

DRONES

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WORLD



In Conversation with

Rajan Luthra

Founding Chair, FICCI Drone Committee



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DRONES WORLD is published by - B. Kartikeya

Hello folks,

Who would say that the New year vibes are meant for January alone, especially when the same excitement is carried over to March? If not you, I am super excited for the Wings



India 2022 is almost there. Unlike the previous edition of Wings which was held during the period of uncertainty, I'm pretty sure that its going to be a big one with a lot of Drone companies participating in the event with their 'Made in India' offerings. Before I get carried over by this 'Wings' talk, let me do my usual ritual of briefing you the contents of your favourite magazine.

Drone based deliveries are something that is gaining traction lately. Isn't it a best way to provide you the updates starting with them? You have been asking for it and we heard you. Not just heard, but also added a couple of pages dedicated to provide you the latest happenings in and around Indian drone industry. Our exclusive conversation with Manoj Abraham IPS, Additional Director General of Police, Kerala makes you realise how the police forces are already leveraging on the industry 4.0 to safeguard the citizens and create peace and harmony. Turning the pages, you can find another conversation we had with Sameer Joshi - Co Founder New Space Research & Technologies who has been a pioneer in innovation and calls it a need of the day. Speaking of Need of the day, you should definitely look into an in-depth conversation we had with Rajan Luthra, Chair - FICCI Drone committee who believes that constructive dialogue to prepare a roadmap for innovation and manufacturing as a crucial component for building a proper drone ecosystem. A story on Location analytics technologies for defences provided by Rahul Jain, an expert in the GIS and remote sensing industry is something you should not miss out. Don't forget to check out the cool product releases and the leadership changes as well in the remaining pages.

Watch out for us at Wings India 2022 as we would always love to interact with you amazing people. Looking forward to sharing my views with you over there. Let me say a goodbye till you hear from me in the next issue. Ciao.

Thanks

B. Kartikeya
Editor

Flirtey Announces New Brand SkyDrop



Flirtey is excited to announce that it is rebranding its last-mile drone delivery business to SkyDrop. SkyDrop is the leading OEM (Original Equipment Manufacturer) of drone delivery systems for operators of last-mile delivery, as well as existing drone companies around the world.

SkyDrop Founder and CEO Matthew Sweeny said, «We have been overwhelmed by demand since we started taking pre-orders for our best-in-class last-mile drone delivery product. We are seeing enormous demand coming from operators, who are rapidly adding delivery drones to their existing fleets. Today, we are announcing our new brand SkyDrop, and focusing on selling and licensing our hardware, software, and patents to leading operators around the world at the forefront of the trillion-dollar store-to-door delivery market.»

The rapidly growing market for operators of SkyDrop's best-in-class last-mile drone delivery product was recently validated by SkyDrop's deal with Mesa Air Group, the regional operator for United and American Airlines, who has become the first scheduled airline to launch drone delivery in the U.S.

SkyDrop has refined their business model to be the OEM, focused on selling drone hardware and licensing autonomous software and patents to operators and existing drone companies all around the world. These operators are initially focused on servicing the trillion-dollar food delivery market with an intent to expand to additional markets.

In certain growth markets, SkyDrop may choose to be an initial operator of their own technology to ensure new operators and their customers grow successfully into these markets.

Delek US Gains First BVLOS Approval for U.S. Refineries Using Percepto Drone and AI Solution



Percepto, pioneering autonomous inspection by industrial robotics, announced the Federal Aviation Administration (FAA) approved Beyond Visual Line of Sight (BVLOS) operations for Delek US Holdings' refineries in Tyler, Texas and El Dorado, Arkansas. Percepto drones inspected its facilities and provided visual data management and analysis. The approval makes Delek US's refineries the first to receive such an approval, and one of the first among US energy companies as well. The operational approval is one of a number received by Percepto customers, including Florida Power & Light, Verizon Skyward and at other industrial sites in Australia, Italy, Spain, Norway, Portugal and Israel.

The BVLOS approval enables Delek US to operate its drones without a pilot to maintain line of sight with the drone. An operator located in the control room can easily manage and monitor pre-scheduled fully autonomous drone missions.

«This approval to use autonomous drone technology is a huge step forward towards cleaner and safer refineries within the oil and gas industry,» said Percepto CEO Dor Abuhasira. «Congratulations to Delek US for being pioneers in digital transformation, and implementing new procedures within an industry that has been seeking new solutions

to old problems.»

«Percepto's end-to-end system supports our environmental, social and governance goals to deliver safe and reliable autonomous drones that can be operated remotely while in compliance with US FAA regulations,» said Delek SVP, Business Transformation, Grigor Bambekov. «By working in partnership with Percepto, Delek US is gaining more effective, efficient, reliable, and profitable utilization of its assets through the next generation of Industry 4.0 drone ecosystems.»

Percepto drones are managed by Percepto's Autonomous Inspection & Monitoring (AIM) platform. The recently upgraded AIM 2022 includes the newest configuration of the Percepto Sparrow, the Percepto Air Max. Amongst other payload and capability upgrades, the Air Max features an OGI camera, capable of detecting gas emissions.

SkyGrid Launches All-in-One Drone App for iOS Globally



SkyGrid, a Boeing, SparkCognition Company, launched its SkyGrid Flight Control™ application globally. The all-in-one drone application is now available for free on the Apple App Store for iPhone and iPad users across the world. The SkyGrid Flight Control application makes it easy for drone operators to explore the airspace, automate flights, and get real-time insights as one integrated solution, enabling safe, secure, and efficient operations.

«After the positive response to our iPad application in the US, we are now making SkyGrid Flight

Control accessible from both the iPad and iPhone iOS, and available to a global audience of drone users. We think this application is a critical unlock in providing users with a seamless solution and encouraging more drones in the global airspace,” said Amir Husain, Founder and CEO of SkyGrid. “Simultaneously, SkyGrid continues to progress towards a future where unmanned and manned aviation coexists. We’re already solving some of the most complex problems in the drone industry, and our journey has just begun.”

Powered by SkyGrid’s AerialOS™, SkyGrid Flight Control enables drone operators to explore airspace, and automate airspace authorization, mission planning, and flight execution in one unified solution. The following features and functionality are available for free within the new iOS application:

- **Airspace intelligence:** Provides a map of airspace classes, boundaries, temporary flight restrictions, notices to airmen, and other advisories
- **Weather layers:** Details local precipitation, wind speed and direction, temperature, cloud cover, and more
- **Automated flight planning:** Automatically generates area exploration, waypoint, and multi-objective missions based on custom flight parameters, such as desired speed, altitude, and location
- **Autonomous flight execution:** Launches the mission to autonomously perform the predefined flight plan or scheduled flight

For U.S.-based users, SkyGrid Flight Control also provides automated authorization to fly in U.S. controlled airspace under 400 feet near airports through integration with the Federal Aviation Administration’s Low Altitude Authorization and Notification Capability (LAANC) 4.0.

More advanced enterprise features are also available for organizations looking to deploy, manage, and scale their drone operations. These features include

AI-based mission planning and rerouting, multi-drone missions, custom object detection and counting, micro-weather, geofencing and alerts, and more.

Download SkyGrid Flight Control today in the Apple App Store or visit the SkyGrid website for more information about the advanced enterprise features.

Domino’s signs deal with SkyDrop to launch next stage of commercial drone delivery in New Zealand



Domino’s Pizza Enterprises Limited (Domino’s) and Flirtey Inc. (SkyDrop) have announced they have signed an agreement for the next stage of commercial drone delivery trials in New Zealand. Domino’s and SkyDrop have now signed a deal to launch the second stage of their commercial drone delivery partnership in New Zealand. The two companies plan to conduct a commercial trial of innovative drone delivery services from a Domino’s store in New Zealand to customer homes, which is expected to commence in 2022. The trial will be operated by SkyDrop or its designee using their best-in-class drone and safety technology to deliver hot Domino’s pizzas to customers. SkyDrop’s advanced drones are now able to conduct drone deliveries that are speedier, safer, quieter, cheaper, and greener.

Domino’s and SkyDrop partnered in 2016 to launch the first stage of drone delivery in New Zealand, delivering hot, fresh pizza from Domino’s

Whangaparaoa store in Auckland, to a customer by drone. These demonstrations were conducted under Civil Aviation Rules Part 101. This landmark achievement was attended by both the CAA and Ministry of Transport. The delivery drone was subsequently accepted into the Aviation collection at the Auckland Museum of Transport and Technology (MOTAT). Over the following years, SkyDrop advanced its technology, increasing the payload of the SkyDrop drone up to 3.5kg, increasing the precision delivery altitude of the drone up to 60 meters, incorporating a parachute system for safety, expanding production of its aircraft system in the U.S. in conjunction with the FAA certification process, and receiving Part 102 Unmanned Aircraft Operator Certificate and Operations Specifications from the CAA in New Zealand.

As the service scales, New Zealand has the opportunity to be at the forefront of the drone delivery industry globally, and benefit from reduced traffic congestion and greenhouse emissions thanks to electrically powered delivery drones.

SkyDrop Founder and CEO Matthew Sweeny said, «SkyDrop is excited to announce that we have signed an agreement with Domino’s for the second stage of our commercial drone delivery partnership in New Zealand. We’re excited to work with local stakeholders in New Zealand, who have the opportunity to be at the forefront of the drone delivery industry globally. We look forward to expanding our leadership in drone delivery focused on the trillion dollar store-to-door food delivery market.”

Domino’s Group CEO and Managing Director Don Meij said, «Domino’s is excited to partner with SkyDrop for the second stage of our commercial drone delivery trial in New Zealand. We invested in this partnership, and technology, because we believe drone delivery will be an essential component of our pizza deliveries in the future. This innovation means customers can experience cutting-edge

technology and the convenience of having the freshest, hottest pizza delivered by drone from their local Domino's store to their door."

Domino's New Zealand General Manager Cameron Toomey said, «Domino's New Zealand is excited to once again be at the forefront of drone delivery. Our partnership with SkyDrop is an exciting opportunity to continue to lead in the food delivery space not only in New Zealand, but in the world. We can't wait to give our customers the unique experience of having their favourite Domino's pizzas delivered by drone!»

Brazil Introduces Agricultural Drones from XAG to Plant Trees



A forest restoration project using XAG Agricultural Drones has been initiated in Brazil, which is a pioneer in experimenting the scope of planting seeds of native tree species by drone. The trial will help demonstrate the effectiveness of drone to boost forest growth, paving the way for the autonomous technology to be used in large-scale planting of Brazilian forests.

This drone seeding application is part of the Arboreto Project, carried out by the Federal University of Paraná (UFPR), Brazil's oldest university, in collaboration with Timber, XAG's local partner and a supplier of autonomous agricultural machinery. It aims to help speed up the process of forest restoration through planting tree species with commercial interest and environmental adaptation.

During the field experiment, different amounts of seeds were

weighed and sorted into the smart container onboard the drone. After the pilot entered all the operation parameters into the mobile APP, such as waypoints, flight speed, and spray volume, the XAG Agricultural Drone with a spreading attachment was planned to run along target lines, evenly distributing seeds from different forest species native to the region.

Compared to planting trees by manual labor, drone with full automation can improve the productivity of the restoration work, especially in terrains that is difficult to access. It is expected that agricultural drone can serve as a cost-effective tool to facilitate the replanting of native trees by governments and companies.

As a leading agri-tech company, XAG develops drones for various agricultural uses that have been introduced to 42 countries and regions. Its agricultural drones are widely used for sowing seeds, spreading fertilizers, spraying pesticides, and digital field mapping.

As deforestation has become a global crisis that can undermine the climate target and threaten food security, the autonomous farming drone could be explored for a new territory to make forest replanting easier and faster. Brazil, with the world's second largest forest area, is among one of the countries which pledged to end and reverse deforestation by 2030 at the COP26 climate summit.

Now with the seeds of hope planted, germination rate and tree growth per row will be carefully evaluated for this innovative project, in addition to understanding the most suitable seed mixture for drone application.

Taking advantage of the versatility of XAG's agricultural drone, UFPR also conducted another experiment with an eye on fertilization and pest control for plantations of commercial tree species. At UFPR's Experimental Farm near Rio Negro, the XAG drone automatically dispersed solid fertilizer and liquid pesticide into an area with 1.5-year-old

slash pine planting.

"We know how difficult it is to carry out work like this one to plant native trees. So, when we can count on a technology that has control and that we can manage to define rigor, this is welcomed", concluded by Professor Alessandro Camargo Angelo.

UVL Robotics launched the first in the Middle East service of daily drone-based parcels delivery



US-based company with the presence in Oman, UVL Robotics, launched the first in the Middle East service of day-to-day parcels delivery based on drones. The payload of flying couriers is 6.6 pounds. Delivery drones are able to cover a distance of more than 25 miles. Previously, the UVL Robotics team obtained all official permits from the Civil Aviation Authority for BVLOS in the Sultanate of Oman. More than 100 air routes of delivery drones were agreed with the local clients.

Drone-based delivery service is able to serve more than 6 000 citizens of hard-to-reach areas of Muscat (Oman), also several five-star resorts and hotels in the region. The project will include different modifications of the drone's landing system: ground landing, on the smart parcel locker

or with a rope dropping system. It includes delivery of parcels and e-commerce packages as well as medicine for remote areas. It's already in high demand among users. In the frames of launching the project, UVL Robotics signed the MoU with the representatives of government bodies of the Sultanate of Oman.

His Excellency Dr Ali Al Shidhani, Undersecretary for Communications and Information Technology said: "Delivery with the UVL Robotics drones is an advanced technology, an important and necessary service that can satisfy the needs of the citizens, who due to the remoteness of their place of permanent residence, don't enjoy the same level of services provided in the city center".

"New modern challenges require new approaches to their solution. I would like to thank everyone who took part in this project. The UVL Robotics team is confident in its success and in the fact that daily drone-based delivery will become an integral part of the global delivery ecosystem", said Eugene Grankin, CEO of UVL Robotics.

The partners of the project are the major players of the Middle East market: last mile delivery companies and e-commerce firms. So far, the service has been launched in the territory of Oman. Further UVL Robotics plans to scale the project to countries from other continents.

UVL Robotics is the first one in the world which offers the full cycle service of inventory counts by smart drones for corporate clients and delivery. The HQ is located in the California (USA), R&D center in Oman and CIS, branches - in Germany, Turkey and Abu Dhabi.

HONEYWELL SMART DRONE RADAR AVOIDS COLLISIONS AUTOMATICALLY IN HIGH-STAKES TEST



Uncrewed aircraft were able to autonomously avoid mid-air collisions using Honeywell's IntuVue RDR-84K radar system as a pilot during a series of tests in Phoenix recently, demonstrating the drone's ability to take remote action safely using its onboard processor without human input.

"We set up the ultimate game of 'chicken,' but the RDR-84K simply wouldn't let these aircraft get into danger," Sapan Shah, product manager, advanced air mobility at Honeywell Aerospace, said. "This is a leap forward in safety that could have far-ranging impacts across aviation."

The testing was conducted by flying two autonomous drones directly toward one another, with the drones analysing one another's movements and avoiding a collision.

"This was all automatic," Larry Surace, lead systems engineer for the RDR-84K at Honeywell Aerospace, said. "The radar recognised the danger, decided on a course of action, flew to safety and then made sure the danger had passed — all without input from anyone on the ground."

According to a statement by Honeywell, autonomously detecting and piloting around unknown objects is critical as pilotless craft fly beyond the line of sight - a difficult undertaking due to the high speeds of the objects involved as well as environmental clutter, requiring a long distance and accurate radar to pinpoint location.

Typically, air traffic control centres are able to do this in traditional aviation settings by cooperating with aircraft who regularly communicate their location. Such radar capabilities hope to help autonomous aircraft avoid colliding with non-communicative traffic. Already, Honeywell's RSR-84K technology has been employed in testing on helicopters and drones, however, the recent testing marks the first occasion where it was used autonomously. The size of a book, the radar weighs less than two pounds and can undertake the

required calculations onboard the aircraft.

Neuron Leverages the Hedera Network for Drone Radar System in UK Government Sponsored Trial



Neuron, a leader in aviation technology and air traffic critical national infrastructure, has leveraged the Hedera network, the most used, sustainable, enterprise-grade public ledger for the decentralized economy, in a UK government-sponsored trial to demonstrate the capability to safely track the movements of military, enterprise, and government drones once out of visual line of sight. The trials, which took place at Port Montrose in Scotland on 29 April 2021, and at Cranfield University during October 2021, used sensors to track the drones, recording flight data via the Hedera Consensus Service. Over time, Neuron's vision is to provide a decentralised platform for a range of mobility solutions including drones, air taxis, autonomous vehicles and ground robots. Neuron will do this by connecting sensors, vehicles and management systems to provide a trusted network which can be used for data sharing, record keeping and potentially even decision making.

Niall Greenwood, CCO of Neuron, said, "Until now, drones have had limited benefit for governments and private enterprises, because they could not be flown safely out of line of sight and therefore could not be used for long distance deliveries, transport, or inspections. With this trial, leveraging Hedera Consensus Service, we have made unmanned, long distance drone travel possible using safety-critical aviation infrastructure. Each flight creates

millions of data points, which no other public ledger has been fast enough to log and correctly order. By leveraging the Hedera Consensus Service we can gather, store, and order this data immediately, giving us a real time 'radar system' for drones."

Neuron sensors pick up data points on each drone's location and direction. From there, the Hedera Consensus Service provides a unique method of logging and timestamping the data from each drone flight onto Hedera's decentralized public ledger. The Hedera network operates at a higher speed and performance, with a lower cost per transaction than any other public distributed ledger technology (DLT), offering a scalable basis for drone flights to be adopted across industries. The Hedera network offers all applications the highest grade of security possible (ABFT), ensuring data protection for users.

The trial was sponsored by the UK government's department for Business, Energy and Industrial Strategy (BEIS), and took place as part of a series of experiments by BEIS to explore the use of drones. The trial by Neuron successfully demonstrated safely tracking drone flights once out of sight, allowing the drones to fly longer distances safely and securely. Drones for the MediDrone trial are supplied by DJI, the World's largest drone manufacturer. Neuron aims to deploy its solution for all drone use cases, transforming industries and supply chains in the UK and internationally. Applications for drone flights leveraging the Hedera-powered radar system in healthcare include remote medical testing, transportation of medical supplies to difficult locations, movement of equipment from hospital to hospital, Covid-19 test kits and beyond, as demonstrated across the UK on-demand.

Mance Harmon, CEO and Co-Founder of Hedera Hashgraph, said, "Through this trial, Neuron has exhibited an extraordinary feat, allowing unmanned drones to safely exist in the sky. The Hedera Consensus Service enables the use

of drones to transport essential equipment across long distances, which has enormous implications in the fields of healthcare and national security in particular. We are excited to continue Hedera's work in these sectors, particularly following our notable partnerships with Everyware and Hala Systems, and to see diverse industries realise the benefits of the Hedera Consensus Service."

Robotics Centre and Smith Myers Announce New, Advanced Small Drone Payload to Find and Reach Mobile Phones during Search & Rescue Operations



Robotics Centre, Inc. and Smith Myers announced that the Smith Myers ARTEMIS Mobile Phone detection, location and communication suite has been integrated into the new Robotics Centre Echo SAR (Search and Rescue) payload for small Unmanned Aerial Systems (UAS) built by Teledyne FLIR Defense.

Echo SAR enables operators to quickly find, map, and interact with mobile phone handsets in fast moving disaster situations, aiding and boosting first responders' ability to locate victims and save lives.

Designed for use on Teledyne FLIR's R80D SkyRaider™ and SkyRanger® R70 drones, the advanced Echo SAR payload will provide users with the stand-alone ability to find an individual mobile handset, conduct mass mapping of mobile phones in out-of-service

areas, and to communicate either with individuals or groups of mobile phones.

"Previously, ARTEMIS airborne capabilities were only available for use on manned rotary and fixed-wing platforms," said Dr. Eric Karmouch, CTO of Robotics Centre. "Now, for the first time, this life-saving technology can be deployed in minutes on a small quad-rotor UAV, providing a whole new capability to SAR operators working in the most difficult conditions."

"ARTEMIS turns a mobile phone into a rescue beacon and was designed specifically for SAR and natural disaster situations," said Andrew Munro, Director, Smith Myers. "By integrating this capability onto Teledyne FLIR drones through the Echo payload, Robotics Centre has created a truly game-changing tactical UAS solution.

"This new system can prove vital in emergency circumstances where a rapid response can mean the difference between life and death," Munro added.

The operationally-proven Teledyne FLIR R80D SkyRaider and SkyRanger R70 UAVs, used by military and public safety agencies worldwide, are rugged, all-weather platforms well suited for Search & Rescue missions. Easily deployed and operated by a single user, the drones can provide extended situational awareness when and where it's needed most.

"The Echo SAR payload adds a critical new sensory capability to our SkyRaider and SkyRanger platforms," said Anne Bulik, Vice President of Unmanned Aerial Systems at Teledyne FLIR Defense. "From disaster relief to border security and beyond, we see many applications for small UAS mobile device detection across both our defense and non-defense customer communities."

Bengaluru-based Drone Startup NewSpace Secures \$21 Million



NewSpace Research & Technologies, a Bengaluru-based drone technology firm, has secured \$21 million in a round headed by Pavestone Technology Fund. The money was raised at an unknown amount. Within the next five years, the company hopes to become a unicorn.

NewSpace Research & Technologies specialises in swarm drone systems and is working on an ambitious project with Hindustan Aeronautics Limited (HAL) to develop a cutting-edge pseudo satellite for surveillance and communications. The company has won at least two contracts from the defence ministry in the last year.

While huge corporations have expanded into the defence manufacturing market in recent years, and some startups have launched, venture capital firms have yet to pour money into the sector in substantial numbers, with investors treading carefully due to the sector’s long gestation time.

Pavestone Technology Fund’s Managing Partner, Sridhar Rampalli, stated, “Our belief is that the opportunity is large and the company is working on two, three products for the future. If done well, it could quickly be a unicorn in the next five or six years.”

The funds received are expected to be sufficient for the next 18 months as the firm begins to deliver its goods to the military, with more rounds anticipated after that. Aside from the defence sector, the firm will concentrate on civil logistic operations for drones, and it is already providing items because the field is new.

The startup inked a design

and development contract with the military ministry on February 10 to create a High Altitude Pseudo Satellite (HAPS), which would be able to perform surveillance missions and assist communications for months at a time. The programme would be led by Hindustan Aeronautics Limited (HAL), which will be mentored under the ministry’s Innovations for Defence Excellence (iDEX) programme.

The Army had made a INR 200 crore deal with the business in September of last year for a swarm drone system capable of surveillance and assault tasks. The system must be provided by the manufacturer within a year after being processed through the emergency procurement method.

campus of Anna University and said that the centre has been producing drones with financial assistance from the State government.

“Initially, they were used by the State police department and later by the Disaster Management Department for conducting surveys in mines and for aerial photography. The need for drones is rising. Such inventions have set an example for technical innovation in TN. Universities should emerge as research centres instead of remaining as degree-giving institutions,” the CM said.

He also stated that Tamil Nadu has an efficient youth force while saying that research and inventions should increase in TN and that more modern studies & courses on foreign countries should be infused in State colleges and universities.

Chief Minister Stalin inaugurates Tamil Nadu Unmanned Aerial Vehicles Corporation



Chief Minister MK Stalin launched the Tamil Nadu Unmanned Aerial Vehicles Corporation (UAVC). Set up at a cost of Rs 10 crore, the objectives of the UAVC include designing, manufacturing, and trading of all types of drones and allied systems, including multi-mission airborne drones, unmanned aerial systems, and aerial surveillance for search and rescue operations.

The CM congratulated the faculty and students of the Centre for Aerospace Research (CAR) on the Madras Institute of Technology

Drones and laser beams near Delhi Airport banned for another 2 months



“**A**s has been consistently reported based on credible information that terrorists plan to carry out terrorist attacks by using UAS including drones, para-gliders and hang-gliders, UAVs, aero-models. Hence by members of the public It is used. Prohibited,”

The existing order will be in force for only two months from February 12 to April 12.

In his order, Assistant Commissioner of Police (Sub Division Palam) Bijendra Singh said

that the Air Traffic Control at IGI Airport has reported incidents of visual disturbances of pilots by laser beams especially while taking off the aircraft.

“It is not only a source of nuisance but can also pose a threat to the safety and security of passengers and aircraft,” Singh said.

Centre notifies drone certification scheme under Drone Rules, 2021

The Union government announced the Drone Certification Scheme on Wednesday in order to create an ecosystem that will enable simpler, faster and transparent type-certification of drones. The government’s goal is to make India the world’s drone hub by 2030 by notifying the liberalised Drone Rules, 2021, released by the Ministry of Civil Aviation.

The government has been working to establish a world-leading drone ecosystem in India, according to the notification, which would create the physical and digital infrastructure to facilitate safe, efficient, and secure access to the Indian airspace by millions of drones. Drone Rules 2021 has made it possible to establish a global certification and accreditation framework for drones, which will scale the commercial application of various drone technologies with appropriate safeguards, said the notification.

The government has set up the Digital Sky platform, which is an all-digital process for drone registration and operation. Users must fill out a one-time registration form for their drones, pilots and owners. A user can request permission online for each flight they wish to take in a yellow or red zone. The government had already announced the airspace map, the PLI scheme, and the single-window DigitalSky platform, all of which

will aid the growth of India’s drone manufacturing industry.

Indian Army to procure additional SWITCH 1.0 drones from ideaForge



Back in November 2021, the occasion of Hon. Prime Minister Shri Narendra Modi handing over ideaForge’s High Altitude SWITCH UAV to the Indian Army marked the on-time execution of the first high-value drone contract received by an Indian firm. ideaForge received the \$20 Million contract after clearing tough field evaluations. This was the first time the Indian Defence Forces entrusted an Indian company to deliver an indigenous high tech product in a short span of time. Despite the severe challenges posed by the pandemic related disruptions, ideaForge proved its resilience by pulling through and delivering in time, without needing extensions.

IdeaForge has also been entrusted with the responsibility of an additional order for the High Altitude SWITCH UAV. The said additional order also needs to be executed in the same timeframe as earlier, in order to help extend the capabilities augmented by the Indian Army under the first contract.

The High Altitude SWITCH UAV is a Vertical Take-off and Landing drone that takes off vertically like a helicopter and then transitions into flying like a regular plane even in High Altitudes with low temperatures, high winds and low density of air. SWITCH UAV in that context is a drone that can be

carried on the back of a Jawan and deployed, with confidence, to act as the eyes-in-the-sky for our forces. Thus, it can help in increasing situational awareness on our borders for ISR missions without necessarily needing our forces to always be in harm’s way both physically and climatically.

ideaForge CEO, Ankit Mehta said, «The additional order of SWITCH UAV is a testament of the class leading capabilities of SWITCH 1.0 exhibited not only during the product trials against a dozen global players but also in the operational environment. We have completed the delivery of the previous order in time and are gearing up to deliver the additional order within the set timelines as well. We are thrilled by the Impact Created by SWITCH UAVs in serving our nation and maintaining the sovereignty of the Indian Territory.»

AUS bags Rs 15 crore project from Survey of India to map Haryana



Drone technology start-up Aarav Unmanned Systems (AUS) said it has bagged a large-scale mapping project from the Survey of India worth USD 2 million (about Rs 15 crore) to map the entire state of Haryana.

The state is spread over an area of around 32,000 square kilometers, the company said.

“The project initiated in January 2022 is scheduled to be completed by next year. The project

will be pivotal to revive the land records apart from boosting the planning and designing of critical infrastructure for transportation, irrigation, portable water supply etc. across the state of Haryana,” AUS founder and CEO Vipul Singh said in a statement.

Under this project, AUS will deploy its proprietary survey grade drones to ensure accurate data capturing which will further be processed by the Survey of India to update the revenue maps and GIS database by digitising the land records.

AUS has mapped roughly 10,000 villages and completed its contract for mapping villages in Uttarakhand successfully till date, the statement said.

Govt Bans Import of Foreign Drones to Promote Domestic Manufacturing

The government of India banned import of foreign drones with certain exceptions as part of efforts to promote domestic manufacturing of drones in the country. Import of drones for R&D, defence and security purposes have been exempted from the ban but such imports will require due clearances.

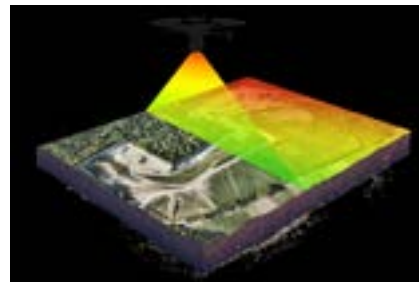
“Import of drone components, however, shall not require any approvals,” the civil aviation ministry said in a release. The Directorate General of Foreign Trade (DGFT) under the commerce and industry ministry has issued a notification banning the import of foreign drones.

“Import policy for drones in CBU (Completely Built Up)/CKD (Completely Knocked Down)/SKD (Semi Knocked Down) form... is prohibited with exceptions provided for R and D, defence and security purposes,” DGFT said.

Import of drones by government entities, educational institutions recognised by central or state government, government recognised R&D entities and drone manufacturers for R&D purpose will be allowed in CBU, SKD or CKD form. This will be subject to import authorisation issued by DGFT in consultation with concerned line ministries.

Import of drones for defence and security purposes will be allowed in CBU, SKD or CKD form subject to import authorisation issued by DGFT in consultation with concerned line ministries. The civil aviation ministry said that in order to promote Made in India drones, import of foreign drones has been prohibited with effect from February 9, 2022.

First phase of property survey with LiDAR technology under NMMC to be available by July 2022



The first phase of the survey of properties under the Navi Mumbai Municipal Corporation (NMMC), to be carried out with the Light Detection and Ranging (LiDAR) technology will be completed by July this year. While reviewing the survey work, civic chief Abhijit Bangar directed the agency as well as the officials attached with the project to take utmost care in the survey.

A Survey of properties under the NMMC jurisdiction with the LiDAR technology is going on. Using

the LiDAR technology that has the feature of video recording with 360-degree panoramic will help NMMC to identify the unassessed properties in its jurisdiction.

According to an official attached to the project, the technology, coupled with video recordings, measures the length, breadth, and height of properties and roads on which they stand. The survey will help the civic body to maintain records of any changes made to the buildings.

The agency hired for survey work with the LiDAR technology shared the procedures being carried out with the civic administration. They informed the civic body that a special app will be developed for the on-spot survey. They will expedite the survey by using drones for which the agency is working to get necessary approvals from the state government and other agencies. Civic chief Bangar assured all cooperation in getting necessary approval for the use of drones.

The civic body claims that the Lidar-based technology is based on Geographic Information System (GIS mapping) and this will increase the income of the corporation by getting the right information of properties in its jurisdiction. It will improve the financial position of the corporation.

“It will update the information about the properties owned by the corporation as well as the waterways, sewerage, street lights, various civic amenities in the city. It will be useful for planning the overall development of the corporation area as it provides complete and accurate information about all the properties,” said civic chief Bangar. He added that the first phase of the survey will be completed by July this year.

In addition, around 100 employees will be given training for collecting and editing information received during the survey, and around 50 employees will be given technical training.

Government to Promote Drone use in Agriculture – Financial Support Being Extended Under ‘Sub-Mission on Agriculture Mechanization’



In a major boost to promote precision farming in India, the Union Ministry of Agriculture and Farmers Welfare has issued guidelines to make drone technology affordable to the stakeholders of this sector. The guidelines of “Sub-Mission on Agricultural Mechanization” (SMAM) have been amended which envisages granting upto 100% of the cost of agriculture drone or Rs. 10 lakhs, whichever is less, as grant for purchase of drones by the Farm Machinery Training & Testing Institutes, ICAR institutes, Krishi Vigyan Kendras and State Agriculture Universities for taking up large scale demonstrations of this technology on the farmers’ fields.

The Farmers Producers Organizations (FPOs) would be eligible to receive grant up to 75% of the cost of agriculture drone for its demonstrations on the farmers’ fields.

A contingency expenditure of Rs.6000 per hectare would be provided to implementing agencies that do not want to purchase

drones but will hire drones for demonstrations from Custom Hiring Centres, Hi-tech Hubs, Drone Manufacturers and Start-Ups. The contingent expenditure to implementing agencies that purchase drones for drone demonstrations would be limited to Rs.3000 per hectare. The financial assistance and grants would be available until March 31, 2023.

In order to provide agricultural services through drone application, 40% of the basic cost of drone and its attachments or Rs.4 lakhs, whichever less would be available as financial assistance for drone purchase by existing Custom Hiring Centers which are set up by Cooperative Society of Farmers, FPOs and Rural entrepreneurs. The new CHCs or the Hi-tech Hubs that will be established by the Cooperative Societies of Farmers, FPOs and Rural entrepreneurs with financial assistance from SMAM, RKVY or any other Schemes can also include Drone as one of the machines along with other agricultural machines in the projects of CHCs/Hi-tech Hubs.

Agriculture graduates establishing Custom Hiring Centers would be eligible to receive 50% of the basic cost of drone and its attachments or up to Rs.5 lakhs in grant support for drone purchases. Rural entrepreneurs should have passed class tenth examination or its equivalent from a recognized Board; and should have remote pilot license from Institute specified by the Director General of Civil Aviation (DGCA) or from any authorized remote pilot training organization.

The subsidized purchase of agriculture drones for CHCs/Hi-tech Hubs will make the technology affordable, resulting in their widespread adoption. This would make drones more accessible to the common man in India and will also significantly encourage domestic drone production.

The drone operations are being permitted by Ministry of Civil Aviation (MoCA) and Director General of Civil Aviation (DGCA) through the conditional exemption route. MoCA has published ‘Drone Rules 2021’ vide GSR No. 589(E) dated 25th August 2021 to regulate the use and operation of Drones in India. The Department of Agriculture & Farmers Welfare has also brought out Standard Operating Procedures (SOPs) for use of Drone application with pesticides for crop protection in agricultural, forestry, non-cropped areas, etc. and for Drone Application in Spraying for Soil and Crop Nutrients. The demonstrating institutions and all the providers of agricultural services through drone application have to comply with these rules/regulations and SOPs

DroneUp Appoints Eric Grubman as New Chairman of the Board



DroneUp, LLC, an autonomous drone delivery platform and leading drone services provider, announced the appointment of Eric Grubman, former executive vice president of the National Football League (NFL) and current chairman of SGHC Limited as the company's new chairman of the board. Grubman will bring decades of financial and business operations experience to DroneUp's fast-growing company.

Mr. Grubman has served in various capacities as an advisor and as a senior executive across multiple industries for decades. After serving in the Navy, he began his private-sector career within the Mergers & Acquisitions Department of Goldman, Sachs & Company beginning in 1987. He was elected Partner in 1996 and became co-head of the worldwide Energy & Power Group. He also spearheaded the formation of Goldman's strategic advisory efforts within Professional Sports. In 1999, he became co-President of Constellation Energy Group. After retirement from Constellation, he joined the National Football League in 2004 as Executive Vice President. He became Chairman of on Location Experiences until its sale in 2020. After that, he co-founded and served as chairman of Sports Entertainment Acquisition Corporation until its merger with SGHC Limited in 2022. Mr. Grubman currently serves as Chairman of SGHC.

"Eric is incredibly respected across many business sectors for his tremendous vision, insight, and passion for technology," said Tom Walker, founder and CEO of DroneUp. "We are truly fortunate to have him as our chairman of the board to tap into that well of experience as we continue to innovate and keep the end user's needs at the forefront of every decision."

"I strongly believe in technology's capacity to improve people's lives," Grubman said. "Drone operations have proven to be value-added in advancing safe and reliable options for consumers, patients, and business organizations. I believe DroneUp has the ability to drive a set of worldwide industry standards, enabling a variety of autonomous services, including inter-modal delivery, inspection, and many other everyday needs. It is very exciting for me to join DroneUp and become part of such an innovation."



DRONE DELIVERY CANADA ANNOUNCES MANAGEMENT CHANGE

Drone Delivery Canada is pleased to announce the appointment of Steve Magirias as the Chief Executive Officer of the Company, effective February 22, 2022.

Steve brings over 20 years of work experience with both mature well-established organizations and nimble entrepreneurial companies, along with a combination of talents and experiences. His background in manufacturing, product development, quality control and operations in wholesale, retail and direct to consumer markets for companies like Curtiss Wright - Indal Technologies and Husky Injection Molding, coupled with an engineering degree and an MBA focused on strategic development, make him an ideal choice to lead the Company through its next phase of development and commercialization.

"Steve has emphasized the importance of maintaining organizational flexibility as well as an entrepreneurial ethos while strategically layering in mature processes and protocols and introducing rigor and structure to optimize innovation, which is exactly what the Company needs at its current stage." says Michael Della Fortuna, the Company's chairman of the board of directors (the "Board").

Mr. Michael Zahra departs as president and Chief Executive Officer of the Company and has also resigned from the Board, which has been accepted by the Board. The Company thanks Mr. Zahra for his contributions and wishes him every success in his future endeavours. Mr. Zahra will remain on the Advisory Board providing insight and support to various projects and developments.



Vigilance - Tech: An eye from the sky

An exclusive conversation with Manoj Abraham IPS, Additional Director General of Police, Kerala

A proud position to boast about, what ignited you to move into public services despite pursuing MBA degree?

Public Service was always a priority from Childhood itself, for I was born and brought up in the National Police Academy and so joining the public service and serving the citizens was a realistic dream. Public service is an area, where you are doing something to make the lives of the citizen's better, and this was the main motivation in life, as compared to any cushy job in the corporates, which would never give the satisfaction that I get now.

While Drones were looked upon as a threat, Kerala police were one among the departments who put the Drones to the best use during the lockdown. What are your views and comments on this?

During the COVID period, Kerala's skies were dotted with unmanned aerial vehicles or drones, watching out for social-distancing violations from small gatherings to games of beach football. What the police wanted is not to identify and prosecute the offenders, but only to deter them into rushing back indoors. These small drones were hence, customised and fitted out with sirens and flashing lights so the people below, would not miss them even after sunset. Wireless technology has also made it possible for the police to relay out instructions over speakers fitted onto these flying machines.

It had all begun with the Kerala police deploying their three high-performance quad copters — drones with four rotors — on lockdown watch. The move worked so well that, the police then drafted in private players to build a network of 300 drones, that

scanned every corner of the state. The extensive use of drones for surveillance, not only to enforce the lockdown, but also in identifying the production of spurious liquor and sale of drugs, was another noteworthy feature of the police response, which was soon emulated by the other forces. The Police intervention in the colonies housing the migrant labours (Guest Workers), checking on the facilities given to them, tying up on their provisions, encouraging them and keeping them engaged without any violence, was another feather in the cap of Kerala Police in handling this crisis.

What could be some more possibilities for effective policing with the utilisation of Drones?

The necessity of modern surveillance and disaster management tools are increasing day by day, so as to ensure that



the lives and property of the citizens are protected. Drones can be a hugely valuable tool in making the first assessment, during disasters. In a disaster, drones can be extremely useful in aiding emergency services to figure out how best to plan their rescue efforts. The recent developments in drone technology, are proving to be an effective solution as a relocatable surveillance asset. For effective policing along with surveillance, drones can be used for Disaster Management Missions, Search and Rescue Applications and delivery of services like emergency medicines, first aid kits, equipment and food in inaccessible areas or remote areas. Drones can carry out these tasks much more quickly than the traditional methods, as well as having the additional advantage of keeping the rescue personnel away from potentially dangerous areas. In these situations, drones can be used, not only to re-establish communication between parties but also to deliver essential items such as food, water or life-saving medical supplies to those who need it. The following categories of drones can be used for effective policing and in service delivery, including transportation of local produce, supply of essential items

etc. especially in remote border areas.

SURVEILLANCE DRONE

Surveillance Drones used for search and rescue missions are often equipped with thermal imaging cameras which can help find missing persons in areas that are difficult to search. These drones are equipped with advanced imaging systems, such as high-resolution cameras, thermal imaging system, multi-spectral camera systems etc. These technologies enable drones to be a powerful relocatable surveillance asset.

HEAVY LIFT DRONE

Heavy Lift drone easily performs supply-drop runs with medical and essential packages. Such packages are critical to the wellbeing of stranded survivors (floods, cyclones, earthquakes, etc.)

NANO DRONE

Most surveillance drones these days are big and easy to detect. The real application of nano surveillance drone is stealthy surveillance, where it needs to be operated undetected.

ENDURANCE DRONE

Endurance for an Unmanned

Aerial Vehicle can be described as the total time taken during the flight. For an electric fixed-wing aircraft or quadrotor this is directly related to the capacity of the battery and the amount of current the motor produces to keep the aircraft in the air in all weather conditions.

ANTI-DRONE SYSTEMS

Counter drone systems can detect and or intercept unwanted drones and unmanned aerial vehicles (UAVs). The system can identify drone threats instantly and has the capabilities to both detect and destroy drones in the air.

AI Based Drones

AI-based drones can get real-time data for Improving the ability to make well-informed decisions for future policing.

It has been 5 months since the inauguration of Drone Forensic Lab and Research Centre. Could you please elaborate on its purpose and accomplishments so far?

With the increasing use of drones in almost all parts of the country, scientific testing of drones, testing of technical information, drone development and mobile anti-drone systems to meet the various needs of the police force are of paramount importance. Recognizing this situation, the Kerala Police Drone Forensic Lab & Research Center, which is the new unit, was started under the Kerala Police Cyberdome. Kerala Police is the first law enforcement agency in India to set up a Drone Forensic Lab & Research Center, with public-private partnership for the use of drones, forensic analysis and to counter threats posed by the drones. The recent drone strike against the Border Security Force near the international border in Jammu and Kashmir and various drone strikes in the Middle East

and other Gulf countries have made drones a weapon of mass attack. It has become a new challenge for the police as criminals use it for various types of attacks, murders, terrorism surveillance, smuggling, and espionage conversations with audio sensors. Drones have begun to be used by criminals to enter the restricted area for surveillance and for many other criminal activities. Despite the increasing misuse of drones in this regard, the Kerala Police is the first in India, to develop the drone development capabilities, in the Police Force, to cater to the diverse needs of drones, the development of drones for various services, the use of advanced technology in drone forensics and anti-drone system development. The Kerala Police Drone Forensic Lab under the Kerala Police Cyberdome has the following divisions dealing with drones.

1. Drone Forensics
Well-equipped forensic examination lab for recovery of digital evidence from drones. This system can provide information such as branding recognition, manufacturing features, battery, media storage GPS data call, etc. through detailed forensic examination of parts of drone or drones recovered from any area.
2. Research on Anti Drone System - Activities include development of counter drone system and drone forensics to effectively prevent possible drone threats in the future. The objective will be to develop Drone Monitoring Equipments that can perform several functions, including: Detection, Classification or Identification, Locating and Tracking, Alerting, Countering and destructing etc.
3. Design and Development of UAV- To build an appropriate mathematical model and

develop a complete control architecture which will allow the drones for accurate observation and scouting missions for Police.

4. Development of AI Based Drones- R&D on AI based drones to get realtime data for Improving the ability to make well-informed decisions for future policing.
5. Training- Conduct regular training to Police personnel to equip them with the latest trends in drone technology.
6. Research & Development- Collaboration with high grade academic institutions, Companies, Drone Associations, Start-ups for Research & Development to build police specific solutions and counter mechanisms to fight the future threats posed by drones. It will be a research centre for the construction of new types of built-in drones and unmanned flying materials to meet the various needs of the police force. These drones, which can carry a variety of payloads, will be manufactured in this lab for carrying disaster management equipment, monitoring and word like VVIP safety. Accomplishments so far /Development in each domain

Drone Development.

- Purchased machinery and tools for research work.
- Phase 1 of Drone Development for various drones in different weight class is going on (Nano, Micro, Small)
- In phase one, focus is in making of drones using COTS (Commercially Off the Shelf) Components that are well suited for our needs. This approach is to speed up the development process and fast deployment of in-house build drones.

- In further phases, In-depth R&D shall be carried out to achieve more optimization.

Drone Training (Flight)

- Purchased Drone Flight Simulators and simulator training is ongoing for Cyberdome personnel. In future, more persons can be trained on the same.
- Actual Drone flight training is to begin in 2-3 weeks in nano drone, micro racing drone, micro semi-autonomous and small semi-autonomous drone after the completion of simulator training.
- Pilots ongoing the training shall be able to fly different models of multicopter drones such as nano, micro and small.

Drone Training (Maintenance)

- Drone making and maintenance training scheduled to begin with actual drone flight.
- After the maintenance training, police personal can conduct maintenance of drones that are made in-house.

Drone Forensic

- Procured several Drone Forensic equipments, procurement and implementation of new hardware's is going on.
- Development of drone analysis and clarification softwares.
- Development underway to build a forensic system that is capable of analysing all aspects of a drone including its flight log, software, hardware systems (Propulsion and power), electronics systems (Flight controller and Radio).

Drone'KP-2021- International Drone Development Hackathon

With the objective of elevating the technical capabilities in this constantly evolving domain, Kerala Police Cyberdome announced

first of its kind International drone development Hackathon - 'Drone'KP' with core focus on Drone technologies. This hackathon aimed to provide opportunities for socially committed and technically competent organizations, academia and individuals to join hands with Kerala Police Cyberdome to improve operational effectiveness of policing by leveraging drone-enabled technologies and to devise mechanisms to counter the emerging threats posed by drones.

The Competition was conducted on the following Categories: -

- SURVEILLANCE DRONE
- HEAVY LIFT DRONE
- DRONE FORENSIC SOLUTIONS
- NANO DRONE
- ENDURANCE DRONE
- ANTI DRONE SYSTEMS

With the advanced Drones soaring in the skies in the future not so far away, how are you planning to identify and mitigate the threats while safeguarding the citizens?

Kerala Police has always been committed to be equipped against new and emerging threats, especially in the key technology areas affecting the security of the state and its citizens. The emergence of 'drones' or 'unpiloted aircraft' has made a significant impact on security and surveillance in recent times. As in the case of any other new technology in this space, it poses huge opportunities along with a host of new threats to law and order establishments. It is imperative to develop novel methodological approaches for the digital forensic analysis of a seized drone, to build police specific solutions and counter mechanisms to fight the future threats posed by drones. In this backdrop, the Kerala Police came out with the Kerala Police Drone Forensics lab and research centre.

The system, which comes under Cyberdome, has all capabilities for conducting forensic analysis on any drone or parts of drones recovered from any area and retrieve background information. It will also provide details of drone's memory, software, hardware and navigation. While analysing a drone at the research centre, the centre will be capable of looking into its origin, devising anti-drone mechanisms to check its misuse etc. Besides addressing the threat aspects of drones, the lab-cum-research centre is also envisaged to look at the utility part of the unmanned aerial vehicles. Kerala Police has always been in the forefront of implementing latest & innovative technologies for better delivery of services to its citizens and in adopting the power of technology for better policing. Kerala Police drone forensics lab and research centre envisages to identify and develop innovative solutions and suitable workforce in drone technology for better and effective service delivery to the citizens along with devising state of the art solutions to tackle the current and future threats posed by the advent of the drone technology.

Mitigating the threats - Bullet Points

- Development of Counter drone systems is being executed in an incremental manner considering its high cost and complexity.
- With the complete development of the proposed system, Kerala Police shall be able to detect and counter almost all drone related threats at the location of interest.

Current development of Counter Drone system are as follows.

- Development of Drone Jammer is ongoing
- Development of AI based real-time Drone classification

software is ongoing

- Development of RF drone detection system is ongoing

Future Development plans on counter drone system

- Development of Drone Detection Radars
- Development of Interceptor drones

Your choice of words for setting an inspiration to the other departments would be...?

Technology has brought about a revolutionary change in the basic ethos of human existence and has totally changed every aspect of human life. But with the technological benefits, there has emerged threats and issues also, that have a global reach and devastating effects of the security of citizens. The law-and-order departments need to be one step ahead of these criminals, if we intend to tackle these problems in the long run, for technology is constantly changing, getting complicated and difficult to detect. Hence the need to understand that public private participation, Inter departmental cooperation, international cooperation, are crucial in handling the threats of the digital world and all stakeholders need to work together towards this end



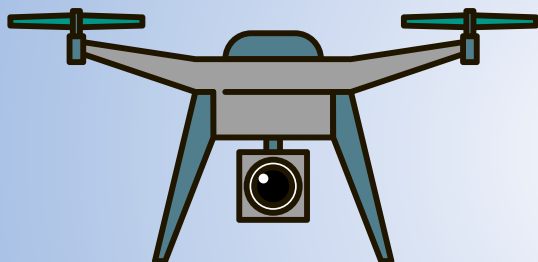


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Indian Drone Industry - Catching the Prime Minister's attention
(An interview with Rajan Luthra, founding Chair, FICCI Drone Committee)

Could you share some details about your career and your current role with our readers?

My career has broadly spanned information technology, security, and drone industries.

I have been fortunate to be among the earliest adopter of innovative tech solutions such as auto-ID and biometrics, IoT solutions, big data, AI, and computer vision across a wide variety of business sectors. Being able to contribute to the regulatory policy frameworks, standard-shaping and public-private partnership initiatives across each of these industries has also been personally rewarding, especially while chairing the FICCI Committee on Drones for the past three years.

After being a member of entrepreneurial teams for nine years in early-stage identity management, packaged software, and electronic security ventures, I joined Reliance Industries in 1999. The past 23 years at RIL across its various hydrocarbon and consumer businesses, especially during start-up and growth phases, has helped me gain in-depth experience in envisioning, planning, and executing large-scale technology platforms and driving strategic business initiatives.

One of the most exciting experience at RIL was being a part

of the founding team at Reliance Retail in 2006, where I was engaged in the business and technology strategy for what is today India's largest retailer and also helmed the loss prevention function.

Currently, as head of special projects in the Chairman's Office, I lead a physical digital platform team, and program manage implementation of path-breaking Integrated Operations Centres across the entire RIL group.

As a member of the Investment Committee representing RIL at an Israel Innovation Authority (IIA) sponsored Incubator for past 5 years in Israel in guiding and mentoring the growth of 15+ early-stage start-ups after evaluating more than 2,000 ventures across frontier technologies has been an enriching experience.

More recently, as a fellow at the Centre for Fourth Industrial Revolution in India, I have started engaging on multiple strategic initiatives for World Economic Forum platforms including aerial mobility, smart cities, cyber-security. A white paper titled "Drones: ensuring cost-effective maintenance of oil and gas pipelines" authored by me jointly with three colleagues that was recently published may be relevant for your readers as well. (<https://www.weforum.org/whitepapers/>

drones-ensuring-cost-effective-maintenance-of-oil-and-gas-pipelines).

The Central Government is laying out the red carpet for the drone industry in India especially in the past few months. What, according to you, has been the key rationale for this?

Since 1970s, remotely piloted aircraft systems (RPAS) or drones have been primarily used in the defence sector for various strategic missions including intelligence, surveillance, and reconnaissance. The primary reason for the recent focus on the drone sector globally is on account of the transformational power of drones across diverse sectors and industries. The impact that drones are capable to deliver has been compared with that of the Internet or the Global Positioning System. This has led to a world-wide attention on this technology that is a subset of the fourth industrial revolution.

In India, our Prime Minister Shri Narendra Modi himself has been an avid advocate of the drone sector. He has repeatedly spoken about the impact being created by use of drones. In his speech at the United National General Assembly on 25th September 2021, Mr. Modi highlighted that "we



Source: The Future of the Drone Economy by Levitate Capital (<https://levitatecap.com/levitate/wp-content/uploads/2020/12/White-Paper-v4.pdf>)

are engaged in providing digital records of their homes and lands to millions of people by mapping them with drones in more than 600,000 villages of India". On 25th October last, he said that drones "is a topic which is dominating the imagination of our country, especially our youth... India is one of the first countries in the world that is preparing digital land records in its villages with help of drones!"

The Survey of Villages Abadi and Mapping with Improved Technology in Village Areas (SVAMITVA) scheme referred above by the Prime Minister was launched nation-wide by him in April 2021 under the Ministry of Panchayati Raj. It is truly a game-changing program whereby hundreds of millions of our rural citizens will benefit by getting financial stability, access to loans and reduced property related disputes. In my view, this successful demonstration of the use of drones, apart from its' known value for agriculture, healthcare, and many other high societal impact use-cases is one of the primary reasons why the nascent drone sector has been receiving the much-needed attention in India after having been neglected for close to a decade.

Can you please elaborate on how the drone sector has gained from this attention and what role has FICCI played in this?

Let me narrate a brief context before responding to this question. We are all aware that keeping in mind the threat from rogue drones, the use of drones had been banned for commercial purposes in 2014. Subsequently, we at FICCI had supported the Government initiatives for partial relaxation that had been provided in 2018.

In September 2020, FICCI had setup a Drone Working Group

that I was privileged to lead, as per directions of the Steering Committee for Advancing Local Value-Add and Exports (SCALE) under the aegis of Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce & Industry. Jointly with EY as our Knowledge Partner, we were tasked to prepare an action plan for making India the drone manufacturing hub of the world. We came up with a bottom-up estimate of the total addressable market potential for drones (for limited sectors) and counter-drones in India to be Rupees 300,000 crores (or roughly US\$ 40 billion) with up to 60% domestic manufacturing opportunity by 2030. In early March 2021, we were ready to present our recommendations to the DPIIT leadership.

However, on 12th March 2021 the drone sector stakeholders got a severe jolt when the UAV Rules 2021 were notified. To say the least, these were highly complicated and may have spelt the death-knell for the large number of promising drone start-ups in India as there were too many compliance overheads. DGCA approval would have been required before each drone flight registration. Each drone prototype would have needed individual ID and approvals, that would have implied academic innovation to come to a standstill.

We held a string of consultations with all stakeholders collecting specific concerns and recommendations. We managed to distil a large list down to two slides in our Working Group presentation to the then DPIIT Secretary, the late Dr Guruprasad Mohapatra, in the presence of Joint Secretary Ministry of Civil Aviation Shri Amber Dubey on 23rd March 2021. The potential of the drone sector was presented along with request for extending the PLI scheme and repealing of the onerous UAV Rules 2021. We were

given a patient hearing and guided suitably on the next steps.

Fortunately, given the personal attention of the Prime Minister, the collective industry feedback was given the due attention it deserved. A lot of effort went into drafting the much simpler Drone Rules 2021 that were notified on 25th August 2021 and the UAV Rules 2021 were repealed. Within a month thereafter, our request for incentives for the drone sector was also accepted at a speed never seen before and on 15th September the announcement of an attractive PLI scheme for drones was made.

Since then, we have seen a series of outcomes being worked on tirelessly by the government officials at the Ministry of Civil Aviation, the Directorate General of Civil Aviation, and the Drone Directorate. This has led to the public availability of air-maps in Digital Sky classifying the entire country into green, yellow, and red zones (September 2021), the announcement of the National UTM Policy Framework (October 2021), launch of Kisan Drones by the Prime Minister and the ban on drone imports (February 2022).

With my tenure as the founding Chairperson of the FICCI Committee on Drones coming to an end recently after three years, I feel privileged to have led a dynamic group of industry members, end-users, academic experts, and start-up founders and having contributed my bit to these key strategic outcomes at a crucial stage for the drone industry in India.

With so much having been done in the past few months, what are the immediate and long-term challenges and opportunities that you see for the Indian drone industry?

India is at the cusp of a take-off in terms of the explosive growth in

demand for drone-based services from the enterprise customers. As already mentioned, despite the threat from rogue drones, India is one of the few countries in the world to have shown enormous boldness in notifying liberalized Drone Rules 2021 for the civil sector. These rules shall enable speeding up of drone R&D, manufacturing, and delivery of aerial-intelligence led services in the country.

I think the phrase 'making India the drone hub of the world' and what it means needs to be thoroughly appreciated. When read carefully, it essentially implies that:

a) India would be one of the nodal points for all activities pertaining to innovation and manufacturing of superior quality drone products,

b) India would need to be fully self-reliant in the drone components and software space. These would have to be indigenously developed and manufactured, and

c) India would be among the top players in the global drone industry and exporter of drones

The entire drone industry including the academia, the early and growth stage start-ups as well as the more established players, now need to go the extra mile to meet up to the above expectations and take it up as the biggest opportunity.

While lot more on-going support is expected to be provided by the Government, the foundation for making India the drone-hub-of-the-world from a regulatory standpoint has already been laid. The ball is now clearly in the court of the youth of India to take up the gauntlet and deliver genuinely world-class products at affordable price points that deliver quick return on investment to customers.

Among the key challenges,

one of the primary issues is that we are currently importing a vast majority of components from abroad. Much work needs to be done to establish components manufacturing in India. This would require large scale investments from industry players, participation of startups, contribution from technology institutions and policy support from the government. Given the multiplicity of stakeholders involved, there is a need for seamless and constructive dialogue to prepare a roadmap for innovation and manufacturing activities in the drone components industry for the next decade. We must also engage and harmonise our efforts on several strategic and operational issues, especially between drone OEMs and component manufacturers. Interested drone component manufacturers must actively seek greater visibility about specific requirements of drone OEMs and allocate resources for product development accordingly.

While drones are used for many diverse applications, which business sector do you think has the highest potential in a vast country like India?

As per a comprehensive report on The Future of the Drone Economy by Levitate Capital (<https://levitatecap.com/levitate/wp-content/uploads/2020/12/White-Paper-v4.pdf>), in 2020 the defence industry had grabbed the largest market share - more than all other segments combined. As per this report, the enterprise segment is growing rapidly and will take the lead by 2025. However, by 2030, drone-based logistics alone is expected to become the largest business sector from a demand standpoint with a market size of US\$ 33 billion.

I fully subscribe to this assessment and believe that in India also, the

use of drones for first-mile, mid-mile, and last-mile of the supply chain, especially for remote and difficult to reach locations, shall see widespread and fast-track adoption. The application of drones for last-mile delivery for the healthcare sector has already been successfully proven in India and Africa. The 'Medicine from the Sky' pilot initiative of World Economic Forum in partnership with the Government of Telangana jointly with NITI Aayog, HealthNet Global (Apollo Hospitals) and Ministry of Civil Aviation, has yielded impressive outcomes by successfully delivering medicines under controlled temperature conditions to primary healthcare centres under beyond visual line of sight (BVLOS) conditions.

Similar pilots are being carried out in multiple states with hilly terrains where road-based cargo delivery is time consuming and expensive. We should hopefully see regulatory framework for BVLOS drone-based delivery and drone-corridors being established within the current year itself.

How do you visualize the advancements in the counter-drone tech and the demand for such systems?

To be clear about the semantics, we are discussing the tech-based solutions for countering the threat from 'small' category of rogue drones. This is technically referred to as counter small unmanned aircraft systems (C-sUAS) and what we generically call the counter-drone systems.

As per the study previously referred, the potential market demand for such systems in India may cumulatively be around 48,000 crore rupees (~US\$ 6.5 billion). The primary customers are likely to be the defence forces, sensitive government establishments, airport and port operators as well as public

and private sector owners of critical infrastructure.

The key factor that end-users need to bear in mind is the ‘design basis threat’. This defines the precise threat scenarios that they wish to secure their assets against. For example, for the Border Security Force, this shall be the drone-based drop of armaments and drugs from across the border. For a large refinery, it shall be the threat from dropping of an improvised explosive device from the drone over vulnerable hydrocarbon infrastructure.

The radio frequency and radar-based technologies for detection and precise location of rogue drones shall keep improving along with other sensors such as the electro-optical and infrared cameras for classification. The soft-kill and hard-kill tools shall also become better in terms of accuracy and effectiveness. However, the key aspect that will determine the overall success of these C-sUAS systems shall be the proper selection of robust and proven command-and-control

software. This needs to fuse the real-time data from multiple types of sensors and systems, undertake complex event processing in real-time, present a common operating picture to the control room personnel to be able to take effective decisions, and then coordinate the countermeasures to be effectively deployed within the few seconds of time that shall be available. This is where the end-users need to take help from subject matter experts in making the right choice and not cut corners.

The regulatory frameworks for use of such C-sUAS systems, especially in the private sector shall also need to be updated on top priority.

A person of your stature will always be an inspiration for the youth. What would be your message for them?

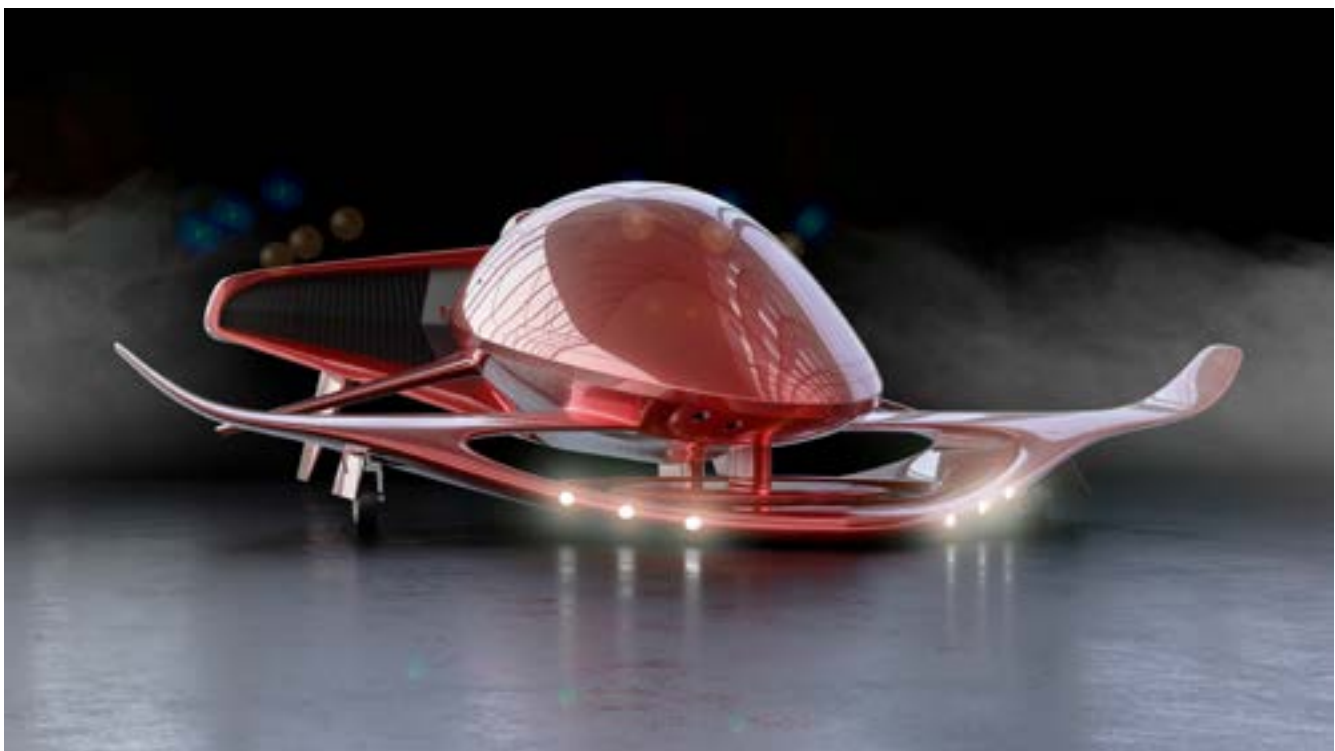
My strong recommendation for the young professionals and entrepreneurs engaged in the drone industry is to focus their energies on three primary dimensions:

a) Understand the key problem statements in-depth and solve the chosen use-case challenges by applying a platform-centric drones-as-a-service (DraaS) delivery model that is geared for fast-track scale-up.

b) Apply the lean startup principles framed by Eric Ries (<http://theleanstartup.com/principles>) especially the build-measure-learn feedback loop even if you are a mature company as these are most important during these challenging times that we live in.

c) “It is important to remember, there are no overnight successes. You will need to be dedicated, single-minded, and there is no substitute to hard work.” This mantra taken from one of Shri Mukesh Ambani’s speech very aptly applies for the drone industry in India today.

Thank you once again for this opportunity. I wish that your efforts in spreading widespread awareness about this transformative drone sector shall continue to yield greater results.



LOCATION ANALYTICS TECHNOLOGIES FOR MILITARY

Location analytics, by definition, is the process or the ability to gain insight from the location or geographic component of business data. Data, especially transactional data generated by businesses, often contains a geographical component that, when laid out in a geographical information system, allows for new dimensions of analysis and insights, in this case through a more visual approach.

Location analytics is often a visual way of interpreting and analyzing the information being portrayed by the data when used in conjunction with a geographical information system. This can be done for both real-time geographical data and historical geographical data. Real-time location analytics can be applied to businesses such as courier and postal services, which need to keep track of the locations of delivery vehicles and packages in real time.

This is also very useful for military purposes, as being able to know the exact location of troops and enemy movements on a map allows for better informed decisions and present tactical advantages. These analytical techniques along with historical and transactional data can be used one can select suitable sites for military bases.

Spatial relationships and Location analytics techniques can be used for siting of Military bases.

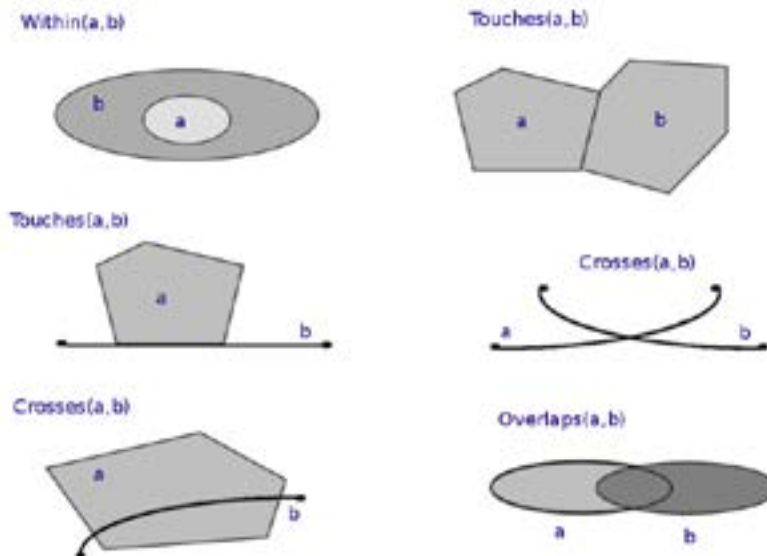
When we talk of locations they can be classified as under

- **Referential:** In reference to something
- **Relative:** Position of two objects in relation to each other.
- **Absolute:** Its True position in the world
- **Topological:** Spatial Data relationships

SPATIAL RELATIONSHIPS

The first three points are self-explanatory however spatial data relationships can be further explained as under

- Within
- Touches
- Crosses
- Over laps



SPATIAL ANALYTICS

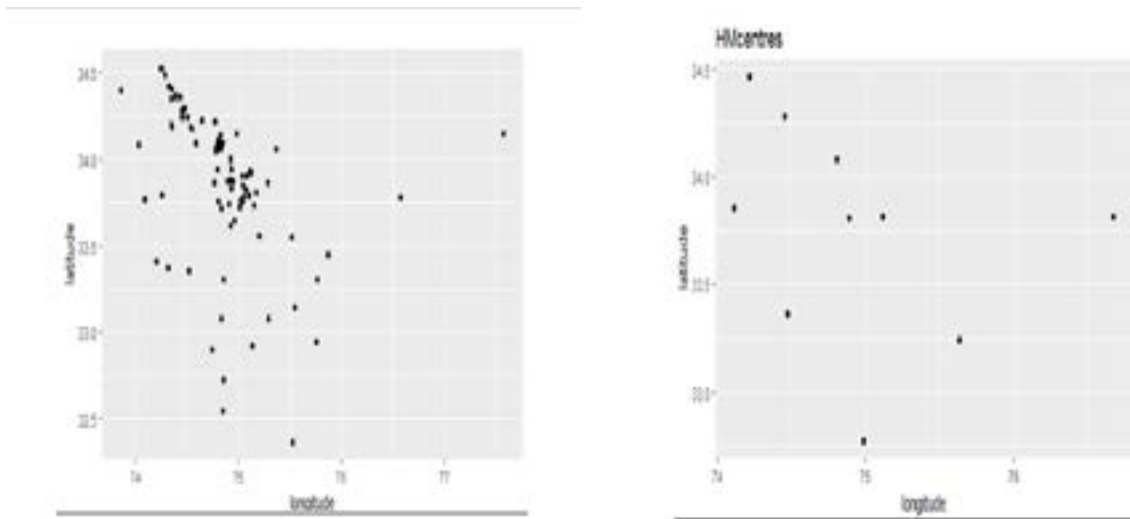
The nuances of spatial analytics can be elaborated as under

- Understanding location
- Where things are or where events occur -using geocoding, mapping, visualization
- Understanding extent and distributions
- Measuring length, area, and distributions -using aggregations and functions
- Understanding relationships, detecting patterns
- How are places related -using predicates and transformations, statistics
- Making predictions
- Calculating the probability of future events -using data mining

Along with the spatial analysis certain techniques of Location Analysis would also need to be incorporated. These techniques help us to narrow down our choices based on analysis thus making selection of the base much easier

LOCATION ANALYTICS TECHNIQUES

- **Clustering:** Cluster analysis or clustering is the task of grouping a set of objects in such a way that objects in the same group (called a cluster) are more similar (in some sense or another) to each other than to those in other groups (clusters). It is a main task of exploratory data mining, and a common technique for statistical data analysis and Spatial Data analysis.



The Left image shows the total activity of Hizbul Mujahideen in recent past. The Right one shows the cluster centres. These centres influence the selection of military bases in the vicinity of these centres (keeping other factors constant)

- **AHP:** The Analytical Hierarchy Process is a powerful tool that was introduced and developed by Saaty in 1980. In the AHP method, obtaining the weights or priority vector of the alternatives or the criteria is required. For this purpose Saaty developed the Pair-wise Comparison Method (PCM). In the AHP, the decision making process starts with dividing the problem into issues, which may optionally be divided further to form a hierarchy of issues. These issues are those to be considered in tackling the problem. These hierarchical orders help to simplify the problem and bring it to a condition which is more easily understood. In each hierarchical level, the weights of the elements are calculated. The decision on the final goal is made considering the weights of the criteria and the alternatives

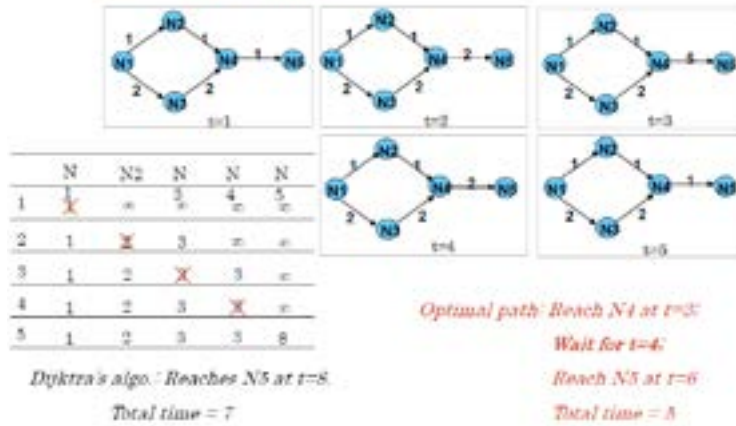
Certain issues for siting can be Flat area, Road availability and connectivity, Water availability, Distance from cluster centre (discussed earlier), Line of sight etc. These issues can be given individual weights and then by using AHP one can home on to one or two sites which can then be physically verified

- **Interpolation:** Interpolation is the process of using points with known values or sample points to estimate values at other unknown points. It can be used to predict unknown values for any geographic point data, such as elevation, rainfall, noise levels,

- **TAGS:** Time aggregated graphs help in working out the minimum time needed for moving from one place to

another. Normally when we move from place A to B , Though one may not find traffic in the early morning but as the day progresses the traffic in certain areas like market place increases thus adding to the travel time , so even if planning for an early morning move , based on the local habits one may still get delayed . Realistic Time and Distance charts can be worked out for travel to various locations. This can be done using TAGs

Find the shortest path travel time from N1 to N5 for start time t = 1.



An illustration of calculation of best path travel time

• **Co-Location , Co-Occurrence, Associations** Most of the military bases need certain constant elements co located with it . Some of them are as under

- Medical facilities
- Workshop location
- Logistic support units
- Perimeter Security
- Water Supply location
- Troop accommodations
- Semi underground/ Underground tactical operations room.

These mandatory requirements can be factored in AHP and clustering to narrow down the choices for locations Certain miscellaneous analyses which can be used to support military operations are as under

- Shortest path analysis
- Best Route
- Closest facility Allocation
- Location-Allocation

Conclusion: These analytical techniques are existing for site selection for industries / facilities/ offices and ware houses. The same can be extrapolated and use for the Military. It would ease out a lot of site selection issues.



About the Author

Rahul Jain did Post Graduation in Geographic Information Systems and Remote Sensing , with an exposure to Data Science. He has extensive experience in GIS and Imagery analysis . He has keen interest in usage of Geospatial technologies for Security purposes.

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Elroy Air unveils autonomous, hybrid-electric VTOL cargo aircraft



San Francisco-based Elroy Air unveiled its pre-production aircraft model - the Chaparral - fitted with the autonomous aerial cargo system. The craft's USP is its end-to-end autonomous vertical take-off and landing (VTOL) aerial cargo system. With this system in place, the Chaparral can autonomously pick up cargo in the weight range of 300-500 lbs and deliver it by air up to a distance of 300 miles.

David Merrill, Elroy Air co-founder and CEO, said, "The Chaparral is a first-of-kind autonomous air cargo system that builds on more than 100 years of American aviation and aircraft development history." Explaining how the Chaparral can transform the future of express logistics, Merrill said, "It is built for full end-to-end automation, and will efficiently enable express shipping in thousands of new areas. Essentially, it is a delivery drone that's faster than ground transport and lower cost than conventional aircraft."

Clint Cope, co-founder and president of Elroy Air, said, "We

have designed an aircraft that behaves like a hybrid between a rough-and-ready helicopter and a battle-hardened bush plane. It can pick up cargo anywhere with a 50 square foot landing area. The Chaparral will be a vital logistics link for people around the world with unreliable roadways and in remote and rural areas that take longer to reach today."

The company has secured agreements for more than 500 aircraft from commercial, defence and humanitarian customers, and this amounts to over \$1 billion in aircraft demand. Kofi Asante, Elroy Air's vice-president of business development and strategy, welcomed future partnerships. "We are excited about the opportunity to partner with strong operators who have been servicing these three core customer markets for decades. The partnerships will focus on missions that aim to improve quality of life for communities by expanding express logistics."

An early prototype of the Chaparral flown in 2019 demonstrated several vital

systems of the aircraft design. The Chaparral system unveiled on Wednesday features eight vertical lift fans, four distributed electric propulsors for forward flight, a high-wing airframe configuration, as well as improved ground autonomy and cargo-handling systems. Elroy Air's solutions aspire to expand delivery locations and reduce timeframes, provide immediate aid and relief in disaster and firefighting situations, as well as rapid, autonomous resupply for troops in the field.

Tech Speak

The Chaparral checklist tick marks:

- A transitioning "lift + cruise" VTOL aircraft with a carbon composite airframe.
- A turbine-based hybrid-electric powertrain for long-range mission capabilities.
- A design to fit in a shipping container or C-130 cargo aircraft, enabling it to be quickly shipped and deployed anywhere in the world.

A "Bi-directional Conveyor Belt"

Elroy Air has developed lightweight, aerodynamic modular cargo pods that can be pre-loaded by ground personnel and picked up by the aircraft before take-off.

The cargo pod is lowered to the ground and released at the delivery location after the system has landed.

The Chaparral system can retrieve another pre-packed pod and transport it to its next destination - creating a bi-directional conveyor belt through the sky.

Wisk Aero Secures \$450 Million from the Boeing Company to Advance Certified Autonomous Electric Flight



Wisk, a leading Advanced Air Mobility (AAM) company and developer of the first all-electric, self-flying air taxi in the U.S., has secured \$450 million in funding from The Boeing Company, making it one of the most well-funded AAM companies in the world. Combined with previous funding, this investment reinforces Wisk's strong position as a privately-backed AAM leader and highlights the strength of Wisk's strategic partnership with Boeing and their collaboration on critical technology development.

This investment will further advance the development of Wisk's 6th generation eVTOL aircraft, a first-ever candidate for certification of an autonomous, all-electric, passenger-carrying aircraft in the U.S. The funding will also support the company as it enters an intensive growth phase over the next year, its preparations for the launch of scale manufacturing, and the company's Go-to-Market efforts.

Within five years following the certification of its 6th generation aircraft, Wisk intends to operate one of the industry's largest fleets of AAM eVTOL aircraft. The scale of this fleet is enabled by the

company's autonomous technology, a competitive differentiator and industry-recognized key to scaling services and maximizing safety. In this timeframe, Wisk anticipates close to 14M annual flights bringing time savings to over 40 million people across 20 cities - all with zero emissions.

Gary Gysin, CEO of Wisk said:

"Wisk is extremely well-positioned to deliver on our long-term strategy and commitment to safe, everyday flight for everyone. We are incredibly fortunate to have Boeing as not only an investor but a strategic partner, which provides us with access to a breadth of resources, industry-leading expertise, a global reach, extensive certification experience, and more. As we enter this next stage of our growth, this additional funding provides us with capital while allowing us to remain focused on our core business and our number one priority, safety."

Marc Allen, Chief Strategy Officer of Boeing said:

"With this investment, we are reconfirming our belief in Wisk's business and the importance of

their work in pioneering all-electric, AI-driven, autonomous capability for the aerospace industry.

Autonomy is the key to unlocking scale across all AAM applications, from passenger to cargo and beyond. That's why straight-to-autonomy is a core first principle. Boeing and Wisk have been at the forefront of AAM innovation for more than a decade, and will continue to lead in the years ahead."

With its deep expertise in autonomous, electric flight, its extensive flight test history, key knowledge and insights from the development of five generations of aircraft, and the strength of its partnerships, Wisk is positioned to maintain its leadership in the AAM and broader mobility space.

Wisk began in 2010 as Zee Aero, with a mission to deliver safe, everyday flight for everyone, and later merged with Kitty Hawk Corporation. Upon recognizing the commercial potential of Wisk's 5th generation aircraft, the aircraft and team were spun out to form Wisk, with an investment from The Boeing Company. Over the past decade, Wisk has achieved a number of aviation and industry firsts, most notably, the first flight of an all-electric, autonomous, eVTOL aircraft designed for passenger use, in the U.S.

Previous undisclosed funding rounds were led by The Boeing Company and Kitty Hawk Corporation, through a joint venture, making Wisk one of the only AAM companies to be backed by two aviation leaders. Kitty Hawk remains an investor and has supported the development of Wisk's previous generations of aircraft.

Fanttik Launches Versatile New Generation Portable Power Station EVO 300



Fanttik, a young and fast-growing brand that creates tech-driven solutions for real-world problems, has announced the launch of its New-Gen EVO 300 portable power station in the United States which boasts a large LCD display and is ideal for outdoor users who need both power and versatility. It is a must-have backup for camping parties or road trips that demand numerous power connections and a reliable and long battery life.

“In an era when everyone is concerned about the environment, traditional gas-powered devices are being criticized for their noise and noxious emissions. As a company dedicated to providing outdoor products that combine advanced technology with down-to-earth practicality for the younger generation, we believe that this new generation portable power station, which is electric-powered and emission-free, will provide greater value and a superior experience to

our customers,” said Bo Du, CEO of Fanttik.

Weighing only 8.8lbs, the portable EVO 300 stands out among many other portable power stations on the market for its massive 299Wh battery capacity, stable output with 9 DC/AC ports, large LCD interactive display, a solar panel for fast and green recharging, as well as a design with 12 safety features.

Massive battery capacity for fast charging

Featuring PD60W two-way fast charging, EVO 300 is packed with a 300W/299Wh high quality and large capacity lithium-ion cell and can provide fast charging for various devices. It is capable of fully charging a laptop five times, a mobile phone 32 times, a drone five times and a camera 21 times.

Multiple DC/AC ports for stable output

EVO 300 has seven DC ports and two AC ports, each with

independent switching controls to ensure user safety. It can be used to simultaneously and steadily charge nine different electronic devices up to 300W, ranging from mobile devices to car refrigerators and even ventilators.

Large interactive LCD display

Offering long-standing power and intelligent user interaction features in a chic and compact design, EVO 300 also ensures users maintain close control by clearly displaying device status metrics such as real time output power, remaining power amount, real time input power and time required to fully recharge.

Flexible, fast and green recharging

The EVO 300’s capacity to recharge in a flexible, quick, and environmentally friendly manner makes it an excellent companion for a safe, pleasurable, and gratifying outdoor experience, as users won’t have to worry about running out of power when participating in outdoor activities. Solar charging, car charging, wall charging, and PD60W fast charging are all supported by the EVO 300. The solar panel on the EVO 300 can fully recharge the power station in just 3.5 to 6 hours, without disrupting the power supply to other electronic devices such as laptops, mobile phones, auto refrigerators, and drones, thanks to an advanced algorithm called maximum power point tracking (MPPT). Users can choose to use two charging methods at the same time to save charging time. With wall charging 90W and PD60W fast charging, a completely charged EVO 300 takes only 2.5 hours.

U.S. Autonomous Drone Maker Skydio Announces New KeyFrame Capability for Breakthrough Autonomous Cinematography



Skydio 2+ introduces enhanced wireless range and battery life to get the most out of every adventure.

In 2019, Skydio 2 made autonomous flight accessible like never before. Skydio autonomy enabled exciting creativity for everything from the solo-creativity, to incredible travel and landscape videography, to capturing motor and action sports. Skydio 2 enabled enterprise customers to perform higher quality inspections faster with

Skydio, the leading U.S. drone manufacturer and world leader in autonomous flight technology, announced a new groundbreaking autonomous flight capability, Skydio KeyFrame. Skydio Keyframe is an AI skill that allows a user to design and capture smooth, complex camera moves with just a few taps. Skydio also announced the availability of Skydio 2+, a drone which builds on the industry-leading autonomy of the Skydio 2 drone with important hardware and software improvements.

Manual drones are hard to fly, easy to crash, and unusable in environments with high GPS or compass interference—making it nearly impossible for even an expert pilot to create dynamic, smooth, and creative shots in complex environments. With the introduction of KeyFrame, anyone can design impossible camera motion that is smooth, precise, and repeatable.

“KeyFrame is absolutely insane,” said drone and tech reviewer, Billy

Kyle. “By far the most feature rich and precise custom flight path system I have ever used on a drone.”

The pilot chooses their KeyFrames with just a few taps, and Skydio Autonomy creates a continuous smooth camera path between them. Once the KeyFrames are set, the user can play it back, forward or backwards, as many times as they want at whatever speed they choose.

“One of the main things that sets professional productions apart is the motion of the camera. With the help of cranes, jibs, and large production crews, Hollywood productions do really unique, interesting things. In the hands of an expert pilot, drone footage can be very cinematic,” said Skydio CEO, Adam Bry. “KeyFrame makes this capability accessible to a new wave of creators. Hollywood quality cinematography, available anywhere, anytime.»

minimal pilot training with the launch of Skydio 3D Scan, a first-of-its-kind adaptive scanning software to automate the data capture process needed to generate 3D models with comprehensive coverage and ultra-high resolution.

With extended range, a more robust wireless connection, and longer battery life, Skydio 2+ allows solo creators, outdoor adventurers, athletes, prosumers and hobbyists—at any skill level—to get the most out of Skydio groundbreaking autonomy.

Starting at a base price of \$1099, Skydio 2+ builds on the company’s industry-leading 360° obstacle avoidance and unprecedented ease of use, adding two omnidirectional external antennas to extend the drone’s range from 3.5 km to 6 km. The Skydio 2+ Battery now offers 20% more flight time, while the Skydio 2+ Beacon™ boasts an extended 3 km range.

Novum Drone: High-end Drone at an Affordable Price



Arthur Bell has introduced the **Novum Drone** with some unique features. The Novum Drone is a precision constructed drone that is specifically intended for effortless flying, making it ideal for flying indoors or filming action shots while on the move. Its lightweight form and folding structure make it an important gear for any expedition.

The **Novum Drone** is the fastest drone of its size, reaching speeds of up to 30 mph. It has all of the functionality that professionals require, but it is also extremely easy to fly and manage, even for total beginners.

The **Novum Drone** has a built-in pre-programmed camera, such as the boomerang and the asteroid, so even the most inexperienced pilot can get a professional-quality film with a single button press.

Novum Drone Features

- **Drone that folds**

The propellers fold inwards to make the drone easier to transport and keep it safe during transportation

- **HD Photos and Video**

Take high-resolution photographs and record HD video at 60 frames per second

- **Gravity Detector**

Sensors detect the ground and other obstructions and automatically alter the flight path to avoid colliding

- **Slo-mo Mode**

Relive the best moments of your life in high-definition slow motion

Novum Drone is a budget-friendly product that will fit in your pocket as you can buy it for around \$100. It produces ideal aerial shots, allowing you to shoot from any angle. The shooting outcomes are consistently superior

to what you would expect at this price point. It's a dream device for anyone with a passion for photography and a desire to learn more about it. The lightweight gear has unrivalled beauty and grandeur, which is reflected in the photographs as well. Novum Drone Can Be Purchased Through Their Official Site.

Novum Drone is capable of flying at a height of 80 meters while avoiding all current obstructions and collisions. During its flying and photography, it can effortlessly link with any smartphone to receive directions. The Drone can simply be positioned to avoid obstacles. The positioning and flight of the drone are constantly updated in the Smartphone, making it easier to use and control. For Buy and

More Information about the Product Visit Official Website.

Tactic Air Drone Launches its Highly-Anticipated Foldable Drone



Tactic Air Drone has launched a new quad copter with enhanced stability, intelligent navigation, and cutting-edge design. The 4K HD Drone is perfect for beginners and seasoned drone enthusiasts alike. It comes with a camera and packs state-of-art technology and top-notch design at an affordable price.

The remote controls for the drone are straightforward. One button to take off, other to land, and another for emergency stops to avoid collisions and obstacles. Users of the **Tactic Air Drone** have two ways to control the sleek device: They either pilot it with a controller or control it with their mobile phone using Wi-Fi. The

drone has a height-setting advanced density pressure sensor with the help of which it can even control itself.

Now, not only does the **Tactical Air Drone** look good with its brushed texture and elegant design, it performs well too. It was created with rigid materials to avoid cracks, fractures from collisions. The designers made sure it was lightweight and foldable. This makes it easy to fold and transport in storage. This drone features a higher battery power of 350 mAh among its many features.

With its innovative and intelligent gesture controller, users can connect their phones to the

drone to control its flight in real-time with various modes such as full-screen, split-screen and picture-in-picture. This gives the users an advantage of using both the cameras at once. Unless, of course, they wish to let the drone control itself automatically. With gesture recognition, users can choose to follow them with its smart sensors. It is perfect as a personal photographer. It also features a variety of flight maneuvers to suit different scenarios.

The creators of the **Tactic Air Drone** claim that this drone can fly for over 20 minutes at a stretch in comparison to other drones which can only fly for 4 to 13 minutes. This gives users the opportunity to capture more photos and record longer videos than before. In case the battery runs out, it can be swapped with another with ease thanks to the modular design.

Speaking of photos and videos, the drone is equipped with a wide-angle lens to capture videos up to 4K HD. It boasts of a 4K UHD resolution with over 9 million pixels to create high-quality pictures and videos even when flying in the air.

The creators of the **Tactic Air Drone** have priced it at \$198, but that's not it. They are currently selling it for a 50% discount. They ship worldwide with a 1-year warranty. In case of accidental damage, they replace the machine, much to the delight of their users. It can be purchased online from their secure website.

**New Age challenges require a ‘Need for innovation’
says Sameer Joshi – Co Founder New Space Research & Technologies.**



Before we go ahead, our readers would be delighted to hear the story of your journey from entry into the defences to serving the same with your innovative offerings.

Right from my younger days, I was an ardent reader of Military history and aerospace technology, wanted to be a fighter pilot. I joined the IAF as a fighter pilot in end 1995. My first operational posting was at Srinagar AFB on the Mig-21 aircraft, where I learnt the art of combat aviation. Being posted at Srinagar also meant exposure towards a variety of multi-role missions all across the Northern

sector. This was a boon in disguise and helped me consolidate as an aviator very fast. I participated in the 1999 Kargil war and have flown combat missions as part of Operation Safed Sagar. The war gave me a unique perspective on what are the fundamental needs to undertake missions in real world scenarios. It also exposed for me the pressing gaps where the human limitations become tantamount towards an operational success. Post this, I was posted to the Mirage-2000 fleet, which Arguably was the most advanced aircraft in Indian inventory at that time. My horizon expanded dramatically as I was exposed to

technologies which were state of the art, as well as missions which were very challenging at a global level. The Mirage 2000 is an aircraft which the IAF has utilised as the tip of the sword in every conflict since the 1980s. My IAF stint however was cut short when I had a medical issue and I took premature retirement to pursue other options in aerospace & defence space. From 2012, I was part of ‘Team Indus’ as a co-founder, which was a deep tech space company aiming to develop technologies for a robotic lunar lander to soft land on surface of the moon as part of the Google Lunar X-Prize (GLXP). Team Indus was an amazing journey of daring to dream the impossible. It exposed me to the engineering and challenges around low SWAP deep space systems, LEO satellites and related technologies. I however wanted to focus on my quest to develop cutting edge aerospace & defence systems and started NewSpace Research & Technologies Pvt Ltd in 2018 along with my co-founders Julius Amrit and Dilip Chabria.

Why don’t you introduce us to NewSpace Research & Technologies? What sparked your interest to setup your own firm?

NewSpace Research & Technologies Pvt Ltd or NRT as we call it, is a next generation missions & technologies start-up. Our aim is to develop cyber physical systems geared towards persistent unmanned needs as well as lay down a paradigm for collective robotic operations with a civilian and military orientation. Our vision of ‘switch to the unmanned’ is unfolding across the world with development of futuristic technologies towards Warfare 4.0. This change is driven by rapid advances in autonomy and artificial intelligence in the last decade or so. We see the military as the early adopters of cutting edge tech and hence our core focus is to design and develop systems which

increase mission effectiveness in this domain. For this, we have evangelised blue sky research and on the horizon tech with the end users, and have been able to generate the needs for development of advanced technology research & development. To maximise the potency of the software which is the core to the employment of the mission, we design proprietary hardware which optimises the performance matrix on the whole; providing a true cyber physical depth for targeted customer needs. Inhouse design & innovation makes us one of the few Indian companies who are carrying captive R&D in aerospace & defence and is not dependent on TOT/ licensing from outside for product development. The Indian government's Make in India and the Atmanirbhar policies are providing us the right impetus in becoming the country's fastest growing deep tech A&D star-up company.

Can you elaborate on the technologies that you are working on and industries you serve?

NRT is developing a host of technologies to support our product evolution. Our technology roadmap comprises of UAVs of various types and form factor, designed to fly at long ranges across the expanse of geographical locations in India from the plains to the high altitude areas (HAA). The UAVs can work standalone or in a cooperative mode to undertake the requisite goals and the complete portfolio offers choices to operate right from the sea level up to the stratosphere. These use a common architecture for organisation, computation and communication offering a wide range of mission flexibility towards focussed applications. Beyond developing the core UAV hardware and cooperative operations algorithms, we are also working on low SWAP networks, sensor fusion, GPS denied applications, human machine

interface using augmented/ virtual reality, simulations and automatic target recognition technologies. We have made good progress towards development of intelligent UAVs and are focussing now on unmanned air and ground based swarms of both fixed wing and multi-rotor variety. Our first multi-rotor swarm offering is under delivery to the Indian Army. We also won the Indian Air Force's prestigious Mehar Baba prize, ending as the top swarm UAV team in this path breaking competition. Two of our programs, the ALFA air launched UAV and the HAPS, are part of Hindustan Aeronautics Limited's (HAL) Combat Air Teaming System (CATS). We have also recently started a 150 kg load carriage UAV program to target the middle mile logistics delivery sector which has been unlocked thanks to the GOI's very progressive drone policy.

While we were doing a bit of information research, NRT's HAPS caught our interest. Could you please elaborate on it?

The high altitude pseudo satellite (HAPS) is NRT's flagship program to develop a unmanned solar powered UAV for persistent operations in the stratosphere. This is part of a new genre of UAVs which exploit the stratospheric altitudes while flying at more than 65,000 feet ceiling for months at a stretch on surveillance, communications and science missions. These are called pseudo satellites because they can carry out more than 70-80% of missions undertaken by satellites, offering a cost effective solution for augmentation and replacement of satellites. Unlike the satellites, they don't need the expensive launch infrastructure and can operate with an endurance of a satellite and flexibility of a UAV with a wide variety of payloads and missions. We started work on this platform in 2018 and have worked with

Boeing Phantom Works during the feasibility phase. We have now been awarded MOD's iDEX project and have a Business collaboration agreement to develop the HAPS with HAL, with the IAF and the Indian Navy as prime customers. The HAPS is one of the most cutting edge aerospace project underway in India, with very stringent design and development criteria.

What is your say on the Drone swarms? Could you explain their importance and the potential they carry in various aspects?

Swarm robotics is an approach to the coordination of multiple autonomous robots as a system which consists of a large number of mostly physical robots, controlled by minimal human intervention. These exhibit collective self-organising (SO) behaviour through interaction and cohesion between robots, as well as interaction of robots with the environment. Swarming algorithms are empowered by biological studies of swarm behaviour of insects, fishes, birds and animals. Swarming R&D across the world is focussed on development of distributed artificial swarm intelligence capability, commodification of technology for lesser cost impact and increasing state of autonomy between the agents in a swarm. While massed drones in spectacular light shows are all controlled centrally and undertake formation flight, in a true swarm each of the drones flies itself following onboard Ai to maintain formation and avoid collisions with algorithms mimicking nature - *there is no true leader and follower, with all agents in a swarm having their own 'mind' able to undertake collective decision-making, adaptive formation flying, and self-healing.* The benefit of such a swarm is that if one drone drops out—and a few appear to crash—the group can rearrange itself to continue undertaking the mission till the last UAV in air. Over time as militaries have incorporated greater communications, training, and organization - they were

able to fight in an increasingly sophisticated manner, leveraging more advanced doctrinal forms, with each evolution superior to the previous. Today militaries predominantly conduct manoeuvre warfare. *Here swarming would be the next evolution in warfare* - with the swarms exhibiting the decentralized nature of melee combat, along with the mobility of manoeuvre warfare. They have varied levels of autonomy and artificial intelligence. The autonomy extends military reach into the well defended battlespace, operating with greater range and persistence than manned systems; while artificial intelligence ensures dangerous and suicidal missions, thus allowing more daring concepts of operation (CONOPs). Both provide greater success in face on increased threat levels and rapid penetration of contested airspace. Swarming will be an essential tool to saturate targets of the future, as well as mission effectiveness manifold with use of cooperative tactics and distributed sensors/ payloads. NewSpace is the leader in swarm UAVs and allied technologies in India.

Where do you see NRT's innovations in shaping the future of warfare?

NRT is helping shape India's future warfare needs. We have evangelized cooperative UAVs, high altitude pseudo satellites, air launched drones and advanced collaborative autonomy algorithms; all which are the essential tenets towards the command of the skies of the future. That we have been able to convert blue sky research into tangible commercial deliveries in the fourth year of our operations is testament to the company's vision, perseverance in technology development and sustained hard work by our 150 member engineering group. While a large part of our product development is yet to unfold, we have the right building blocks to help crack futuristic products and integrate them to the unique concept of operations needed in years ahead. NRT is also associated

with the mandated aerospace & defence design agencies in India like HAL, ADA & DRDO through various engagement mechanisms and will be part of next generation product evolutions happening in India. With its depth in aerospace design employing multidisciplinary optimization (MDO) techniques, the company aims to deliver fast track product iterations for the end user. In house R&D is the biggest USP at NRT and a large thrust is maintained to onboard and groom resources who have the 'right stuff' towards futuristic mapping of NRT's product development effort.

Would you like to inspire the Drone-prenuers with your call on 'Need for Innovation'?

Yes, I would like to inspire the Droneprenuers with a call on 'Need for Innovation'. In-house innovation & R&D is the bedrock of growth for a country. All companies, especially in the private sector need to believe in their vision and the value they can create for the eco system. It is essential that dependency on foreign products and sub systems has to be reduced in the days ahead. Events such as the Russia-Ukraine war will continue to disrupt the normal mechanisms of product orientation and supply

chain access/ availability. One thing is very apparent, there is a very big domestic market to service in the defence and civilian UAV space in india. The MOD has made some unique announcements of reserving 25% of R&D budget for the private industry. More schemes will be formulated in days ahead. It's very essential that companies identify and synergise their efforts to target the needs of the end user, for which the user needs to spell their requirements in a crisp, clear and concise manner. If the recent announcements by the MOD of some cutting edge indigenous requirements in the Make 1 & 2 space are any indication, the future for Droneprenuers and in house innovation is very bright. Calculated Risk is an inherent component of entrepreneurship and we in India need to break this glass ceiling in aerospace too. Supported by the GOI's start-up/ MSME friendly policies and the future requirements of the Indian Defence and upcoming civilian sectors, there is a very good chance that clinical tech development & innovation will more than succeed in all measures. In the end it will be a win-win for all players and will help the private A&D eco-system to consolidate and surge ahead.



Sameer Joshi & Julius Amrit with the IAF's Mehar Baba swarm drone competition winner trophies

Boost for Drone training in India



With the government liberalising the drone rules 2021, the country has been exposed to a lot of opportunity in the drone ecosystem. The Indian drone market is now ready and open to boost Indian startups towards making in India and hence contributing towards the Indian economy through foreign investments.

The regulators are also opening gates for RPTOs by setting up an industry friendly standards for opening up of new RPTO to cater for the increase in demand of trained licenced pilots without compromising on the safety and security.

No. of Training Institutes Vs Future Need of training Institutes

The RPAS training regime started late in 2018 where the first CAR on RPAS was published by DGCA and subsequent regulations and liberalisation of the rules made by the Ministry of Civil Aviation opened many opportunities for the drone industry in India.

Currently there are 14 listed

RPTO in the country and looking at the constantly growing demand of drones there exists a need of around 2.5 lakh drone pilots to cater for various applications being fulfilled by drones.

According to a report of Goldman Sachs, the upcoming drone industry is a market worth of 4.3 billion. In order to cater for this increasing demand towards making India a drone hub. For this we need to increase the number of RPTOs in the country who will be responsible for safe training of the students and making them industry ready enabling them to perform drone operations safely.

Present skilled manpower Vs Required skilled manpower

There are a lot of pilots in the country who are already providing services in the drone industry but there is an extreme shortage of skilled pilots who need a licence for further operations.

The RPTOs are tasked in training pilots to handle RPAS and carry out safe operations.

However there are a lot of

youngsters wanting to make drone a career, and Without any Prior experience in drones in the country with the new syllabus trains the pilot with handling the RPAS and carrying out safe operations by inculcating them with mission planning techniques. But there are a lot of youngsters wanting to make drones as a career and for the same without any prior experience it becomes difficult to penetrate the already serving industry and hence the new syllabus and category introduced by DGCA.

Over the period of time the country is going to require highly skilled remote pilots to operate in BVLOS and BRLOS operations catering for human air taxis or cargo delivery using drones where the flying envelope increases and the risk mitigation plays a vital role for smooth merger of the two aviation ecospace of manned and unmanned.

Pro's

With the Covid pandemic hitting the world and the drone industry showcasing capability by reducing human effort and increasing the

efficiency and accuracy, drones are now making their way to each and every industry from surveillance of a crowd to mapping of villages to agriculture which makes the backbone of India.

These new liberalised Drone Rules, 2021, are set to transform core sectors of the economy including logistics, agriculture, mining, infrastructure, surveillance, emergency response, transportation, geo-spatial mapping, defence, and law enforcement and will make India a global hub for drones by 2030. Having skilled pilots trained by DGCA approved RPTOs not only helps in safe operations using drones but also helps in reducing the misuse of drones.

Con's

Misuse of drones by non-state players, being a young industry, incidents are bound to happen which will receive amplified publicity and could lead to negative consequences.

Procedure to be implemented or followed

India is on the track to become a leader in the drone industry globally which can be attributed to the more open approach by the government which will be needed in the near future.

Proper streamlining of administration and governance of the drone ecosystem in India will go a long way to further boost the growth of the industry.

Conclusion

By promoting Make in India and raising the bar of the standard of training for remote pilots, India can achieve the goal of being a drone hub by 2030 and also produce drone pilots which will be accepted globally with the Indian training, certification/licence.

As an RPTO we always strive towards safe operations and making

the student pilot, industry ready by imparting quality practical training.

About Author

Yash Patel is a mechanical engineer and a pilot. He is a brilliant achiever by being the youngest DGCA approved RPAS Instructor. At such a young age, Yash has already made various aero-models and customised drone solutions which are accepted by the industry. His flying skills were useful to the various law enforcement agencies during the covid pandemic.

As an UAV training expert, Yash represents the industry in front of Govt bodies by being part of various key committees for laying down training syllabus. He is being regularly invited by industry forums to share his thoughts about how the UAV market is going to shape up in India.

At such an early age, Yash has trained drone pilots who are

already serving the industry and carrying out drone operations safely. Seeing a dream of flying aircrafts with his grandfather his hobby of aeromodelling and drone flying has now turned into his profession and he is still fulfilling the dream by perusing his commercial pilot license.



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