

# White Paper

## Drone Automation In Security & Surveillance



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## Executive Summary

It is a matter of when – not if – drones will be deployed, at scale, for industrial and commercial security around the world. At least, that has been the belief in the drone industry since 2015, if not earlier. Having an electronic eye-in-the-sky is as close as it gets to a silver bullet for physical security and surveillance applications. Yet, drone usage for perimeter security remains limited in the commercial sense – we are yet to see fleets of dozens of drones patrolling and securing high-value assets and premises - autonomously, reliably, repeatedly, affordably, globally. This white paper seeks to shed some light on what might help mature the drone-for-security market from the ‘early adopter’ phase to the ‘early majority’ phase of the adoption curve. It turns out that 3 success factors must fall into place for the drone opportunity in physical security to truly take off: a) reliable, off-the-shelf hardware b) cloud-based, hardware-agnostic software, and c) faster time-to-value, driven by low capex and seamless integration.



<https://flytgcs.live/security-and-surveillance/>

# Industrial & Commercial Security Market

The global industrial and commercial security market is large and growing, estimated to cross US\$200B in the coming years. Human security guards, locking mechanisms, K9 units, safes, CCTVs, and other traditional means of securing people, assets and premises continue to account for the vast majority of the property surveillance market. Nevertheless, automation technologies are rapidly making a dent, resulting in high-growth sub-segments such as video surveillance-as-a-service, robotic aerial security, drone surveillance systems, home & office surveillance drones, border security, etc. Besides type of user & geography, these segments can be classified by:

- Sensing & navigation technologies: thermal, inertial, LiDAR, GPS, ultrasound, sonar, etc.
- Context: aerial, underwater, on-ground, under-ground, etc.
- Application: routine patrols, search & rescue, situational awareness, etc.
- Asset type: residential properties, industrial premises, critical infrastructure, events, prisons, etc.

For drones, the opportunity in the commercial security sector is of the order of US\$1B per year in the coming decade. While nearly 70% of the top security firms are keen to adopt - or already use - drones in their operations during 2019, much of this remains ad-hoc and manual. It is worthwhile to note that this segment remains fragmented, with startups as well as large corporations pursuing the segment with a mix of hardware, software and services offerings.

## Use-cases & Pain points

Unmanned aerial vehicles (UAVs) can be deployed in a multitude of 24/7 security and surveillance use-cases - the pace of which is determined by the intensity of user/customer pain points - such as:

- Need for real-time situation awareness for optimal resource deployment
- High turnover and expense of human security guards, who are also prone to harm
- Risk of manned patrols in harsh weather and unsafe environments
- Liabilities and insurance costs related to worker safety
- Fixed nature of CCTVs, resulting in blind spots and zero mobility
- Live remote monitoring of high-value projects or activities

- Off-shore, maritime, high-altitude, high-traffic situations
- Expensive, risky helicopter missions for tracking & following
- Hard-to-reach locations such as roofs, oil rigs
- Isolation of drone-based solutions from existing security systems
- Anti-terror, anti-piracy, anti-criminal, and riot control scenarios

Thus, sectors ranging from construction, oil & gas, utilities, large agricultural farms, railways to civil security, public safety and emergency response all offer significant opportunities for autonomous drone-based monitoring and intelligent reconnaissance.

## Enterprise Drone Adoption for Industrial Security

The two obvious obstacles for driving broad adoption of drones in aerial security use-cases tended to be:

- Hardware (battery life, sensor quality, flight stability, etc.), and
- Regulation (especially for beyond visual-line-of-sight i.e. BVLOS operations)

However, these are now turning enablers, with the emergence of:

- Reliable, off-the-shelf drones that are affordable and programmable.
- FAA integrated pilot programs, BVLOS relaxations, Part 107 certifications and UAS Remote ID.

In fact, the prosumer drone market has matured so rapidly in the last few years that commercial-off-the-shelf drones priced under US\$1500 can be used commercially, instead of (expensive, monolithic, low reliability) custom drones, in all but the most demanding security and surveillance use-cases. Regulators and government agencies too have acknowledged the substantial civil and public safety benefits of autonomous drone fleets – as evidenced in funds, waivers and permissions granted for emergency response, SWAT units, border security and police drone surveillance applications at the local, regional and national levels.



## Drone-in-a-box

The one area where drone hardware remains an obstacle is the lack of an industry-standard, affordable drone-in-a-box. For drones to create large-scale business value in the security industry, deployments must move past proof-of-concept projects and pilot programs to production deployments involving autonomous fleets. This requires that drones should takeoff from boxes (docking stations) kept outdoors, complete their routine/on-demand/tactical



missions, gather the required intelligence, and land autonomously and precisely back into their 'homes' or 'nests' for recharging and preparing for the next mission.

This drone-in-a-box capability remains expensive, proprietary and limited in reliability. Indoor missions can be managed via charging pads that are more reliable and cost-effective – but even indoors, the adoption can jump 10X or more, once cost-effective drones are paired with equally affordable charging pads, with built-in precision

landing capability. In fact, the monolithic, non-scalable nature of some of the existing drone-in-a-box offerings targeted at security cases has dragged down the pace of enterprise drone adoption.

## Sophisticated Software for Scale

If there is one factor critical to the non-linear growth of the automated drone security system market, it is software that is hardware-agnostic, scalable and seamless to integrate. The simplest analogies here are those of the personal computer and smartphone markets – the commoditization of hardware combined with the emergence of openly accessible software platforms and applications was central to the rapid enterprise adoption of these technologies.





For always-on security and surveillance, the core set of software capabilities include:

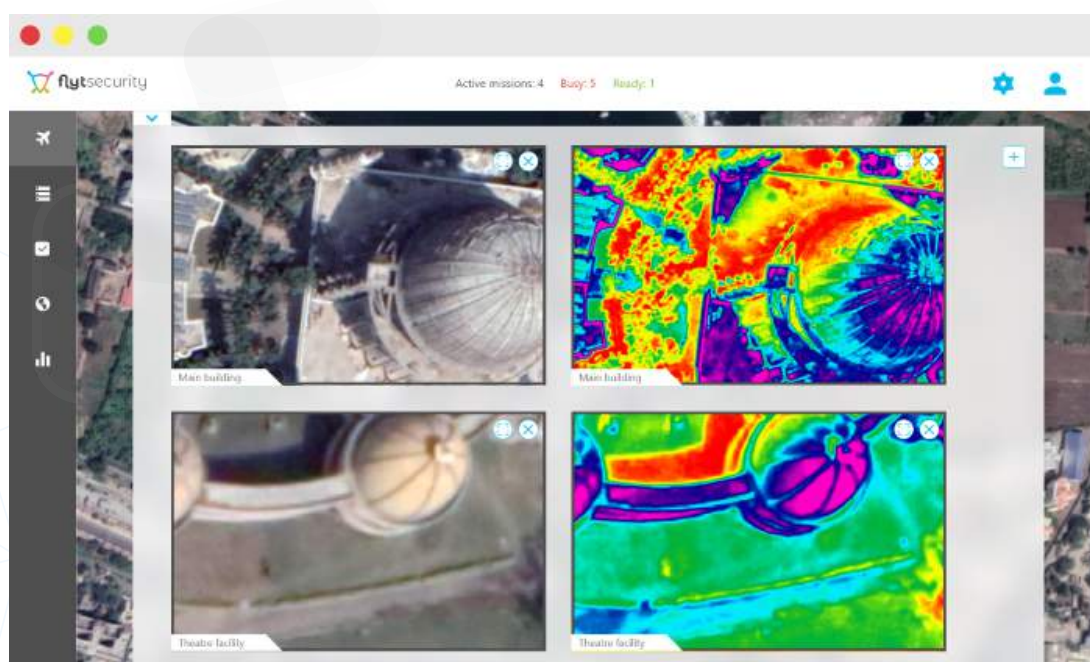
- Live, low-latency HD video feeds over 4G/LTE/5G, with support for multiple cameras (eg. thermal, IR), since image, video data are at the heart of automated drone surveillance.
- Support for a mix of drone hardware (i.e. hardware-agnostic software) to enable enterprises to optimize capital expenditure by balancing performance, fleet size, etc.
- Remote telemetry and gimbal control, so that stakeholders from across the world can participate in real-time drone missions.
- The ability to schedule, repeat and monitor autonomous missions, so that autonomous drone fleets can augment human security guards and fixed cameras, thus serving as a force multiplication technology.
- AI/ML-based detection of objects, humans, animals, etc. so that geo-tagged data can be analyzed automatically and converted into actionable insights eg. instant alerts upon detection of anomalies, threats, trespassing, etc.
- API-based integration with existing security management systems, so that executives and decision-makers can run drone operations via unified dashboards & interfaces.
- 24x7 availability, making a cloud-based SaaS offering the ideal deployment model.



With AI/ML technologies deployed at the edge and in the cloud, aerial security technologies can enable not only observation and reconnaissance use-cases, but also detection, identification, recognition and deterrence. The addition of payloads such as thermal imaging & infrared cameras further expands the scope to touring operations at night, detecting

intruders amidst smoky and foggy conditions, and maintaining situational awareness in hostile environments. Security officers and auditors can augment their vulnerability assessments and emergency planning activities by using AI/ML algorithms that analyze terabytes of security footage and create predictive and prescriptive models. Automation of drone fleets further extends these capabilities to scheduled drone patrols along points of interest, real-time broadcast of intrusion incidents, autonomous rapid response in emergency situations, anomaly detection and alerts.

Needless to say, reliance on manual drone flights i.e. by (skilled, expensive) pilots will undo many of the benefits of drones for enterprise security. Autonomy and automation must, by design, be at the centre of production deployments to truly capture the 'faster, better, cheaper' promise of UAV fleets.



## Investment vs. Subscription

As intelligent software penetrates deeper into traditional industries and sectors, the SaaS model is gaining traction amongst procurers and executives. Shifting



from upfront capital expenditures to monthly or annual recurring fees is obviously attractive - the ability to do so even when procuring hardware is proving to be a key success factor for drone technology and service providers. By better aligning risk and reward between suppliers and buyers, 'as-a-service' revenue models tend to

shorten payback periods, improve RoI and accelerate buying decisions. Security directors thus increasingly opt for well-integrated, B2B SaaS offerings for aerial security.

## Conclusion

The physical security market is one of the most compelling target segments for the commercial drone industry. As automation technology is adopted for industrial and commercial security, drone fleets will play a central role, given that they can be deployed autonomously, at scale. As UAV regulations mature, security agencies in particular are expected to rapidly adopt drones to substantially reduce their operating costs, improve perimeter coverage & awareness, and equally importantly to minimize occupational, health & safety risks to human guards. Despite a variety of relevant use-cases, the enterprise adoption of drones in this sector remains at the proof-of-concept and pilot stage; for production deployments to become widespread, three enablers are needed:

1. Drone-in-a-box hardware that is cost-effective and yet reliable,
2. SaaS solutions that automate drones, are scalable and yet hardware-agnostic,
3. Integrated offerings that require low investment, & hence pay back in < 1 year.

For VLOS and EVLOS security operations, the drone-in-a-box requirement is less critical. Thus, security agencies, domain consultants, drone system integrators, managed service providers and end users can all get started with off-the-shelf, prosumer-grade drones and existing SaaS offerings, and eventually add docking stations and charging pads to their autonomous drone security operations.



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