

C·UAS HUB



Countering the UAS Threat: A Comprehensive Review of National C-UAS Programs

2025

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National counter-UAS programs at a glance

The need for advanced counter-UAS solutions has intensified due to escalating geopolitical conflicts and the widespread use of drones by both state and non-state actors. The conflict in Ukraine has prominently highlighted the tactical value of drones in warfare, with Russia and Ukraine deploying drones for reconnaissance, electronic warfare and targeted strikes, many have woken up to the fact that we are now firmly in an era of drone warfare. This has driven nations to prioritise systems capable of detecting and neutralising such threats.

In the Middle East, the persistent use of drones by groups like Houthi rebels for attacks on infrastructure has highlighted vulnerabilities in air defence systems. Similarly, tensions in East Asia, including the Korean Peninsula and the Taiwan Strait, have further driven the need for rapid development of counter-UAS capabilities.

Beyond military conflicts, the rise of unauthorised civilian drone activity has added urgency to the development of counter-UAS measures at the civilian level. Incidents involving drones at airports, around critical infrastructure and during public events have raised safety and security alarms globally.

With securing against drones now a key priority for many, we will take a look into the counter-UAS programmes and capabilities for each member of the NATO alliance along with Ukraine, South Korea, Japan, Brazil, Jordan, Saudi Arabia and India. We will also assess the UAS threat posed by nations such as Russia, China and Iran.



NATO nations

United States



In recent years, the United States has significantly advanced its counter-UAS technology in response to evolving aerial threats. The Department of Defense, with coordination led by the Joint Counter-Small Unmanned Aircraft Systems Office (JCO) established in 2020, has made strides in unifying counter-UAS capabilities across all branches. The JCO's primary mission is to address the rapidly increasing use of drones by adversaries, which includes prioritising both detection and defeat solutions against UAS threats in combat zones and around critical infrastructure.

To meet these objectives, the U.S. has invested heavily in layered defence approaches that involve radar, radio frequency detection, electronic warfare and kinetic systems.

The U.S. Army has driven to secure mobile, expeditionary counter-UAS capabilities suitable for forward-deployed units. These efforts include the use of counter-drone lasers and RF-based disruption technologies designed to handle swarming attacks and autonomous threats. Recent exercises also highlighted the Army's efforts to develop soldier-portable systems that enhance ground forces' resilience against UAS threats.

In addition, the DoD's strategic partnerships with allied nations and NATO aim to ensure interoperability of counter-UAS systems, a key factor in NATO's European defence posture. This includes joint exercises and technology-sharing initiatives to counter the global proliferation of commercial and weaponised drones.

The DoD has awarded many contracts to key defence contractors in recent years. Raytheon secured \$197 million for its Coyote Block 2 interceptors in September 2024, which

targets and neutralises small drones. Northrop Grumman received a follow-on contract reaching more than \$161 million, also in September, for its JCREW/DRAKE 2.0 systems.

Planned acquisitions

The United States Department of State's Bureau of International Narcotics and Law Enforcement Affairs is currently seeking information on the availability and technological capabilities for UAS detect and defeat. The Office of Global Acquisition is said to be considering awarding IDIQs, BPAs or similar ordering mechanisms to fulfil recurring needs and to streamline the acquisition process for detect and defeat systems.

The U.S. Army Contracting Command is also seeking to identify companies that can provide counter-UAS radar modules designed for remote weapon systems. The goal is to enhance the Army's ability to detect, track and neutralise sUAS with minimal modifications to existing technologies.

The Army is also planning four counter drone-related competitions next year that will assess counter-UAS technologies, including one to select a next-generation missile.

Key domestic counter-UAS companies:

Lockheed Martin, Northrop Grumman, Raytheon, Anduril Industries



United Kingdom



Project Synergia, initiated by the United Kingdom's Ministry of Defence in 2018, is a major component of the UK's defence strategy against UAS threats. This program includes technology from contractors such as Leonardo, Thales Group, QinetiQ and Rafael Advanced Defense Systems.

Key technologies within Project Synergia include Rafael's Drone Dome system, equipped with RF jamming, radar and laser interception capabilities, offering both "soft-kill" and "hard-kill" solutions. The UK has strategically deployed these counter-UAS assets to protect critical sites, including military bases and sensitive government installations. Project Synergia is part of the UK's broader goal to integrate air defence systems that support quick adaptability in both passive and active defence measures. Recent expansions of the project aim to increase deployment flexibility, enabling rapid response to drone threats in various urban and rural environments across the nation.

The UK's Defence Science and Technology Laboratory (Dstl) has been active in the development of innovative proprietary technologies, particularly with regard to directed energy weapons (DEWs). These include the well-known 'Dragonfire' laser weapon and an the RFDEW radio frequency weapon. The UK has announced plans to equip Royal Navy ships with the 'Dragonfire' system by 2027.

The UK has also turned to industry for solutions, with the UK's Defence Equipment & Support (DE&S) awarding a £135 million contract to Systems Engineering & Assessment, partnered with Chess Dynamics and Frazer-Nash Consultancy, to equip the Royal Navy with new

decoy launchers to counter missile and drone threats in March 2024.

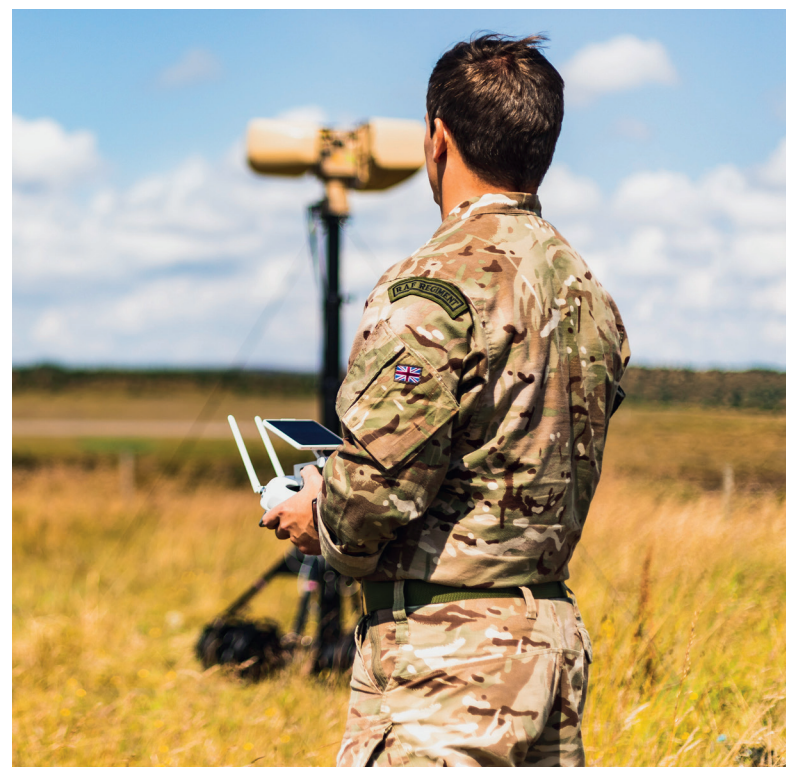
Planned acquisitions:

The UK Ministry of Defence has announced plans to continue strengthening national counter-UAS capabilities and, more specifically, DEWs. The plan is to develop additional sovereign capabilities which will offer opportunities to UK industry, with officials stating that the development will link into the government's wider 'Invest 2025' Modern Industrial Strategy, which includes a clear focus on promoting UK industry.

The UK Home Office announced in April 2024 that it is seeking to create a Framework Agreement for the 'Counter Drones next generation RF Effector Programme.' The Home Office is looking for companies to provide next-generation handheld radio frequency (RF) technology as part of the NPCC Counter Drones program. This framework aims to facilitate the delivery of advanced RF effector tools and related services that can be used by UK police forces, government departments, and associated agencies.

Key domestic counter-UAS companies:

Drone Defence, QinetiQ, Chess Dynamics, Leonardo UK



Germany



Germany has been enhancing its counter-UAS capabilities to protect sensitive areas and support military operations. The Bundeswehr has implemented systems such as the ASUL (autonomous sensor and effector system against mini-drones), which employs sensors to detect and verify drone threats and then uses jamming technology to neutralise them. ASUL has been tested successfully and deployed at significant events like the G7 Summit

Last year the Bundeswehr announced the creation of a 'Drone Task Force' which will focus on short-term improvements, especially in the area of small and ultra-small flying drones.

Germany's counter-UAS efforts are bolstered by an expanding and capable domestic defence industry. Key domestic capabilities include electronic warfare with RF detection, radar and optical sensors for multi-layered drone detection and interception. Germany's counter-UAS strategy emphasises interoperability within NATO, enabling integration into joint defence exercises. Germany has also been involved in assistance to NATO allies in developing counter-UAS capabilities, particularly through the European Sky Shield Initiative.

The German government signed a contract in January 2024 with ARGE NNbS, for development of the Short and Very Short-Range Air Defence System (SHORAD/VSHORAD) programme. In February 2024, the Bundeswehr awarded Rheinmetall a \$627 million contract to deliver the Skyranger 30 mobile air defence system.

Key domestic counter-UAS companies: Diehl Defence, ESG Elektroniksystem, Rohde & Schwarz, HENSOLDT

France



France's counter-UAS efforts have grown in recent years to address rising drone threats, particularly in preparation for the Paris 2024 Olympics. The French military and government are adopting layered counter-UAS approaches, which range from ground-based interception technologies to ship-integrated systems.

A key element is the PARADE system (Protection Déployable Modulaire Anti-Drone), which is spearheaded by a consortium led by Thales and CS Group. Launched in 2021 and funded by the French Defence Procurement Agency (DGA), PARADE is designed to provide versatile and modular drone defence capabilities. The system is intended to detect, classify and neutralise UAS threats, including small and mid-sized drones.

In April 2024, the French Army's Technical Section announced deployment of its first VAB ARLAD anti-drone combat vehicles, including a 12.7 mm machine gun modified with an "airburst" capability via a 40 mm grenade launcher and a sophisticated radar system capable of detecting drones from up to 2.5 km away.

The French Navy has selected France-based CERBAIR, a specialist in anti-drone defence, to supply a naval version of its radio frequency detection system for seven new offshore patrol vessels, announced in November 2024.

Key domestic counter-UAS companies: Thales Group, MBDA, CS Group

Canada



Canada's counter-UAS initiatives are primarily led by the Canadian Armed Forces and Public Services and Procurement Canada. The Royal Canadian Air Force is also incorporating advanced counter-UAS systems as part of its base security, with particular attention to UAS threats at airports and key installations. Through NATO collaboration, Canada participates in joint exercises to maintain compatibility with other allied nations' counter-UAS frameworks. This year, Canada established its JCO to centralise efforts in countering the threats posed by UAS.

In addition, Canada's DND has been actively testing various counter-UAS technologies in its CUAS Sandbox. This aligns with Canada's defence strategy for preventing potential threats posed by drones across sensitive and high-security locations.

Notably, Leonardo UK Ltd. has been contracted to deliver its Falcon Shield counter-UAS system, providing fixed-site counter-drone capabilities. This technology will enhance protection for Canadian forces, especially in forward-deployed bases with NATO in Latvia. Other procurements include the ORION-H9 directional systems from Singapore's TRD Systems and BEAM 3.0 omni-directional systems from CACI Inc. in the U.S. Additionally, Canada's Ground Based Air Defence project is in development to cover drone and missile threats.

Key domestic counter-UAS companies:

Rheinmetall Canada, MDA, Accipiter Radar

Italy



Italy's counter-UAS strategy features strong industry collaboration, notably through the JEY-CUAS project, coordinated by Leonardo under the European Defence Industrial Development Programme (EDIDP). This project has been designed to counter micro and mini drones using integrated detection, tracking and neutralisation capabilities.

The JEY-CUAS final demonstration in April 2024 showcased technologies for real-time classification and neutralisation of swarm and single UAS to further the goal of identifying interoperable counter-UAS solutions for deployment across European borders.

Investments have been made in Leonardo's Falcon Shield system for air base protection and integration of counter-UAS measures within NATO missions abroad.

Additionally, companies such as IDS Ingegneria Dei Sistemi are advancing systems like Omega360, which can handle simultaneous low, slow and small threats in diverse environments. Key systems from Leonardo include the well-known Drone Dome and the ACUS enhanced system.

Key domestic counter-UAS companies:

Leonardo, Elettronica, IDS Ingegneria Dei Sistemi



Belgium



Belgium's counter-UAS initiatives involve substantial collaboration with NATO and the European Defence Agency. Belgium's Ministry of Defence has invested in both detection systems and neutralisation capabilities for UAS defence. Through its STAR (Security, Service, Technology, Ambition, Resilience) plan, Belgium allocated significant resources to enhance its military capabilities, including counter-UAS technologies

These efforts include technology partnerships with European companies to deploy radar and signal-disruption systems capable of addressing threats from low-altitude UAS at critical infrastructure sites. Belgium is also an active participant in joint NATO exercises, ensuring the interoperability of its counter-UAS systems with other member states.

In October 2023, Belgium hosted trials to develop standardised counter-UAS evaluation methods, aiming to create a unified testing approach for various technologies used across NATO and EU members.

In November 2024, Thales Belgium signed a Memorandum of Understanding with a Ukrainian defence firm to supply counter-UAS missiles, demonstrating the capacity of the Belgian defence industry.

Key domestic counter-UAS companies: FN Herstal, COBBS BELUX BV, Thales Belgium

Netherlands

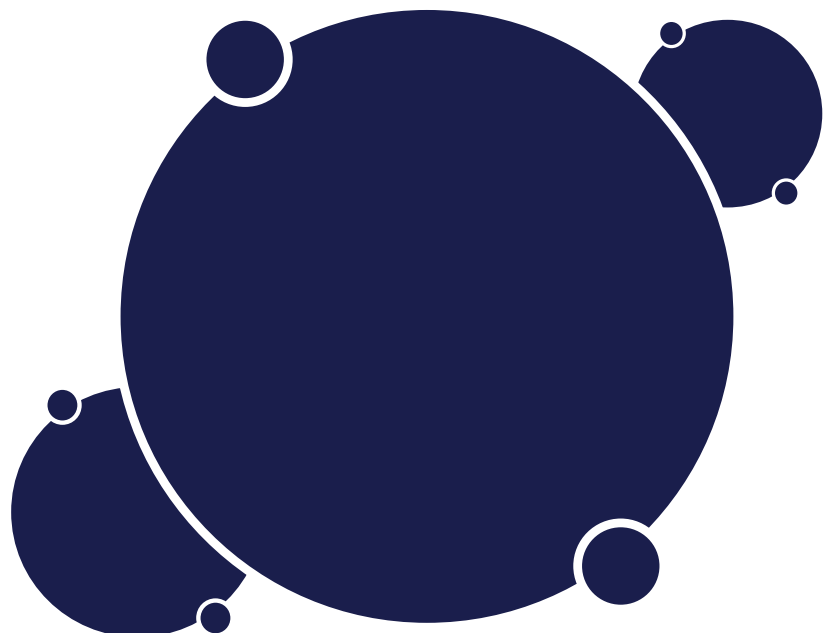


The Netherlands is expanding its counter-UAS capabilities and has been actively involved in NATO's programmes, working to establish protocols and share expertise with other member states to improve collective defence against UAS threats.

The Netherlands' CITADEL program is a major initiative focused on enhancing air and missile defence. A key recent component of this program includes the acquisition of NASAMS and NOMADS air defence systems from Kongsberg Defence & Aerospace in 2024.

In August 2023, the Netherlands awarded a \$55 million contract to Elbit Systems to supply multi-layered ReDrone counter-UAS systems, comprised of DAiR Radar, signal intelligence sensors and COAPS-L electro-optical payload.

Key domestic counter-UAS companies: Robin Radar, Thales Netherlands



Poland



Poland has fortified its counter-UAS efforts as part of its broader air defence modernisation, focusing on protecting vital infrastructure and supporting NATO obligations. The country leverages radar and RF technology for early drone detection and interception. Polish authorities have explored various domestic and imported counter-UAS solutions for deployment at military bases and strategic sites.

Notably, the country has integrated the Dronebuster device, a portable, non-kinetic tool used to disrupt drone communications, which is widely utilised by NATO allies and can be operated with minimal training. Poland has also incorporated systems from Polish contractor Advanced Protection Systems, such as SKYctrl, which are integrated into the nation's air defence framework.

In November 2023, The UK and Poland's defence industries signed a deal worth over \$5 billion, to continue the next phase of Poland's future air defence programme, Narew. The programme will provide Polish forces with an enhanced ground-based air defence system capable of launching missiles to engage air threats at ranges of more than 40 km.

Key domestic counter-UAS companies: WB Electronics, PIT-RADWAR, MESKO

Norway



Norway has been advancing its counter-UAS capabilities primarily to protect critical national infrastructure and contribute to NATO missions. Norway's counter-UAS strategy emphasises Arctic security, particularly in protecting oil facilities and military bases from unauthorised UAS.

Notable activities include comprehensive live counter-UAS testing at Oslo's Gardermoen Airport, where various detection systems and countermeasures were evaluated in real-life scenarios. The exercise included radar, RF detection and multisensor systems, scrutinising both passive and active counter-drone strategies. This initiative aimed to address potential drone incursions in high-traffic areas and enhance operational safety.

Norway has also contributed significantly to Ukraine's defence with Norwegian defence contractor Kongsberg's Cortex Typhon system. The system integrates advanced sensors, such as those from Teledyne Flir, with Kongsberg's technology for detection and neutralisation.

Key domestic counter-UAS companies: Kongsberg Defence & Aerospace, Nammo



Denmark



Denmark prioritises versatile, portable counter-UAS measures designed to integrate with maritime operations, aligning with Nordic defence strategies.

The Danish Defence Acquisition and Logistics Organisation (DALO) has been proactive in researching and deploying counter-UAS technology, particularly systems designed for rapid deployment in military and urban settings. Solutions focus on combining electronic jamming and kinetic countermeasures for flexibility.

Systems acquired by DALO include the Thales Ground Master 200 Multi-Mission Compact Radars and SMART-L Radars and APAR Systems for naval counter-UAS defence.

Key domestic counter-UAS companies: Terma, Weibel Scientific

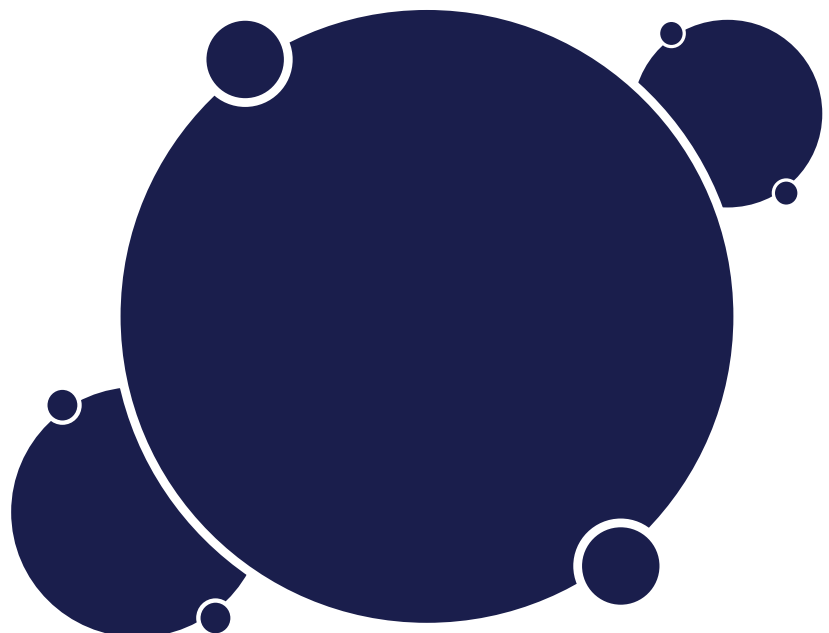
Greece



The Hellenic Armed Forces have tested and deployed counter-UAS systems, primarily involving radar and signal disruption technologies. Collaborative exercises with NATO allies have bolstered Greece's ability to integrate its counter-UAS capabilities within broader regional defence strategies.

Notably, Greece has deployed a customised version of Rafael's Drone Dome system to provide protection against Turkish domestically built drones. Designed to detect, track and neutralise UAS through communication and GPS jamming, the system uses a 10-kilowatt laser to disable drones autonomously from distances up to 2 km.

Key domestic counter-UAS companies: Intracom Defense, Hellenic Aerospace Industry



Turkey



Turkey has become a significant developer and user of counter-UAS technologies, leveraging its domestic defence industry. The country fields multiple systems, such as those developed by Aselsan, which include detection and neutralisation technologies employing radar, RF jamming and directed energy solutions. These systems are actively used to protect borders, military bases and critical infrastructure.

Systems developed by the Turkish defence industry include Aselsan's IHTAR System, which features an RF jammer, GERGEDAN, which provides broad-spectrum jamming and is complemented by the CHAMELEON signal emulator for taking control of UAS.

Meteksan's KAPAN System includes the Retinar FAR radar for long-range drone detection and tracking, paired with EO/IR cameras and optional laser weapon systems for neutralisation. The SEYEMEN Electronic Warfare System, also by Meteksan, is designed for broader applications, jamming and deceiving GPS and C2 systems to protect against various aerial threats.

Key domestic counter-UAS companies:

Aselsan, Roketsan, Meteksan

Spain



The Spanish Army and Guardia Civil utilise integrated counter-UAS systems with radar and electronic warfare components. Spain also participates in European Union and NATO joint initiatives to ensure its approaches align with wider alliance practices.

Initially tested in 2019, Spain's SIGLO-CD initiative operates via a network of client-server architecture that includes C2 software to enhance national counter-drone security. It has been implemented in Madrid, Valencia and various southern regions of Spain, with plans for expansion to over 50 cities within the coming years.

Key among Spain's counter-UAS options is the Crow system, provided by the Spanish defence company Indra. The system has been employed at high-profile events such as the NATO summit in Madrid. Additionally, Spain has acquired the ARMS anti-drone system, also developed by Indra, aimed at integrating and expanding their counter-UAS operational framework.

Key domestic counter-UAS companies:

Indra, GMV



Portugal



Portugal's efforts have primarily focused on traffic management for civilian drones, with UTM companies such as Speedbird Aero and AstraUTM both having set up offices in Portugal. However, efforts have been made to secure dedicated counter-drone and air defence systems from both the Portuguese and International defence industry.

In 2023 a Portuguese SME, Geocompass, secured an \$84,000 contract to deliver a drone detection and mitigation system to the Internal State Department of Portugal, although details on the specifics of this system are limited.

The Portuguese Army confirmed this year that it has selected Thales' RapidRanger, a vehicle based, automated air defence system, to counter aerial threats

Key domestic counter-UAS companies: Geocompass

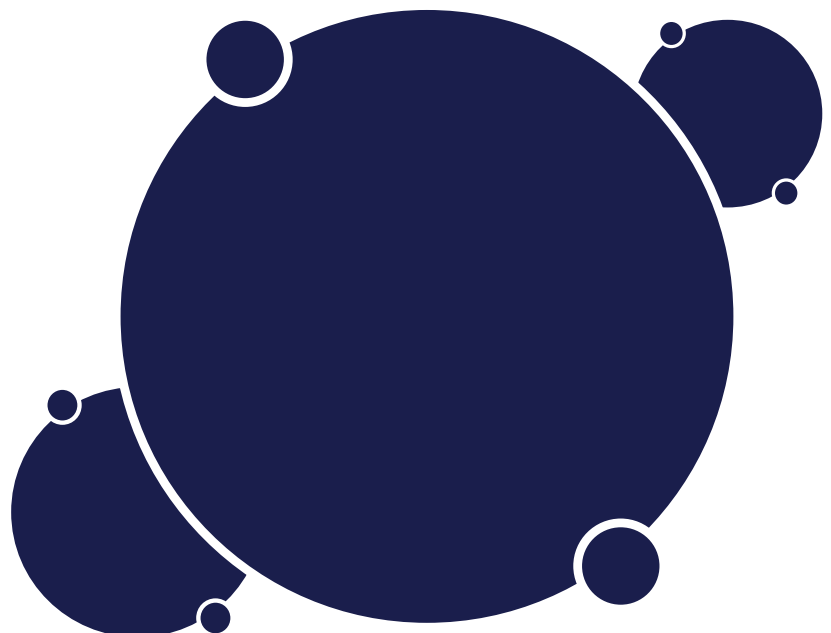
Hungary



Hungary has invested in air defence capabilities as part of a broader effort to modernise its military forces. Recent years have seen the procurement of Kongsberg's National Advanced Surface-to-Air Missile System (NASAMS) from Norway in a \$432 million deal. NASAMS provides medium-range air defence and can launch Advanced Medium-Range Air-to-Air Missiles (AMRAAM).

The government has also added Rheinmetall's Skyranger 30 to its fleet, a vehicle-mounted air defence system designed to counter drones and other low-altitude threats. The Skyranger 30, integrated with the Lynx infantry fighting vehicle, enhances Hungary's short-range, on-the-move counter-drone capability.

Key domestic counter-UAS companies: Pro Patria Electronics, Rheinmetall Hungary



Romania



Efforts to secure Romanian airspace against drone threats have intensified as a result of the war in Ukraine. In October 2024, Romania's Defence Ministry published a draft law which would allow for drones to be destroyed, neutralised or taken control of when infringing on Romanian airspace. This development follows claims by Romania that drones destined for Ukraine have been tracked over Romania, and military drone fragments located within the nation's borders.

Romania relies primarily on the Patriot missile defence system for air defence, seven of which were purchased for \$4 billion in 2017, to address a broad range of aerial threats. Four of these have been delivered by the U.S. so far, one of which was donated to Ukraine with Norway offering \$127 million to help replace it. The remaining four will be delivered by the U.S. in the coming years.

U.S. based DZYNE Technologies and Romanian company ROMARM SA signed a Memorandum of Understanding in September 2024 to collaborate on Romanian defence capabilities. DZYNE is known for producing counter-UAS defence systems such as the Sawtooth and Dronebuster.

Key domestic counter-UAS companies: UTI Grup, Aerostar S.A.

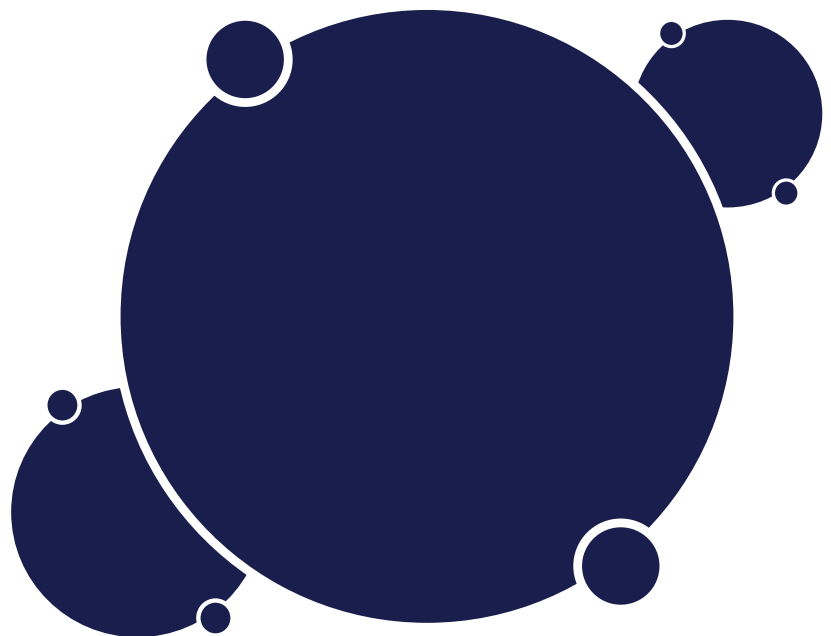
Bulgaria



Bulgaria has generally focused on enhancing its radar capabilities rather than dedicated counter-UAS systems, following concerns regarding the nation's lack of military-grade radar systems. Under the "Acquisition of New Three-Dimensional Radars" project, Thales seem likely to secure the contract to upgrade Bulgaria's radar capabilities to include 3D monitoring for low-altitude aircraft, which covers UAS detection.

Bulgaria's domestic defence industry also offers counter-UAS solutions, with Bulgarian company Optix offering its Anti-Drone system, which uses a combination of RF detection and jamming to track and disrupt hostile UAS.

Key domestic counter-UAS companies: Optix Co, Samel-90



Croatia



Following the Russian invasion of Ukraine in 2022 and the crash of an unidentified Soviet-made drone in Zagreb, Croatian government committed to upgrading air defence capabilities. The nation subsequently secured the French Mistral missile system for a fee close to \$76 million.

In the civilian sector Croatia has demonstrated a sustained effort to secure against drone threats in Croatian airspace, with a particular focus on protecting airports from unauthorised drone incursions. Croatia's private air navigation services provider, CroControl, has collaborated with D-Fend solutions and Operational Solutions Limited to test counter-UAS solutions at Split Airport.

Details of Croatian dedicated counter-UAS systems are not widely publicised. However, the nation collaborates with various militaries, including U.S. forces, in the annual Croatian 'Exercise Shield.' The exercise aims to strengthen air defence strategies, and electronic warfare tactics.

Key domestic counter-UAS companies: CroControl., DOK-ING

Czech Republic

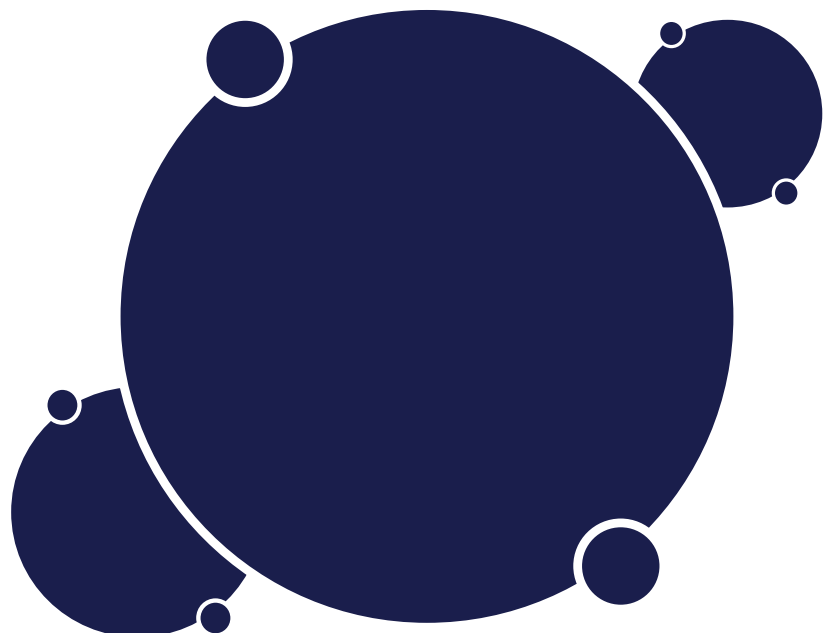


The Czech Republic has been active in counter-UAS initiatives through testing and development collaborations. ERA, a Czech defence technology firm, has tested the VERA-NG passive electronic support system with the Czech Armed Forces to detect UAS across large distances. The system tracks drones from dozens of kilometres away to provide extensive surveillance coverage, even for small drones.

In 2022, a Czech-Polish consortium carried out tests of the AUDROS system, an autonomous interceptor drone that utilises a net to neutralise unauthorised UAS. More recently in 2023, the Czech Ministry of Defence committed to spending \$120 million on 48 long-range, air-to-air missiles from Rafael Systems.

The STARKOM mobile communication jammer, developed and manufactured in the Czech Republic, bolsters Czech electronic warfare capabilities. The system enables jamming of ground-based and aerial targets, including drones.

Key domestic counter-UAS companies: ERA, Retia, EVPÚ Defense



Slovakia



Although details on dedicated counter-UAS systems are not widely available, Slovakia has been working with NATO allies on bolstering air defence capabilities, with the NATO Multinational Battlegroup Slovakia having deployed the Czech STARKOM system at its training centre in Pliesovce in November 2023.

Slovakia's Mám Dron association, which typically works to educate on the safe use of drones in civilian contexts, was also involved in the assessment of UTM technology from Slovakian firm R-SYS for military purposes alongside Slovakia's Armed Forces Academy.

The nation has also utilised D-Fend Solutions drone mitigation capabilities in the past, notably deploying its systems during a Papal visit.

Key domestic counter-UAS companies: MSM Group

Slovenia



Slovenia has been receiving support in the development of its counter-UAS capabilities with the assistance of NATO allies. The nation has also been receiving assistance under the European Sky Shield Initiative, with HESNOLDT providing TRML-4D radars and Diehl Defence delivering IRIS-T SLM air defence systems on behalf of the German government.

The Slovenian defence industry is also involved in the production of counter-UAS systems, with DAT-CON partnering with UK-based Blighter Surveillance systems to integrate the company's B400 ground surveillance radar for detection of slow-moving targets.

Key domestic counter-UAS companies: DAT-CON

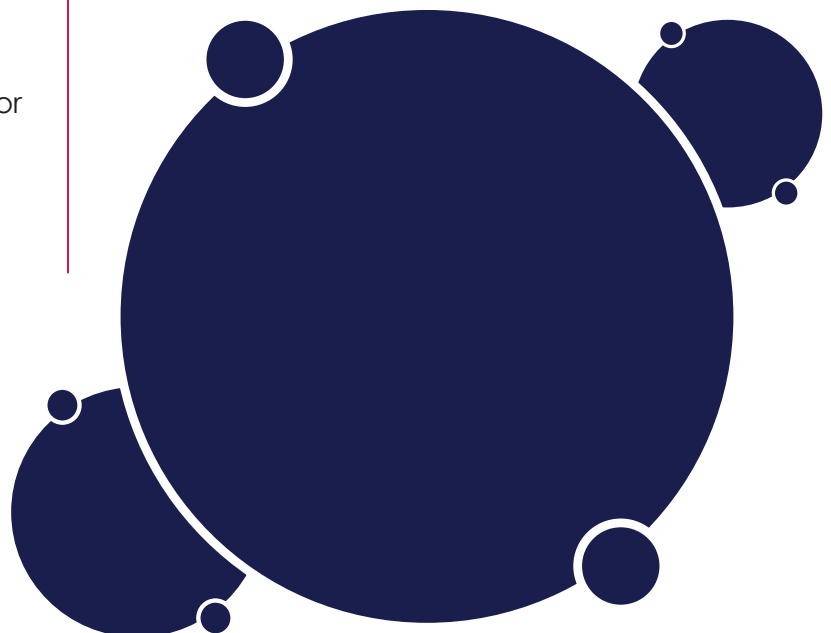
Estonia



Due to Estonia's shared eastern border with Russia, the nation has been keen to develop counter-UAS capabilities aimed at border defence. A \$12.6 million, government-backed "drone wall" project is currently underway, although the Police and Border Guard Board has noted that its capacity is still far from adequate. The need for such an initiative has been driven by drone use in smuggling across the Estonian border and reports of drone detections above Estonian critical infrastructure.

Estonia's domestic defence industry has also been active, with Frankenburg Technologies set to provide Estonian-made, low-cost counter-UAS missiles to Ukraine for testing.

Key domestic counter-UAS companies: Guardtime, Frankenburg Technologies



Latvia



Another nation sharing a border with Russia, Latvia has also sought solutions to protect its perimeter from aerial threats. Last year, the Latvian State Border Guard spent more than \$1.7 million on counter-UAS systems to safeguard the border. Concerns over border safety have been heightened by the landing of a Russian Shahed drone in Eastern Latvia in September 2024.

In November 2023 the Ministry of Defence of the Republic of Latvia and Diehl Defence signed a purchase order for the procurement of the IRIS-T SLM medium-range air defence system. This marked the biggest defence investment since the country secured independence more than 30 years ago, amounting to around €665 million.

HENSOLT, a German defence electronics provider, has committed to providing TRML-4D radars to enhance Latvian air defence capabilities through the European Sky Shield Initiative.

Key domestic counter-UAS companies:

LMT Defense

Lithuania



Lithuania has been undergoing efforts to advance counter-UAS capabilities following an announcement by Defence Minister Laurynas Kasciūnas in June 2024, which discussed the need for additional counter-UAS investments.

In the civilian sector, Lithuania's Ministry of Transport and Communications has plans to implement a drone traffic management system following a recent demonstration by Oro Navigacija, an Air Navigation Service Provider that provides services to aircraft flying in Lithuanian airspace.

The nation has also been active in procuring air defence solutions, with Saab receiving an additional order in October 2024 for the MSHORAD system, following an initial order in July. The MSHORAD system includes integrated mobile radar and firing units.

The Lithuanian Ministry of National Defence's Defence Resources Agency placed an order with Kaunas-based NT Service UAB in March of 2024. NT Service is contracted to provide 351 counter-UAS units including anti-drone dome systems and individual suppressors.

Lithuania's domestic defence industry has also assisted with support to Ukraine, with Ivan Sybyriakov, Manager of the Unmanned Systems Centre at SpetsTechnoExport, reporting that thousands of Lithuania-made SkyWiper counter-UAS systems have been deployed in Ukraine.

Key domestic counter-UAS companies: Elsis Pro, Axis Industries



Non-NATO nations

Ukraine



Ukraine is naturally investing heavily into counter-UAS systems due to its ongoing war with Russia, in which it has faced regular UAS attacks including an ongoing campaign of one-way attack drone strikes by Iranian supplied Shahed drones. The conflict has pushed Ukraine to the forefront of counter-UAS innovation, with the nation now considered one of the world's leaders in innovation with regard counter-UAS technology and strategy.

Ukraine's advances in counter-UAS technology and strategy have been recognised internationally. Many have reported that the lessons learned and technologies developed by Ukraine are now informing counter-UAS efforts in other countries facing drone threats. The extensive use and continual refinement of its countermeasures in an active combat zone provide Ukraine with a unique edge Ukraine's allies, particularly NATO members, have bolstered its counter-UAS capabilities through training, provision of equipment and intelligence sharing. This collaboration has provided Ukraine access to state-of-the-art technologies and expertise, complementing its domestic advancements.

International support:

Kongsberg's vehicle-mounted Cortex Typhon systems are capable of detecting, tracking, destroying or disrupting drones using a suite of sensors, cameras, radars and electronic surveillance equipment. Funded by the International Fund for Ukraine, Kongsberg will receive \$71 million for the contract.

Lithuania has provided thousands of Skywiper EDM4S and Omni Jammers to Ukraine. The jammers are used to disrupt drone control, video and GPS signals with a range of 3-5 km and are designed for Orphan to be fixed.

L3Harris won a contract valued at \$40 million to supply 14 VAMPIRE systems to Ukraine. The compact, palletised four-round launcher is designed for installation on flatbed trucks.

It has been reported that various DroneShield counter-UAS units are being sent to Ukraine since 2022. These include the DroneGun, a handheld 'rifle-like' directional RF jammer supplied by Australia.

Domestic capabilities

Domestic capabilities have also been rapidly advanced to reduce the reliance on international support in attempts to make Ukraine more independent in its war against Russia.

Bukovel-AD is an electronic warfare system produced by the Ukrainian firm Proximus, capable of detecting and jamming enemy drones. It effectively disrupts UAS operations by interfering with their communication channels.

Kvertus' Aero Azimuth utilises aerostats equipped with electronic warfare payloads to detect and track drone operators' positions from high altitudes, allowing for more strategic targeting over a 30 km range. Kvertus also produces the AD MW System, a handheld anti-drone system disrupting drone signals effectively at shorter ranges and the 'hedgehog' backpack equipped with antennas that generate a dome-like effect to disable hostile drones.

Key domestic counter-UAS companies: Kvertus, Bukovel-AD





South Korea

South Korea has focused intensively on developing counter-UAS capabilities, particularly in response to threats near its northern border. A dedicated Drone Operations Command was formed under the Ministry of National Defense to centralise counter-drone operations across all branches of the military. This command will oversee an integrated defence approach that includes electronic, kinetic and radar-based systems to enhance response to drone incursions.

In response to North Korea's drone incursions, Seoul has taken steps to enhance its anti-drone capabilities. The Defense Acquisition Program Administration (DAPA) issued a notice on its procurement website in 2023 for a project worth \$37.2 million. This initiative sought to strengthen South Korea's defences against unauthorised drones. As part of the project, DAPA tasked local companies to supply a counter-drone system for the Army, Navy and Air Force use.

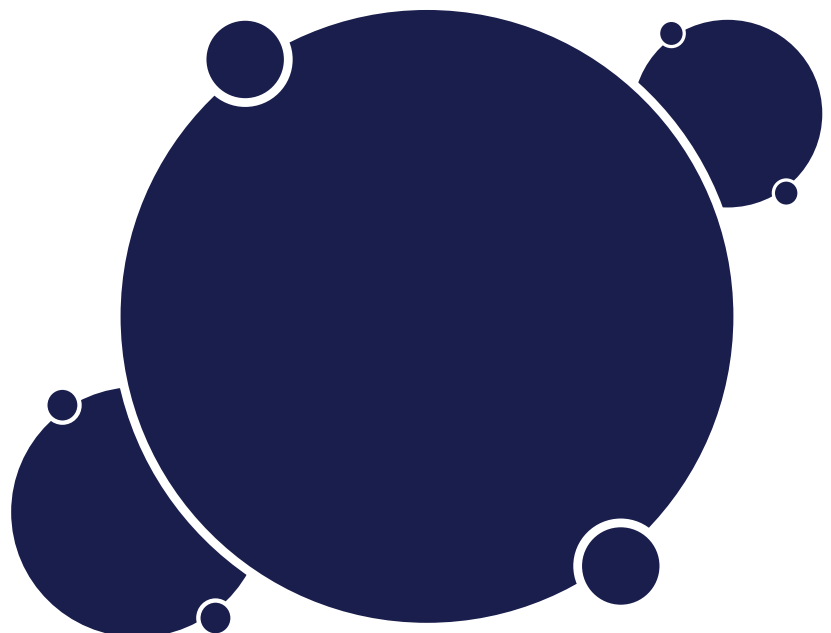
Subsequently, South Korean firm Hanwha Systems signed two deals worth approximately \$26.9 million with DAPA for integrated drone defence in critical areas. The contract calls for manufacture of equipment for South Korean forces capable of detecting small UAS and drones near critical infrastructure like airports. The system will include jammers to disrupt the radio frequency command and control signal, diverting the flying objects or causing them to crash.

The DAPA issued a statement in July 2024 indicating that it will continue to work with Hanwha Systems, which has developed laser DEWs in a project dubbed 'StarWars.' The laser system, known as Block-I, neutralised 100 percent of its targets during a live-fire test in April 2024, according to the DAPA.

South Korea has also invested heavily into its more traditional 'Korean Air and Missile Defence' system, which features advanced interceptor missiles. In May 2024, the DAPA announced plans to develop an upgraded version of its Block-II surface-to-air missile system, projecting a cost of approximately \$2 billion for the M-SAM Block-III project.

Key domestic counter-UAS companies:

Hanwha Systems, LIG Nex1, Korea Aerospace Industries



Japan



Japan has seen significant investment into its counter-UAS capabilities in recent years, likely driven by security concerns due to the military capabilities of close neighbours like China, Russia and North Korea. There is significant work being done by Japan's commercial sector to develop defence systems, notably, major Japanese technology companies such as Mitsubishi and Toshiba provide various counter-UAS solutions that bolster the nation's UAS defence capabilities.

Toshiba's Lidar Surveillance and Detection system is designed to detect and track drones. The system provides real-time monitoring and high-resolution imaging to identify and classify drone threats in rapid response scenarios. Toshiba also offers an RF monitoring system to detect the presence of drones by identifying and locating the source of drone communication signals and an autonomous interceptor drone equipped with net guns.

For airspace management, the Terra Drone UTM system tracks the location of many drones at once for the effective management of drone operations and airspace monitoring. Terra Drone has recently signed a Memorandum of Understanding with Toshiba to collaborate on the expansion of UAS and counter-UAS technologies.

Key domestic counter-UAS companies: Toshiba, Mitsubishi, NEC Corporation, Terra Drone

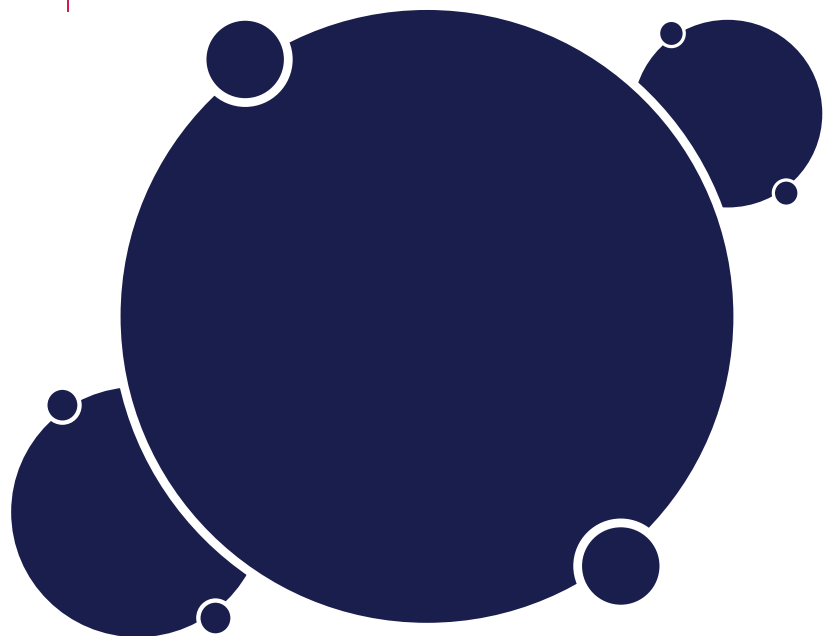
Brazil



Currently, Brazil's counter-UAS capabilities are evolving, with a focus on securing critical events and infrastructure from potential threats posed by drones and advancing airspace management efforts. Ongoing efforts include collaboration between governmental bodies and private companies to bolster both detection and neutralisation technologies as well as a national UTM project led by the Brazilian Department of Airspace Control.

Brazil's national UTM project is a key focus, aiming to safely integrate UAS and eVTOLs into Brazilian Airspace. The initiative relies on public-private partnerships, with Sao Paulo-based BIRDS being selected to provide its VEGA UTM system.

The Brazilian government is actively sourcing counter-UAS solutions from industry, with the Brazilian Navy signing a Memorandum of Understanding with UAE-based EDGE group in November 2024. The collaboration aims to advance autonomous surface and aerial defence systems, laying a foundation for developing sophisticated anti-drone technologies specifically tailored for naval operations. The Brazilian government has also integrated DroneShield's DroneGun Tactical to secure prisons and key events, such as the presidential inauguration, against drone threats.





Jordan

Jordan has been proactively developing its counter-UAS capabilities due to its position in the Middle East, where ongoing conflicts and the persistent use of attack drones by nations like Iran have heightened awareness of the need for effective drone defences.

Jordan has established dedicated facilities to advance its goals, including a drone and counter-UAS testing site located near Azraq. This facility is designed to support testing and development of counter-UAS technologies, including electronic warfare systems, and supports researchers in the development of new technologies under the umbrella of the Jordanian Armed Forces.

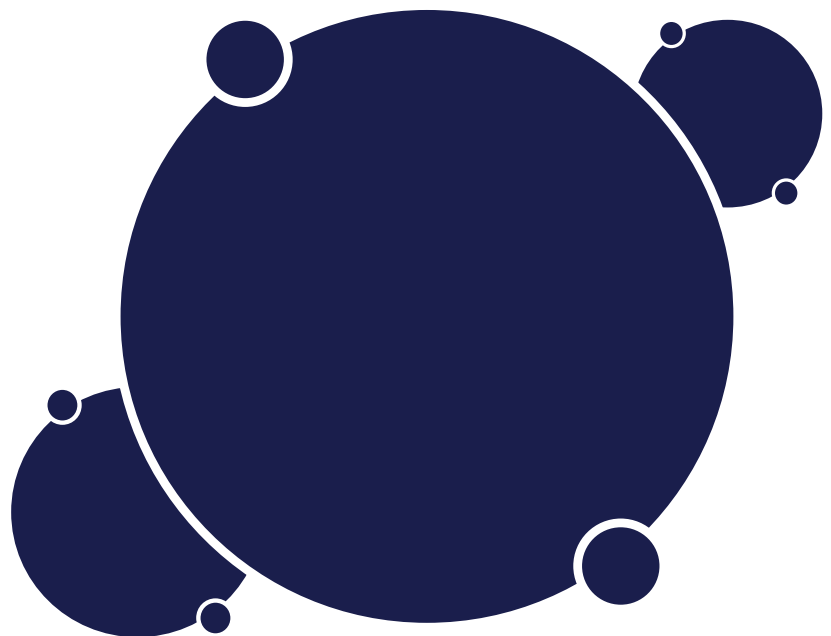
The Jordanian Design and Development Bureau (JODDB) was established as a centre for research, development and manufacturing of defence and security equipment. Established to bolster the technological capabilities of the Armed Forces and contribute to the local defence industry, JODDB collaborates closely with international and local partners to advance its expertise in various fields, including counter-UAS.

JODDB is increasingly focused on advancing national counter-UAS capabilities. In September 2024, JODDB announced a partnership with SAE Media Group to host the Counter-UAS Middle East & Africa conference in Jordan, following success in the U.S. and UK. The conference is expected to draw experts and officials from both government and industry to discuss the UAS challenges and developments in the region. This will be the first opportunity for the counter-UAS industry

to collaborate on the latest strategies and technological advancements to address increasing concerns over threats posed by UAS in the Middle East and Africa.

Jordan receives international support for the development of its counter-UAS capabilities, with NATO releasing a survey seeking information from NATO members and qualified industry to assess the availability, pricing and delivery timeline of counter-UAS equipment for Jordan in October 2024. This also suggests that the Jordanians are planning significant expansion of the quantity and diversity of counter-UAS systems that they can field.

Jordan's capabilities come primarily from its military branches, with the Jordanian Armed Forces demonstrating capabilities to counter drone smuggling along its borders, although information on domestic, commercial capabilities is scarce.



Saudi Arabia

Saudi Arabia has been actively advancing its counter-UAS capabilities, driven by the increasing prevalence of drone threats in the region and attacks on Saudi infrastructure by Houthi rebels. Its efforts include collaborative initiatives with international partners and the development of domestic counter-drone programmes.

Saudi Arabia has collaborated with the United States on the Red Sands counter-UAS exercises. These drills, held at the Red Sands Integrated Experimentation Center in Riyadh, aim to rapidly test and develop kinetic counter-drone technologies.

Saudi Arabia has prioritised working with international partners to accelerate development of counter-UAS solutions, with the goal of developing a national counter-UAS system. This process has been ongoing since Saudi Arabia suffered attacks on its oil facilities in 2019 and have since been entertaining collaboration with commercial entities across the globe.

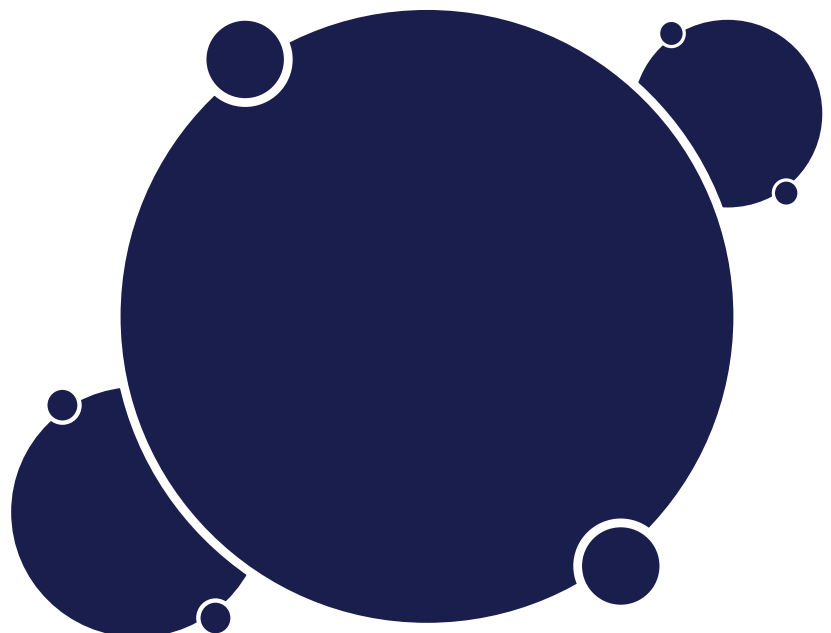
In February 2024, Fortem Technologies and Saudi company INTRA Defense Technology announced they are partnering to engineer, manufacture and market advanced counter-UAS solutions in Saudi Arabia. A joint venture called TRD Middle East Industry Co, was also established in February between TRD Singapore and Saudi domestic defence company Rakaa Holding which will see the Orion-H9 radio frequency (RF) jammer manufactured locally.

Partnerships have also been formed with other counter-UAS solution providers, such as Leonardo and APS.

These partnerships represent an ongoing effort by Saudi Arabia to develop indigenous defence technologies under its Vision 2023 initiative.

Key domestic counter-UAS companies:

Saudi Arabian Military Industries (SAMI), INTRA Defense Technologies



India



India has been actively advancing its counter-UAS capabilities through a combination of military initiatives and collaborations with domestic defence companies. A shared border with China, one of the world's most prominent developers of UAS technology, has resulted in escalating tensions and a growing desire to accelerate drone defences.

In August 2024, the Indian Army issued an RFI for the procurement of a high-power microwave system, a DEW designed to eliminate drone threats with a "soft-kill" countermeasure. Such systems are particularly effective against drone swarms due to their ability to target multiple drones with a wide beam.

The Indian Air Force (IAF) has also expressed a need to counter swarm threats, calling on the defence industry to develop a multi-domain aerial system capable of defending sensitive installations against drone swarm attacks. In October 2024, the IAF outlined its need for a counter-swarm drone system, capable of being launched through various platforms, including vehicles, tubes, aerostats or balloons.

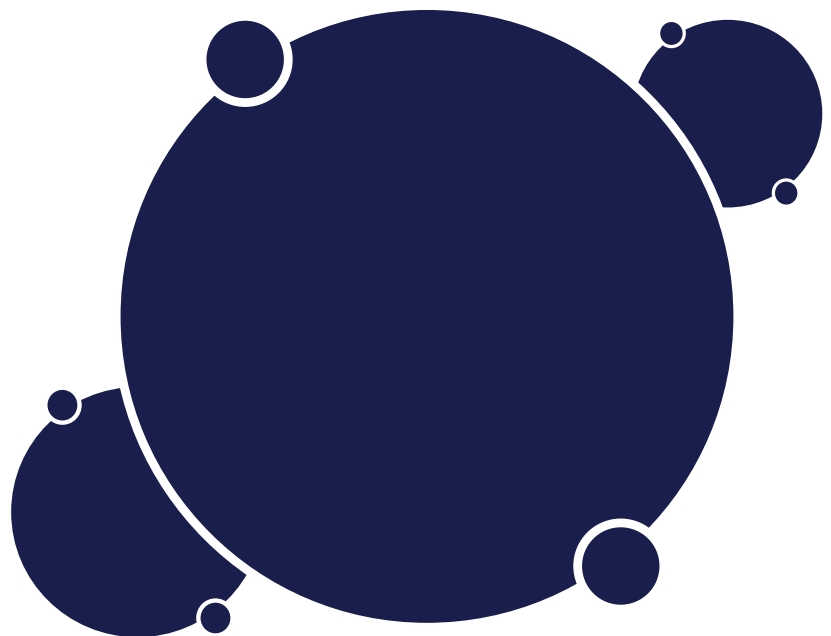
The IAF has also worked internally to develop a low-cost counter-UAS system to secure critical airbases. The system features a micro-doppler radar with AI-based detection capabilities, acoustic sensors and a camera.

The Defence Research and Development Organisation (DRDO) has developed a range

of counter-drone technologies, including the Drone Detect, Deter, and Destroy System (D4S). This was the DRDO's first indigenously developed counter-drone system adopted by the Indian Armed Forces. It includes capabilities for detection, tracking and neutralisation through both "soft-kill" (jamming) and "hard-kill" (laser) mechanisms.

India has also been procuring counter-drone systems from private industry. Bharat Electronics Limited (BEL) has developed a system capable of jamming and "hard-kill" using a laser-based countermeasure. The system has already been deployed at high-profile events like the 2020 Republic Day parade and procured by the Indian Navy as part of a naval anti-drone system. Similarly, Zen Technologies and Gurutvaa Systems are contributing advanced counter-UAS platforms focusing on drone detection and neutralisation.

Key domestic counter-UAS companies: Bharat Electronics Limited, Gurutvaa Systems, Adani Defence and Aerospace



Assessing the threat

Iran



Iran's offensive UAS capabilities are among the most advanced in the Middle East. These capabilities have become central to Iran's military doctrine, facilitating an asymmetric warfare approach that seeks to overwhelm defences with relatively inexpensive drones.

UAS arsenal

Key among the Iranian UAS arsenal are the Shahed and Mohajer series drones, which are equipped for surveillance and strike missions. These systems can carry precision-guided munitions and operate at extended ranges, making them suitable for cross-border attacks.

The Shahed-136, often described as a loitering munition or "kamikaze drone", has been used extensively by Iranian forces and proxies. It provides a low-cost method of saturating enemy air defences and has featured heavily in the war in Ukraine, with large numbers being sold to the Russians.

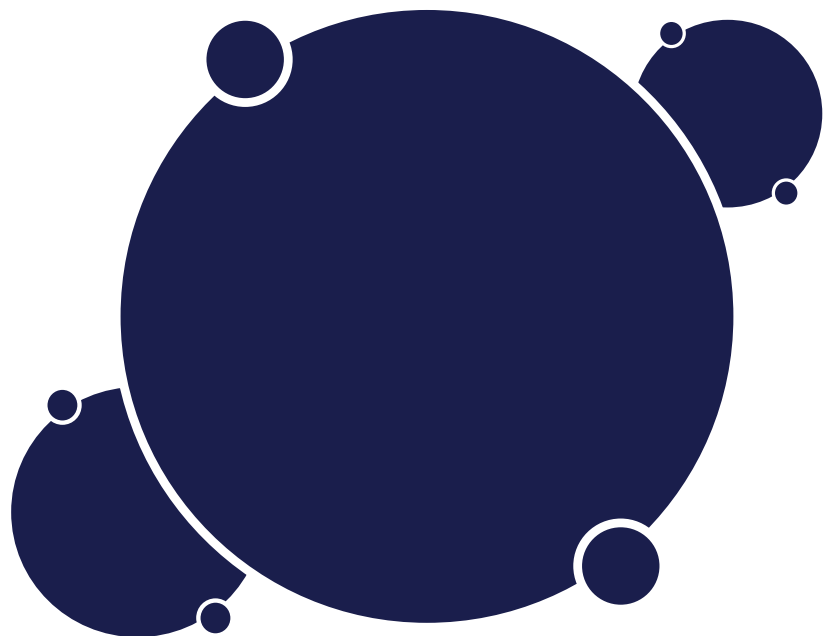
Tactics and strategy

Iran has experimented with employing drone swarms, leveraging numbers to overwhelm defences. This tactic is particularly effective when targeting critical infrastructure or military installations.

Iran frequently supplies drones to allied militias and groups, such as Hezbollah, the Houthis in Yemen and militias in Iraq and Syria. This proxy deployment spreads the operational burden across multiple fronts.

Iranian tactics often integrate drones with missile and rocket attacks to suppress air defences and maximise the effectiveness of subsequent strikes.

Iranian drones have been used in attacks across the Middle East, targeting Saudi oil facilities, U.S. bases in Iraq and Syria and Israeli-linked assets. Their effective use of drones in the Yemeni conflict, particularly by the Houthis, demonstrates the strategic depth of this capability.





Russia

UAS arsenal

Russia has developed a diverse arsenal of UAS, ranging from small reconnaissance drones to advanced loitering munitions. Key systems include the Orlan-10, a versatile reconnaissance drone frequently used in battlefield surveillance and targeting, and the Lancet-3, a loitering munition designed for precision strikes on vehicles, artillery and fortified positions. The KUB-BLA, another loitering munition, is suited for kamikaze missions, enabling cost-effective strikes against valuable targets.

The development of long-range drones like the Altius-U, capable of high-altitude reconnaissance and precision strikes, is aimed at enabling reconnaissance, strike and electronic attack missions.

The Zala family of drones includes small reconnaissance systems like the Zala 421-16E and larger, more capable systems like the Zala 421-16E2. These drones are designed for intelligence, surveillance and reconnaissance operations and are notable for their portability and ability to operate in electronic warfare-contested environments.

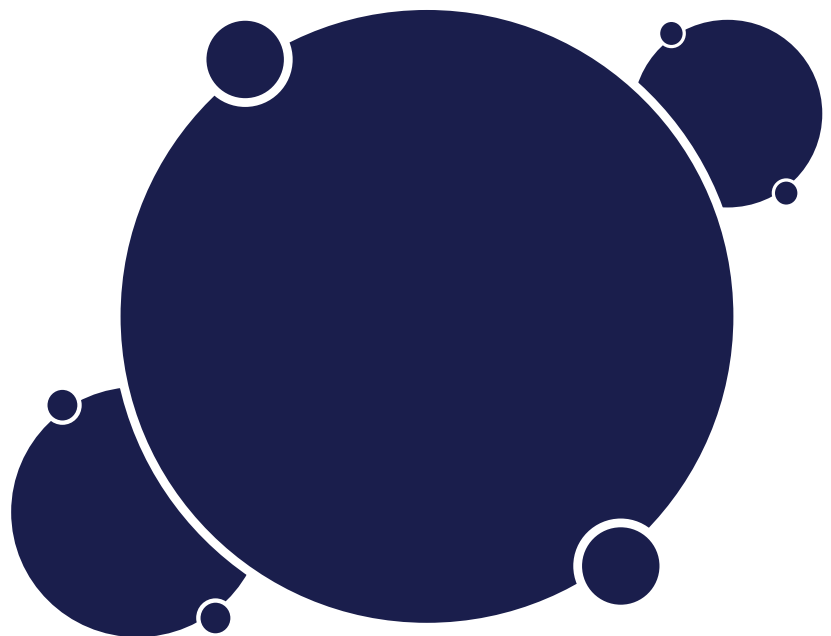
Russia is also now producing its own versions of Iranian Shahed drones, known locally as Geran-2 drones. This enables Russia to replenish its supplies much more quickly, with the Ukrainians shooting down and disabling a staggering number of Shahed drones on an almost nightly basis.

Tactics and strategy

Russia's approach to UAS deployment integrates unmanned systems into combined arms operations, leveraging them for surveillance, targeting and direct strikes. In Ukraine, Russian forces have heavily used loitering munitions such as the Lancet-3 to disrupt supply lines and counter offensive operations. These tactics have been particularly effective in destroying Ukrainian artillery and air defence systems.

Russia frequently uses massed drone strikes to overwhelm enemy defences. For instance, swarms of loitering munitions and surveillance drones are coordinated with missile and artillery attacks, creating a multi-layered assault that complicates defensive responses. Drones are also used for psychological operations, as their persistent presence in conflict zones exerts constant pressure on enemy forces.

Russia has shown a focus on adapting to enemy capabilities, as the Ukrainians have become particularly effective in their counter-UAS efforts. Drones are being equipped with electronic warfare resilience, with upgrades to mitigate Ukrainian jamming. Efforts have also been made to reduce radar visibility to evade detection by Ukrainian air defences.





China

China's offensive UAS capabilities are more difficult to gauge due to extreme secrecy and the fact that it has only been involved in minor engagements in recent years. However, not only are military analysts constantly scrutinising China but it has showcased many of its capabilities with regard to UAS at its domestic air shows. Customers in the Middle East and Africa have also made use of Chinese drones in conflicts in the past.

UAS are a cornerstone of China's modern military doctrine, which focuses on leveraging advanced technologies to achieve dominance in key strategic theatres. The People's Liberation Army (PLA) has developed a comprehensive range of UAS for surveillance, strike and multi-role missions.

UAS arsenal

China fields a variety of advanced UAS platforms, including the CH (Cai Hong) and Wing Loong series, which have been widely exported and tested in various conflicts such as those in Libya, Yemen, Ethiopia and Nigeria. These drones are capable of carrying precision-guided munitions and performing long-range reconnaissance. The Wing Loong-2, for example, can conduct both surveillance and precision strikes with payloads of advanced air-to-surface missiles and bombs.

China has also developed stealth drones such as the GJ-11, designed to avoid detection in high-threat environments.

One of China's current focuses is the development of drone swarm technology. China continues to prioritise AI integration and swarm technologies to outpace adversaries in UAS innovation. The Chinese swarm carrier drone is one example which involves a large unmanned aerial platform designed to deploy

and coordinate multiple smaller drones as part of a swarm. The smaller drones can operate autonomously or semi-autonomously in a coordinated manner, executing tasks such as overwhelming enemy defences or conducting reconnaissance.

China has showcased such concepts through its defence exhibitions and test demonstrations.

Tactics and strategy

While the majority of discussion around Chinese drone strategy is speculative, it would likely rely on integration with broader military systems, including electronic warfare and cyber capabilities. The PLA employs drones for reconnaissance regularly along its border with India and possesses plenty of capability for target acquisition and suppression of enemy defences.

This is evident in their focus on area denial strategies, particularly in contested regions such as the South China Sea and around Taiwan. The Chinese use UAS to enhance situational awareness and conduct precision strikes during simulated blockades or joint firepower operations.

PLA drones are a key component of China's "informatized" and "intelligentized" warfare doctrine, which seeks to leverage advanced technologies to dominate the information battlefield. For example, drones like the BZK-005 and CH-series are used in conjunction with manned aircraft and naval forces to patrol airspace, track targets and support strike operations. These systems demonstrate interoperability and coordination in exercises near Taiwan, where UAS often scout targets while working alongside bombers or electronic warfare planes.