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Battle for Aerial Dominance: Drones and Modern Warfare

High-tech weapons and advanced battle equipment have changed the dynamics of modern-day warfare. Now militaries can carry out surveillance, air raids, and attacks on their enemies from hundreds of miles away using drone technology.

The U.S. Navy was the first to test the possibility of a pilotless aircraft in battle scenarios. They began experimenting with radio-controlled (RC) aircraft as early as the 1930s. In 1937, Curtis Aircraft developed N2C-2, the world's first-ever remotely piloted aircraft. Due to the short range of radio control signals, the N2C-2 could only be controlled through another aircraft, which killed the whole purpose of using drones in military operations.

Some early RC aircraft models were used by the U.S. Army Air Corps for mid-air target practice. Combining the maneuverability of an RC aircraft with the idea of cruise missiles, American aerospace company McDonnell built TD2T Katydid, the first-ever radio-controlled target drone that could carry a warhead.¹

The use of unmanned aerial vehicles in modern security scenarios plays an important role in surveillance, reconnaissance, aerial raids, and finding target coordinates. The ever-evolving drone technology provides a promising replacement for the depleting number of skilled combat pilots all around the world.

The Russia-Ukraine war has unveiled how drones have completely transformed the modern-day battlefield. Ranging from compact palm-sized drones to ones exceeding the weight of 454 kilograms, Russia and Ukraine have developed and obtained a varied array of remotely piloted aircraft to disrupt and impede the enemy's military actions.

It was also during the Russia-Ukraine war that the world has seen the effectiveness of First Person View (FPV) drones on the battlefield.² FPV drones, equipped with cameras that provide



Ukrainian soldier operating FPV drone. (Image Credit: X/@ZelenskyyUa)

1. National Air and Space Museum, Katydid Drone, Smithsonian. https://airandspace.si.edu/collection-objects/katydid-drone/nasm_A19660162000

2. Yan Boechat, 'First Person View' drones in Ukraine usher in new era of warfare, Voice of America News, April 3, 2024. <https://www.voanews.com/a/first-person-view-drones-in-ukraine-usher-in-a-new-era-of-warfare-/7556206.html>

real-time video feeds to operators, offer valuable reconnaissance capabilities, allowing forces to gather intelligence, monitor enemy movements, and assess battlefield situations with enhanced situational awareness.

These drones provide a direct perspective of the operational environment, enabling more informed decision-making and tactical maneuvers for both Ukrainian and Russian forces. As a result, FPV drones have emerged as essential tools in modern warfare, shaping the strategies and outcomes of the ongoing conflict between Russia and Ukraine.

Nations around the world are investing in and developing drone technologies to bolster their defense capabilities and adapt to the evolving nature of conflicts. As the reliance on drone warfare grows, it continues to reshape military strategies, tactics, and the overall conduct of armed conflicts worldwide.

Here is the list of the most advanced and lethal combat drones currently used by militaries around the world.

1. MQ-9 Reaper

Built by the U.S.-based General Dynamics, the MQ-9 Reaper is an advanced long-range, high-altitude surveillance and attack drone. At the time of its induction in 2006, Reaper was the first of its kind hunter-killer UAV designed for long endurance and high-altitude target recognition. It has a large wingspan and long body that allows extended endurance and the ability to carry high volumes of ordnance payload and even cruise missiles.³

MQ-9 Reaper has a maximum speed of 480 kilometers per hour and a cruising speed of 300 kilometers per hour. Its weaponry is largely made up of air-to-surface missiles AGM-114 Hellfire.



An MQ-9 Reaper drone can carry up to eight laser-guided missiles under its wings. The United States Air Force (USAF) used different variants of the Reaper drones in Afghanistan and Iraq to carry out precise strategic attacks. Different variants of the Reaper drones are also used by militaries in France, Germany, Italy, the United Kingdom, and Australia.

Endurance: 27 hours

Payload capacity: 1,701 kilograms (kg)

Maximum altitude: Up to 50,000 feet (ft)

Primary function: Intelligence collection in support of strike, coordination, and reconnaissance missions.

3. GA-ASI, MQ-9A Reaper Drone, General Atomics. <https://www.ga-asi.com/remotely-piloted-aircraft/mq-9a>

2. TAI Aksungur

The Turkish drone industry has gained prominence globally in recent years. One of the most promising drones that have come out from Turkey is the Aksungur, a Medium Altitude Long Endurance (MALE+) class UAV System. Developed by the Turkish Aerospace Industries (TAI), the Aksungur entered service in 2021. Aksungur drone has been built using the existing technology that TAI employed in its previous successful drone named Anka.

The aircraft is 12 meters long with a wingspan that stretches up to 24 meters in width. It is powered by a twin-propellor design using PD-170 dual-turbocharged diesel engines developed by Turkey's Tusas Engine Industries (TEI). The drone is ideal for high-altitude reconnaissance, observation, and destruction of enemy targets. The UAV can carry guided missiles on its six underwing suspension nodes, including guided bombs, and laser-guided munition.⁴



Anka Aksungur UAV System. (Image Credit: Turkish Aerospace Industries)

Endurance: 50 hours

Payload capacity: 750 kg

Maximum speed: 110 mph (180 km/h)

Maximum altitude: Up to 25,000 ft

Primary function: Day and night Intelligence, Surveillance and Reconnaissance (ISR), and strike missions.

3. Hongdu GJ-11 Sharp Sword

Different variants of GJ-11 serve as the primary combat drones for the Chinese military. Introduced in 2013, the Hongdu GJ-11 Sharp Sword is a jet-powered stealth drone that carries a wide array of sensors and weaponry. The drone is about 12 meters long and 14 meters wide designed in a single-wing configuration. The tailless design provides extra stealth capabilities and high-speed maneuverability.⁵

4. TUSAS, Anka Aksungur UAV System, Turkish Aerospace Industries. <https://www.tusas.com/en/products/uav/high-payload-capacity-uas/aksungur/>

5. ODIN, GJ-11 Sharp Sword Chinese Unmanned Aerial Vehicle (UAV), Operational Environment Data Integration Network, U.S. Army. <https://odin.tradoc.army.mil/WEG/Asset/bb664308b41d682ff0cf74e3355e22c0>

GJ-11 is jointly designed and developed by China's Shenyang Aircraft Design Institute (SYADI), Shenyang Aerospace University (SAU), and Hongdu Aviation Industry Group (HAIG). It can carry more than 1,800 kilograms of payload inside its internal weapons bay. This includes air-launched decoys and precision-guided missiles. China's People's Liberation Army Navy (PLAN) also operates GJ-11 from its Type 075 amphibious assault ship, making it one of the few drones in the world that can be operated and stored on naval aircraft carriers.



China's GJ-11 stealth attack drone during the National Day parade held in Beijing on October 1, 2019. (Image Credit: Fan Lingzhi/GT)

Endurance: 6 hours

Payload capacity: 1000 kg

Maximum altitude: Up to 41,000 ft

Maximum speed: 621 mph (1000 km/h)

Primary function: Aerial surveillance, reconnaissance, and combat missions.

4. S-70 Okhotnik B

Russian-made S-70 Okhotnik (Hunter) is a long-range, stealth combat drone that can carry out reconnaissance, surveillance, and aerial attack missions. The UAV has been developed by the Novosibirsk aviation plant in western Siberia, a subsidiary of the aircraft company Sukhoi. It is equipped with a flat nozzle to increase its stealth capability.

Okhotnik's powerful engine allows the drone to fly more than 6,000 kilometers in a single flight. The Okhotnik drone can also fly collaborative missions with the Russian Air Force's fifth-generation Su-57.⁶ The drone can take off with a net weight of twenty tons, making it one of the heaviest combat drones. It can reach a maximum speed of approximately 1000 kilometers per

hour. So far, there are two flyable prototype models of Okhotnik B in existence. The drone is expected to be inducted into the Russian Air Force by 2024.



Russian stealth combat drone Okhotnik photographed in far east Russia. (Image Credit: X/@fighter_bomber)

Endurance: 24 hours

Payload capacity: 6,000 kg

Maximum speed: 1,400 km/h

Maximum altitude: 59,000 ft

Primary function: Complex reconnaissance missions and also carry rockets and bombs for strike missions.

6. IRIA News, Russia unveils first flight prototype of Okhotnik heavy attack drone, IRIA, December 17, 2021. <https://www.ir-ia.com/news/russia-unveils-first-flight-prototype-of-okhotnik-heavy-attack-drone/>

5. RQ-4 Global Hawk

Developed by the makers of the B-2 bomber aircraft, Northrop Grumman's RQ-4 Global Hawk combat drone is a prime example of a modern-day remotely piloted surveillance aircraft. Rather than focusing on packing advanced weaponry and attacking capabilities, the Global Hawk provides a broad overview and systematic surveillance using high-resolution Synthetic Aperture Radar (SAR) and Electro-Optical Infrared sensors.⁷



An RQ-4 Global Hawk from Andersen Air Force Base, Guam at Misawa Air Base, Japan. (Image Credit: U.S. Air Force/Staff Sgt. Nathan Lipscomb)

The drone can survey as much as 40,000 square miles of terrain per day. To put it in perspective, one Global Hawk drone can provide a detailed terrain map for the whole country of South Korea in a single day. Due to its highly precise surveillance capabilities, the U.S.-based space agency NASA also uses it to support its high-altitude, long-duration Earth science missions.

Northrop Grumman has also developed EuroHawk, a European variant of its RQ-4 drone with customized sensors. The EuroHawk variant is currently used by the German Air Force and other European forces.

Endurance: More than 34 hours

Payload capacity: 1,360 kg

Maximum speed: 357 mph (575 km/h)

Maximum altitude: 60,000 feet

Primary function: High-altitude and long-endurance ISR.

7. USAF, RQ-4 Global Hawk, United States Air Force.
<https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104516/rq-4-global-hawk/>

6. Wing Loong III

China's advanced Wing Loong-3 is the first in its series to reach the intercontinental range. The latest variant of the Wing Loong drone series can fly at an impressive maximum range of 10,000 kilometers (6,200 miles) at medium altitude. The drone was first unveiled at the Airshow China 2022 exhibition held in Zhuhai.



China's Wing-Loong 3 combat drone during the International Aviation and Aerospace Exhibition in Zhuhai 2022. (Image Credit: Twitter/ChinaDaily)

Developed by state-owned aerospace and defense firm Aviation Industry Corporation of China (AVIC), the medium-altitude long-endurance (MALE) UAV, has a 12.2-meter-long main body and a 24-meter wingspan. These features allow the UAV to achieve long-range flight while carrying heavy payloads. It has nine payload hard points and can carry as many as 16 missiles and bombs.⁸

Wing Loong-III's long-range, heavy payload and multirole capabilities address the requirements of both Chinese and international customers seeking extended mission capabilities and cross-regional long-range flights. The drone can conduct various missions such as maritime escort, anti-submarine operations, aerial fire support, anti-radiation attacks, low altitude alert patrols, electronic reconnaissance, communications relays, and collaborate with manned aircraft and other drones.

Endurance: 40 hours

Payload capacity: 2,300 kg

Maximum range: 6,200 miles (10,000 kilometers)

Primary function: Long-distance surveillance, strikes, and long-duration air patrol

7. Shahed 129

Iran has recently emerged as a bulk drone manufacturer. Most of the Iranian drones are cheaper and disposable, widely used by the Russian forces in their invasion of Ukraine. However, standing out among its array of inexpensive Kamikaze drones is Iran's Shahed 129, a multirole drone capable of carrying out reconnaissance missions and precision air-to-ground strikes with small guided munitions.

Iran has reportedly used this drone for both external and internal missions since unveiling



Iran's Shahed 129 UAV seen during the Eqtedar 40 defence exhibition in Tehran. (Image Credit: Fars Media Corporation)

8. J. Michael Dahm, Special Mission Aircraft And Unmanned Systems, South China Sea Military Capability Series - A Survey of Technologies and Capabilities on China's Military Outposts in the South China Sea, Johns Hopkins University Applied Physics Laboratory, 2020. <https://apps.dtic.mil/sti/pdfs/AD1128646.pdf>

the drone in September 2012. Iran has not released much information about the drone, however, experts believe that the design and making of Shahed 129 are highly inspired by the U.S.-made MQ-1 Predator and Israel's Hermes 450 drones. The UAV's maximum range reaches 1,700 km and a flight endurance of about 24 hours.⁹

Endurance: 24 hours

Payload capacity: 400 kg

Maximum speed: 150 km/h

Maximum altitude: 7,300 m (24,000 ft)

Primary function: Combat or intelligence and surveillance missions.

8. Kronshtadt Orion

Orion is a relatively smaller drone developed by Russia's Kronshtadt Group under a project funded by the Russian Ministry of Defense. Kronshtadt began the development of Orion in 2011. The prototype took to the skies in 2016 and the drone was inducted into the Russian Air Force in 2020.

Orion is primarily a reconnaissance system that is equipped with sensors to map the terrain and transmit coordinate targets. With 8 meters of length and 16 meters of wingspan, Orion can carry 250 kilograms of payload. It has a maximum speed of 120 kilometers per hour and a cruising speed of 200 kilometers per hour.¹⁰ The drone can also be modified to carry missiles and other armaments. Kronshtadt has also developed Vikhr-1V guided missiles for its Orion drone.



Russia used Kronshtadt Orion Inokhodets drone armed with guided missile in Ukraine. (Image Credit: Russian Ministry of Defense)

Endurance: 24 hours

Payload capacity: 200 kg

Maximum speed: 120 km/h

Maximum altitude: 7,500 m (24,600 ft)

Primary function: Day and night aerial intelligence and surveillance missions.

9. Elbit Hermes 900

Hermes 900 is a successor to the Hermes 450, a series of drones produced by Israel-based international defense electronics company, Elbit Systems. Hermes 900 is a medium-altitude and long-endurance UAV designed for short-range tactical missions. It has an endurance of over 30 hours and can fly at an altitude of 30,000 feet to provide intelligence, surveillance, target

9. ODIN, Shahed-129 Iranian Medium-Altitude Long Endurance (MALE) Unmanned Aerial Vehicle (UAV), Operational Environment Data Integration Network, U.S. Army. [https://odin.tradoc.army.mil/WEG/Asset/Shahed-129_Iranian_Medium-Altitude_Long_Endurance_\(MALE\)_Unmanned_Aerial_Vehicle_\(UAV\)](https://odin.tradoc.army.mil/WEG/Asset/Shahed-129_Iranian_Medium-Altitude_Long_Endurance_(MALE)_Unmanned_Aerial_Vehicle_(UAV))

10. Kronshtadt, Orion-E Medium-Altitude Long-Endurance Intelligence, Surveillance and Reconnaissance Unmanned Aircraft System. https://kronshtadt.ru/assets/files/productfiles/Orion_eng.pdf

acquisition, and reconnaissance (ISTAR). The drone is equipped with several high-tech infrared and electro-optical sensors. It can also carry a 300-kilogram payload.

Elbit Hermes 900 has been in service with the Israeli Air Force since 2012. Due to its low cost and high endurance, several countries have made deals with Elbit to procure the Hermes 900 drone. The list includes Azerbaijan, Chile, Brazil, Canada, Iceland, the Philippines, and Switzerland.

Endurance: Up to 36 hours
Payload capacity: 350 kg
Maximum speed: 220 km/h
Maximum altitude: 9,144 m (30,000 ft)
Primary function: Intelligence, surveillance, target acquisition, and reconnaissance.



Hermes 900 multi-role MALE UAS. (Image Credit: Elbit System)

10. Turkish Aerospace Anka-3

Designed and produced by the Turkish Aerospace Industries (TAI), the Anka-3 drone is powered by a turbofan engine, which allows it to attain a maximum speed of 0.7 Mach and an altitude of 40,000 feet. The tailless design of the Anka-3 drone provides stealth capabilities with a high payload-carrying capacity.

The uncrewed combat aerial vehicle can be used for different missions such as reconnaissance, surveillance, and intelligence, with air-ground munitions, air-to-air ammunition, and radar systems. It has two store stations that can carry up to 630 kilograms of payload and weapons, while the outer wing stations will each have a capacity of 100 kilograms.

The drone also has internal weapons bays, which will be necessary to preserve its low-observable features. In total, Anka-3 has a payload capacity of 1,200 kilograms and is capable of taking off with a maximum weight of 6,500 kilograms.



Artist rendering of ANKA-3 Unmanned Combat Aircraft. (Image Credit: X/@ConflictTR)

Endurance: 10 hours
Payload capacity: 1200 kilograms
Maximum speed: 460 km/h
Maximum altitude: 3,000 feet
Primary function: Intelligence collection, coordination, reconnaissance missions, air-to-air, air-to-ground strike operations.

11. Elbit Systems, Hermes 900 UAS. <https://elbitsystems.com/product/hermes-900/>

12. TUSAS, ANKA-III Unmanned Combat Aerial Vehicle, Turkish Aerospace Industries. <https://www.tusas.com/en/products/uav/operative-strategic-uav-systems/anka-iii>



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U.S. General Atomics Aeronautical multi-mission MQ-9 Reaper Drone.
(Image Credit: General Atomics)



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