating in its place,” said Katsumata.

LUPEX is JAXA's first mission to send a rover of this size to the moon, and the mission is designed to explore the lunar surface and search for subsurface water. LUPEX is an international cooperative project, with JAXA in charge of the lunar rover and Isro responsible for the lander that will carry the rover. Observation instruments from the National Aeronautics and Space Administration and European Space Agency will be mounted on the rover.

“Analyses of various observational data over recent years suggest that water may be present in the lunar polar regions,” the Japanese agency said in a mission document. “If water can be found in these regions, it could be used as an energy source for future human activities on the moon.”

The LUPEX rover will be equipped with seven experiments, JAXA scientists said, declining to be named. There will be an advanced lunar imaging spectrometer developed by JAXA on the left side, which has mirrors that move both horizontally and vertically. There will be an exospheric mass spectrometer developed by the European Space Agency near the centre and a mid-infrared imaging spectrometer developed by Isro on the right.

The rover will also house a resource investigation water analyser (REIWA), also developed by JAXA. REIWA also has Isro's sample analysis package, which is equipped to identify the mineral composition of samples collected from the surface of rocks.

The NASA's neutron spectrometer will be fixed behind the rover. Isro will also be sending a ground penetrating radar on the rover. These instruments will analyse minerals, molecules, water and other aspects of the lunar surface.

While the final date of the LUPEX launch has not decided, JAXA said the mission is expected to take flight by 2026.

“Isro has advanced technological capabilities that it has applied to operating lunar orbiters and developing lunar landers and rovers, and the LUPEX project will have to build a larger lunar rover than ISRO has developed to date,” the agency said in a statement. “We hope to make an international impact by combining these capabilities with JAXA's rovers and measurement/analysis technologies.”

<https://www.hindustantimes.com/india-news/japanese-rover-tests-on-track-for-lunar-mission-with-india-101699725798029.html>

