

# THE DRONE FRONTIER: INDIA'S ARMED FORCES UAV INVENTORY, GLOBAL LESSONS, AND STRATEGIC IMPERATIVES FOR NON- CONTACT KINETIC WARFARE

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# CENTRE FOR JOINT WARFARE STUDIES



## CENJOWS

**The Drone Frontier: India's Armed Forces UAV Inventory, Global Lessons, and Strategic Imperatives for Non-Contact Kinetic Warfare**



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### Introduction

The operational role of UAVs has undergone a fundamental shift over the past decade—evolving from surveillance assets into full-spectrum combat systems spanning precision strike, electronic warfare, logistics, swarm saturation attacks, and active drone intercept missions. The proliferation of inexpensive First Person View (FPV) kamikaze UAVs and tactical loitering munitions has compressed the cost-exchange ratio to a point where a ₹50,000 FPV can neutralise a multi-crore Main Battle Tank (MBT), a ₹15 lakh loitering munition can blind a ₹500 crore air defence radar, and a ₹80,000 interceptor drone can neutralise a ₹35 lakh Shahed-class loitering munition before it reaches its target. The cost calculus of modern warfare has been inverted at every tier simultaneously.



**Figure 1:** The evolution of Indian UAVs and Stealth Platforms

Israel and the United States spent billions intercepting Iran's missile attacks — deploying USD 3–6 million Arrow and David's Sling interceptors against USD 20,000–50,000 Shahed drones. Ukraine's answer was architecturally different —a USD 2,500 thermal-guided interceptor produced at over 1,500 units per day by end-2025,<sup>1</sup> achieving one drone-on-drone kill for every three Russian aerial targets destroyed.<sup>2</sup> The Wild Hornets STING alone accounted for over 3,900 Geran kills including the first confirmed shoot-down of the jet-powered Geran-3 variant,<sup>3</sup> compelling the United States, Jordan, the United Arab Emirates, Qatar, and over a dozen nations to formally request Ukrainian interceptor drones and operator teams.<sup>4</sup> Any defence procurement framework that fails to account for this fundamental economic reality is rendered obsolete at the point of publication —as confirmed operationally across the Russia-Ukraine theatre and more recently through Operation Sindoor, Operation Roaring Lion and Operation Epic Fury.

- **Drivers of Change**

Economy, Public Opinion, Emerging Technologies and the Punitive Cost of Nuclear Strike are the primary drivers of change in future warfare —consonant with ISO's primary drivers<sup>5</sup> of Economy, Society, Technology and Environment. Full-scale conventional war has become extremely remote given economic interdependence and nuclear deterrence. Low-intensity proxy conflicts<sup>6</sup> employing asymmetric tactics and high-technology platforms —particularlyUCAVs —have consequently become the dominant mode of conflict.

- **Transformation in the Indian Context**

The Indian Armed Forces operate across two of the world's most heavily militarised frontiers —the Line of Actual Control (LAC) with the People's Liberation Army (PLA) and the Line of Control (LoC) with Pakistan. The PLA fields platforms specifically forward-positioned at Shigatse Air Base in Tibet — including the WZ-7 Soaring Dragon HALE ISR platform, Rainbow-series MALE UCAVs, and the GJ-11 Sharp Sword stealth UCAV confirmed deployed there in August-September 2025. Pakistan has inducted Turkish and Chinese MALE UCAVs alongside its indigenous Shahpar-2 and Burraq platforms. The 2020 Galwan crisis triggered emergency procurements and accelerated indigenous development timelines. Operation Sindoor validated indigenous loitering munitions in live combat and the announcement of a dedicated Drone Force under the Defence Forces Vision 2047 roadmap signals recognition of the need for a structural —not merely a procurement —response.

- **Air Power and UCAVs in Future Conventional Warfare**

Future wars will be Network Centric<sup>7</sup> —fought by small task-oriented forces operating as a system of systems<sup>8 9</sup> that UCAVs in swarm mode are uniquely suited to realise. The SEAD-by-deception model, validated in Israel's 1973 Yom Kippur War and 1982 Bekaa Valley operations, was operationalised at scale in Operation Sindoor, where Qinetiq/Anadrone Banshee Jet 40 target drones were deployed in a decoy role to force Pakistani air defence systems to reveal and expend resources.<sup>10</sup>

The doctrinal context established above frames the operational assessment that follows.

### **Background —India's UAV Journey**

India's UAV programme began in the early 2000s with Israeli-origin MALE-class ISR platforms —the IAI Searcher and Heron families —procured across all three services. Indigenous development under the Defence Research and Development Organisation (DRDO) produced operationally limited systems that did not reduce import dependence.<sup>11</sup> The June 2020 Galwan clash triggered emergency acquisitions,

including the lease of IAI Heron TP armed UCAVs and accelerated evaluation of the General Atomics MQ-9B —culminating in an approximately USD 4 billion Foreign Military Sale (FMS) agreement for 31 airframes in October 2024.<sup>12</sup> The Defence Acquisition Procedure (DAP) 2020, iDEX framework, and Production Linked Incentive (PLI) scheme for drones together created the policy architecture enabling India's rapid indigenous loitering munition and FPV ecosystem expansion.

Operation Sindoor (07–10 May 2025)<sup>13</sup> —in which the Nagastra-1,<sup>14</sup> ALS-50, SkyStriker, Warmate, JM-1<sup>15</sup> and Harop all saw confirmed combat employment alongside Banshee Jet 40 decoy drones —validated the results. India's air defence performed creditably against Pakistan's counter-employment, neutralising the overwhelming majority of incoming threats. The procurement response was swift — 450 Nagastra-1R units were contracted<sup>16</sup> and a ₹5,000 crore emergency loitering munition package was awarded —each decision a direct translation of operational lessons into acquisition action.

### **Current Inventory —Category-wise Assessment**

India's armed forces operated over 140 platforms across nine UAV categories as of March 2026. Where platform specifications are reproduced in this section, they are drawn from publicly available manufacturer statements, official procurement notices, and verified open-source defence reporting. Since this is an open-source technical assessment, factual accuracy necessitates reproduction of documented specifications. All such data points are cited accordingly.

- **MALE/HALE UAV and UCAV (Category 1)**

The IAI Heron Mk I/II (60+ airframes) and Searcher Mk I/II (100+ airframes) provide the long-range ISR backbone. The MQ-9B SeaGuardian/SkyGuardian (31 on order, USD 4 billion FMS) represents India's most capable imported platform. The Drishti 10 Starliner (initial batch in service) is India's most advanced domestically produced MALE platform. On the indigenous side, TAPAS-BH-201 was closed in January 2024. The Archer-NG, HAL CATS Warrior, DRDO Ghatak, FWDA Kaala Bhairav, NewSpace Abhimanyu and Cingularity Bravo Tango are all at the prototype or development stage. The 97 MALE-class UAV programme —24 vendors competing, Acceptance of

Necessity (AoN) accorded mid-2025 —remains the most consequential procurement decision India faces.



**Figure 2:** Surveillance TAPAS-BH-201 MALE UAV in flight over mountainous terrain

- **Long-Range Loitering Munitions (Category 2)**

The IAI Harop and IAI Harpy —both combat-employed in Operation Sindoor — constitute India's entire operational SEAD loitering munition capability. India acquired dozens of Berkut-BM jet-powered kamikaze drones from Belarus in early 2026 (150 km range, 410 kph).<sup>17</sup> The NewSpace Sheshnaag-150, VEM Chaser, and NAL/SDAL 150 kg LM are under indigenous development —none yet inducted.



**Figure 3:** Long-rang loitering munitions

- **Tactical Loitering Munitions (Category 3)**

Operation Sindoor combat-employed the Nagastra-1, ALS-50, SkyStriker, Warmate, and JM-1. Inducted platforms include the Kadet Defence Systems LAM family (50+ delivered), SMPP Peacekeeper, PALM-120, PALM-400, Mackerel, Sureshastra Mk1 and Munitions India Limited loitering munitions

(₹500 crore contract). At the trial stage are the Nagastra-2, Nagastra-3, ALS-250, ALFA-S, Vajra, ALE, Kadet HO3b/HO2/Anudishya, APJK-2C40, APJK-6C100, BEL Loitering Munition, VASP-VTOL, Kalyani/KSSL Bharat 150, aerReaper AMMO-G8/R7, Dynauton KAATIL (India's first jet-powered LM at 600 kph), Kharga, Kharga 2.0 and the ADE SWiFT-K (Mach 0.6 stealth kamikaze, high-speed taxi trials completed).<sup>18</sup>



**Figure 4:** Indigenous loitering munition prototype

- **FPV and Armed Multirotor UAV (Category 4)**

Combat-validated platforms include the InsideFPV Advik and TBRL/Fleur-De-Lis Brigade FPVs, IG Drones. Inducted platforms include Apollyon Dynamics, Quantum Tech FPV (standard and fiber-optic variants), DroneYards, Rising Star DSB (100+ fabricated at ₹1.4 lakh per airframe), and the RamaAstra optic-fiber multi-role UAV at the pre-induction stage.<sup>19</sup> At the trial stage are the Rudrastra, DroneAcharya variants, Optiemus Fiber-Optic FPV, aerStriker AST-R7, and Droneverse FPV.



**Figure 5:** An FPV Kamikaze drone equipped with an improvised explosive payload

- **Mini/Micro UAV (Category 5)**

Imported platforms include the Black Hornet Nano and Skydio X2D. The ideaForge family —SWITCH 1.0, SWITCH V2 (₹30 crore order), ZOLT (₹75 crore order), Q6, Netra V4+, and Netra V4 Pro —dominates the indigenous induction segment across all three services and Central Armed Police Forces (CAPF). Additional inducted platforms include the Johnnette JF-2, Raphe mPhibr family, NewSpace Swarm Drones, Nimbus (combat-employed Operation Sindoor), and Throttle Aerospace nimble-i. The NeoSky/TAS Tethered Hexacopter has been delivered to Indian Army units.



**Figure 6:** Pre-flight checks on a swarm drone array

- **Remaining Categories**

Logistics (Category 6): Inducted platforms include the EndureAir Sabal-20, BonV Airawat RM001, and Raphe mPhibr MR-20 for high-altitude forward area resupply. Target Drones (Category 7): DRDO Lakshya, HAL ABHYAS, and Banshee Jet 40 (deployed as a decoy in Operation Sindoor) are inducted. HAPS and Maritime (Category 8): NewSpace Arka and CSIR-NAL HAPS are at the R&D stage. The maritime tier remains the most underdeveloped relative to India's strategic requirements —India's 7,516 km coastline, 1,382 islands, and 2.37 million sq km Exclusive Economic Zone (EEZ) cannot be adequately covered by the current posture. In-House Programmes (Category 9): The Ashney Drone Platoon Programme targeting 380 battalions with 100,000+ UAVs<sup>20</sup> —confirmed by Director General Infantry Lieutenant General Ajay Kumar —is the most strategically significant unit-level initiative.



**Figure 7:** A heavy-lift cargo drone operating in the Himalayas

## Key Observations And Analysis

- **Reimagining Organisational Structures —The Drone Force**

The announcement of a dedicated Drone Force under the Defence Forces Vision 2047 roadmap signals a transition from platform-level acquisition to recognising unmanned systems as a distinct warfighting domain requiring dedicated command, doctrine, training, logistics, and procurement architecture. If resourced and empowered appropriately, it has the potential to be the most consequential organisational reform in India's unmanned systems domain in two decades.

- **Evolving Philosophies —The Indigenous Transition**

India's UAV platforms have grown from fewer than a dozen in 2020 to over 140 across nine operational categories by March 2026. The transition, however, remains incomplete at the highest tiers —no indigenous MALE-class UAV has been inducted after two decades, and India's SEAD loitering munition capability remains entirely import-dependent.

- **Developing Capabilities —Global Lessons India Must Absorb**

### **Russia-Ukraine**

The Russia-Ukraine war, entering its fourth year as of March 2026, has generated the most empirically validated body of drone warfare operational knowledge in military history. Russian aerial strike packages had, by 2025,

escalated to approximately 370 munitions per sortie at intervals of roughly eight days —compelling Ukraine to construct a tiered drone interception barrier built around cheaply manufactured FPV interceptors priced between USD 2,000 and 5,000, with daily expenditure exceeding 5,000 units.<sup>21</sup> Western-supplied GPS-reliant loitering munitions were degraded to operational ineffectiveness in heavily jammed sectors —reliable performance was confined to systems capable of autonomous terminal approach with minimal operator involvement. Fiber-optic tethered and machine-vision guided FPV platforms consequently became the dominant EW-resistant strike tool, while UAV-assisted artillery targeting compressed the time between target acquisition and munition impact to under ten minutes.<sup>22</sup> Four lessons apply directly to India: multi-mode terminal guidance must be mandated across all loitering munition acquisitions to counter China's LAC-deployed jamming platforms; UAV-artillery fire correction must be formalised as a core Ashney Drone Platoon function; a minimum 50 percent of all FPV acquisitions must be fiber-optic or AI-guided; and a dedicated Drone Operator Training Corps is a prerequisite for the Ashney programme's 100,000+ UAV target —operator sustainability is as critical as platform numbers.

### **Israel-US-Iran-Hezbollah**

The direct sequence of Israel-Iran confrontations —the April and October 2024 exchanges, the Twelve-Day War of June 2025, in which Iran launched over 550 ballistic missiles and 1,000 suicide drones; and the subsequent US-Israel campaign against Iranian nuclear and missile infrastructure through early 2026 —constitutes the most consequential live-fire stress test of integrated air defence architecture in recent history. Iran's saturation model —waves of cheap loitering munitions to exhaust interceptors followed by ballistic missiles targeting the depleted air defence umbrella —is the operational blueprint Pakistan and China are most likely to adapt against India. Hezbollah's decoy-and-strike sequencing, using a cheap drone to trigger interceptors while a second followed a terrain-hugging flight path, defeated one of the world's most advanced air defence networks —a tactic directly relevant to India's own Banshee Jet 40 decoy employment in Operation Sindoor and one adversary will seek to reverse-apply. Israel spent an estimated USD 1 billion intercepting

the April 2024 attack alone. India's C-UAS procurement must embed a mandatory cost-exchange ratio constraint: no hard-kill interceptor should cost more than five times the target drone it is designed to destroy. India's Akashteer-based architecture faces an identical saturation risk from Pakistan's combined rocket artillery and loitering munition inventory on the western front.



**Figure 8:** The Shahed-136 loitering munition on public display in Tehran

### **The Chinese Drone Threat —Specific Present and Escalating**

Shigatse Air Base in Tibet —roughly 150 km from India's Sikkim border —has emerged as China's primary drone hub facing India, hosting the WZ-7 Soaring Dragon HALE ISR platform confirmed deployed near the Indian border since December 2022; Rainbow-series MALE UCAVs; GJ-2 reconnaissance drones; and the GJ-11 Sharp Sword stealth UCAV, with satellite imagery confirming its deployment there in August-September 2025. The GJ-11 —with an estimated combat radius of over 1,000 km, internal carriage of two 500 kg guided bombs, and a low-observable flying-wing design —is a deep-strike platform India has no current indigenous counter to. <sup>23</sup> China has demonstrated coordinated 1,000+ UAV swarm formations integrated into PLA operational concepts including LAC contingency planning. India's swarm development exists but is not structured as a direct response —this framing is absent from current doctrine.



**Figure 9:** The GJ-11 sharp sword stealth UAV on parade in Beijing

- **Curating Doctrines —Ethical Aspects and Problem Areas**

Employment of UCAVs in populated areas carries risks of collateral damage mitigable only through specific intelligence and precision targeting. Electronic deception has emerged as a deliberate UCAV employment technique — validated by the Banshee Jet 40 decoy role in Operation Sindoor and China's confirmed deployment of UAVs with falsified transponder codes over contested airspace —and must be explicitly addressed in India's Rules of Engagement for autonomous systems. GPS-denied navigation remains the Achilles heel of RF-dependent UAVs in a Chinese EW environment along the LAC. The survivability of a UCAV in a contested airspace —unlike the benign environments where Predator-class systems previously operated —needs to be battle-evaluated and incorporated into future doctrine.

- **The MALE Gap, the 97 UAV Tender, and the GJ-11 Threat**

India's inability to induct an indigenous MALE-class UAV after two decades represents the most significant structural gap in its inventory. The 97 MALE-class UAV programme offers the most realistic near-term path to closing it. The confirmed deployment of the GJ-11 at Shigatse in 2025 has sharpened the urgency and flight testing of CH-7 —the gap is no longer solely about ISR but about fielding platforms capable of credibly operating against a deep-strike stealth UCAV with a 1,000 km combat radius. The DRDO Ghatak must accordingly be treated as India's direct strategic response to the GJ-11 threat, and the Defence Procurement Board's recommended sixty-unit procurement should be formalised at the earliest.

- **The Ashney Programme and Operator Sustainability**

By embedding drone platoons at the battalion level, the Indian Army is institutionalising a decentralised drone warfare doctrine mirroring the most effective models from Ukraine. The programme's risk is twofold: the EW vulnerability of RF-guided FPV platforms and the absence of a matching operator training pipeline. Ukraine's loss of tens of thousands of FPV operators to fatigue and casualties demonstrates that a 100,000+ UAV inventory without a dedicated Drone Operator Training Corps produces idle drone units that cannot contribute to the fight. This is not a policy suggestion —it is an operational necessity.



**Figure 10:** The Kharga Corps with a diverse integrated drone inventory

- **Future Developments in UCAV Related Fields**

Hypersonic propulsion through scramjet technology<sup>24 25</sup> could render current intercept solutions ineffective. High-Altitude Pseudo-Satellite (HAPS) platforms at 65,000 ft offer persistent communications relay for India's future networked drone architecture. Stealth and active camouflage technologies<sup>26 27</sup> applied to UCAV swarms represent a force multiplication effect current air defences are not designed to counter. India's Ghatak stealth UCAV and ADE/DRDO SWIFT-K represent the most credible near-term steps toward these capabilities.

## Policy Suggestions

- **Establish and Resource the Drone Force as a Priority Tri-Service Command**

The Drone Force must be established with a clear mandate, dedicated budget allocation and tri-service integration authority empowered to publish a National Drone Warfare Doctrine; own the procurement specification process across all three services; establish a National Drone Warfare Training Centre; and establish a dedicated Drone Operator Training Corps —without which the Ashney programme's 100,000+ UAV target cannot be operationally sustained.

- **Build a Layered Networked Hard-Kill C-UAS Architecture at Scale**

Iran's saturation model and Hezbollah's decoy-and-strike sequencing confirm that AI-enabled autonomous intercept authority —not human-in-the-loop decision-making —is essential. The programme structure should include a dedicated iDEX challenge for a sub-₹1 lakh fire-and-forget kinetic interceptor UAV with AI machine vision terminal guidance and EW-resilient homing at altitudes up to 5,000 m ASL; a mandatory cost-exchange ratio constraint (interceptor cost not exceeding five times the target drone cost, validated by Israel's USD 1 billion April 2024 expenditure); deployment of Akashteer as the integration backbone configured specifically to defeat saturation and sequencing attack models; and pre-positioned interceptor UAV corridors along the LoC western sector and Eastern Ladakh LAC with autonomous intercept authority.

- **Accelerate the 97 MALE-Class UAV Tender and Ghatak Programme**

The 97 MALE-class UAV tender must be brought to contract conclusion without further delay. The GJ-11's confirmed deployment at Shigatse changes the nature of this gap —the Ghatak must be treated as India's direct strategic response to the GJ-11 threat and its 60-unit procurement formalised at the earliest. The Archer-NG must be managed as a genuine mission-critical programme with independent milestone accountability.

- **Standardise EW-Resilient FPV Across Infantry Battalions**

Ukraine's operational experience —where RF-guided systems failed at scale in contested EW sectors while fiber-optic and AI-guided platforms remained effective —provides the direct evidentiary basis for mandating a minimum 50 percent fiber-optic or acoustic-guided FPV component in each Ashney drone platoon. All new FPV acquisitions must include night and thermal capability as a baseline specification.

- **Invest in Indigenous Long-Range Loitering Munition Capability**

The Sheshnaag-150, VEM Chaser and NAL/SDAL 150 kg LM must be fast-tracked with at least one designated a mission-mode project targeting induction by 2028. The Dynauton KAATIL should be evaluated for emergency procurement fast-tracking. The ADE/DRDO SWiFT-K upon induction would give India its first indigenous SEAD-capable long-range strike drone.

- **Establish a Real-Time Drone Kill Data Feedback Loop**

Operation Sindoor employment data must be systematically captured and fed back through a Ministry of Defence-Industry Drone Performance Feedback Programme —replicating Ukraine's Delta platform model that has enabled design iteration on a cycle of weeks rather than years.

- **Accelerate the Ghatak UCAV and Formalise a 60-Unit Procurement**

The Defence Procurement Board's recommendation for 60 Ghatak UCAVs should be confirmed and formalised before first the flight —providing HAL, DRDO, and the Aeronautical Development Agency (ADA) the programme certainty needed to scale manufacturing and secure long-lead supply chains.

- **Build a Coherent COIN and Sub-Conventional UAV Architecture**

Three measures are required: deploy a dedicated C-UAS system along the Punjab and Jammu and Kashmir border corridor with the Border Security Force (BSF) and Central Reserve Police Force (CRPF) as the primary operating agencies; induct Black Hornet-class nano ISR UAVs for Counter-Insurgency (COIN) operations in the Northeast and Left Wing Extremism (LWE)-affected

areas; and establish a formal counter-drone mandate for Central Armed Police Forces (CAPF) and state police.

- **Build a Maritime UAV Network for IOR and Coastal Surveillance**

Four measures are required: establish a UAV surveillance network for the Andaman and Nicobar island chain; formalise the MQ-9B SeaGuardian's Anti-Submarine Warfare (ASW) role through integration with the P-8I Poseidon fleet; accelerate induction of ship-launched Vertical Take-Off and Landing (VTOL) ISR platforms for Indian Navy surface combatants; and commission a dedicated maritime loitering munition requirement for the Indian Navy.

## **Conclusion**

India's UAV inventory in 2026 is simultaneously impressive in its breadth and uneven in its depth —a diverse ecosystem built largely within five years that has already produced combat-validated indigenous loitering munitions. The threat environment against which it must be measured however, is not static. China's deployment of the GJ-11 Sharp Sword stealth UCAV at Shigatse in 2025, Pakistan's demonstrated willingness to employ loitering munitions in active conflict, and the saturation attack model validated across the Israel-Iran-Hezbollah theatre and the ongoing 2026 US-Israel strikes against Iranian nuclear sites together define a threat environment that India's current inventory and doctrine are not fully configured to counter.

The fundamental lesson of all three theatres is the same: the economics of drone warfare have permanently changed the cost calculus of conflict. A ₹50,000 FPV can destroy a ₹25 crore tank. A ₹15 lakh loitering munition can blind a ₹500 crore air defence radar. And an ₹80,000 interceptor drone can neutralise a ₹35 lakh Shahed-class loitering munition before it reaches its target. India's response must exploit this asymmetry offensively through cheap loitering munitions, FPV swarms, and jet-powered kamikaze platforms while mitigating it defensively through affordable networked hard-kill interceptors built to a cost-exchange ratio constraint not a capability specification alone.

Operation Sindoor confirmed the UAV revolution has arrived on the subcontinent. The Drone Force announcement signals institutional recognition of the need for a structural response. But organisational reform alone is insufficient —it must be accompanied by the formalisation of the Ghatak procurement as India's direct strategic response to the GJ-11 threat, the mandatory transition to EW-resilient FPV platforms validated by four years of Ukraine combat experience, and the establishment of a Drone Operator Training Corps without which India's inventory cannot be operationally sustained. The question is not whether to invest in unmanned systems —that decision has been made correctly. The question is whether India can build the doctrine, institutions and industrial depth to translate the inventory into a genuinely decisive warfighting advantage before the next conflict makes the answer irrelevant.

#### **DISCLAIMER**

The paper is the author's individual scholastic articulation and does not necessarily reflect the views of CENJOWS, the Defence forces, or the Government of India. The author certifies that the article is original in content, unpublished, and it has not been submitted for publication/ web upload elsewhere and that the facts and figures quoted are duly referenced, as needed and are believed to be correct.

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