



# High Altitude Pseudo-Satellite (HAPS)

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## Why in News?

The [Council of Scientific and Industrial Research \(CSIR\) - National Aerospace Laboratories \(NAL\)](#) recently conducted successful tests on a **High Altitude Pseudo-Satellite (HAPS)**, marking a significant milestone in [unmanned aerial vehicle \(UAV\) technology](#).

## What is High Altitude Pseudo-Satellite (HAPS)?

### ▪ About:

- HAPS is a solar-powered UAV. It can generate [solar energy](#) and **remain in the air for months or years**.
  - HAPS operates in the **stratosphere** (which extends from 6-50 km above the earth's surface), flying at altitudes of **18-20 km**, nearly double the heights of commercial aeroplanes. This altitude allows them to provide **surveillance capabilities akin to satellites**.
- HAPS is designed for persistent surveillance, communications, and specialist science missions.
- HAPS is a **still-developing technology**, and the successful test flight puts India among a very small group of countries currently experimenting with this technology.

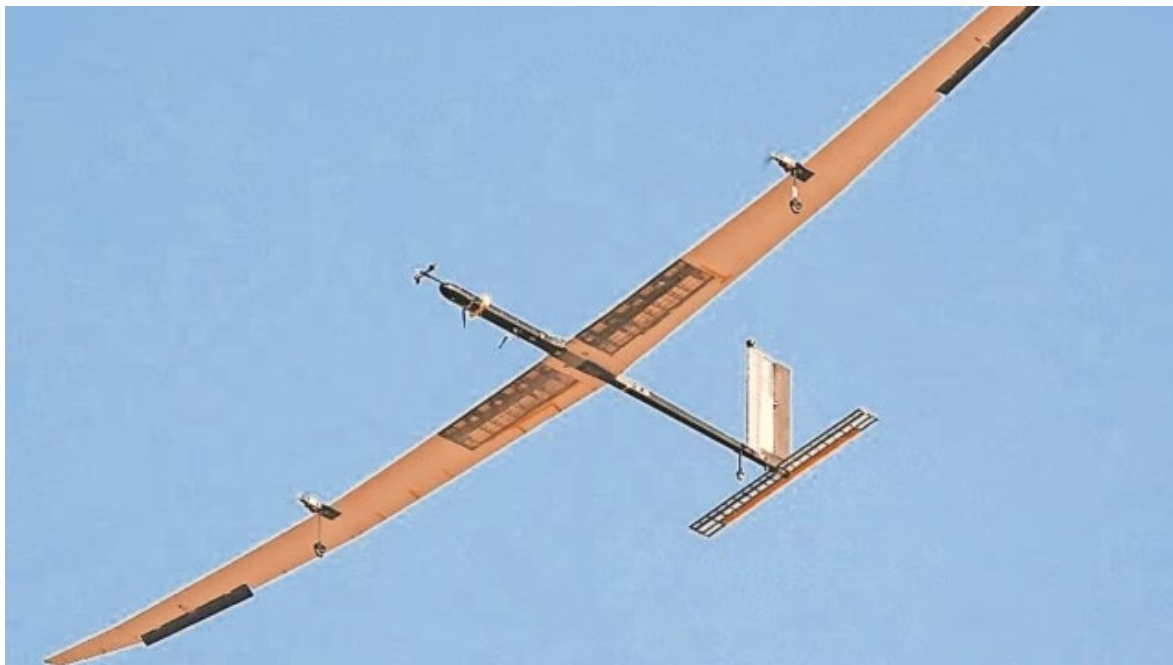
### ▪ Need:

- The need for development of HAPS arose from the desire to have continuous surveillance of border areas to detect changes or movements, particularly in the wake of the [Doklam standoff in 2017](#).
- Previous **limitations with battery-powered UAVs** and satellites led to the development of solar-powered UAVs.
- The cost of operating HAPS is significantly **lower than traditional satellites** as it doesn't require rocket launches.

### ▪ Versatility and Applications:

- HAPS can be deployed in **disaster situations** and provide mobile **communication networks (5G waves)** in remote areas, if the normal networks get damaged due to any calamity.
- They can double up as **"towers in the sky"** and have more flexibility than satellites, in being able to map a piece of land from above.

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## CSIR- National Aerospace Laboratories

- NAL, a constituent of the CSIR, established in 1959 in Bengaluru, is the only government **aerospace R&D laboratory** in the country's civilian sector.
- CSIR-NAL is a **high-technology-oriented institution** focusing on advanced disciplines in aerospace.
- CSIR-NAL has provided significant value-added inputs to all the **Indian national aerospace programmes.**
- CSIR-NAL's mandate is to **develop aerospace technologies** with strong science content, design and build small, medium sized civil aircraft, and support all national aerospace programmes.

# 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**



## UPSC Civil Services Examination, Previous Years Questions (PYQs)

### Prelims:

**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)**

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