Photo courtesy Keith Turner/Shutterstock

Countering UAS technology

The massive boom in unmanned aerial system (UAS) technology in the last decade has seen the rapid advancement of a relatively new major source of threat. With militaries the world over jumping on board with their own UAS for offensive missions, the sector has scrambled to come up with solutions to protect against this new form of adversary.

Amy Saunders, Editor, Global Military Communications

Originally designed for military missions that were too 'dull, dirty or dangerous' for human participants, unmanned aerial systems (UASs) have by now made their mark across a wide range of sectors, moving beyond pure tactical sectors through to a whole host of commercial applications. Indeed, today UASs are utilized enormously by the commercial sector for mapping, surveying, utilities, and the monitoring of crops, livestock, weather, etc.

It's no surprise then that the latest report from MarketsandMarkets forecasts that the global UAS market will grow at a CAGR of 16.4 percent from 2021 through to 2026 to reach US$58.4 billion by 2026. North America is expected to account for the largest share of the market during the reporting period. Demand is expected to increase further as new technologies such as artificial intelligence is incorporated into UASs, which will enable activities such as data analysis without human intervention. The COVID-19 pandemic has had a significant impact on the UAS sector; production was largely halted in 2020 and again in parts of 2021 in line with lockdowns, staff shortages, raw material shortages, social distancing protocols. It is likely to be some time yet until usual production levels and supply chains return to normal.

Within the military sphere, UASs have been employed for more than a decade now, and budgets for UAS technology continue to grow year-on-year. The DoD budget request, for example, grew by 26 percent year-on-year to US$9.39 billion in 2019, and featured orders for at least 2,447 new UAVs. Globally, the military market for UASs is expected to grow at a CAGR of nine percent over 2021-2026 to US$19.641 billion.

Early detection

It sounds obvious to say, but one of the most critical aspects of protecting against UASs is in their early detection and identification. Indeed, whether we're talking about the battlefield, an airport, commercial buildings or a secure location, situational awareness is critical to maintaining the tactical advantage. This has become more challenging in recent years as UAS technology has stormed ahead, with micro-drones and increasingly sophisticated autonomous navigation posing a major threat.

In October 2021, Thales launched a new solution for the early detection of UASs: The GO20 MM radar, which uniquely combines ground and low-level air surveillance in a single surveillance asset to offer exceptional early UAS detection and automatic classification. The GO20 MM provides continuous 360° 3D coverage for a multitude of threats; the radar surveys a large volume in 3D, with fast update rates, enabling early detection and automatic classification of long-range drones especially when they are not yet a threat, providing additional crucial seconds for C-UAS measures.

Through a simple HMI Venus interface, operators automatically and easily recognize a threat, gaining precious time to decide if and what counter strategy to adopt. In complex scenarios such as asymmetric conflicts or high-density combat, the ability to classify automatically and quickly to get a fast situation picture provides tactical advantage. Thanks to its compact size and modular configuration, the GO20 MM is easily transportable and deployable. In five minutes, two soldiers can set it up and quickly redeploy for a new mission, whether on a mast or for off-board operations. Moreover, the GO20 MM provides Armed and Special Forces with seamless situational

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Counter UAS developments

The booming UAS sector and indeed the increasing instances of UASs being utilized my mischievous or malicious entities, has prompted urgent activity and the creation and rapid growth of the counter-UAS (C-UAS) sector.

The C-UAS market is expected to grow at a CAGR of 15.18 percent from US$1.57 billion in 2021 to US$6.44 billion by 2031, according to research from ReportLinker. The market is expected to be dominated by North America during the reporting period. Indeed, several interesting projects are being reported even amongst the ongoing COVID-19 chaos, with innovations being spread far and wide throughout the world. While the majority of R&D continues into traditional kinetic systems, alternatives are now being trialed in select locations.

An ultra-modern, and more science fiction solution to the ever-expanding threat of UASs is laser, or directed energy, technology. Still very much in their infancy, lasers have the potential to inflict extreme harm on personnel and equipment from a tiny form factor and with relatively low energy input. The appeal to military groups across the globe is obvious: Lasers represent the next generation of adaptable, mobile, reusable, non-lethal and lethal weapons.

In July 2021, France's Armed Forces Ministry conducted advanced testing of a laser-powered cannon reportedly capable of destroying a moving drone. Developed by Cilas, the High-Energy Laser for Multiple Application – Power (HELMA-P) can neutralize in-flight targets up to 1km away in a matter of seconds. The cannon is expected to be in play by the 2024 Paris Olympic Games and will help secure this and other major events.

The HELMA-P is designed to respond to small UASs, securing operations on national territory by identifying, tracking, and neutralizing fixed or mobile threats. According to Cilas, the weapon has destroyed drones moving at more than 50km/h and under difficult tracking conditions.

Additionally, it can be used to neutralize improvised explosive devices.

As well as the HELMA-P project, France's military is also reportedly preparing a tender to develop an electromagnetic wave cannon and an interceptor drone capable of protecting against enemy drones. Such weapons can fire projectiles within 200km at five times the speed of sound, making use of powerful jolts of electric current to propel non-explosive slugs at supersonic velocities.

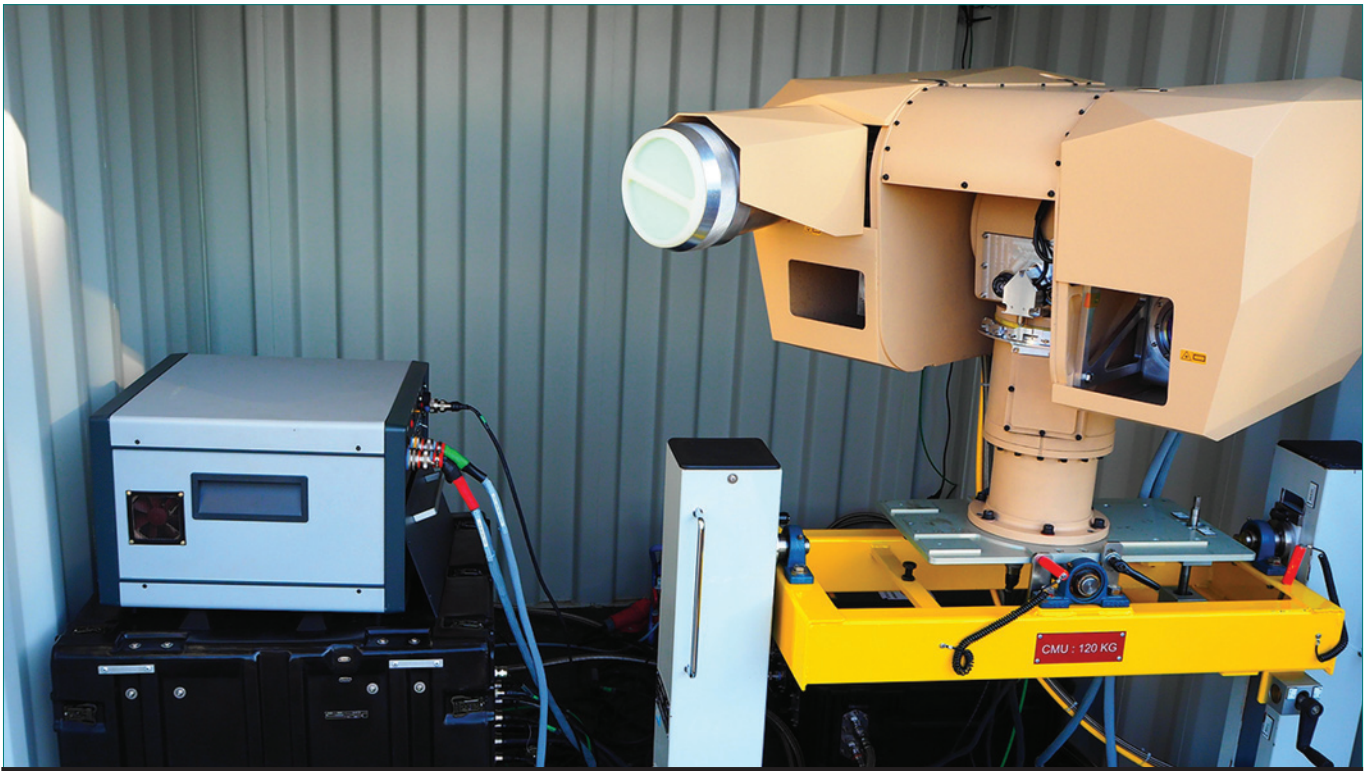
Also exploring directed energy weapons, August saw the Indian Navy award Bharat Electronics Limited (BEL) a contract for the supply of a locally developed system designed to detect, track, and neutralize micro UASs. The contract is for an undisclosed number of Naval Anti Drone Systems (NADSs) featuring both soft- and hard-kill effector options. The soft-kill consists of a jammer used to suppress the control and navigation signals to the UAS, with an effective range of 3km, while the hard-kill consists of a high-energy laser that works by directly damaging or destroying the UAS's flight-critical systems.

Developed jointly by the IN, BEL, and the Defence Research and Development Organization (DRDO), the C-UAS system "will be an effective all-encompassing counter to the increased drone threat to strategic naval installations," according to the Indian Government's Press Information Bureau (PIB).

Meanwhile, in September, Raytheon UK was awarded a demonstrator contract to provide a High-Energy Laser Weapon System (HELWS) to the UK Ministry of Defence (MoD). Raytheon UK will deliver the high-energy laser demonstrator to show the application of directed energy weapons technology to help protect UK armed forces personnel from UASs in the battlefield.

A high-energy laser demonstrator will be installed by the Raytheon UK team on one of the MoD's Wolfhound land vehicles for a period of comprehensive experimentation. The experimentation provides an opportunity to establish how HELWS could enhance UK capabilities, while augmenting understanding in high-energy laser weapons.

The modular counter-UAV system uses an electro-optical/infrared sensor that prosecutes highly manoeuvrable threats with precision and relative ease. The system can be installed on a variety of platforms and has been fielded in several real-world environments; it can also be integrated with many modern air defence systems, offering a robust layered defence capability as needed. **GMC**



Multiple Application – Power (HELMA-P) can neutralize in-flight targets up to 1km away. Photo courtesy Cilas

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