POINT OF VIEW

Radar & Sensors

The Need For a Multilayer Detection System is Growing

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FRONT VENTURES

1. Introduction

What Is a Radar?

Radar stands for Radio Detection and Ranging. In simple terms, radar is a sensor that helps detect objects at a distance, even when they are too far away, too fast or too difficult to see with the human eye.

Radar became important during the Second World War as an early-warning system against incoming aircraft. Since then, it has developed into one of the core sensor technologies behind modern air defence.

It works by sending out radio waves and measuring the signals that bounce back when they hit an object. From these reflections, the radar can calculate where the object is, how far away it is, how fast it is moving and in which direction it is travelling. More advanced radar systems can also estimate altitude and help classify what type of object has been detected.

For the operator, the output is usually shown as a track: a moving object on a screen with position, speed and direction. In modern systems, this is increasingly supported by digital signal processing, software and classification algorithms.

Radar is therefore not a weapon by itself. It is part of the sensor layer that makes air defence possible. Without detection, a force cannot decide whether to jam, intercept, avoid or destroy an incoming threat.

Why It Is Relevant Now

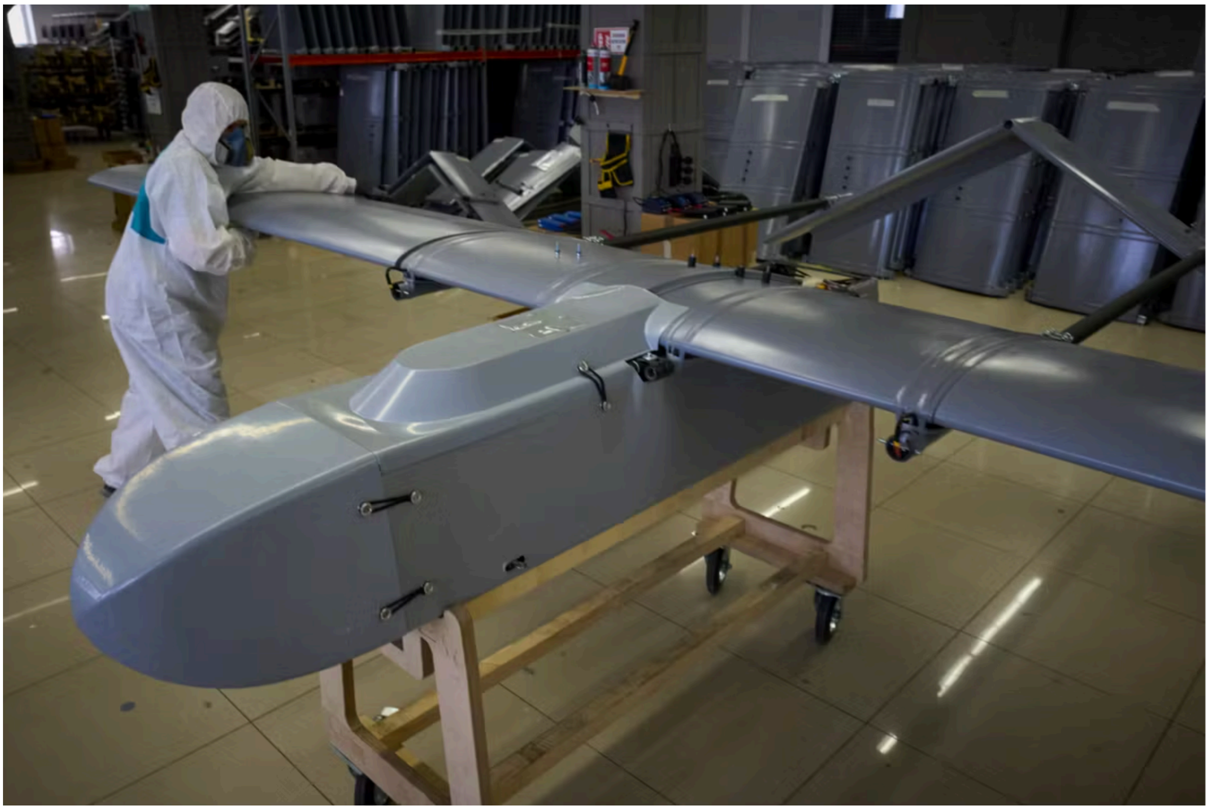
Modern air defence was built for a different threat profile vs what is now seen in the drone dominated conflicts in Ukraine and Middle East. Historically, radar systems were designed to detect and support engagement against a smaller number of larger and more valuable aerial targets such as aircraft, helicopters, cruise missiles and ballistic missiles (see pictures below). That threat picture has changed. Modern attacks increasingly combine missiles and large numbers of low-cost drones. Instead of facing a few large targets, air defence systems now need to manage many small, cheap and low-flying objects at the same time.

Ukraine has shown how central this shift has become. Both sides now use drones, missiles and loitering munitions in combination to overwhelm air defences, complicate detection and increase the cost of defence. Russia has used large numbers of low-cost Shahed-type drones to saturate Ukrainian air defences, while Ukraine's own Fire Point systems, including the FP-1 and FP-2 strike drones and the FP-5 Flamingo cruise missile, show how quickly the battlefield is moving toward mixed drone-and-missile strike packages (see pictures below). Small drones and loitering munitions are often used not only as weapons, but also to saturate sensors, expose air-defence positions and force defenders to respond with more expensive countermeasures. This changes the economics of air defence: cheap, mass-produced drones and lower-cost strike systems can create pressure on systems designed for fewer, larger and more expensive threats.

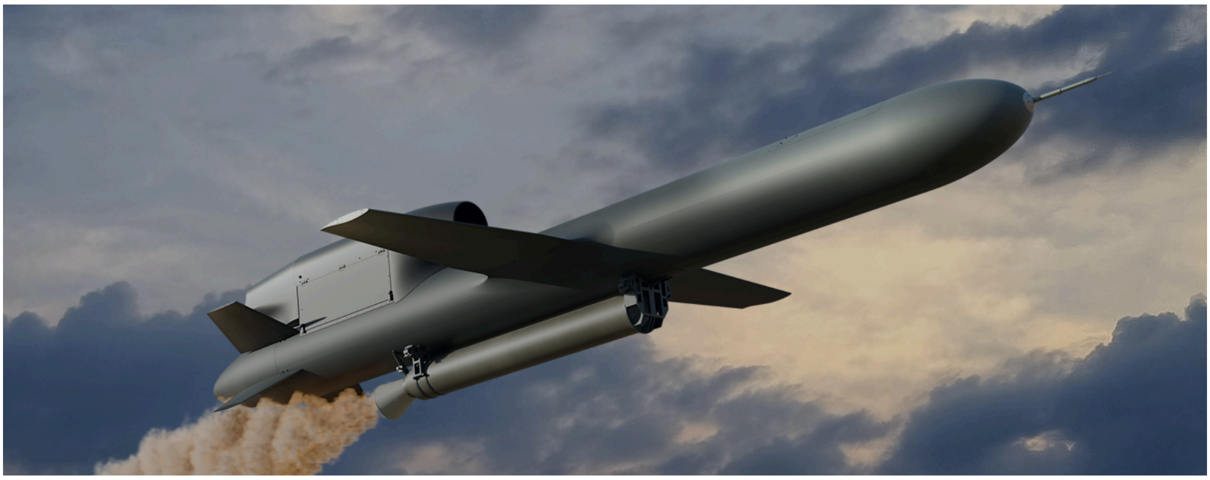
This creates a new sensor problem. The challenge is no longer only to detect one incoming aircraft or missile. It is to identify, classify and prioritise many small objects in a crowded airspace, often flying close to the ground and moving among buildings, vehicles, trees and other radar clutter. This is exactly where traditional radar systems struggle, because they were not originally designed for mass-scale drone threats.

Detection is the first bottleneck in the counter-UAV chain. A force cannot jam, intercept, avoid or destroy a drone it has not detected in time. However, detection alone is not enough. The growing number of drones also creates demand for cheaper and more scalable countermeasures, including electronic warfare, gun-based systems, lasers, interceptor drones and other low-cost effectors.

The sensor layer itself is also becoming more exposed. Large and expensive radar systems remain critical, but they are increasingly visible and high-value targets in a battlefield shaped by drones, satellite imagery and long-range precision strike. When cheap drones are available in large numbers, they can be used not only against frontline units, but also to pressure, locate or attack the radar and air-defence infrastructure that enables interception. This creates a difficult cost equation: defenders need advanced sensors to detect mass drone attacks, but those sensors must also become more distributed, mobile and affordable enough to survive in a drone-saturated environment.



Source: Le monde. Ukrainian FP-1 drone - low-cost long-range strike UAV designed for deep attacks against Russian infrastructure.



Source: Firepoint technology. Fire Point FP-5 Flamingo - large Ukrainian cruise missile showing the missile side of the mixed drone-and-missile threat.

Source: Saab. Giraffe 1X on pickup - Distributed, mobile short-range radar.

Source: Missile defense advocacy alliance. Patriot AN/MPQ-53/65 radar - a large, high-value air-defence radar system designed for traditional air and missile defence

2. The Military Radar Market

A Large but Established Market

Military radar is already a large and established defence category. According to Mordor Intelligence, the global military radar market is estimated at approximately USD 13.5 billion in 2026 and is forecast to reach USD 16.8 billion by 2031, a compound annual growth rate of approximately 4.6%.[1] Other market research providers, using broader market definitions and scope, estimate current market size somewhat higher and project continued growth toward the USD 20+ billion range over the next decade. The key point across estimates is consistent: this is a large, mature defence category, not an early-stage one.[2]

This makes radar a mature market, not an early-stage technology category. The investment opportunity is therefore not radar in general, but the faster-growing tactical segments where existing systems are not fully adapted to today's threat environment. What and why this segment is becoming increasingly attractive is discussed in the following sections.

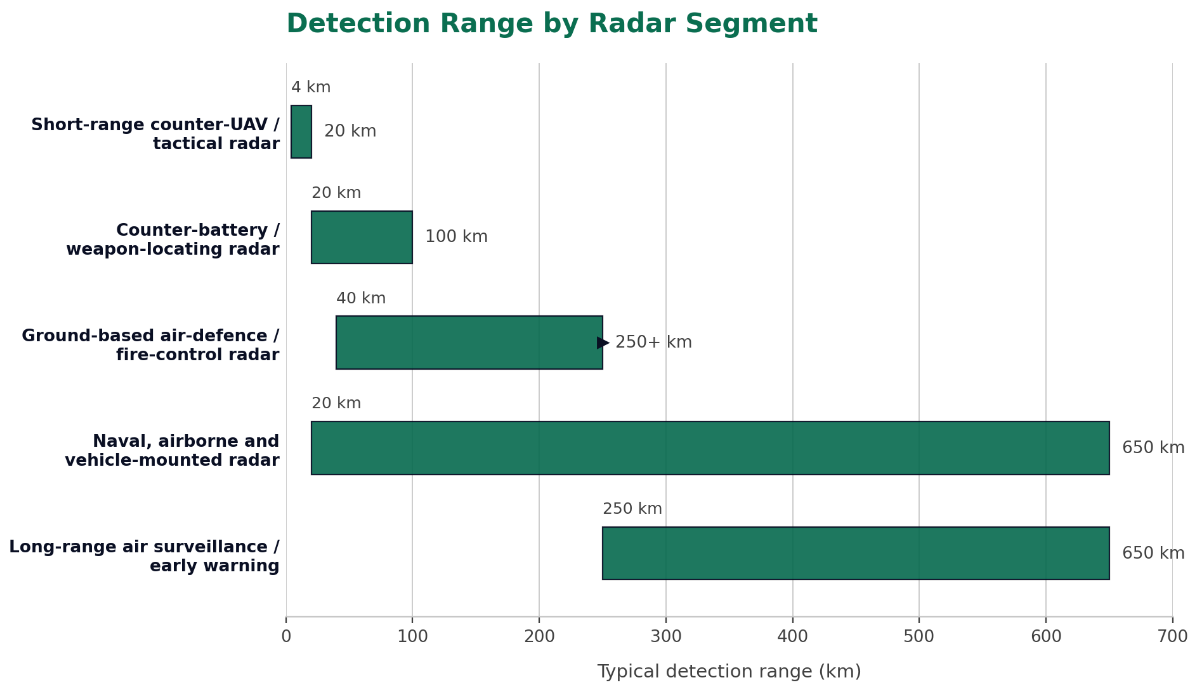
What the Market Includes

The radar market is not one single product category. It spans several segments with very different range profiles, price levels and procurement requirements. The table below illustrates how radar moves from large, strategic systems with long detection ranges and high programme values, to smaller tactical systems with shorter range but greater need for distributed deployment.

Segment	Typical use case	Examples	Typical detection range	Indicative price level	Market structure / investment angle
Long-range air surveillance / early warning	National or regional air picture; early warning against aircraft and missiles	Saab Giraffe 4A, Lockheed Martin TPS-77, Thales GM400, Hensoldt long-range radars	~250–650 km against larger aerial targets	Tens of millions per radar / programme-level procurement	Dominated by large primes. Hard to disrupt directly due to certification, integration and long procurement cycles.
Ground-based air-defence / fire-control radar	Supports missile and air-defence systems; tracks targets for engagement	Patriot AN/MPQ-65, LTAMDS, Hensoldt TRML-4D, Saab Giraffe AMB / 4A	~40–250+ km depending on system and target	High to very high. Full firing units or radar programmes can reach hundreds of millions	Strong prime/integrator market. Buyers prioritise reliability, interoperability and integration with effectors.
Counter-battery / weapon-locating radar	Detects artillery, rockets and mortars in flight and calculates launch position	Saab Arthur, COBRA, AN/TPQ-53	~20–100 km	Medium-high to high. Advanced systems can cost tens of millions	Specialised defence radar segment. Less about air surveillance, more about fast trajectory detection.
Naval, airborne and vehicle-mounted radar	Radar integrated into ships, aircraft,	Sea Giraffe, Erieye / GlobalEye, fighter	~20–650 km depending on platform	Usually platform-integrated and programme-level	Dominated by primes and platform integrators. Hard to compare directly

Segment	Typical use case	Examples	Typical detection range	Indicative price level	Market structure / investment angle
	ground vehicles or mobile air-defence units	radars, vehicle-mounted battlefield radar			because radar is often part of a larger system.
Short-range counter-UAV / tactical radar	Detects small drones around troops, bases, convoys and critical infrastructure	Saab Giraffe 1X, Robin Radar IRIS, APS FIELDctrl, Leonardo DRS RADA, Thales Gamekeeper, Echodyne EchoShield	Often ~4–20 km for small drones	Lower per unit: roughly €150k–€3m depending on configuration	Newer and more fragmented. Most venture-relevant segment because speed, mobility, software updates and cost matter more.
Software / sensor-fusion layer	Combines radar with RF, EO/IR, acoustic sensors, C2 and effectors	C-UAV integrators, C2 software, threat libraries, AI classification	Not range-based	Lower capital intensity than full radar hardware	Can sit across multiple hardware platforms. Attractive because value shifts from single sensor to detection-to-action system.

Note: Price ranges are indicative and based on public contract values and market estimates. Radar pricing is difficult to compare directly because contracts often include vehicles, integration, command software, training, support, spare parts and lifecycle services.



Bars show the typical detection-range span per segment. The arrow on ground-based air-defence / fire-control radar denotes an open-ended upper bound (40 - 250+ km) for the largest integrated systems. The software / sensor-fusion layer is excluded as it is not range-based – its detection radius is inherited from the hardware sensors it integrates.

The key point is that range, price and use case move together. Large radar systems are expensive, strategic and usually procured through major defence programmes. Short-range counter-UAV radar is different: it has shorter detection range, but requires many more mobile sensor nodes closer to troops, bases, convoys and critical infrastructure. This is where the market is changing fastest and where specialised companies may have the strongest opportunity.

Demand and Procurement

Western and NATO countries are closely watching the lessons from Ukraine. One of the clearest lessons is that small, cheap and low-flying drones have become a central battlefield threat. This is increasing demand for denser detection coverage, especially around troops, bases, convoys and critical infrastructure. This favours radar systems that are mobile, scalable, affordable and easier to deploy.

At the same time, radar remains a difficult market to enter. Traditional military radar is usually bought through national defence ministries and large defence programmes. Buyers prioritise reliability, certification, interoperability with existing systems, cybersecurity, production capacity and long-term support. This gives established defence primes a strong position.

However, counter-UAV requirements are developing faster than traditional procurement cycles. Drone threats change quickly, and tactical users need systems that can be deployed, tested and updated much faster than conventional defence platforms. This creates room for specialised companies where speed, mobility, cost and software updates matter more than building the largest full-spectrum radar system.

3. The case for Counter-Unmanned Aircraft Systems (C-UAS)

Counter-Unmanned Aircraft Systems (C-UAS) refers to the systems used to detect, track, classify and neutralise hostile drones. This includes radar, radio-frequency detection, optical and infrared sensors, acoustic sensors, command software and effectors such as jamming, interceptor drones, guns or missiles.

This is where the radar discussion becomes most relevant. Traditional radar remains a large and mature market, but the fastest-changing opportunity is in the C-UAS layer, where defence forces (and infrastructure operators) need to detect small, low-flying and fast-evolving drone threats. The market is already growing quickly, though estimates vary meaningfully by definition and scope. Mordor Intelligence estimates the anti-drone market at approximately USD 2.5 billion in 2026, growing at a compound annual growth rate of approximately 27.8% to USD 8.4 billion by 2031.[3] Broader market definitions produce higher current estimates: MarketsandMarkets, for example, estimates the global anti-drone market at USD 4.5 billion in 2025, growing at a CAGR of approximately 26.5% to USD 14.5 billion by 2030. Across sources, the direction is consistent: a market already in the low single-digit billions today, growing at a CAGR in the mid-20s% or higher.[4]

The rest of this report therefore focuses on why small drones create a new detection problem, why no single sensor is enough, and why the market is moving toward mobile, distributed and integrated C-UAS systems.

A Different Target Profile

Traditional military radar was primarily designed for larger aerial threats such as aircraft, helicopters, cruise missiles and ballistic missiles. These targets usually fly higher, move faster and reflect more radar energy than small drones.

Small drones have a very different profile. They are small, low-flying, slow-moving and often built with limited metal content. This makes them harder to detect, track and classify with legacy air-defence radar.

Radar cross-section, or RCS, measures how visible a target is to radar. It describes how much radar energy is reflected back to the receiver and is measured in square metres. The difference between traditional threats and small drones can be significant:

Target type	Radar cross-section (order-of-magnitude) [5,6]
Large fighter aircraft, F-16 class	~5 m²
Cruise missile, Tomahawk class	~0.05 m²
Commercial DJI Mavic-class drone	~0.01 m²
Purpose-built military FPV drone (composite frame, limited metal content)	~0.001 – 0.005 m²

(Illustrative order-of-magnitude ranges)

These figures are indicative, since radar visibility depends on angle, frequency, material and target shape. However, the operational implication is clear: a small drone may not appear as a weaker aircraft on radar. It may fall below the effective detection threshold of systems designed for larger targets.

This is why small-drone detection requires a different radar design logic. The system must be optimised for low radar cross-section targets, not only traditional air threats.

Low Altitude, Ground Clutter and Short Reaction Time

Small drones often fly close to the ground. This places them in the same radar environment as trees, buildings, vehicles and terrain, which also reflect radar signals. The radar must therefore separate a very small moving target from a noisy background.

This is the ground clutter problem. The challenge is not only to detect a return, but to identify which return is actually a drone. High clutter increases the risk of missed detections and false alarms, which can overload operators and reduce response quality.

This also explains why detection range is much shorter for small drones than for aircraft. A long-range radar may detect larger aerial targets at hundreds of kilometres, but a compact counter-drone radar may only detect a very small UAV at a few kilometres. Saab's Giraffe 1X, for example, can detect a UAV lighter than a milk carton at around 4 km[7]. Robin Radar IRIS has a standard instrumented range of 5 km[8], while Thales Gamekeeper / EagleShield states drone detection up to 18 km depending on configuration[9].

The reason this matters is reaction time. At 120 km/h, a drone detected at 500 metres gives roughly 15 seconds of warning. If detection happens too late, the defender may not have enough time to classify the object, decide whether it is hostile and choose a response.

Small drones also challenge other sensor types. Electric drones emit limited heat compared with vehicles, missiles or aircraft, making infrared detection harder, especially against warm ground backgrounds. They can also fly slowly enough to be confused with birds, while racing-class FPV drones can move fast enough to leave only seconds to react.

The lower, smaller and less visible the drone is, the more important it becomes to detect it early and classify it correctly.

From Ground Clutter to Operational Saturation

There is also a second type of clutter: operational saturation. Small drones and decoy UAVs can be used in large numbers to create many simultaneous tracks, force defenders to classify more targets and make it harder to prioritise the real threat.

Ukraine has shown this clearly. Russian attacks increasingly use Shahed-type strike drones together with cheaper decoy drones such as Gerbera and Parodiya. The purpose is not only to hit targets directly, but also to test, exhaust and overload air-defence networks. Even decoys without warheads can force defenders to operate at full capacity, spend attention and potentially waste expensive interceptors.

This changes the role of detection. The radar must first separate a small drone from the physical background. The wider C-UAS system must then decide whether that object is a strike drone, a decoy, a reconnaissance platform or part of a larger attack. The problem is therefore not only detection, but classification and prioritisation under pressure.

Smaller tactical radars do not solve this alone. Their role is to make the sensor layer more distributed. Instead of relying only on a few large radar systems, forces can deploy more mobile sensor nodes closer to the asset being protected. When combined with RF, EO/IR, acoustic sensors and command software, this can improve local coverage, reduce blind spots and help classify low-altitude drones before they force a response from more expensive air-defence systems.

The Threat Is Evolving Faster Than Traditional Systems

Small-drone detection is a moving target. Drone designs, control methods and attack tactics evolve faster than traditional defence procurement cycles. Attackers are reducing detectability through smaller airframes, lightweight materials, lower metal content, autonomous navigation, fibre-optic control and flight profiles that stay close to terrain.

Recent battlefield examples show this clearly. Ukraine's FP-1 uses lightweight materials such as epoxy resin and plywood, and is designed to fly at very low altitude to reduce radar detection[10]. Russia's Molniya follows a similar low-cost logic, with a simple airframe built largely from lightweight, non-metallic materials such as plywood and foam[11]. Attackers can quickly change airframes, materials, control links and flight profiles to make detection harder. These drones are not invisible, but they show why radar systems cannot rely on one fixed drone profile.

Fibre-optic FPV (First-Person-View) drones make this even more important. Traditional RF (Radio Frequency) detection can identify control or video signals between a drone and its operator. Fibre-optic drones reduce that signal dependency by using a physical cable rather than a radio link, making them harder to detect or jam through radio-frequency methods alone. The detection layer therefore cannot rely on one sensor type or one signature.

From Single Sensor to Detection System

The answer is not simply "better radar". Modern C-UAS systems increasingly combine several sensors and effectors. Radar provides range, direction, altitude, speed and continuous tracking. RF sensors detect control and navigation signals. EO (Electro-Optical) and thermal cameras provide visual confirmation. Acoustic sensors can support close-range detection and classification. Command software then fuses these inputs into one operating picture and connects them to effectors such as jamming, interceptor drones, guns, missiles or directed energy.

Ukraine's acoustic sensor network illustrates the same logic. Instead of relying only on high-end radar, Ukraine has deployed thousands of low-cost acoustic sensors to detect incoming one-way attack drones and send flight-path information to mobile fire teams.[12] The system does not replace radar, but it shows the direction of travel: C-UAS detection is becoming more distributed, cheaper per node and increasingly dependent on software that combines many sensor inputs into actionable tracks.

This shift is important because the commercial opportunity moves from a standalone radar unit to a broader detection-to-action layer. The value is increasingly in radar hardware, sensor fusion, classification software, threat libraries, APIs, integration and lifecycle updates.

The requirement is therefore becoming more specific. Counter-drone detection must be specialised enough to recognise small drones, mobile enough to survive near the front line, and updateable enough to keep pace with changing drone designs. It must also be scalable, because mass drone attacks require many sensor nodes rather than a few large fixed systems.

This is why the most interesting part of the radar market is not traditional long-range radar. It is the new C-UAS detection layer built around small, low-flying and constantly changing drone threats.

4. Alternative Sensor Technologies: From Single Sensors to Sensor Fusion

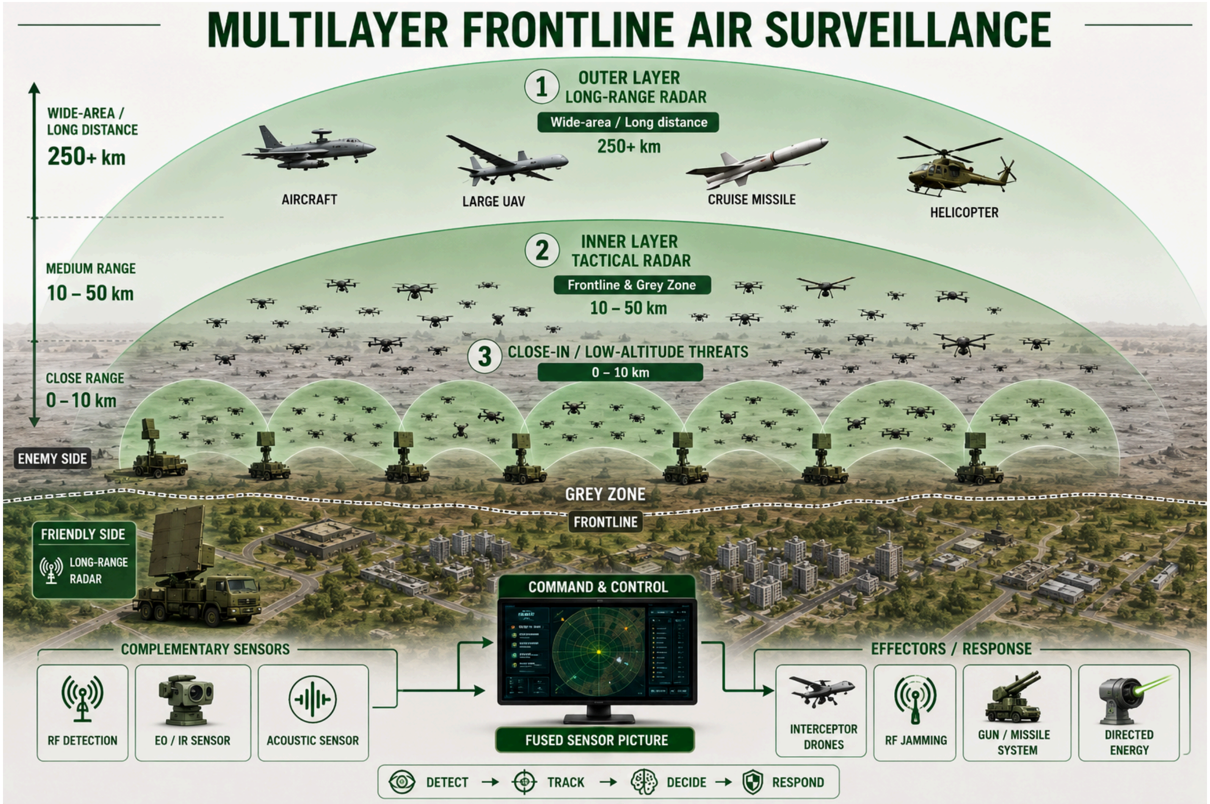
Alternative Sensor Technologies

Radar is a core part of the C-UAS detection layer, but it is not enough on its own. Small drones create a multi-dimensional detection problem. As written, they can be small, low-flying, radio-silent, low-heat, autonomous, fibre-optic-controlled or hidden in ground clutter. As a result, no single sensor type works reliably across all conditions.

This is why modern C-UAS systems are moving from standalone sensors toward integrated detection systems. Radar, RF detection, EO/IR cameras, acoustic sensors and command-and-control software each solve different parts of the problem. Radar provides physical detection and tracking. RF sensors detect signals. EO/IR helps confirm and classify the target. Acoustic sensors provide low-cost local awareness. Command software fuses these inputs into one operating picture and connects detection to action.

The key point is that the value is shifting from individual sensors to the full detection chain. The most capable systems are not simply those with the best radar or the best camera, but those that can combine multiple sensor inputs, reduce false alarms, classify threats and support a fast response.

Sensor / layer	What it detects or does	Why it is used	Main weakness	Best role in C-UAS	Investment implication
Radar	Physical objects, movement, range, speed and direction	Detects drones even without radio signals and provides continuous tracking	Cost, ground clutter, false alarms and difficulty with very small low-RCS targets	Primary detection and tracking layer	Still a core sensor category, especially for military-grade C-UAS
Radio-frequency detection	Control, telemetry and video signals between drone and operator	Passive, often lower-cost and can sometimes locate the operator	Weak against autonomous, encrypted, pre-programmed or fibre-optic drones	Early warning and signal detection	RF-only systems may become less defensible as drone control methods evolve
Electro-optical / infrared sensors	Visual and thermal image of the target	Confirms what the object actually is and supports classification	Weather, smoke, terrain, line of sight and low heat signatures from electric drones	Confirmation and rules-of-engagement layer	Valuable as part of a fused system, but weaker as a standalone detection layer
Acoustic sensors	Motor, rotor and propeller noise	Passive, low-cost and scalable across many local nodes	Short range and sensitive to wind, vehicles, artillery and background noise	Local supplementary detection and low-cost warning layer	Attractive for distributed networks, especially when combined with software
Command-and-control software	Fused sensor picture, threat classification and decision support	Turns detections into tracks, classifications and actions	Requires integration, low latency and high-quality data	Decision and prioritisation layer	One of the most scalable parts of the value chain



The investment implication is clear. Radar remains a critical sensor category, especially as drones become more autonomous, pre-programmed and fibre-optic-controlled. However, the broader opportunity is increasingly in integrated detection systems.

The most attractive companies may therefore be those that combine strong sensor hardware with classification software, sensor fusion, open architecture, threat libraries and integration into effectors. In this environment, the market is moving from single sensors toward systems that can detect, track, classify, prioritise and connect the threat picture to action.

5. Competitive Landscape: Short-Range C-UAS Radar

Relevant Competitive Set

The relevant competitive set is short-range Counter-Unmanned Aircraft Systems (C-UAS) radar: systems used for drone detection, tactical air defence, base protection, convoy protection and mobile counter-drone coverage.

These systems are not identical. Some are broader tactical radars, some are specialised drone-detection radars, and some are radar modules inside larger multi-sensor C-UAS platforms. The market is therefore competitive, but not yet standardised.

The key question is not which radar has the longest range in general, but which system is best aligned with the small-drone problem: low radar cross-section targets, low-altitude flight, ground clutter, short warning times, tactical mobility and integration with command software and effectors.

System / company	What it is	Approx. small-drone detection range	Indicative price level	Land-system fit	Positioning note
Molfar Defence Technologies (Front Ventures Investment)	Tactical counter-drone radar under development	Not publicly disclosed	Not publicly disclosed	Designed for tactical use and distributed radar networks	Built specifically around small, low-flying drones and complex battlefield environments. Field validation is the key open milestone.
Saab Giraffe 1X	Compact 3D multi-mission radar	~4 km for very small UAVs; broader air-surveillance range depends on target	~€1.2–2.0m	Mobile, fixed, deployable, vehicle-mounted	Credible, in-service tactical radar. Strong procurement position, but broader than drone-only detection.
Leonardo DRS RADA ieMHR	Software-defined multi-mission hemispheric radar	~10 km for nano UAVs; up to ~45 km for medium UAVs	~€200k per panel; ~€800k for four-panel configuration before integration	Vehicle, fixed-site and short-range air-defence integration	Mature multi-mission radar for C-UAS, C-RAM, ground surveillance and fire control.
HENSOLDT SPEXER 2000 3D	X-band AESA radar family for short-range surveillance and force protection	Configuration-dependent	~€0.8–1.8m	Fixed, mobile and vehicle-mounted	Broader force-protection radar with drone, bird, helicopter, vehicle and projectile classification.
Advanced Protection Systems FIELDctrl / SKYctrl	3D MIMO radar integrated into the SKYctrl C-UAS platform	up to ~8 km depending on FIELDctrl version and configuration	~€170–300k per radar panel; full system higher	Fixed-site, mobile and platform-integrated	Strong example of radar integrated with electro-optical sensors, radio-frequency detection,

System / company	What it is	Approx. small-drone detection range	Indicative price level	Land-system fit	Positioning note
					command software, jamming and kinetic effectors.
Robin Radar IRIS	Compact rotating 3D drone-detection radar	5 km standard instrumented range; 12 km selectable long-range mode	~€150–200k	Fixed-site, mobile and national airspace protection	Strong drone focus and rapid delivery profile. Well suited for air bases and critical infrastructure.
Thales Gamekeeper / EagleShield	Holographic radar inside a complete C-UAS platform	Up to ~18-20 km depending on configuration	~€1.5–3.0m for radar; complete site higher	Fixed-site and integrated C-UAS deployment	High-end integrated platform with radar, radio-frequency sensors, electro-optical sensors, command software, data fusion and threat assessment.
Echodyne EchoShield	Compact software-defined 4D radar module	Not publicly disclosed	Not publicly disclosed	Fixed, expeditionary and rapidly deployable C-UAS configurations	High-performance radar module selected for the United States Air Force SUADS architecture. Strong in integrated systems rather than standalone radar sales.
Weibel XENTA	X-band radar family for C-UAS and short-range air defence	Public sources indicate DJI-class drone detection beyond ~7 km and classification beyond ~5 km	Unit price not disclosed; large programme order above DKK 500m	Short-range air defence, counter-drone, border and perimeter protection	Established European radar supplier with strong short-range air-defence and C-UAS positioning.
Fortem TrueView / SkyDome	Compact AESA radar integrated with command software and DroneHunter interceptor	Configuration-dependent	Not publicly disclosed	Integrated detect-and-defeat platform	Strong example of radar paired directly with autonomous interception. Less comparable to pure radar suppliers.
Blighter A400 / A800	Counter-drone and ground-surveillance radar family	Up to ~20 km depending on system and target	Not publicly disclosed	Perimeter, border, base and site protection	Established in low-altitude and near-ground drone detection, with emphasis on clutter suppression and

System / company	What it is	Approx. small-drone detection range	Indicative price level	Land-system fit	Positioning note
					all-weather operation.
RTX KuRFS	High-end Ku-band radar for short-range air defence and C-UAS	Not publicly disclosed	Not publicly disclosed; high-end U.S. programme system	Integrated U.S. Army air-defence architecture	Highly validated but positioned at the premium defence-programme end of the market. Not directly comparable to lower-cost distributed tactical nodes.

Coverage Economics and Survivability

The value of a tactical radar network is determined not only by the performance of one individual radar, but by how many deployed radar nodes are needed to protect a given area.

A radar node means one radar unit deployed in the field as part of the network. Each node creates a local detection bubble around itself and needs power, communications, maintenance and integration with command-and-control software. In practice, the question is therefore not only "how far can one radar see?", but "how much area can a network of radars protect reliably, at what cost, and with how much survivability?"

For illustration, a radar with a 3 km effective operational radius and a 50% usable coverage factor would cover approximately 14 km² per deployed node. The 50% factor reflects that real-world coverage is never a perfect circle: terrain, buildings, vegetation, blind spots, overlap between radars and redundancy reduce the usable area.

Protecting 100 km² would therefore require up to eight radar nodes. At a unit cost of €200,000, the radar hardware cost would amount to approximately €1.6 million.

A radar costing €1.5 million with a 6 km effective operational radius would cover approximately 57 km² under the same assumptions. Protecting 100 km² would require at least two radar nodes, resulting in approximately €3 million of radar hardware.

This shows why maximum range alone can be misleading. A more expensive radar may cover a larger area per unit, but a network of smaller radars can sometimes provide broader, denser or more resilient coverage at a lower total hardware cost.

The distributed architecture also provides a survivability advantage. If one of eight radar nodes is destroyed, jammed or forced to relocate, only part of the protected area is affected and the remaining network can continue operating. By contrast, if the network depends on only one or two high-value radar systems, the loss of one system can create a much larger coverage gap.

Smaller radar nodes are also easier to conceal, move and replace. An adversary must find, target and engage multiple smaller sensor points rather than one or two large high-value radar assets.

This advantage is not free. More radar nodes also mean more networking, power supply, maintenance, spare parts, operator training and integration requirements. The relevant metric is therefore not detection range alone, but total cost per reliably protected square kilometre, adjusted for terrain, overlap, redundancy, communications, replacement cost and network survivability.

What the Landscape Shows

Established systems offer procurement credibility, integration experience and proven defence-customer access. Saab, Leonardo, HENSOLDT, Thales, Weibel and RTX are examples of suppliers with strong positions in tactical radar, short-range air defence or integrated air-defence architectures. These systems are important, but many are broader than drone-only detection and the new threats shown in Ukraine.

Specialised systems are positioned differently. Robin Radar IRIS, APS FIELDctrl, Echodyne EchoShield, Fortem TrueView, Blighter and Molfar-like systems are more directly linked to the C-UAS detection problem. Their focus is not only air surveillance, but detecting, tracking and classifying smaller targets closer to the protected asset.

The landscape also shows that radar is increasingly becoming part of a wider system. APS SKYctrl, Thales EagleShield, Fortem SkyDome and Trust Automation's SUADS all point in the same direction: radar is connected to radio-frequency sensors, electro-optical sensors, command software, data fusion and effectors.

The white space is therefore not simply "another radar". The more interesting space is a system that combines drone-specific detection, tactical mobility, lower-cost deployability and open integration into wider C-UAS architectures. Those systems should not be framed as replacing established radars across the market. It should be framed as competing for the specialised detection layer below broader air-surveillance systems.

The key commercial question is whether specialised counter-drone radar can prove field performance, scale production and enter NATO procurement channels.

NATO and Allied Procurement Signals

Recent procurement signals show that short-range C-UAS detection is moving from experimentation to structured procurement.

Poland is one of the clearest examples. The SAN programme is a major national counter-drone air-defence programme worth approximately PLN 15 billion net. It includes 18 counter-drone batteries, 52 fire platoons, 18 command platoons and more than 700 vehicles[13]. Advanced Protection Systems is a key technology supplier, and the programme includes radar, electro-optical systems, command software, electronic warfare and kinetic effectors. This is important because it shows that C-UAS is being procured as an integrated land system, not as a single standalone sensor.

The United States is also moving in this direction. Trust Automation received a $490 million indefinite-delivery / indefinite-quantity contract from the United States Air Force for Small-Unmanned Air Defense System capabilities[14]. Echodyne EchoShield was selected as a primary radar for fixed, expeditionary and rapidly deployable configurations – further evidence of demand for compact radar inside modular, deployable C-UAS systems.

Saab's Giraffe 1X also shows growing NATO traction. Sweden placed an order for Giraffe 1X radars worth approximately SEK 650 million in December 2025[15]. The United States Army awarded Saab a contract worth approximately $46 million for Giraffe 1X radars, with deliveries starting in 2026[16]. France also ordered 17 Giraffe 1X radars in 2026, with 16 systems to be mounted on Scania tactical vehicles[17], underlining demand for compact radar that supports mobile short-range air defence and counter-drone missions.

The Netherlands provides a more drone-specific example. The Dutch Ministry of Defence ordered 100 Robin Radar IRIS drone-detection radars in December 2025. Robin Radar stated that the first 30 systems shipped within 24 hours and the first 50 had already been delivered shortly after contract announcement[18]. This is a strong signal that customers are beginning to buy drone-detection radar in volume, not as one-off pilots.

Other allied signals point in the same direction. Australia has allocated up to A$7 billion for counter-drone capabilities over ten years[19]. DroneShield has received large European and United States counter-drone orders, although these are broader C-UAS systems rather than radar-only procurements. Weibel Scientific also signed a large order with Kongsberg Defence & Aerospace for XENTA radars used in short-range air defence and counter-drone applications[20].

The message is consistent: demand is shifting toward layered, mobile and integrated C-UAS systems. Radar remains a core sensor, but procurement is increasingly focused on complete detection-to-action architectures. This supports the case for specialised companies that can solve small-drone detection problems and integrate into larger NATO and allied systems.

6. Key Risks

Western Procurement Inertia

One of the main risks is slow Western adoption. Defence procurement in NATO countries is typically built around long budget cycles, formal requirements, certification processes and multi-year framework agreements. Many customers already have existing relationships with large defence primes and have invested in radar, air-defence and command systems that are expected to remain in service for many years.

This creates a timing risk for specialised Counter-Unmanned Aircraft Systems (C-UAS) radar companies. Even if the threat is evolving quickly, procurement systems may not adapt at the same speed. New systems may need to be tested, certified, integrated and approved before larger orders are placed. As a result, the market opportunity can be large, but commercial conversion may take longer than the operational need suggests.

Competitive Response from Defence Primes

Large defence primes are unlikely to ignore the C-UAS detection market. Companies with existing radar portfolios, defence-customer relationships and integration experience can respond by developing smaller tactical systems, bundling C-UAS radar into broader air-defence packages or acquiring specialised companies.

This is a risk because primes can outscale smaller companies in production, certification, government relationships and lifecycle support. They can also use existing procurement channels to defend their market position. However, this risk also has a positive side. If a specialist company can prove differentiated performance, field validation and strong integration potential, it may become an attractive partner, supplier or acquisition target for larger defence companies.

Technical Complexity and Capital Intensity

C-UAS radar and tactical short-range radar are technically difficult to build and maintain. The system must detect, track and classify small drones, but often also needs to fit into a broader air-defence picture covering loitering munitions, larger unmanned aerial vehicles, helicopters, low-flying aircraft and other short-range threats.

This requires advanced radar engineering, signal processing, classification software, testing infrastructure and continuous updates as both drone designs and broader battlefield threats evolve.

The cost and complexity of development create high barriers to entry, but they also create execution risk. A company may prove performance in controlled tests but struggle with field reliability, production quality, maintenance, software updates or integration into military systems. Scaling from prototype to deployable defence product is therefore a major milestone.

Customer Access and Integration Risk

A further risk is that technical performance alone may not be enough to win in the Counter-Unmanned Aircraft Systems (C-UAS) radar market. Defence customers rarely buy a standalone sensor in isolation. Radar systems often need to be integrated with existing command-and-control software, air-defence networks, vehicles, radio-frequency sensors, electro-optical and infrared sensors, electronic warfare systems and effectors.

This creates a customer-access and integration risk for specialised radar and sensor companies. Even if a system performs well technically, it may still face long sales cycles if it cannot integrate smoothly into existing military architectures or if the company lacks access to the right procurement channels, prime contractors and system integrators.

This risk applies broadly across the market, not to one company specifically. The C-UAS market is moving toward complete detection-to-action systems, where customers value interoperability, open interfaces, low latency, data quality, cybersecurity and lifecycle support. Companies that can only provide a strong sensor may struggle if they cannot also show how that sensor fits into the wider operational system.

For smaller and specialised companies, this makes partnerships important. The strongest commercial path may not always be direct sales to defence ministries. In many cases, success may depend on becoming a subsystem supplier, technology partner or integrated component inside larger C-UAS and air-defence programmes.

7. Why Invest

A New Tactical Detection Gap Is Emerging

The detection gap is not uniform across the market. Some modern tactical radars can detect and track small UAVs effectively, but many existing systems were designed as broader multi-mission radars rather than being optimised specifically for low-RCS, low-altitude drones operating in complex ground clutter.

This creates a more specific market gap than simply “better radar”. Current systems often involve difficult trade-offs. Some provide strong detection performance, but are too expensive, power-intensive or operationally complex for dense deployment close to troops, bases, convoys and critical infrastructure. Others are more compact and affordable, but may face limitations in range, tracking accuracy, clutter rejection, false alarm reduction or target classification. The most capable systems can address several of these challenges at once, but usually at a significantly higher acquisition and lifecycle cost.

This matters because small drones require a different detection logic. They are often small, low-flying, slow-moving and built with limited metal content. They may operate close to terrain, buildings, vehicles, trees and other background objects that also reflect radar signals. In these environments, the challenge is not only detecting a radar return, but identifying which return is actually a drone, maintaining a reliable track and giving operators enough time to respond.

A further limitation is integration. A radar creates limited operational value if it cannot function as a modular sensor within a wider C-UAS architecture. It must be able to exchange low-latency track data with command-and-control software, EO/IR systems, RF sensors, acoustic sensors and effectors through open and secure interfaces. Proprietary architectures, poor data quality, integration complexity and vendor lock-in can therefore be as important as radar performance itself.

The market opportunity lies in reducing these trade-offs: delivering reliable detection and tracking of small UAVs in cluttered environments, with sufficient range and accuracy, while maintaining a cost, form factor and integration architecture that supports distributed deployment and multi-sensor operation at scale.

The competitive advantage is therefore not maximum range alone. It is the combination of detection quality, false alarm performance, coverage economics, interoperability and battlefield survivability. A successful tactical C-UAS radar does not need to replace prime-led long-range radar systems. It can become an additional specialised layer below broader air-defence systems, protecting troops, bases, convoys, artillery, logistics nodes and critical infrastructure against the small-drone threat.

For investors, this is attractive because it creates a more specific and defensible opportunity than radar in general. Companies that can solve the tactical small-drone detection problem at scale may become critical infrastructure for the next generation of C-UAS and short-range air defence.

Tactical Counter-Drone Radar Is Still Fragmented

The short-range C-UAS radar market remains competitive, but not yet standardised. Established defence companies offer credible tactical radar systems, but many are broader multi-mission products designed for short-range air defence, counter-rocket, artillery and mortar warning, ground surveillance or force protection. Specialist companies are more focused on drone detection, but many are still proving field performance, production scale and procurement access.

This fragmentation creates an investment window. The likely winners will not be the companies with the longest theoretical detection range, but those that combine operational performance, tactical mobility, lower-cost deployment and easy integration into wider C-UAS systems.

The market may also consolidate. Large defence primes are likely to acquire, partner with or integrate specialist technologies rather than build every niche capability internally. For a specialist company with real performance, this creates potential strategic value beyond standalone sales.

Ukraine Provides Real-World Validation

Ukraine has made the small-drone problem impossible to ignore. The war has shown how cheap drones, decoys, fibre-optic first-person view drones, one-way attack drones and mixed drone-and-missile attack packages can pressure traditional air-defence systems, reinforcing why detection has to come first in the C-UAS chain.

Ukraine also validates the direction of the market. Detection is becoming more distributed, multi-sensor and software-driven. Acoustic networks, mobile fire teams, radar nodes, radio-frequency detection, electro-optical confirmation and command software all point toward the same conclusion: the future C-UAS architecture is not one large sensor, but many connected sensors feeding a decision layer.

This matters because Ukrainian battlefield feedback compresses product development cycles. Systems that can learn from operational data, update threat libraries and adapt to new drone designs may improve faster than traditional procurement programmes.

Radar Makes Interceptor Drones More Effective

The value of C-UAS radar increases significantly when it is connected directly to interceptor systems. Detection alone is not enough. A radar track must be connected to a response system, whether that response is jamming, an interceptor drone, a gun, a missile, a laser or another directed-energy system.

Interceptor drones are one of the most attractive effectors against low-cost UAVs because they can be much cheaper than traditional missiles. However, they also have a clear operational limitation: short flight time and limited engagement windows. Some Ukrainian interceptor drones have reported flight times of around 20 minutes, meaning they cannot simply patrol the sky for long periods waiting for a target.[21]

This makes radar critical. Without good target data, operators are forced to launch late, search visually and estimate where the incoming drone is likely to be. With radar, the system can detect the target earlier, estimate speed, altitude and direction, and launch the interceptor only when there is a realistic intercept opportunity. The radar does not necessarily need to guide the interceptor all the way to impact. Its main role is to provide the initial track, cue the launch, reduce search time and bring the interceptor close enough for onboard optical, thermal or AI-assisted guidance to complete the engagement.

This improves the economics of the whole C-UAS system. Better radar increases the useful range, timing and probability of success of interceptor drones. It also reduces wasted launches, operator workload and the need to use expensive missiles against cheap drones. Battlefield examples from Ukraine show how practical this integration has become: operators have reportedly even added radar-reflective material, such as aluminium foil, to friendly FPV interceptors to make them more visible on their own radar picture.[22]

The investment implication is important: radar is not only a detection product. It is an enabling layer for low-cost interception. As interceptor drones become a larger part of air defence, demand should increase for tactical radar systems with clean tracking data, low latency, classification software and open integration into command systems. The better the radar layer, the more effective and scalable the interceptor layer becomes.

A European Alternative to Prime-Led and Non-European Supply

Western militaries are increasing C-UAS procurement, but the supply base remains concentrated around large defence primes and a limited number of specialist suppliers. This creates a strategic opening for European and Ukrainian companies that can offer specialised, battle-informed and scalable detection technology.

The case is not that European customers should avoid American or prime-led systems. Many of those systems will remain important. The case is that NATO and European countries are unlikely to want full dependence on a small number of non-European suppliers for such a critical layer of air defence. Local production, faster iteration and European supply-chain control are becoming more important procurement considerations.

This supports the investment case for specialised European C-UAS radar and sensor companies. If they can prove performance, scale production and integrate into NATO-compatible systems, they can become suppliers, original equipment manufacturer partners or acquisition targets for larger defence companies.

The core investment thesis is simple: small drones have created a new detection gap, and the market is moving toward specialised, distributed and integrated C-UAS systems. Companies that can solve the detection problem at tactical level may become valuable infrastructure for the next generation of air defence.

Front Ventures Investment: Molfar

In June 2026, Front Ventures invested EUR 1.5 million in Molfar Defence Technologies, a Polish-Ukrainian radar company developing tactical radar systems for the early localisation and tracking of small, low-flying airborne threats.

Molfar is positioned directly in the part of the market highlighted in this report: the emerging Counter-Unmanned Aircraft Systems (C-UAS) detection layer. The company is focused on tactical radar systems intended to operate close to the units and environments that need protection, with planned validation in Ukraine and NATO countries.

The investment reflects several of the report’s key findings. Small, low-flying drones are creating a detection gap that traditional radar infrastructure was not designed to solve. The market is moving toward distributed, tactical and integrated C-UAS systems rather than relying only on large fixed radar assets. Ukraine provides real-world battlefield feedback, while NATO countries are beginning to increase procurement of counter-drone capabilities.

Molfar should therefore not be viewed as a replacement for established prime-led radar systems. The more relevant opportunity is to build a specialised detection layer below broader air-defence systems: closer to the frontline, focused on small-drone detection, and designed to integrate into wider C-UAS architectures.

Want to know more or support Ukrainian defence innovation?

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