



Counter-Drone Technology and UAV Development

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Why in News?

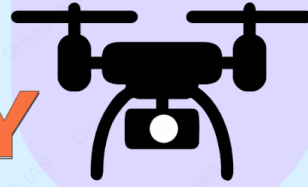
The [Defence Research and Development Organisation \(DRDO\)](#) has made substantial strides in developing a **comprehensive counter-drone system**, as well as focusing on the advancement of **high-endurance Unmanned Aerial Vehicles (UAVs)**.

What are the Recent Developments in Counter-Drone Technology and UAV Development?

- **Counter-Drone Technology Development:**
 - DRDO has developed a comprehensive anti-drone system encompassing **detection, identification, and neutralization of drones**.
 - The technology is capable of **countering attacks, soft kill and hard kill of all types of drones**, including micro drones.
 - Also, the technology has been transferred to private companies like **BEL, L&T, and Icom** for mass production
- **UAV Development:**
 - **Tapas MALE UAV:** The **Tapas Medium Altitude Long Endurance (MALE) UAV developed for Intelligence, Surveillance, Target Acquisition, and Reconnaissance (ISTAR) applications** is in an advanced stage of developmental trials.
 - **Lithium Ion-based battery** with indigenous battery management system has been developed by the DRDO in association with a private vendor and is **being used on Tapas UAV**.
 - **Archer UAV:** Short-range armed UAV Archer is under development for **reconnaissance, surveillance, and low-intensity conflict scenarios**, with developmental flight trials in progress.

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DRONE TECHNOLOGY



Drone is a pilotless flying machine, using aerodynamics for lift, can operate autonomously or remotely, and may carry lethal or nonlethal cargo.

COMPONENTS

- Unmanned aircraft (UA)
- Control system (ground control station - GCS)
- Control link (specialized datalink)
- Other related support equipment

CLASSIFICATION

(as per Drone Rules, 2021)

- Nano: <250 gm
- Small: 25 kg to 150 kg
- Micro: 250 gm to 2 kg
- Large: >150 kg
- Mini: 2 kg to 25 kg

APPLICATIONS

- Mapping & Surveying (asset inspection, roof inspections)
- Agriculture (bird control, crop spraying & monitoring etc)
- Multispectral/thermal/NIR cameras, Aerial Photo/videography and Live streaming events
- Emergency Response (search and rescue, marine rescue, fire fighting)
- Disaster (zone mapping, disaster relief etc)
- Mining
- Monitoring Poachers
- Meteorology, Aviation, Payload carrying

DRONES IN DEFENCE

Purpose

- Surveillance and Reconnaissance
- Search and Rescue
- Maritime Surveillance
- Combat Drones
- Offensive (heterogeneous SWARM drones)
- Counter-Terrorism Operations

India's Counter-Drone System

- Indrajaal (India's inaugural autonomous drone-defense dome)
- Procurement of combat-capable Heron drones from Israel
- Acquisition of MQ-9B Armed Drones from the US

RELATED REGULATIONS

- Aircraft (Security) Rules, 2023
- Drones Rules, 2021 and Drone (Amendment) Rules, 2022

INDIA'S INITIATIVES

- Digital Sky Platform
- No-Permission-No-Takeoff (NPNT) framework
- PLI Scheme for Drones
- Drone Shakti Scheme

ISSUES

- Increased risk of armed attacks
- Data security
- Cheaper cost enables a larger population to procure drones
- Use of drones in warfare (remote warfare)
- Procurement by non-state actors can pose serious threats
- Ease in delivering mass destruction weapons



What is the Defence Research and Development Organization?

- About:** DRDO is the R&D wing of the Ministry of Defence, Govt of India, with a vision to empower India with cutting-edge defense technologies and a mission to achieve self-reliance in critical defense technologies.
 - Core Principle:** "Balasya Mulam Vigyanam" (Science is the source of strength)
- Foundation:** Established in 1958 by amalgamating existing establishments from the Indian Army and Directorate of Technical Development & Production.
- Significant Contributions:** Developed strategic systems and platforms like [Agni and Prithvi series of missiles](#), [Tejas \(Light Combat Aircraft\)](#), [Pinaka \(Multi-barrel Rocket Launcher\)](#), [Akash \(Air Defence System\)](#), radars, and electronic warfare systems.

UPSC Civil Services Examination, Previous Years Questions (PYQs)

Q1. What is "Terminal High Altitude Area Defense (THAAD)", sometimes seen in the news? (2018)

- (a) An Israeli radar system
- (b) India's indigenous anti-missile programme

(c) An American anti-missile system

(d) A defence collaboration between Japan and South Korea

Ans: c

Q2. With reference to Agni-IV Missile, which of the following statements is/are correct? (2014)

1. It is a surface-to-surface missile.
2. It is fuelled by liquid propellant only.
3. It can deliver one-tonne nuclear warheads about 7500 km away.

Select the correct answer using the code given below:

- (a) 1 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2 and 3

Ans: (a)

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