

DRONES

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Cover Story



Prof. M S Prasad
Director of AISST
Amity University

In Conversation with

Mr. Sanjay Datta

Chief, Underwriting & Claims, ICICI Lombard.



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Hello my dear Readers,

Welcome to yet another edition of Drones World, India's first ever bi-monthly magazine that offers a closer perspective of all things on or about Drones Industry.



The pandemic has taught us so many things, and most importantly, how to use technology to the optimum. One of the major aspects to be taken care of this year is contactless delivery of goods and the use of bots instead of humans to avoid spreading the contagion. For that, the Unmanned Aerial Vehicles or drones are now used to deliver essentials, medical supplies, work as surveillance devices, and function as emergency ambulances. No wonder, the future would be for the bots and drone technology.

Drones are helping several governments and authorities during this post pandemic COVID-19. Indian Government is trying to draft new rules and regulations of BVLOS Drones to avoid the initial restrictions that were imposed on them.

In this issue, we have covered the essential bits of global news, innovations, Acquisitions, trails & new products. The special Interviews with Mr. Sanjay Datta, Chief, Underwriting & Claims, ICICI Lombard expects the market for drones to go up and thereby also the drone insurance market to increase. & Robert Cheek Chief Operating Officer of Uvify believes Over the next 2-5 year period the drone industry will create an abundance of new employment opportunities.

It's a boon for Drone Startups to showcase their abilities and capabilities to attract investors and governments around the world. We wish to see the whole unmanned industry as the winner of the decade & it's the need of the hour to save our lives and the world in the present and future.

Our Current Issue Cover Story is on Anti-Drones will give you clear picture of drone detection methods as Counter-drone technologies for perimeter security cover a wide range of capabilities and niches. As drones become more affordable to deploy, defenses safeguarding military bases or other key installations must be multi-layered, adaptive, and reliable.

With that, I take your leave this month. More when we meet again in our next issue.

Till then, stay safe, God bless.

Thanks

Kartikeya

B. Kartikeya
Editor

Volocopter Conducts First Crewed eVTOL Flight in France



Volocopter became a two-time pioneer as the first eVTOL developer to conduct both crewed and remotely piloted test flights in France. The crewed flights were part of a week-long urban air mobility (UAM) test campaign that will give Volocopter and its partners - Groupe ADP and RATP Group - key insights for subsequently launching the UAM industry in time for the 2024 Paris Olympic and Paralympic Games.

Volocopter's full-scale testing

prototype, the 2X, was used to perform successful flight tests at Pontoise airfield in Paris to measure the aircraft's noise emissions. This data will be used by the company's partners to shape the future of urban air mobility services in and around Paris.

"We have demonstrated our pioneering power once again here in Paris," said Volocopter's Chief Commercial Officer Christian Bauer. "By flying our aircraft in a crewed configuration at a Paris airport, we are proving to one of our launch cities firsthand that our aircraft will offer a practical addition for potential airport-to-city routes."

Volocopter first flew its electric vertical takeoff and landing (eVTOL) aircraft in France uncrewed at the Paris Air Forum held in June 2021. Together with its partners, the company is gearing up for

commercial launch in the next 2-3 years.

UAM refers to a subcategory of advanced air mobility (AAM) and how advanced aircraft (i.e., eVTOLs) can operate in and around cities. Seen as an addition to existing transportation options, UAM supports the development of environmentally friendly mobility solutions and will offer cities worldwide a unique mix of urban multimodal transportation systems.

The UAM testing sandbox at Pontoise airfield addresses the challenges of this new form of mobility directly by assessing UAM solution use, acceptability, regulations, technologies, and industrialization. Furthermore, the airfield offers a real and secure aeronautical environment in a suburban area, 35 km northwest of Paris.

TeamViewer Enables Real-time Remote Video Sharing for Industrial Aerial Drones by SB C&S (SoftBank Commerce & Service)



TeamViewer, a global leading provider of remote connectivity and workplace digitalization solutions announced that its connectivity solution is integrated into the professional aerial drones provided by SB C&S (SoftBank Commerce & Service). Team Viewer's software enables the real-time sharing of aerial video and audio streams captured by the drones' cameras to multiple remotely connected devices. Commercial use cases for this technology include for example joint infrastructure inspections, as

well as joint aerial inspections of disaster sites or other locations that are difficult to access.

Via Team Viewer's solution, images or videos captured by the drone-carried camera can be seamlessly streamed to multiple remotely connected devices through a 4G or LTE mobile network. Also, the images from devices such as infrared cameras for temperature measurements or LiDARs could be transmitted and streamed through the solution.

Katsumi Moriya, Vice President, Deputy Head of ICT Unit, Head of Cloud Service Promotion Division, Cloud Service Unit at SB C&S, said: "In recent years, there has been an increasing need to remotely check real-time video footage of aerial photography using drones and to give instructions directly to the operator. We are pleased that we can now offer this effective utilization of our drones together with TeamViewer. We will continue

solving customer issues together with TeamViewer in response to the rapidly increasing need for aerial drones in different kinds of scenarios."

"The real-time aerial imagery transmissions enable people located in different parts of the world to efficiently work together on exploring remote locations", said Sojung Lee, President APAC at TeamViewer. "Although our solution is perfectly working with 4G and LTE networks, the worldwide introduction of 5G networks will enable various additional use cases, with even higher image resolutions and larger amounts of data to be transmitted and shared in real-time. We are happy to work with our strong partner SB C&S to address challenges and explore use cases of various customers from industry as well as public authorities."

Red Cat Holdings Selected by U.S. Army for Short Range Reconnaissance Tranche 2 Drone Program



Red Cat, a hardware-enabled software provider to the drone industry, announces that its subsidiary Teal Drones (Teal) has been selected by the Department of Defence’s (DoD) Defense Innovation Unit (DIU) and U.S. Army to compete in the Short Range Reconnaissance Tranche 2 (SRR T2) Program of Record.

Teal was selected to develop a next-generation small unmanned aerial system (sUAS) designed for surveillance and reconnaissance (S&R) duties, with a focus on autonomous capability, for the U.S. Army. The ultimate goal of the SRR T2 program is to provide a small, rucksack portable sUAS that gives all Army platoons (20-50 soldiers)

with situational awareness beyond the next terrain feature.

Following a successful demonstration in September 2021, Teal was notified by the U.S. Army’s Short Range Reconnaissance Product Office that it would advance to the prototype phase of the SRR T2 program and was awarded a \$1.5M prototype contract. Teal will develop a next-generation drone that meets or exceeds the Army’s technical system requirements of SRR T2 and competes for the SRR T2 production contract.

“The rigorous technical requirements and program objectives of SRR T2 dramatically narrowed the field from over three dozen drone manufacturers to just a handful that were selected by the Army to move forward with the program. We believe this puts us among the most elite drone manufacturers in the world and, consequently, is a significant recognition of our capabilities,” commented George Matus, founder

and Chief Executive Officer of Teal. “The \$1.5 million prototype contract we were awarded for SRR T2 reinforces the sophistication and technical expertise of our entire Teal Team. We look forward to developing the Army’s next-generation sUAS to improve the safety and lethality of our warfighters.”

The SRR Tranche 1 program began in 2020, and Teal was similarly selected for that program with a prototype contract award as part of its selection. The five drones (including Teal’s Golden Eagle) developed for SRR Tranche 1 became the five drones named to the Blue sUAS list in August 2020 and were subsequently approved by the Department of Defense (DoD) and other U.S. Federal Departments. The Blue sUAS list was originally developed by the Defense Innovation Unit (DIU), an organization within the DoD organization, that is focused on integrating leading commercial technologies into the Government.

Percepto drones receive approval to fly BVLOS under new European regulation

Percepto, pioneering autonomous inspection by industrial robotics announced that the Dutch civil aviation authority (ILT) has approved Percepto drones to operate Beyond Visual Line of Sight (BVLOS), making it the first BVLOS approval granted to Percepto under the new European drone regulations.

The approval will enable Falcker, Percepto’s partner, to empower their customers to conduct drone flights out of sight of the drone pilot with Percepto’s drone-in-a-box system. An operator located in the control room can easily manage and monitor pre-scheduled fully autonomous drone missions. The approval paves the way for automated inspections of industrial installations and security applications in the region. Falcker will conduct its first drone inspections with the new approval later this month with expansion into Germany and Belgium planned

for the near future.

New European Aviation Safety Association (EASA) drone regulations came into effect in January 2022, providing a framework for companies to perform complex operations and harmonizing the rules throughout the continent. Under the new rules, approvals granted by one member state can be used in similar conditions throughout all EASA member states. Gaining this first BVLOS waiver in Europe lays the groundwork for the company to achieve future waivers throughout Europe as the company has achieved similarly in the United States, Australia and Israel.

Percepto’s drones are integrated into Autonomous Inspection & Monitoring (AIM), an end-to-end software solution. The drone-in-a-box solution is industrial-grade and weatherproof with a high-resolution RGB camera and a thermal camera. Percepto drones take off autonomously from a docking station and then fly routine inspection missions with imagery

processed by Percepto AIM. Drones can also perform flights as needed in the event of disasters, such as a fire or security breach. At the end of each flight, the drone returns to the box to be charged for future deployment.

“We are thrilled about this latest BVLOS achievement, which will make a big impact on expanding drone inspections in the Netherlands and across Europe,” said Percepto CEO Dor Abuhasira. “The Percepto team looks forward to continuing to work with Falcker as it further develops its autonomous drone program to serve its customers with a new level of security and efficiency.”

“After years of consulting with the Dutch civil aviation authority, we are extremely pleased with achieving this designation,” said Falcker CIO Duco Boer. “Our first flights with Percepto’s drone solution will be at a tank terminal this month, and we are excited to implement autonomous drone inspection solutions at projects across Europe in the near future.”

Lighter and More Compact Drone LiDAR from GeoCue True View 645/650



Building upon the success of its RIEGL-based True View® 3D Imaging Systems (3DIS®) GeoCue is proud to announce the new True View 645/650. GeoCue CEO Frank Darmayan explains “True View 3D imaging products provide fully integrated LiDAR sensors and photogrammetric cameras in a completely calibrated package. The newest True View 645/650 includes a Riegl mini VUX3-UAV and dual mapping cameras.

It’s even lighter and more compact than previous models; that means it can be used with more drones, such as the very popular DJI M300.” He adds, “This

system delivers colored LiDAR deliverables with accuracy better than 3cm RMSE for the True View 645, and better than 2cm for the True View 650.”

Combined with GeoCue’s industry-leading integrated data processing software suite, True View EVO, all GeoCue 3DIS include the full post-processing software workflow, including direct integration with Applanix POSpac. Vivien Heriard Dubreuil, CEO of parent company mdGroup adds, “The integrated software and workflow generate fully georeferenced, point-traced, colored point clouds; it actually takes less time than it takes to fly the project.”

True View EVO supports the direct creation of many standard project deliverables including ground classified point clouds, surface models, contours, Digital Elevation Models (DEMs), volumetric analysis, wire extraction and similar products without the need for additional third-party software.

True View 645/650 is equipped

with the RIEGL miniVUX-3UAV laser scanner. The miniVUX-3UAV, a 360° rotating mirror scanner, increases the scanner frequency to 300 kHz and offers a unique mode where the 200,000 pulse per second scan rate is focused in a 120° cross-track field of view, providing significantly increased point densities in aerial mapping applications. This increased density, along with GeoCue’s integrated mapping cameras, provides stunning colored point clouds bringing collected data to life!

GeoCue Director of Business Development Madelyne McNab says “By reducing the weight of our previous generation system, customers can now simultaneously collect survey-grade LiDAR data and imagery on platforms from DJI, Harris Aerial, Inspired Flight, Skyfront, Freefly and Watts Innovations. It’s just another example of how the GeoCue team rapidly adapts to meet the demands of our customers.”

GA-ASI Introduces New Eagle Eye Radar



General Atomics Aeronautical Systems, Inc. (GA-ASI), a leader in Multi-mode Radar technology for Unmanned Aircraft Systems, introduces the Eagle Eye radar. The new MMR is installed and has flown on a U.S. Army-operated Gray Eagle Extended Range (GE-ER) UAS. Eagle Eye joins GA-ASI’s line of radar products, which includes the Lynx® MMR.

Eagle Eye is a high-performance radar system that delivers high-resolution, photographic-quality imagery that can be captured through clouds, rain, dust, smoke and fog at multiple times the range

of previous radars. It’s a “drop-in solution” for Gray Eagle ER and is designed to meet the range and accuracy to Detect, Identify, Locate & Report (DILR) stationary and moving targets relevant for Multi-Domain Operations (MDO) with Enhanced Range Cannon Artillery (ERCA). Eagle Eye radar can deliver precision air-to-surface targeting accuracy and superb wide-area search capabilities in support of Long-Range Precision Fires.

Featuring Synthetic Aperture Radar (SAR), Ground/Dismount Moving Target Indicator (GMTI/DMTI), and robust Maritime Wide Area Search (MWAS) modes, Eagle Eye’s search modes provide the wide-area coverage for any integrated sensor suite, allowing for cross-cue to a narrow Field-of-View (FOV) Electro-optical/Infrared (EO/IR) sensor.

The Eagle Eye’s first flight on the Army GE-ER aircraft took place in December, incorporating the new Video SAR capability. Video SAR

enables continuous collection and processing of radar data, allowing persistent observation of targets day or night and during inclement weather or atmospheric conditions. In addition, Eagle Eye’s processing techniques enables three modes – SAR Shadow Moving Detection, SAR Stationary Vehicle Detection and Moving Vehicle Detection as part of its Moving Target Indicator – to operate simultaneously.

“The Video SAR in Eagle Eye provides all-weather tracking and revolutionizes precision targeting of both moving and stationary targets at the same time,” said GA-ASI Vice President of Army Programs Don Cattell. “This is a critical capability in an MDO environment to ensure military aviation, ground force and artillery have constant situational awareness and targeting of enemy combatants.”

Iris Automation Launches Ground-based Surveillance System, Casia G



Addressing the need for large-scale, safe uncrewed aviation, Iris Automation announces the commercial availability of Casia G, a ground-based version of its detect and avoid (DAA) surveillance solution. Using the same patented AI and computer vision technology as Iris Automation’s onboard solutions, it provides a full optical, 360°-degree field of regard designed to detect, alert and enable operators to avoid both co-operative and non-cooperative aircraft for safe beyond visual line of sight (BVLOS) flight.

Casia G creates a perimeter of sanitized, monitored airspace for UAVs to perform work safely, without additional payload. It’s ideal for operations in fixed or temporary locations, supporting drone in the box operations and augmenting or replacing human visual observers. BVLOS flight for uncrewed systems has been challenging due to right of way concerns, specifically the

inability for uncrewed aircraft to successfully see and avoid other aircraft.

Quote from Jon Damush, CEO, Iris Automation
 “A human has sufficient visual acuity to see airborne traffic only within a +/-5-degree field of view around our focal point - we have to scan the sky, and are frankly not very good at it. Casia G sees the entire sky, with uniform probability and resolution, 10 times per second - without distractions or breaks. This is a solution for airspace awareness that covers a large majority of small UAS use cases, but at a price point that is economically viable and without complex integration.”

Casia G provides an operator with airspace awareness:

- At a price point that allows operators to fix their costs and enjoy lower per-flight costs as operations scale.
- Operating multiple, dissimilar types of aircraft within the coverage area, since no direct aircraft integration is required.
- Without requiring difficult or expensive integrations with aircraft systems.
- Without consuming valuable size, weight and power (SWaP) from the aircraft.
- Without requiring approvals from agencies other than the FAA.

Casia G can be expanded by simply adding additional units in a mesh to create a network of detection nodes for large-area air risk mitigation. The system then provides a single feed of cooperative and non-cooperative air traffic, available to an operator’s UTM system. This provides a path to approvals for both larger area and one-to-many operations by enabling a holistic view of the airspace. Casia G has already obtained a BVLOS waiver on behalf of the City of Reno, and Iris Automation is in the process of proving additional deployment patterns and concepts of operation with the FAA.

Comments Jason Hardy-Smith, VP of Product, Iris Automation
 “The Casia portfolio of products is a force multiplier for safety. Whether enabling autonomous flight or adding an additional layer of safety for piloted flight, it’s an extra level of surveillance. Casia G offers an extremely scalable ground-based solution for times where onboard isn’t an option or a fixed location needs to be surveyed, creating a safety zone ideal for a wide range of surveillance use cases.”

Iris Automation believes a significant amount of collaboration is required to bring routine BVLOS operations to uncrewed aircraft, and has already partnered with the following industry leaders for Casia G:

Aergility to Unveil ATLAS Hybrid Cargo VTOL UAV

Aergility Corporation announced that it will be unveiling its full-scale ATLAS hybrid cargo VTOL UAV prototype on April 25th.

As a result of years of development and testing, the innovative drone uses the company’s patented Managed Autorotation technology to carry 400-500 pounds of cargo straight to the point-of-need 300 to 600 miles

away.

The UAV uses six fixed-pitch, nine-foot diameter electric rotors for takeoff and landing. Forward propulsion is handled by an efficient 90 kW multifuel turboprop engine, which also recharges the batteries for the rotors in flight. In forward flight, lift is provided by a small cord wing and airflow through the rotors like an autogyro. Managed autorotation enables ATLAS to maintain lift and flight control

by varying rotor RPMs while still drawing net zero battery power. Cruising speed is 100 miles per hour.

ATLAS is designed to provide time-critical delivery of cargo straight to the point-of-need in places with undeveloped, limited or damaged infrastructure. The internal cargo bay is 40 cubic feet, and the tail opens for easy loading and unloading.



Involi launches new generation tracker fully compatible with regulations

In its mission to allow drone operators to fly safely and according to regulations around the world, INVOLI launches a new generation drone tracker, the LEMAN RemoteID, specifically developed to comply with the latest regulations and bearing the CE/FCC labels. The LEMAN RemoteID drone tracker has been conceived to be used by drone operators in all simplicity.

In fact, it is independent (it does not need to be connected to the drone's battery to work) and it is easy to use: it starts transmitting its position just after turning it on. The tracker is lightweight (47 g), resistant to rain (IP67), and has an autonomy of 4 hours and 30 min for a refresh rate every 1 second, making it adapted for all drone operations.

INVOLI wants to make it easy for drone operations to be carried out in compliance with the ever-

evolving regulatory framework, thus INVOLI team follows the evolution of legislation and adapts its products accordingly. The new INVOLI drone tracker has been developed to follow the ASTM Remote ID Standard F3411-19, and thus it complies with the FAA Rule on Remote Identification for UAs and with the Commission Implementing Regulation (EU) 2019/947.

The new INVOLI RemoteID drone tracker transmits the position and identification of the drone in two ways: direct broadcast, over Wi-fi frequency (Remote ID Broadcast) and over 4G network (Network Remote ID), with a version for European 4G bands and a version for North American ones.

Manu Lubrano, CEO of INVOLI says "It is a great challenge to transform regulatory requirements into a technical product, but we want this burden to be on our

company instead of being on drone operators: I strongly believe that drone operators should focus on their operation and their core business, and the regulatory part should be handled as easily and elegantly as fastening your seatbelt in your car.

Installing the Leman RemoteID drone tracker makes your drone compliant to new regulations with one push of a button".

Tristan David, Business Development Manager at INVOLI also adds "Many drone operators have multiple drones from different drone manufacturers. With our Drone Tracker it is possible to follow all of them at the same time over the INVOLI.live platform, simplifying enormously the operational side of managing a fleet of drones".



GA-ASI Announces Evolution Class of UAS for the Future Fights of Tomorrow

General Atomics Aeronautical Systems, Inc. (GA-ASI) is pleased to announce its new category of future-forward unmanned aircraft systems, focused on information dominance and airspace supremacy. Leveraging three decades of experience across millions of successful combat flight hours, the new Evolution line of advanced UAS joins GA-ASI's existing Predator-class and Mojave-class aircraft in delivering next-generation UAS that lead the pack in advanced, affordable, attritable and autonomous combat power.

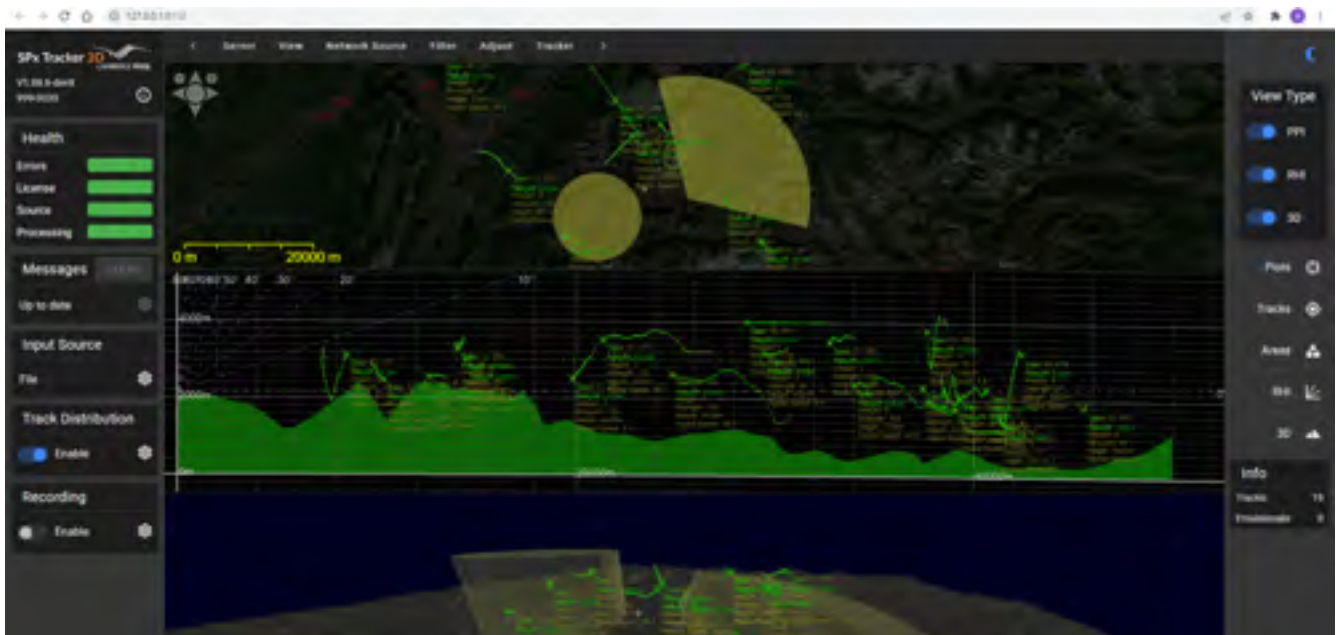
The name Evolution refers to the evolutionary path GA-ASI has followed as it chartered the realm

of unmanned aircraft through its rich, 30-year history of UAS innovation, designing for the future, and the force-multiplying power UAS provide modern warfighters. In the past three decades, GA-ASI has launched more than 25 UAS variants, beginning with the Gnat in 1992.

Evolution establishes a third aircraft class within GA-ASI, joining the well-known Predator® line and recently announced Mojave line of expeditionary UAS featuring short-takeoff and landing (STOL) capability. Evolution includes the development of GA-ASI's next-generation UAS solutions designed to meet the needs of the U.S. Air

Force's vision for its future force, as well as new UAS concepts such as Defender, Sparrowhawk and the recently announced Gambit.

"We're continuing to grow and respond to the rapidly changing world," said GA-ASI President David R. Alexander. "As we celebrate our 30-year anniversary as a company, our new Evolution-series aircraft will merge our unique heritage of advanced and affordable UAS technologies with innovative technologies for the future. We're looking ahead to new concepts and never-before-seen aircraft that meet the needs of our customers today and tomorrow."



Cambridge Pixel Leads Radar Electronics Market with Release of New 3D Tracker

Cambridge Pixel has launched a new software-based radar tracker for manufacturers and integrators of deployed E-scan (electronic) radars. These are radars that can be steered electronically and do not require a mechanically rotating antenna. Such a design reduces the radar cross-section and infrared signature of an installation, making it altogether more ergonomic and robust for deployment in ground-based security surveillance applications or in air defence.

The new SPx Tracker-3D is a primary/IFF radar tracker, with automatic track initiation that takes in plots (rather than video) from the sensor to create and maintain tracks, which can be output in ASTERIX format for external display or fusion processing. The software is capable of tracking up to 4000 targets, and allows users to configure target dynamics and heights appropriately, associating new plots with existing tracks, so that positions can be accurately updated using a Kalman filter. This is essential to ensure that noise from the measurement and possible manoeuvres of the targets are taken into account, filtering to

accommodate varying degrees of uncertainty in the measurement process. Where new plots cannot be associated with existing tracks they become candidates for new tracks that can be promoted, after a period of confidence build-up.

SPx Tracker-3D is compatible with Windows 10 (or later) and Linux, has a browser-based interface for initial configuration and reads terrain data at startup to define the 3D space surrounding the sensor, assessing whether targets are likely to be lost because of the terrain. Operators are able to move the viewpoint in real-time to help inspect targets, enjoying visualisation of plots, tracks, terrain and the associated configuration data.

Building on the techniques originally developed to create Cambridge Pixel's SPx Server, that has been deployed widely around the world in situations varying from the protection of offshore wind farms, coastal surveillance, border security, surveillance of firing ranges and many air defence and naval projects where conventional 2D radars are in use, the SPx Tracker-3D is exclusively designed

to operate with 3D data.

Commenting on the release, David Johnson, Cambridge Pixel's Managing Director said: "This product expands our range of target tracking solutions to support the latest generation of advanced 3D and electronically-scanned radars."

Richard Warren, Technical Director at Cambridge Pixel, said: "Airborne targets of interest are getting smaller and more agile, so using advanced tracking software is key to operational superiority in air defence.

This new 3D tracker takes in plot detections with variable update rates, allowing for a greater granularity of information on key targets such as position, size, height and other statistics derived from the radar data, enhancing one's air defence capabilities. Our software is highly flexible and can work with a wide range of commercial and military radars to assist our customers in providing effective security, and to combat an increase in terrorism, smuggling, piracy and insurgency."



Teledyne FLIR Introduces Neutrino SX12 ISR1200 MWIR Camera with Zoom Lens for Ground ISR

Teledyne FLIR, part of Teledyne Technologies Incorporated introduced the Neutrino SX12 ISR1200, the first model in the new Neutrino Ground ISR series of high-performance, MWIR camera modules with integrated CZ optics. The HD MWIR system combines a Teledyne FLIR MWIR camera module and 120mm to 1,200mm CZ optics with industry-adopted imaging electronics from InVeo Designs LLC to provide a best-in-class ISR solution with low-switching-cost for defense and industrial integrators.

Based on Teledyne FLIR focal plane array (FPA) technology, near diffraction-limited optics, and a long-life linear Stirling cooler with 25,000 hour MTTF, the Neutrino SX12 ISR1200 offers 1280x1024 resolution with 12µm

pixel size. It also features dual-parallel outputs using a 60Hz Camera Link base with 1080P30 HD-SDI or 720P60 HD-SDI, ideal for tracking, turbulence mitigation, and artificial intelligence. The SX12 ISR1200 is a turnkey system that is ideal for integration with ground-based, long-range ISR, perimeter surveillance, border surveillance, and counter-unmanned aircraft systems (C-UAS).

“The Neutrino Ground ISR series joins the Neutrino IS series of MWIR camera modules with integrated CZ optics, offering defense and industrial integrators shortened time-to-market and reduced project risk thanks to its familiar imaging components and off-the-shelf design and delivery,” said Dan Walker, vice president, product management, Teledyne

FLIR. “All Neutrino series systems are classified under US Department of Commerce jurisdiction as EAR 6A003.b.4.a and are not subject to International Traffic in Arms Regulations (ITAR).”

The long focal length CZ lens was developed and is produced by the Teledyne FLIR team, formerly of New England Optical Systems (NEOS), which joined FLIR in 2019. The system provides autofocus, focus, and boresight retention through zoom, and it is factory optimized for each integrated system. The lens, the MWIR camera module, and imaging electronics are all designed and manufactured in the United States.



Based on the K8 platform, ComNav Technology released a powerful and reliable UAV solution capable of photo position at centimeter-level, providing high-precision results for the users.

The Unmanned Aerial Mapping solution consists of an E300 RTK drone and an optional camera as well as flight control software.

Featuring high accuracy, strong compatibility, long endurance, high performance, and easy workflow, it can meet the requirements of many different applications, including topographic survey, urban construction, forestry investigation, emergency rescue, 3D modeling, mining surveying, etc.

High Accuracy

E300 RTK drone embedded with high precision K8 GNSS module, supporting GPS L1/L2/L5, BeiDou B1/B2/B3/B1C/B2a, GLONASS L1/L2, Galileo E1/E5-a/E5-b/AltBOC/E6, QZSS L1/L2/L5. With Quantum III Technology, K8 GNSS module provides reliable and stable RTK positioning results. The professional Post Processing Kinematic software Compass Solution support the full-constellation calculation, providing

accurate positioning results. RTK/PPK is the dual backup, one as a failsafe for another, to ensure the acquisition of data. The in-built antenna offset the correction, thus, further increasing the precision of photo position. What's more, EVENT Synchronization Technology can reduce camera trigger error, ensure the high performance of the solution.

Strong Compatibility

Featuring a carrying capacity of 3 kg, the E300's payload bay is compatible with a wide range of cameras, including C20, C50, LiAir VH2, and others. Payloads can be quickly and easily swapped in the field for maximum versatility, which can meet the requirements of different applications.

Apart from supporting standard Ntrip protocol, E300 is compatible with all the base station and CORS system of different brands.

Long Endurance

The E300 is characterized by an ultra-efficient aerodynamic design and can reach 60 minutes flight without payload and 50 minutes with basic payload to cover areas with a maximum 10 km radius per

flight. In one flight, E300 can map around 0.62km² in 1.5cm/px GSD with one battery.

High Performance

Based on intelligent recognition algorithms, E300 is able to capture high-resolution images consistently even in complex environments.

Moreover, E300 adopts multi-path redundancy design with key modules for safety.

With RTK.PPK, The solution can provide centimeter-level positioning results without ground control points (GCPs), which also saves time during the operation.

Easy workflow

One side, the E300 RTK drone features a simplified design for easy rapid assembly within 1 minute while still providing excellent stability and vibration resistance. Another side, the solution is supported by ComNav self-developed flight control software with a clear interface, easy workflow, powerful flight control capability, which can completely satisfy the requirements of high-efficiency, high-quality, and high-precision aerial survey operations.



UAVOS Announces a New Generation S1-V300 MALE Unmanned Platform Prototype

The improved S1-V300 prototype is equipped with both Line-of-Sight (LOS) and Beyond-Line-of-Sight (BLOS) data link systems for over-the-horizon operations. Additionally, the aircraft may be integrated with multiple ISR sensors, including state-of-the-art Electro-optical Infrared (EO/IR) cameras and a state-of-the-art Synthetic Aperture Radar (SAR) that offers all-weather, day/night performance for a wide-area search capability. Enhanced with unsurpassed ISR capabilities, the S1-V300 UAS will now be able to support a variety of overland and

maritime Intelligence, Surveillance, and Reconnaissance (ISR) missions worldwide.

The S1-V300 MALE UAS next-generation capabilities combined with medium-altitude persistence make it an ideal platform to add with long range RADAR, Signals Intelligence (SIGINT), communication relay payloads, and system of counter electronic warfare. Additional retrofits include improved structural strength wings and extra hard points for carrying external payload of 300 kg.

The S1-V300 MALE is an advanced Unmanned Aerial System prototype with fully autonomous operation capability. It is equipped with automatic taxi-takeoff and landing systems, satellite communication for extended range, and fully redundant avionics. The UAV is designed to operate in harsh environments and is adapted to perform in an extremely hostile, dry and dusty ambient air. The aircraft features a 8,7 meters long fuselage, a 18,7 meters wingspan, is capable of flying at 220 km/h, and has an endurance of over 28 hours.



Primoco UAV SE Appointed Ing. Vladan Ševčík as a Member of the Supervisory Board

Primoco UAV SE, Czech manufacturer of civilian and military aircraft, appointed Colonel of the General Staff (Retired) Ing. Vladan Ševčík as a member of the Supervisory Board following the resignation of Ing. Josef Rada. The decision to appoint a new member of the Supervisory Board was made during the General Meeting of the company at its registered office on 26 April 2022.

Ladislav Semetkovský, CEO, sees the appointment to the Supervisory Board as the next step towards ensuring the development of the company's governance and closer co-operation with the state authorities and key elements of the Czech aviation industry: "Vladan Ševčík has been working in our company since 2020 as Quality Manager and I am very pleased that he has agreed to become more involved in the running of our company. His professional qualities and managerial experience resulted in our request for his support and advice on the ongoing certification of our company and the unmanned

aircraft, both in the civilian and military fields."

Colonel of the General Staff (Retired) Ing. Vladan Ševčík (1965) worked for more than 20 years in the state administration of the Ministry of Defence in the areas of certification and maintenance of airworthiness of military aircraft, as well as in the approval of the competence of design, production and maintenance organizations dealing with military aviation equipment, as well as the approval of the competence of personnel for the maintenance of military aircraft. As the Head of the Aviation Technology of the Department of Military Aviation Supervision of the Ministry of Defence, he worked in foreign committees of the EDA/MAWA Forum and NATO/AWAG, where he participated in the harmonisation and implementation of supranational aviation regulations in the Czech Republic. In addition, he is Vice President for Quality and Airworthiness at Aero Vodochody Aerospace.



DRONAMICS appoints CFO ahead of commercial launch and operational scale-up

DRONAMICS, the world's leading middle-mile cargo drone developer and operator, today announced the appointment of Paul Morton as Chief Financial Officer and member of the Executive team.

The appointment comes at a key moment as the company prepares for the first commercial flights of its flagship Black Swan aircraft, gears towards operating its first commercial routes, and prepares for its Series A funding round set to launch later this year. Paul brings two decades of financial and commercial expertise, having previously held senior roles at DAZN, Perform, and Deloitte. Paul will report to CEO and founder Svilen Rangelov. Based in the UK, Paul will boost DRONAMICS' growingly international Executive team.

"2022 will be a key year for growth, as we mark our first commercial flights with the Black Swan - our proprietary drone powered by clean and energy-efficient technologies. As a fast-growing technology company on the path to net-zero, that is looking to change the status quo in the cargo mobility sector, Paul's valuable experience and knowledge will be vital as we prepare for our next round of funding and scale up our operations." - said Svilen Rangelov, CEO and Co-Founder of DRONAMICS.



DRONEDEK Names Jackie Byers its Chief Financial Officer

DRONEDEK, known for its “mailbox of the future,” announced that it has appointed Jackie Byers its Chief Financial Officer (CFO).

“DRONEDEK is navigating more sophisticated and larger capital raises, and we need additional financial expertise and experience in those areas,” said CEO Dan O’Toole. “Jackie brings that in a big way. She has been a true partner to each of the companies she’s helped lead, and we are happy to have her on board.”

Byers is a graduate of the University of Notre Dame and has held several key executive roles for various private and publicly held companies. She was CFO at Centerfield Capital Partners, a private equity firm headquartered in Indianapolis where she led the finance function, accounting, audit and tax, treasury and insurance needs.

Prior to joining Centerfield, Byers served as director of financial reporting at Remy International, a global manufacturer, which was a U.S. Securities and Exchange Commission registrant. Prior

to Remy International, she held various financial and compliance leadership roles at CNO Financial, also a public company. She was an auditor at PricewaterhouseCoopers for the initial 12 years of her career where she gained experience with merger and acquisition transactions and due diligence.

DRONEDEK, which has nearly 5,000 individual investors, recently completed its crowdfunding capital raise where it earned the distinction of being the highest pre-revenue valuation company to have ever successfully crowd funded in the history of crowdfunding. Future financial activities under consideration include merger, acquisition, forming a special purpose acquisition company, an initial public offering or sale. Having the right team members in place and that have been there before is important credibility for DRONEDEK to be able to leverage, O’Toole said.

Byers replaces Richard Ohrn, who had served as CFO and Treasurer.

“Rick is a great friend and served DRONEDEK exceptionally well as we grew,” O’Toole said.



Hartzell Propeller adds Mitch Heaton to lead technology initiatives for Advanced Air Mobility

Hartzell Propeller has appointed Mitch Heaton as director, Business Development and New Technology to further the company’s programs involving advanced air mobility (AAM). His focus will be on developing propellers for eVTOL, eSTOL, electric, hybrid and hydrogen-powered aircraft. Using an innovative blend of sophisticated engineering analytics, certification skills and world-class manufacturing technologies, Hartzell is working closely with several OEMs within these emerging industries to fine-tune their propeller applications.

Hartzell has dedicated tens of thousands of engineering and development hours to electric, hybrid and hydrogen-powered aircraft since 2019 and it continues to make advancements in tooling, manufacturing processes, and lightweight materials.

“Mitch Heaton has experience leading strategy and business development across multiple industries, with aviation and aerospace often as a focus,” said Hartzell Propeller President JJ Frigge.

“His efforts have included design of connection systems for aircraft, growing unmanned aerial ecosystems, and collaborating with leaders of global aerospace and defense companies and organizations,” Frigge added.

Archer Aviation Announces Leadership Transition; Appoints Adam Goldstein Sole CEO

ARCHER

Archer Aviation has announced that Adam Goldstein has been named sole CEO, as the company prepares for its next phase of growth in the fast-developing urban air mobility market. Brett Adcock, Archer's co-founder and former co-CEO, will remain on the Company's Board of Directors. The Company took this step, which it believes will help simplify its operating structure, to drive its flight testing and certification program on its path to commercialization. As one of the most well-capitalized eVTOL companies with a team of world-class engineering and design talent,

Archer is strategically positioned to bring urban air mobility to market.

"I want to thank the Board for giving me the leadership opportunity to capitalize on our core strategic advantages that will make urban air mobility an everyday reality here in the U.S.," said Adam Goldstein. "Over the last four years at Archer, the team has worked tirelessly to become a leader in the eVTOL industry. I also want to thank Brett for his partnership and many contributions to Archer along the way."

"Co-founding and leading Archer was one of the greatest experiences of my life, and I am so proud of the incredible Archer team and

their many accomplishments. I am fully committed to the success of Archer," said Brett Adcock.

"In the past year, Archer has achieved its stated milestones and continued to build out its leading engineering, design and certification teams putting the company in a strategic position for winning," said Oscar Munoz, a member of Archer's Board of Directors and Former Chairman and CEO of United Airlines. "Under Adam's leadership, this management structure will continue to drive the success of the Company."

UAV Industry Expert Joseph Menaker joins Alpha Unmanned Systems Advisory Board



Alpha Unmanned Systems (AUS), the Madrid-based manufacturer of helicopter UAVs, is pleased to announce the incorporation of Joseph Menaker, co-founder and CEO of UAV Factory (now known as EDGE Autonomy <https://edgeautonomy.io/>), to Alpha's Advisory Board.

With over 30 years of high-tech industry experience, Joseph provides Alpha with deep managerial and industry knowledge.

UAV Factory (EDGE Autonomy), the manufacturer of the Penguin fixed-wing UAV and of the Epsilon line of sensors, is a benchmark for small & mid-size UAV manufacturers worldwide.

With offices in Latvia and the US, UAV Factory was acquired in 2021 by AE Industrial Partners (<https://www.aeroequity.com/>).

Mr. Menaker has a Ph.D. in Econometrics and a master's degree in Quantitative Economics.

On joining Alpha, Menaker states, "Alpha offers great helicopter UAV platforms that fill many commercial and military requirements. Their products are unique in their performance and operational capabilities. I hope I can

help scale it up quickly and build additional distribution channels worldwide."

Eric Freeman, CEO of Alpha Unmanned Systems, states, "Alpha is delighted to add Joseph to its ranks. Joseph has deep and broad UAV manufacturing and distribution experience and we look forward to learning lots from him and from his extensive network of contacts in the industry."

Joseph has excellent experience with the target markets of our new Alpha 900 and we are confident that we can execute even better with his insight and support."

Counter Drone Technologies for Perimeter Security

The drone attack on the Jammu air force station on June 27, 2021 was a rude wake-up call for India to enhance its anti-drone capabilities. The attack was followed by a series of drones being neutralised at the borders. It was time to take a relook at the existing options and enhance measures for combating unmanned warfare.

Perimeter security, in particular, means that no one — including autonomous or human-controlled drones — can pass a site. Small drones are increasingly being used for spying/reconnaissance applications. They are small in size, making them hard to detect. They can be carried easily on a backpack, launched and recovered almost in any terrains. They are capable of providing real-time situational awareness information through live videos and high-definition pictures. Thus, they can pose real and significant threats to military operations. The defenses against them run the gamut of intelligence; kill and disable; and electronic attacks as well. This effort is known either as counter-unmanned aerial vehicle (C-UAV) or counter-unmanned aerial system (C-UAS).

Counter-drone technologies for perimeter security cover a wide range of capabilities and niches. As drones become more affordable to deploy, defenses safeguarding military bases or other key installations must be multi-layered, adaptive, and reliable.

The Defence Research and Development Organisation (DRDO) has developed an anti-drone technology for short ranges which was deployed for Prime Minister's security during the Independence Day address last August. In December 2021, Navy Chief Admiral Karambir Singh said that the Navy was procuring Smash-2000 rifles to counter drones, among other measures.

A rapidly changing threat

Many people in the field prefer to use the term Unmanned Aircraft Systems since a UAV is usually part of a system made out of:

- one or more drones destined for observation - these are equipped with a series of sensors,
- Ground control stations - these are the bases where the drones are controlled. These stations control the drones and receive data from sensors
- The radio connection that is established between the drones and the ground control stations.

The FAA has adopted the UAS - Unmanned Aircraft System acronym, to capture the complex systems which include ground stations and other elements, and not only the actual aerial vehicles.

Broadly, UAV threat management can be defined in three steps:

1. Detection: This involves collection of some phenomenological information captured by sensors of different types but this step does not necessarily denote classification as nuisance drone or Target.

2. Classification: This deals with analysis of data received in the detection phase, with the goal being to separate real targets from highly cluttered, noisy background data. This is generally recommended to be performed by humans due to large probability of false alarms.

3. Neutralization (Counter measures): Once a target is positively identified in the previous step, additional action must be taken to deny mission success, including the potential for target neutralization.

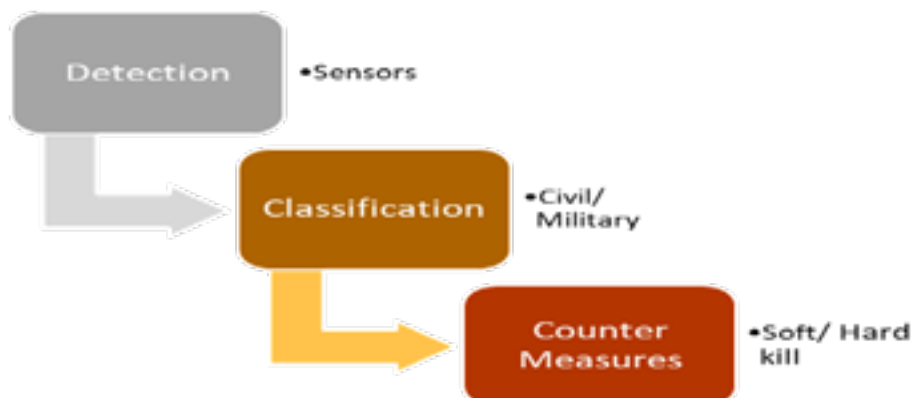


Figure 1: Threat Management

1. Drone Detection methods

There are a number of different approaches to drone detection. The focus is on the small drones that can provide real-time tactical information data. Also, they are very transportable, can be launched and recovered easily in any terrain, and are difficult to detect.

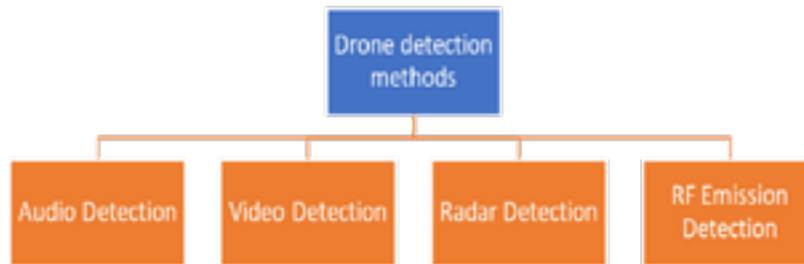


Figure 2: Drone Detection techniques

I. Audio detection

Noise from spinning propellers and electric motors can be detected by acoustic sensors such as microphones; but they have a limited range of about 100-150 m. A database of acoustic signatures from various drone models is compiled to discriminate ambient noises, preventing false alarm to set off. However, drone noise signature can be altered or muffled easily to defeat the database. Moreover, audio detection cannot be used to track target easily or accurately; it can only detect the presence of a drone in the vicinity and provides a warning.



Figure 3: Audio detection of Drones

II. Video detection

Video cameras provide also a relatively short-range detection, about 500m with telescopic lens. Because drones fly at low speed, around 16 m/s (58 km/hr), cameras may have difficulty distinguishing between drones and birds, especially when the birds are gliding. However, with the combination of AI (Artificial Intelligence) and signal processing, a system can be developed which can differentiate drones from birds on video/camera images through motion analysis

Most drones are built of plastic and carbon fiber materials. Thermal detection is found to be problematic in detecting these materials. Infra-red cameras are more likely to pick up small birds due to their large thermal signatures, thus potentially causing a high rate of false alarm.

III. Radar detection

Conventional radar systems for drone detection are available. These systems can pick up drones which have radar cross-section (RCS) the size of small birds (0.01 m²) at a range up to 2 km using very low transmitted power. However, there have been reports that radars have difficulties picking up small drone targets even though the drone RCS is within the detectable value. The problem is that subtle radar returns are hard to differentiate between those of a small drone and those from small birds and other sources of clutter. For drones that fly at low altitude and slow speed, unwanted clutters are problematic.

More suitable radar technologies are found in the K- and Ka-Band operating with frequencies between 20 and 40 GHz as far as in the W-Band between 60 to 120 GHz.

IV. Radio-Frequency (RF) Emission Detection

Using signals emitted by the drone is seen as another effective way to detect drones. Detecting target RF emission signal is much easier because of the larger signal strength available to the sensors directly from the target.

Targets have to communicate with the ground controllers in navigation and in imagery collection. Because of the one-way RF propagation and omni-directional RF emission, RF emission can be detected using smaller equipment. Thus, a RF detection system can be very mobile and transportable.

A potential application for RF detection is detecting and tracking nano-drones. Nano-drones are palm-size or smaller in physical dimensions. They can disguise their appearance as small birds, making them less conspicuous in hostile environments and harder to detect visually. These nano-drones can carry tiny cameras for surveillance and for remote piloting. The presence and activities of nano-drones can still be detected even when they are not in flight. In addition, a perched drone cannot be detected by the radar detection method because a stationary drone would be buried among clutters of the surroundings.

2. Classification of drones

In the military, UAVs are classified according to their weight, range, speed, and particular characteristics. Drones, like drones in general, come in a variety of shapes and sizes depending on the job they're supposed to perform, and its fun to look at different varieties of these aerial vehicles.

The military drones can be classified as:

I. Based on Weight

- Class I (< 150 KG): Micro, Mini or Small Drones

There are several types of Class I drones that can be used to perform Computerized Command, Control, Communication & Information solutions. These drones are very useful in the military as they can provide ISTAR (Intelligence, Surveillance, Target Acquisition and Reconnaissance).

Class I drones can include micro, mini or small drones.

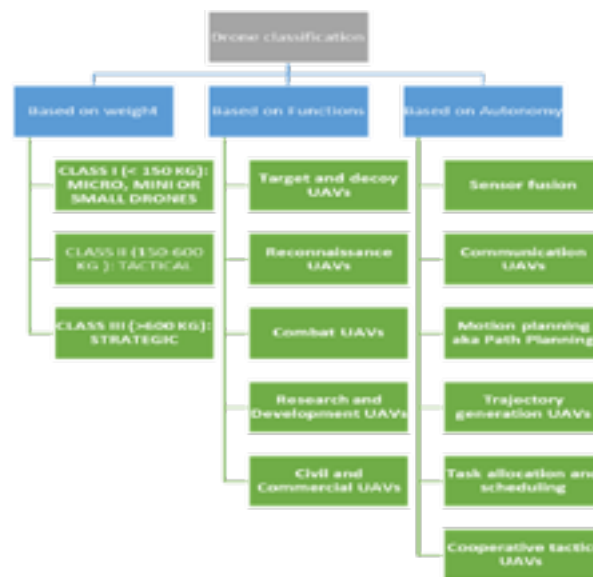


Figure 4: Classification of Drones

- Class II (150-600 KG): Tactical

The tactical UAVs are specially designed to be used in the organic battalion level or in Special Forces. These UAVs are great assets for purposes of medium range surveillance. They have a vital role in filling the gap between the range of functions of the short-range micro-UAVs and the strategic UAVS, which comprise of the MALE and HALE. These drones achieve this by having a combination of flexibility, endurance as well as ruggedness. Basically, they are a good middle ground between small drones and strategic drones.

These drones have been of use in situational analysis and awareness to offer protection and surveillance. They are also used in target acquisition and the assessment of some damage based on a given force.

The most sophisticated tactical ISTAR system on the whole globe right now is the Watchkeeper, which was developed by Thales. It is also the largest UAS programme in Europe. As a matter of fact, the Watchkeeper platform is the only large UAV in Europe that is certified to fly in civilian airspace, and this even includes urban areas.

- Class III (>600 KG): Strategic

The Class III UAVs are usually referred to as Medium Altitude Long Endurance, MALE systems as well as High Altitude Long Endurance UAVs, HALEs. The MALEs are especially ideal for surveillance as well as reconnaissance on a non-threatening area.

They have a wide range of applications. These include being used to determine the position of the enemy or the movement of certain populations that are not involved into a conflict. They have state of the art infrastructure and they have also been used to compile lists of targets.

II. Based on Functions

UAVs can also be classified based on the specific roles they are meant to play in particular military operations. Based on these qualifications, we have the following UAVs:

- Target and decoy UAVs - these can be used to provide ground as well as aerial gunnery at a target, and can simulate an enemy missile or aircraft.
- Reconnaissance UAVs - these are used to provide intelligence on the battlefield.
- Combat UAVs - these have been used to provide attack capability for some high-risk missions.
- Research and Development UAVs - these have been used to further develop UAV technologies that can be integrated into UAVs that have been deployed in the field.
- Civil and Commercial UAVs - these are those that have been designed to be used in civil and commercial applications.

III. Based on Autonomy of UAVs

UAVs could also be classified based on their autonomy, with more advanced ones are aiming for total autonomy. This classification will result in UAVs being grouped into different generations based on their autonomic capabilities.

As a matter of fact, the field of autonomy is an emerging field in the UAS and their crucial role in helping the military have battlefield-ready technology should be entertained. This autonomous technology is seen as something that is hoped to be included in the design of future military UAVs. The following classifications exists for with UAVs that make use of autonomous technology:

- Sensor fusion - these UAVs combine information sourced from different sensors for use on board the vehicle.
- Communication UAVs - these help in the handling of communication and coordination between multiple agents in the presence of incomplete and imperfect information.
- Motion planning aka Path Planning - these UAVs help in the determination of an optimal path for the vehicle to go in case it encounters certain obstacles.
- Trajectory generation UAVs - these UAVs have the ability to determine an optimal control maneuver in order to take to follow a given path or to go to from a given location to another.
- Task allocation and scheduling - these UAVs have the ability to determine the optimal distribution of several tasks among a group of specified agents in the event that there are time and equipment constraints.
- Cooperative tactics UAVs - these have the ability to formulate an optimal sequence as well as a spatial distribution of some activities between various agents with the goal of optimizing or maximizing the chance of success for a particular mission.

3. Counter measures against small UAVs

Based on the detection techniques, it is evident that counter measures for Drones have to be dependent on their RF being emitted by them or by sending them false co-ordinates of their flight path way points. This leads to counter measure methods mentioned below: -

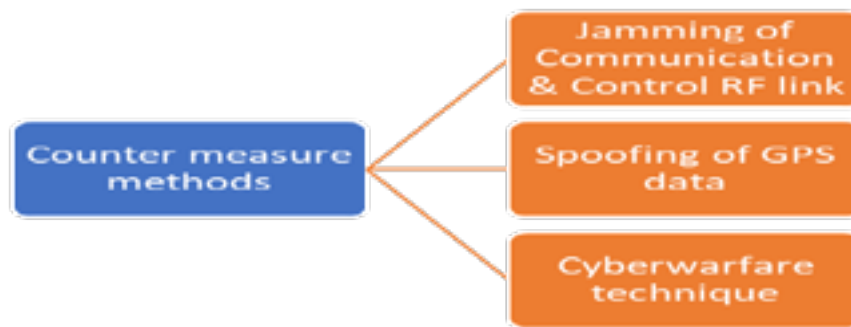


Figure 5: Counter-measure Techniques

I. Jamming the Communication Links

One of the simple approaches would be to jam the communication links used by Drones which are generally at 2.4 GHz or 5.8 GHz. Nowadays, Drones are also controlled by using GSM system. The jammers designed would be able to block all the different means of communication link using different antenna and power. The system can block video transmissions as well as prevent the explosion of radio-controlled Improvised Explosive Devices (IED). This technique will exploit well established methods of EW and can be designed and developed faster.

II. Spoofing: GPS System

Spoofing is a deliberate transmission of fake GPS signals with the intention of fooling a GPS receiver into providing false Position, velocity etc information. The goal of spoofing is to secretly force a GPS receiver to track the spoofed signal (or deceptive signals) with the objective to provide or at least to induce a wrong position solution.

Spoofing Attacks can be simplistic attack, intermediate attack and sophisticated attack. In the simplistic attack, a commercial GPS simulator can be used to broadcast GPS signals for the spoofed position, to the GPS receiver under attack. The attack can be detected relatively easily since pseudo range, C/N0 and Doppler jumps will occur, which can be monitored in the receiver.

An intermediate attack is carried out with the spoofer first gaining information on the victim's and using this information to generate a similar spoofed composite GPS signal broadcast via the spoofer's antenna towards the victim. Gradually, the spoofed signals' power is increased till the attacked receiver locks onto the spoofed signal without noticing. Then the spoofer can gradually change the victim's position to an arbitrary value. Since the attack starts with the victim's actual position, such an attack is hard to detect with standard GNSS receiver processing.

In the sophisticated attack, a similar attack as described before is carried out, but by using several coordinated spoofers to also emulate the spatial signal domain, making the attack itself very difficult to carry out as well as very hard to detect for a conventional single antenna receiver.

The most common type of commercial spoofer does not attack the GPS signal itself but just inserts the spoofed information directly at the receiver's output.

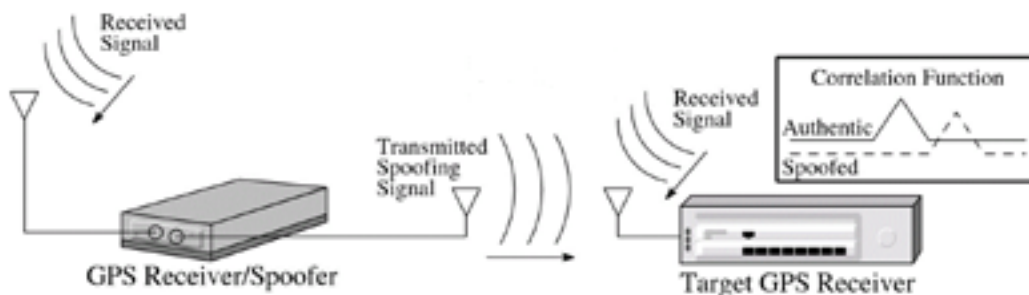


Figure 6: GPS Spoofing: An Overview

GPS spoofing is often efficient, but it can be overtaken by remote control of UAV, and fast shifting of GPS position can also force UAV to immediately landing.

III. Cyber-attacks Malware

A final source of attack against drones could be via infecting them with malware.

The malware takes advantage of a backdoor in the wireless network.

The second option for malware design is by targeting the drone's drivers and sensors and then sending this information back to the attacker who could then use this data to control the drone.

Two of the most popular pieces of malware are SkyJack and Maldrone. SkyJack is a UAV created by Samy Kamkar and is designed to autonomously seek out, hack, and wirelessly take over other Parrot AR within Wi-Fi distance, "creating an army of zombie drones under your control". A second piece of malware known as Maldrone has proved that it is possible to, not only create malware to infect a particular drone, as done with SkyJack, but also create a piece of malware capable of infecting across different types of drones.

Active drone countermeasures that is use of laser weapon not considered now.

State of the Indian Industry

The systems being developed and given to the forces have both soft and hard kill capabilities. Soft kill refers to jamming the incoming drone rendering it ineffective, while a hard kill destroys the drone with a direct hit.

In a series of orders, the armed forces have given out contracts to Indian companies in line with the self-reliance mantra anti-drone platforms—Counter Unmanned Aircraft Systems (CUAS).

The latest among the recent contracts is the Indian Air Force placing an order worth Rs 155 crore for anti-drone platforms or counter-unmanned aircraft systems.



Figure 7: Anti-Drone technologies developed By Zen Technologies, Hyderabad

The contract has been bagged by Hyderabad-based Zen Technologies that will supply the systems within a year. The IAF's contract comes soon after the Indian Navy inked an agreement with Bharat Electronics Limited (BEL) for India's indigenous Naval Anti Drone System (NADS). The Naval Anti Drone System can instantly detect and jam micro drones. It uses a laser-based kill mechanism to terminate targets.

The anti-drone system was first deployed to provide security cover for the Republic Day Parade this year and later during the Prime Minister's Independence Day address to the Nation from the ramparts of the Red Fort. The system offers 360-degree coverage and was also deployed in Ahmedabad for the Modi-Trump roadshow.

The system comes in two versions—mobile and static and both platforms will be available with the Indian Navy to secure its onshore installations.

This will be deployed for all critical assets, including the Navy's airfields that have air assets. With the help of radar, electro-optical/infrared sensors and radiofrequency detectors, the drones can be detected and jammed.

Looking at the future, the Air Force wants 10 anti-drone systems armed with laser-directed energy weapons to bring down rogue drones. The Request for Information for this was issued a day after the attack on the Jammu air force station where unmanned aerial vehicles were used to drop bombs.

While the DRDO has developed an anti-drone technology to detect, intercept and shoot down drones, there are options from the private industry as well Hyderabad-based Grene Robotics says it has developed India's drone dome 'Indrajaal' that can guard against drone threats.

After the Indian Navy and the Indian Air Force, other security agencies are also looking at immediately procuring the indigenous anti-drone capabilities without further delays.

Mitsubishi Electric Corporation, Saab AB, Thales Group, Bosch, Raytheon Company, Lockheed Martin Corporation, Israel Aerospace Industries Ltd., LEONARDO S.P.A., Rafael Advanced Defense Systems Ltd., SCI Technology are the leading players operating in India drones' deterrence market. Manufacturers are increasingly focusing on research and development process to fuel higher growth in the market. To meet evolving customer demand with respect to better efficiency and durability, several drones' deterrence manufacturers are coming up with their technologically advanced offerings.

The Future is here...

Militaries all around the world are already implementing cutting-edge defence technologies and cutting-edge weapons. Tactical UAVs are becoming more prevalent in ISR, combat, and supplies delivery. They're all prepared to take over as front-line battle warriors, and future human-machine collaboration will be considerably higher. Imminent advancements in the sector could be disruptive, as unmanned aerial vehicles (UAVs) achieve greater efficiency and autonomy, allowing them to make intelligent judgments during conflict and so provide vital air dominance. Drone swarms, however still in their early stages, are seen as the future of robotic warfare by armed forces around the world. Advancements in AI, computer vision and deep neural algorithms will further intensify stealth and lethal capabilities, in addition to complete autonomy of these aerial vehicles in a battlefield.



M S Prasad is currently Director of Amity Institute of Space Science and Technology. He has worked in DRDO on number of projects related to navigation and guidance. He is advisor to International body on UAV regulation and low level traffic management.



Dr. Shivani Verma is Associate Professor in Amity Institute of Space Science & Technology at the Amity University. She is a winner of first prize in Dare to Dream 2.0 Innovation contest organized by DRDO under Atma Nirbhar Bharat scheme announced by Hon'ble Prime Minister of India in Aug 2020. Dr Shivani is currently working on a one crore project sanctioned by Technology Development Fund (TDF).

**In Conversation with Mr. Sanjay Datta,
Chief, Underwriting & Claims, ICICI Lombard.**



We are hearing a lot about drone insurance recently. Can you tell us about the products and services ICICI Lombard has in store for the drone industry?

ICICI Lombard's offering on drone insurance (Remotely piloted aircraft insurance) is a comprehensive product. DGCA has classified drones into 5 large categories basis their weight into Nano, Micro, Small, Medium, and large drones. All drones that are below 250 gms are in the nano category. DGCA has made third party liability insurance compulsory for any drone that is greater than 250 gms. ICICI Lombard offers a comprehensive drone product covering hull and third-party liability for all drones.

Importance of Insuring the drones and how does it work?

We are seeing an increase in drone uses in a lot of commercial operations namely Survey and Mapping, Infrastructure, Agriculture etc. Insuring your drone will

safeguard the operator from any liability caused while performing these operations to any third person/property and to the drone itself. It will enable hassle free functioning of the operations.

What are the various types of drone insurances that you are providing at the moment?

ICICI Lombard's offering on drone insurance (Remotely piloted aircraft insurance) is a comprehensive product offering providing cover for Third Party, Hull, and Payload of the drone. Additionally, we have a varied variety of add-on cover options available that include BVLOS (Beyond Visual Line of Sight), Night Flying, Drone War Liabilities, Invasion of Privacy Cover, Drone in Transit cover to name a few.

How big is the market of drone insurance in India? How does the Indian market compare against that of overseas on the same aspect?

The Indian market currently is in its infancy and will mature over time. We are seeing DGCA formulating rules around the uses of the drones. We have seen that with the latest DGCA circular on drones, registration of all drones was made mandatory. As per latest DGCA report there are more than 20,000 drones that are registered in India.

How will you visualise the future of drones in the coming 5-10 years?

We see the uses of drones to increase in a variety of business that include aerospace and aerial photography, training, survey etc. One of the largest drone use markets is expected to be for agriculture where we can expect the drone uses to increase. Additionally with the onset of the experimental trials for drone deliveries we expect the market for drones to go up and thereby also the drone insurance market to increase.



IdeaForge, India's preeminent drone manufacturer raises \$20 Million led by Florintree



IdeaForge, India's largest manufacturer of drones, has closed its Series B funding round of \$20 Million led by Florintree, which is helmed by the former Blackstone India private equity Co-Head, Mathew Cyriac. The round also saw participation from its existing investors such as Celesta, which is a prominent deep tech investment fund, Infosys, Qualcomm and

Infina, along with the Exim Bank of India.

Founded in 2007 by IIT Bombay alumni, ideaForge is packed with more than 15 years of research and development (R&D) with 20+ global patents. It dominates the Indian market with its drones being deployed for a mission every 6 minutes by Defence, Homeland Security and Enterprise customers. With a proven delivery track record and a large order book, ideaForge boasts of being the first Indian OEM to bag repeat contracts from the Indian Army for its SWITCH UAVs. Its customers also include the Indian Navy, Air Force, State Police Forces, BSF, NSG, CRPF, Adani, L&T, Indian Oil, Survey of India, Indian Railways, and so on.

IdeaForge Co-founder & CEO, Ankit Mehta commented, "IdeaForge is very happy to be associated with Florintree, which has a proven track record of helping organisations unlock enterprise value. IdeaForge has grown 10X in the last two years and we will use this funding to invest in R&D, international

expansion and building a world-class team. We want to continue to create high performance, reliable and autonomous drones that inspire the adoption of this technology."

Mathew Cyriac, executive chairman, Florintree Advisors, with serial IPOs wins in Defence and Aerospace technology said, "Florintree has been tracking the drone sector closely for the last two years and ideaForge is one of the few globally competitive full stack players in the sector with scale and profitability. The strong order book built by the company is testament to the R&D work done by the team over the last 15 years and they are primed to grow exponentially. While the industry has proliferated in the last few years on the back of government policy, we expect ideaForge with its focus on building indigenous hardware within house software subsystems to gain an outsized market share in a rapidly growing industry."

vHive Raises \$25 Million in Series B Led by PSG



vHive, a software solution that enables enterprises to deploy autonomous drone hives to create Digital Twins of their assets, announced that it has secured \$25 million in Series B funding. The funding round is led by PSG, a leading growth equity firm partnering with software and technology-enabled services companies to help accelerate their growth. Previous investors Octopus Ventures and Telekom Innovation Pool (TIP), Deutsche Telekom's strategic investment fund advised by DTCP, also participated in the round. Ronen Nir, Managing Director at PSG, has joined vHive's board of directors.

vHive's software platform is built with its customers' journey

in mind, providing end-to-end solutions that enable organizations to autonomously capture data using drones to create Digital Twins of their assets, such as cell towers, cranes, and structures. Its AI and computer vision algorithms were built on comprehensive data and hands-on field experience with global top-tier customers to deliver performance and capabilities that vHive believes are hard for others to replicate. The company believes its ability to connect the physical and the digital world provides enterprises with a new way to digitally transform their field assets, visually access information, and rapidly reach actionable business insights.

PSG's investment in vHive aims to further accelerate the company's expansion of its global customer base and enable the company to scale up operations in key markets, as well as to enter new ones. The investment is also intended to help bolster vHive's enterprise digitization platform market leadership and product offerings, which include autonomous drones, data analytics, computer vision,

and AI, and fuel the development of new solution capabilities for key markets.

"We believe vHive has built one of the industry's most advanced and comprehensive digitization solutions, and we are excited to seek to replicate our success in the telecom and crane markets in new market verticals," said Yariv Geller, CEO and Co-Founder of vHive. "We are thrilled to partner with seasoned investors who share a common vision to advance the company's mission, extend its reach, and scale its customer base."

"vHive's solutions for capturing and digitizing physical assets have enabled the company to build a reputation as a strong partner of choice for top-tier enterprises going through digital transformation - a global trend that is sweeping through multiple industries. Its customers can experience measurable success using vHive's solution, impacting their operations and workflows," said Nir. "We have been impressed with the company's rapid growth and are excited to propel it to the next level."

Skyports raises USD 23 million in first close of Series B funding round



Skyports, the electric air taxi infrastructure and drone services provider, has raised USD 23 million in the first close of its Series B funding round. The capital, from a combination of new and existing investors, will enable Skyports to consolidate its position as a global leader in the advanced air mobility infrastructure and drone operations markets.

All existing institutional shareholders participated in the round including Deutsche

Bahn Digital Ventures, Groupe ADP, Solar Ventus, Irelandia and Levitate Capital with a number materially increasing their stake. These investors were joined by Japanese conglomerate Kanematsu Corporation, global industrial property group Goodman Group, Italian airport platform 2i Aeroporti, backed by Ardian's Infrastructure Fund and F2i Italian Infrastructure Fund, and US based VC firm GreenPoint.

Kanematsu Corporation will take a seat on the Skyports board and will be joined by Ken Allen, CEO of DHL ecommerce who joins the board as an independent non-executive director.

The new capital and the sizeable balance sheets of the investors enables Skyports to accelerate its work with the world's leading electric air taxi manufacturers and operators, providing take-off and landing infrastructure in key launch markets. Skyports will

also materially scale its Drone Services operations in new and existing markets, building on active operations in the UK, Europe and Asia.

Duncan Walker, CEO of Skyports said: "This is another great milestone for Skyports as we continue our journey to be the leading vertiport owner and operator in the world. The support of our original investors who have deep experience in aviation and infrastructure and the addition of new capital from world class companies with a global footprint enables us to build the air taxi eco-system alongside our best-in-class vehicle partners for initial operations within a couple of years. Our growing Drone Services business puts us ahead of the curve with technology development, regulation and operational experience whilst reducing carbon emissions by using drones for a broad range of customers."

Terra Drone Raises \$70 Million for UTM, AAM



Drone and Urban Air Mobility (UAM) technology company Terra Drone Corporation announced today that it has raised \$70 million (8 billion Japanese yen) in Series B funding with investments from Mitsui & Co., Ltd., SBI Investment Co., Ltd., Tokyu Land Corporation, Kyushu Electric Power T&D, and Seika Corporation. The round also saw the funding by Japan Overseas Infrastructure Investment Corporation for Transport & Urban Development (JOIN) - a public-private infrastructure fund by the Japanese Ministry of Land, Infrastructure,

Transport and Tourism (MLIT) - to the newly established joint venture, as well as participation from existing investor Venture Lab Investment.

"Our airspace is going to get more crowded than ever, but most companies today are concentrating only on hardware development," says Toru Tokushige, founder and CEO of Terra Drone. "There's an urgent need for a global air traffic management solution to enable safe and efficient drone and UAM operations, and Terra Drone aims to be the leading player building the digital infrastructure in the sky."

To that end, Terra Drone has been working with the Japan Aerospace Exploration Agency (JAXA) to coordinate flight management of both crewed and uncrewed aircraft.

Meanwhile, in the drone inspection vertical, Netherlands-based group company Terra Inspectioneering is serving Oil and Gas production and processing

companies such as Shell, BASF, and Bunge. In Southeast Asia, Terra Drone offers survey, inspection, and surveillance services through group company Terra Drone Indonesia whose clients include Chevron, ConocoPhillips, and AECOM.

The company is further enhancing safety and efficiency in many other industries by implementing drone-based solutions worldwide.

"A focus on increasing recurring revenue through the sale of survey-grade hardware and cloud based software such as Terra LiDAR; providing specialized solutions such as ultrasonic thickness (UT) measurements and non-destructive testing (NDT) using drones through Terra Inspectioneering; and a strategic consolidation of overseas business has made us well-positioned for success. With this latest round of funding, we will be able to scale up operations and innovate faster," Tokushige says.

FlightWave Aerospace closes new round of funding



FlightWave Aerospace, makers of cutting-edge unmanned aerial systems and integrated sensor technology, has closed a new round of investment to rapidly expand and accelerate new product development and market reach.

California-based aerospace company FlightWave announced a new round of investment,

enabling the development of a new generation of UAS in addition to more rapid growth of its already established UAS technologies. Snowpoint Ventures (snowpoint.vc) led the round with Catapult Ventures (catapult.vc) adding to its previous investment and Decisive Point Ventures (decisivepoint.com) also participating. Catapult invests in companies with differentiated core technology, while Snowpoint seeks to close the gap between government and tech by focusing on disruptive technologies.

“Now, more than ever, securing our critical infrastructure and technologies in the U.S. is extremely important and a primary focus of our portfolio.”, explains Alex Creasey, Founder and General Partner at Snowpoint Ventures. “FlightWave’s unique approach

to the UAS industry is unlike anything we’ve seen in the market to date - their modular design allows the current platform to be leveraged for both commercial and tactical applications via a unique interchangeable payload system in combination with a best in class fixed-wing VTOL platform.”

“FlightWave has already developed an incredibly innovative and efficient small UAS platform,” noted Darren Liccardo, Cofounder and Managing Director at Catapult Ventures.

“We are excited to continue our partnership with FlightWave as they prepare to scale into multiple high growth markets.”

With this infusion of funding, FlightWave intends to dramatically expand its team, facilities, and overall market reach.

ACQUISITIONS

uAvionix Announces Acquisition by DC Capital Partners



uAvionix is pleased to announce its acquisition by DC Capital Partners, LLC (DCCP). Since uAvionix’s inception, the company has leveraged disruptive technology to emerge at the forefront of the unmanned and general aviation markets. Becoming a portfolio company of DCCP will propel uAvionix forward with the means to impact the broader aerospace and defense markets.

With over 30 years’ experience, DCCP is a Private Equity investment firm with over 60 acquisitions and \$1 billion in total investments. Over time, DCCP has developed a strategic and systematic approach built on three pillars of Domain Expertise, Market Focus, and Strategic Process to building and

accelerating companies’ success. DCCP has deep bench of strategic advisors including well-respected senior diplomatic, intelligence, and military officials.

uAvionix CEO Paul Beard said “DCCP share our passion for connecting everything that flies, especially our current general aviation and UAS avionics products. DCCPs experience in maturing young companies will help us to improve our internal operations, allowing us to expand our solutions to existing, adjacent and defense markets, while enabling us to scale globally.

“I’m incredibly proud of how far we’ve come in just 7 years since our founding. This next chapter with DCCP will be just as challenging,

just as exciting, and propel us even further along our aerospace and defense trajectory.”

Thomas J. Campbell, Founder and President of DC Capital Partners, said, “We are extremely pleased to partner with Paul and the team. uAvionix has a history of developing and delivering disruptive technology to the manned and unmanned sectors. Their highly skilled and talented workforce continues to develop new and game-changing solutions to meet evolving requirements. We will continue to grow the company and to deliver innovative technologies and differentiated capabilities and solutions to our customers.”

Drones World Editor Kartikeya In Conversation With Robert Cheek Chief Operating Officer of UVify



How best can you describe the journey UVify since its humble beginnings to where it is now?

That's a great question. If I were to use a word for those interested in aerial vehicles might best relate to, I think the word would be turbulent—but what startup doesn't experience turbulence? The trick is to climb above and pass through the turbulence, which I'm happy to say the company has done successfully. That doesn't mean there won't be other instances of turbulence, of course not. But as a company, we're quite adept at identifying and navigating such instances.

What are the various products and services that UVify has in offer currently?

Currently, we've a two-pronged approach. One is our swarm drone light show business. We offer a complete turnkey solution with our IFO drone to customers all over the world. The IFO is the world's most commercially successful and widely used swarm drone light show and can be seen in almost all of the major events which utilize drone shows. Some examples are the Superbowl, BTS, Drake, the recurring shows in Sydney, the Halo series release, and many more.

We also offer the IFO-S and IFO-SX swarm research drones. These are open platforms and are selected by more research organizations than any other platform in the

industry. Our customers range from universities, to corporate research divisions, to government agencies. IFO-S is the drone used in the DARPA OFFset program.

In addition to the two aforementioned businesses, we are constantly developing new products and technologies and offer other products which are related to the broader drone/robotics sector.

What is your say on the integration or utilization of emerging technologies in Drone sector?

There are many exciting developments taking place with regards to the integration or utilization of emerging technologies in the Drone sector. Indeed, the work in swarm technologies is of particular interest. Further, there are other amazing developments taking place, such as the new ways of using sensors with drones to develop digital twins and building metaverse models.

What kind of phenomenal transformations have you witnessed in the Drone Swarm space with the outbreak of pandemic Covid-19?

With regards to the drone swarm space at the outbreak of the pandemic, one of the applications that emerged was using drone light show swarms to deliver public messages on a massive scale. Another is task allocation with smart contracts and providing financial rewards to drones in swarms, which will prove transformative in swarm robotics. Military research in swarm drones also dramatically increased during this period. The research with operating swarms and utilizing blockchain technologies will game-changer in the industry. With regards to drone swarms, blockchain technologies will play a

critical role with future application developments.

Can you talk about the employment opportunities Drone industry is capable of creating in the next 2-5 years period?

Absolutely. Over the next 2-5-year period the drone industry will create an abundance of new employment opportunities. And these will not only come in the form of hardware or software engineering, business, and the traditional areas of employment. Rather, we'll see the emergence of new sorts of employment, which have hitherto to be envisioned. Indeed, the next few years will prove to be even more exciting times for the drone industry.

What are your wishes for the Drone industry in the New Year 2022?

One of my wishes for the drone industry in 2022 is for it to create more great jobs. Another wish is for the technology to be increasingly used to help the planet in ways such as fighting global warming, protecting endangered species, and reducing other threats to our planet and its inhabitants.

A person of your stature will always be an inspiration for the future generations. Would you like to deliver an inspirational message for them?

Thank you. Yes, the world is now going through a hyper-transformative period. Many of our existing beliefs with regards to work, wealth, the universe, and more will likely be upended. As such, it's crucial for you to follow your dream and not waste time doing something that does not align with your vision. If you're working at a job for which you have no passion, change it, remember that you can always find another job, or create your own.



FedEx Plans to Test Autonomous Drone Cargo Delivery with Elroy Air

FedEx Express and the world's largest express transportation company, is teaming up with California Bay Area-based Elroy Air, the company building the first end-to-end autonomous vertical take-off and landing (VTOL) aerial cargo system. As a first of its kind agreement in the U.S., FedEx Express will develop plans to test Elroy Air's Chaparral autonomous air cargo system within the company's middle-mile logistics operations, moving shipments between sortation locations. This is the latest initiative from FedEx in its effort to explore and adopt emerging technologies across its networks.

The exponential growth of e-commerce has accelerated the demand for reliable, efficient transportation and logistics solutions throughout all stages of the supply chain. FedEx believes

that continued innovation and automation will improve safety, efficiency, and productivity for the company's 600,000 team members as they continue to move the world forward.

"FedEx was built on innovation and we are always looking toward new technologies to help enhance the logistics industry through improved safety, efficiency and customer service," said Joe Stephens, senior vice president, global planning, engineering and technology, FedEx Express. "We look forward to continued testing and learning throughout our collaboration with Elroy Air."

Elroy Air announced its signature Chaparral autonomous aircraft in January 2022. The Chaparral aircraft is an eVTOL aerial cargo system that can autonomously pick up 300-500 pounds of cargo and deliver it by

air up to 300 miles. The Chaparral is capable of longer-range flights without the need for additional infrastructure, such as airports or charging stations.

"We are proud to work with FedEx to build the next generation of express logistics," said Kofi Asante, Elroy Air's VP of Business Development and Strategy. "When you're not limited by challenging infrastructure, traffic, or airports, logistics can reach more people, faster than ever before. We look forward to working together to create a new future for how we get goods to people around the world."

FedEx and Elroy Air have been working together since January 2020 and will continue their collaboration to pursue certifications and begin flight testing in 2023.

German Airways and Wingcopter agree to cooperate and drive the use of drones with offshore deliveries

German logistics and aviation holding Zeitfracht Group and its subsidiary German Airways will be among the first companies worldwide to commercially deploy drones in logistics. In a joint letter of intent with the German drone manufacturer Wingcopter, the companies have agreed to purchase 17 Wingcopter 198 delivery drones and acquire options to order an additional 115 drones in two further tranches by the end of 2023. The aircraft are to be deployed from the second half of 2024 – initially offshore, for example for the delivery of spare parts to wind farms.

The Zeitfracht Group is already successfully operating in this business with its specialized shipping company OPUS Marine. As the delivery drones must be able to land with pinpoint accuracy on a moving ship, their use will be technologically demanding. German Airways and Wingcopter will work closely together on the development of this feature.

The Wingcopters will take off from Rostock Airport, which has also been part of the Zeitfracht Group since the beginning of the year and offers the Wingcopter development team an ideal environment for extended test flights as well as premises for

measurements and the evaluation of the data collected in the process.

Holding an Air Operator Certificate (AOC), German Airways already fulfills essential requirements to operate Wingcopter's delivery drones in the "specific category" and, later, in the "certified category". In addition, German Airways is also IOSA certified and thus operates according to the highest internationally agreed standards of the international aviation authority IATA.

Wingcopters can carry a payload of up to five kilograms and – depending on the payload – can cover distances between 75 and 110 kilometers. The aircraft were selected by German Airways because of their extraordinary wind- and weather resistance and their globally leading payload-to-range ratio. They take off vertically, without requiring additional infrastructure, and then move forward horizontally in flight like a normal aircraft. Thanks to their purely electric propulsion, Wingcopter delivery drones also contribute to zero-emission logistics.

Zeitfracht CEO Wolfram Simon-Schröter: "At the Zeitfracht Group, we are very creative and always interested in using new

technologies in a market-leading way. We believe the time is now ripe for the commercial use of drones, for example for the delivery of spare parts to offshore wind farms. With German Airways, our Rostock Airport and the experience of our shipping company OPUS in delivery operations on the high seas, together with Wingcopter we have the ideal prerequisites to drive this technology a huge step forward."

"We are very pleased to have won Zeitfracht as a partner with extraordinary experience in the logistics and aviation sector. With the planned supply flights to ships and offshore wind farms, we will tap into a new, fast-growing field of application for which the Wingcopter 198 is ideally suited thanks to its high efficiency, even in extreme weather conditions. In addition, the test site and the close cooperation offer the opportunity to jointly develop further promising business areas," adds Tom Plümmer, co-founder and CEO of Wingcopter.

Drone manufacturer TSAW Drones is joining DLE to work on drone delivery standardisation Solutions



TSAW Drones is joining Drone Logistics Ecosystem to collaborate with its members to develop standardised products and services for the drone delivery market. As one of the frontrunners in the drone delivery industry in India, the company has developed innovative end-to-end smart GCS, UTM and AI-assisted technologies, including GCS Smart Fleet Health Management to deliver all kinds of loads. TSAW drones are working towards making the delivery operations completely autonomous and free of any human intervention.

TSAW DRONES, Co-founder & CEO Mr Kishan Tiwari, said “Drones are the future of transportation. TSAW drone’s vision is to bring this technology and its advantages to mankind. Human societies for centuries have grown vertically because we didn’t have father modes of transportation. Drones are going to eliminate this limitation by making transportation

lighting fast. To make this vision a reality we require an ecosystem that can complement our technology and vision. DLE is one such ecosystem. We are looking forward to working closely with all the partners.”

Drone Logistics Ecosystem™

Drone Logistics Ecosystem (DLE) is a free of charge, global multidisciplinary “quadruple helix” network of Companies, Universities, Public/Government, and Investors to stimulate innovations, collaborations, and standardisations in the drone logistics industry.

The aim of the Drone Logistics Ecosystem is to bring together stakeholders in the drone logistics industry under one roof to support commercialisation and marketing of products of Drone Logistics members. Since the industry at its inception, most of the companies are early-stage

start-ups with limited access to funding, manpower and expertise, making us an ideal platform for companies to lend their expertise for joint-development of products, consulting, or simply as sub-contractors, or for any other format of cross-disciplinary/border collaboration.

The benefits of the Drone Logistics Ecosystem include.

□ Inclusivity for all players in the industry with an open Drone Logistics Ecosystem.

□ Standardization globally to ensure the smooth and efficient movement of goods from the factory to the end customer globally.

□ A win-win for all participants in this emerging industry and the delivery and courier industry, and more importantly, the customers.

Roter Precision Instruments Pvt Ltd recognised as 'Best Drone Company' at Wings India Awards 2022



The Roter Precision Instruments Pvt Ltd is acclaimed for its customer-centric approach, smart innovations and adoption of cutting-edge surveying and mapping technologies including drones, has won accolades at the Wings India Awards 2022. The company is also the largest manufacturer of civilian drones and have served with commendable number of drones to Government of India, space application centre, wildlife institutes and other organisations in India and beyond.

Roter has been adjudged the 'Best Drone Company'. This

recognition is one of the industry's most recognised accolades, and are awarded following an assessment of product quality, customer service, uniqueness and innovations.

The awards were conferred by the Hon'ble Minister of Civil Aviation, Government of India, Shri Jyotiraditya Scindia, in the presence of senior officials from the Ministry of Civil Aviation, industry leaders, and other stakeholders on March 25, 2022 at Hotel Taj Krishna, Hyderabad.

Jointly organised by the Ministry of Civil Aviation and FICCI, the awards are conferred to those

who have created benchmarks and made notable contributions in India and Government schemes like 'Svemitva'.

"We are honoured to receive this recognition from Wings India 2022 for our relentless efforts in providing superior technological experiences to our customers from surveying and mapping industry. The awards will motivate us further to keep enhancing our product & services to meet the ever increasing needs of Indian surveying community," said Sajid Mukhtar, Chairman & MD, Roter Group of Companies.



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