
Canva
UAV
UNMANNED AERIAL VEHICLE
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HISTORY OF UAV

Target drones and remotely piloted vehicles (RPVs), which were used by the armed forces of numerous nations in the years immediately following World War II, are the ancestors of unmanned aerial vehicles (UAVs). When the Israeli Defense Forces equipped small drones that resembled large model aeroplanes with trainable television and infrared cameras as well as target designators for laser-guided munitions, all of which were downlinked to a control station, modern UAVs made their debut as a significant weapons system in the early 1980s. These vehicles were untraceable due to their small size and silent engines, and they were useful for target identification and battlefield reconnaissance.

Applications

- **Military**
- **Image and video mapping**
- Medical
- Search & rescue
- Hidden area exploration
- Oil rigs and power line monitoring
- Wireless communication
- Aerial surveillance

ROBOT BODY DESIGN & LOCOMOTION

- Light & durable
- Aerodynamics shape
  - Streamlined shape
- Modular and customizable

Fixed wing design

Works similarly to a conventional aeroplane, using its wings to produce lift and a jet engine or propeller to produce forward thrust.

Rotary wing deisgn

Utilise whirling blades to create lift and perform aerial manoeuvres.

Hybrid wing design

To increase flying versatility, integrate aspects of both rotary- and fixed-wing designs.

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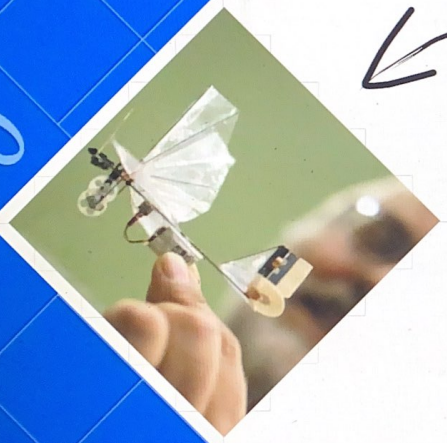
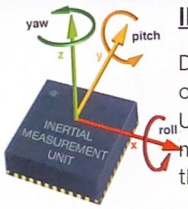


Flapping wing design

Uses the flapping of its wings to provide lift and forward motion, mimicking the movement of birds or insects. Flapping-wing UAVs are mostly utilised for research and are still in the early stages of development.

Vertical takeoff and landing (VTOL) design

Built to fly and land vertically, without a runway. Rotorcraft with rotary wings, such as quadcopters, or tiltrotor aircraft that can change direction midair are examples of VTOL UAVs.



IMU (Inertial Measurement Unit)

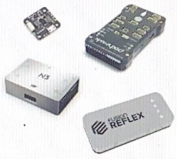
Determines the UAV's acceleration, velocity, and orientation using accelerometers and gyroscopes. The UAV is stabilised while in flight, its heading is maintained, and its flight path is adjusted as needed thanks to data from the IMU.

GPS

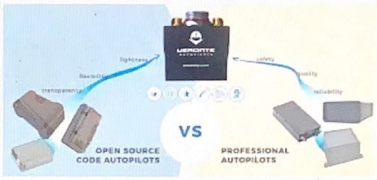
Identify the location, altitude, and speed of the UAV. To make flight plans, monitor the UAV's movement, and make sure it stays inside designated flight zones, GPS data is employed.

Flight controller

Processing inputs from the pilot or autopilot system, GPS, and IMU data. In order to maintain stability, modify the UAV's fly path, and carry out other necessary tasks, the flight controller uses this information to operate the motors, servos, and other parts of the UAV.



NAVIGATION & SYSTEM CONTROL



Radio Control System

Using real-time data to modify its course or adhering to pre-programmed flight plans. Advanced algorithms and sensor data are used by autopilot systems to guide and control the UAV while it is in flight.

Autopilot System

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DATA COLLECTION

Imagery

- Camera (visible light, thermal & multispectral)
- Used for mapping, surveying, and monitoring.

LiDAR

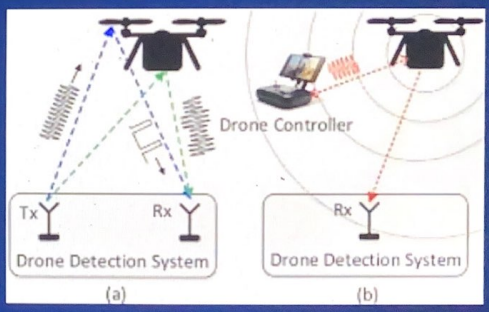
Calculating distance and making extremely precise 3D ground maps. For forestry, infrastructure inspection, and terrain mapping, LiDAR-equipped UAVs are frequently utilised.

Hyperspectral imaging

- Capturing images in many narrow, contiguous spectral bands
- Used for mineral exploration, environmental monitoring, and agriculture.

Radio Frequency Signal

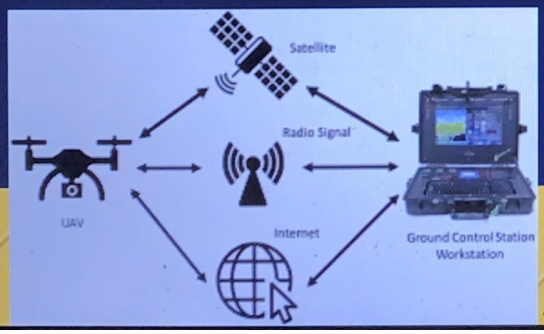
Detect sources of interference or unlawful transmission by recording radio frequency signals.



DATA TRANSMISSION

Radio Communication

Fitted with a radio transmitter that uses radio waves to relay data to a ground station. The ground station has a radio receiver that picks up the data and analyses it so it may be seen or analysed.



Satellite Communication

With a satellite modem that sends information to an orbiting satellite, which then transfers it to a ground station.

Cellular Communication

Cellular modem that transfers data to a cellular network, which subsequently relays the information to a ground station. Yet, it is a cost-effective alternative for UAV operations in urban or suburban regions. Cellular connection is restricted to locations with cellular coverage.

Direct Cable Connection

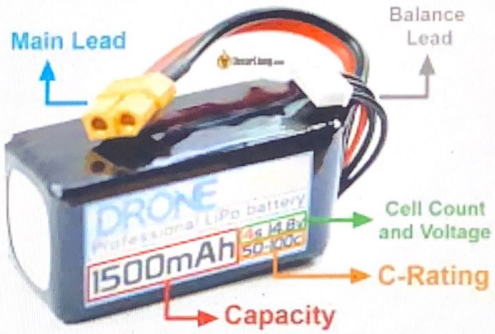
Gives delicate applications, like military or scientific missions, a very reliable and secure means of data transfer.

POWER SYSTEM MANAGEMENT

Hybrid Engine UAV

A UAV's hybrid engine typically combines an electric motor and a combustion engine to provide the vehicle with power.

The UAV's main power source is an electric motor that is driven by a battery. The motor offers efficient and quiet operation, making it a common choice for takeoff, landing, and low-speed flight. The UAV is propelled by a combustion engine when flying quickly or when the battery is running low. Due to the engine's optimisation for UAV operations, it is frequently smaller and more effective than a conventional combustion engine.



Rechargeable battery

Since lithium-based battery technologies have a better energy density than previous nickel-based battery technologies and can produce more useable power per unit weight, they are the most often employed battery technologies in unmanned systems.