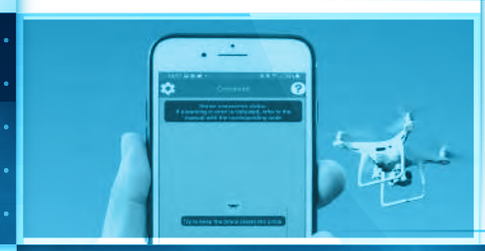
AIR INTELLIGENCE SYSTEM

SECURING THE SKY



DETECT
TRACK
IDENTIFY
EFFECT

LiveLink Aerospace

Hardware and software designed and built in the United Kingdom.

Keeping your airspace secure and functional

Whether it's terror groups attempting to make a statement, Critical National Infrastructure (CNI) surveillance, or the pirate broadcast of a live sporting event, intrusive drones can be an extremely challenging problem. In the wrong hands, drones can become a tool for potential harm and disruption and, in current armed conflicts, the weapon of choice.

The first step to combating this problem is to know what's in the skies above you and whether or not it poses any risk to your operations. It shouldn't matter whether it's a high-security facility, an outdoor event, private property, or a correctional facility; monitoring your airspace should be a priority.

Because drone technology is constantly advancing, and security will always be unique to specific site requirements, any counter-drone solution must be both agile and adaptable to its environment.

Using specifically designed hardware, bespoke firmware, and a cutting-edge software control system, LiveLink Aerospace has developed a cost-effective, mesh-based air defence solution that can be deployed and employed locally or at scale around any infrastructure that requires airspace surveillance.

Defending and enabling the future of flight

Today, obtaining an easy-to-fly drone equipped with an HD camera has never been easier. With minimal knowledge and required ability, almost anyone can purchase one online or in a specialised shop.

Unfortunately, this increase in availability has led to the sky becoming a playground for the morally ambiguous.

However, as much as the privacy concerns of someone flying a drone over your back garden can be alarming and highly intrusive, this isn't the biggest problem. The increased number of domestically available drone units has presented far more significant security issues.

PwC 2030 Forecast (Specific)	Think 2035 Forecast (Specific)
900,000	**400,000**

All studies forecast a significant increase in operational drones over the next ten years.

2019	2020	2021	2022
5,416	6,213	6,939	7,000

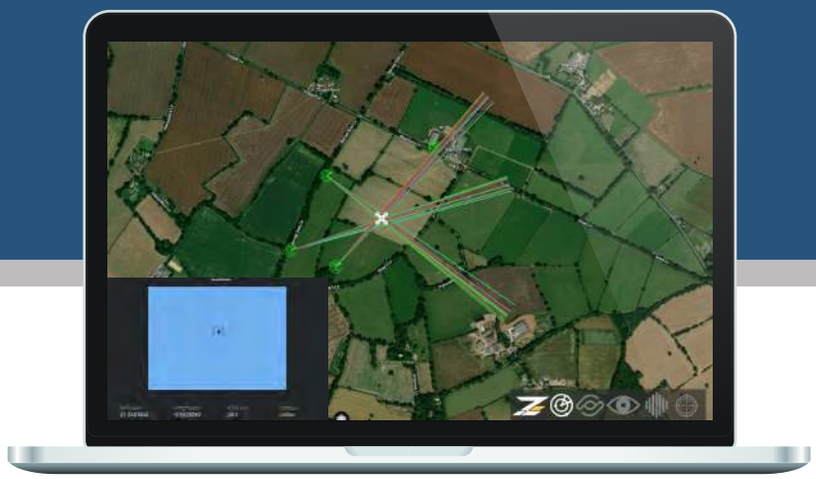
Active Operational Authorisations

2019	2020	2021	2022
32k	140k	279k	285,000

Flyer IDs

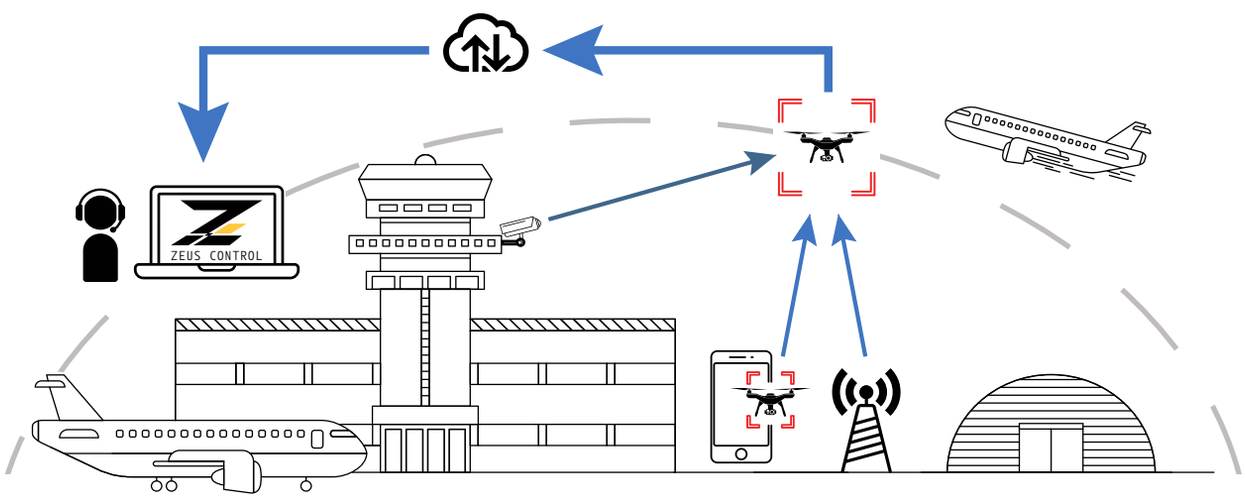
2019	2020	2021	2022
115k	168k	184k	181,000

Active operator IDs



Designed for a 21st Century threat

It is essential to understand what is in your airspace and whether it poses any risk to your operations.



Developed in-house in the United Kingdom, our end-to-end air intelligence system focuses on communicating information through all levels of decision-making. Our technology stack includes high-level products that work in concert with our 'Command and Control' C2 human interface, Zeus. As the central hub, Zeus correlates all the data into a central system and presents the data to the operator in an easy-to-understand graphical display.

Our suite of sensors and sensor fusion systems can enable those operations by increasing detection confidence and offering a more accurate air picture in real time.

System Overview

1. Detection

The LiveLink Airspace Intelligence System correlates multi-sensor input of imagery, video, passive RF and acoustics, quickly detecting the arrival of suspicious targets.

2. Tracking

The live status of any suspicious target is constantly monitored and tracked through multiple sensors, made visible in real time via the control terminal.

3. Identification

By pulling data from multiple sources, the LiveLink Airspace Intelligence System continuously evolves through machine learning, AI (Artificial Intelligence) and cutting-edge algorithms.

4. Effectors

Our autonomous drone defeat system uses its onboard navigation systems to detect and classify the target whilst plotting a path to fly underneath it for a successful soft-kill intercept.

AIR SECURITY ECOSYSTEM

Our technology stack consists of several high-level products designed to work in concert with our 'Command and Control' C2 human interface, Zeus.

P.D.A.R

Passive RF direction finding with over 5km range and multiple target detection capability

Hera

AI powered autonomous camera tracking system with integrated identification and classification

Zeus Control

Powerful, easy-to-use human interface giving instant air picture awareness with multi-target capability

Panoptes

Counter drone system on your smartphone. Relay realtime images and location data to Zeus Control

Apollo

Passive acoustic direction finding with integrated AI threat identification and classification

Orion

Fully autonomous drone defeat system capable of navigating to target and removing the threat

Autonomous Drone Defeat System: Orion

Once a threat has been identified, and you are satisfied that appropriate measures need to be taken, Orion can be autonomously deployed directly from the Zeus interface.

Initial navigational data will come directly from a sensor or sensors. This data allows Orion to fly an intercept path towards the target, dynamically plotting its flight path as it receives new navigation data. On approach and within close proximity, Orion uses its onboard navigation systems to detect and classify the target. Still working autonomously, Orion plots a path to fly underneath the target for a successful soft-kill intercept.

Orion's mounted catch net 'snags' the threat aircraft, further preventing it from retaking flight. Especially vital in civilian airspace where jammers, directed energy weapons, and radio interference look fantastic but offer no practical use beyond exhibitions.

With the threat neutralised, Orion is free to return to its launch area or proceed to the next intercept should it be required in the same flight. Once satisfied the airspace is clear, the operator can instruct Orion to return to base with the rogue drone/drones safely within its custody and for the authorities to use as evidence.

INTRODUCING:
SkyClaw & Hercules Nano

LiveLink Aerospace specialise in finding creative and innovative solutions to complex hardware and software problems.

SkyClaw

Introducing new equipment for drone target cueing and interception. SkyClaw augments an existing capability as a bore sighter and behaves similarly to Panoptes, which provides a virtual Angle of Arrival (AoA) based on Human visual detection. The drone is followed through the sighter and offers a unique fingerprint that can be supplied to Zeus — trialled recently at Canadian Sandbox Trials to great effect.

SKYCLAW

Hercules Nano

When determined adversaries launch faster destructive weapons, there needs to be a counter to deter future strikes. The Hercules Nano has been developed to manage 12+ hours of flight and speeds to support next-gen interception. Missions include very long-duration flights on ISR missions to deploy equipment or munitions. Built upon an existing civilian design, the uncrewed system has a suite of upgrades for additional range, resilience & modular payloads.

HERCULES NANO

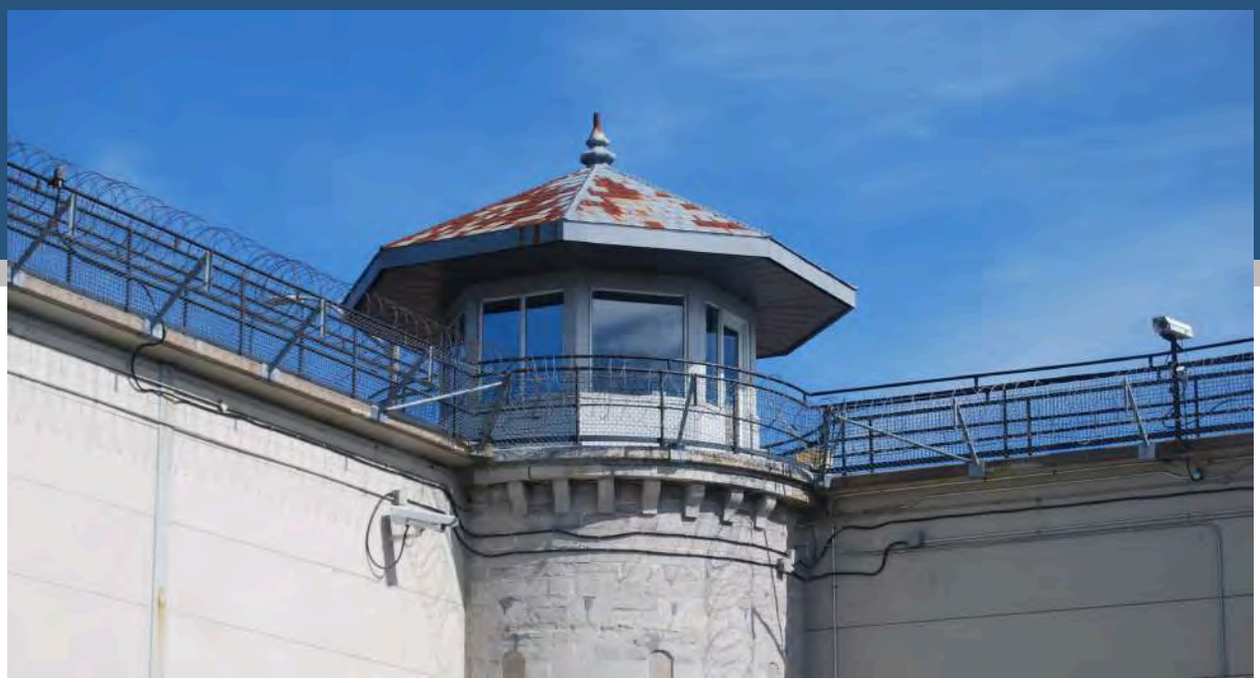
Sector use and operation

Airports

Every year there are numerous cases of drones flying dangerously close to airports and aircraft. Unfortunately, this is an ever-increasing problem, with the number of reported drone-related incidents growing yearly. In 2020 a drone almost collided with a light aircraft over Perth, Scotland. Fortunately, the pilot was able to land at Perth airport. Another incident involved an aeroplane flying over Manchester when the pilot saw a 'football-sized' drone pass down the left hand side of his aircraft. In January 2021, a helicopter from the Chilean Navy was struck by a drone while out on a routine flight. The drone pierced the helicopter's windscreen and struck the passenger in the face, resulting in an emergency landing and hospital visit.

The fears of a drone colliding with an aircraft or being used for a terror attack are genuine. For the most part, the majority of radars do not have the capacity or resolution to detect recreational drones. Most air traffic control radars have a built-in filter that screens out small objects like birds. Unfortunately, an average drone is very similar in size to a bird and is easily misinterpreted by radar when and if it's detected.

It's become almost a weekly occurrence for some pilots. They regularly have situations where a drone has been spotted too close to an aircraft they are piloting. With 400+ reported incidents a year and rising, and an estimated 100,000 drone users here in the United Kingdom, the inevitable doesn't bear thinking about.



Prisons

Prisons face an ever-increasing challenge from criminal organisations and smugglers using drones to deliver contraband to inmates. With minimal skill required to fly a quadcopter drone, it didn't take long for the obvious leap in audacity from specific individuals and criminal groups. It has become such a problem in the UK that in 2017 the government formed a special task force to tackle this issue.

After several months of surveillance, one of the UK's most prevalent gangs were eventually caught and arrested. They had smuggled an estimated £600,000 - £1,000,000 of contraband into three prisons via fifty separate drone flights. Police and prison security staff retrieved cannabis, narcotic spice, and heroin packages, along with many other items, including mobile phones and weapons. In the United States, an inmate even managed to order a 'hit' on a rival gang member via a mobile phone smuggled into him via a drone.

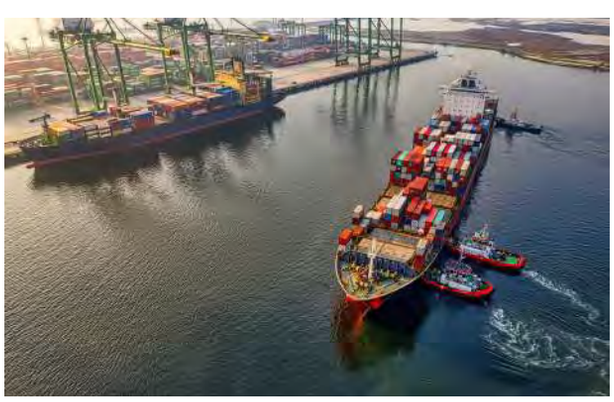
Prison security today is no longer a case of monitoring the perimeter, gates and walls. A clear and accurate picture of its airspace is essential. Fast and effective drone detection is critical in maintaining the highest security standards.

CNI Security

The Critical National Infrastructure (CNI) consists of the functional elements necessary for a country to function and upon which day-to-day life depends. These would include Water, Agriculture and Food, Public Health, Emergency Services, and Telecommunications, to name a few. Also included would be other sites and organisations that are not necessarily critical to maintaining essential services but would need protection due to potential public-facing hazards. These include chemicals/hazardous materials and civil nuclear sites, for example.

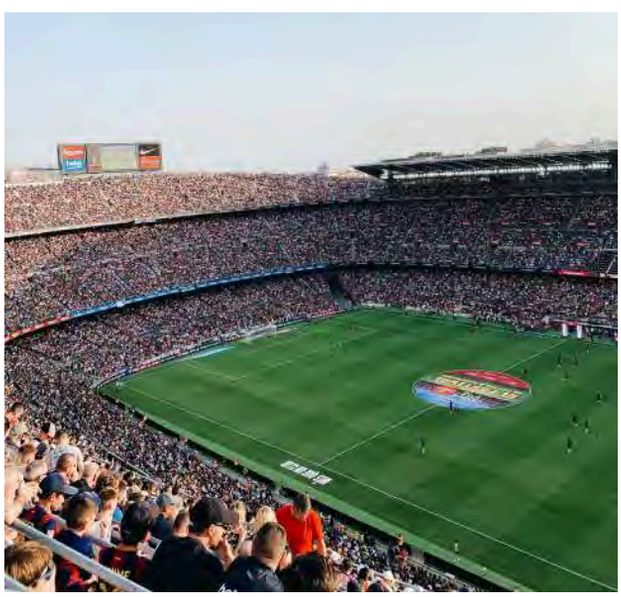
Drones are easily acquired and can be operated with very little training. Their high level of mobility and low detection rate from standard security measures make them a highly effective covert surveillance tool. They can perform complex surveillance tasks, relaying highly-sensitive information back to the pilot, who can be far from the targeted security breach.

Governmental facilities, utilities, ports and harbours are all logical targets for espionage and terrorism, with drones making the perfect tool for the job. Whether it's intelligence gathering, breaching security at a classified area, or posing a threat at a sensitive location. A successful attack could have a devastating effect on national security, public health and public safety.



Festivals & Events

In this age of social media, venues and events with high entertainment value present prime opportunities for those who wish to shoot video illegally, take photographs or cause disruption with a drone. The ability to fly a drone over security walls and pass detection from a security team on the ground makes them the perfect tool for gaining unwanted access to restricted areas.



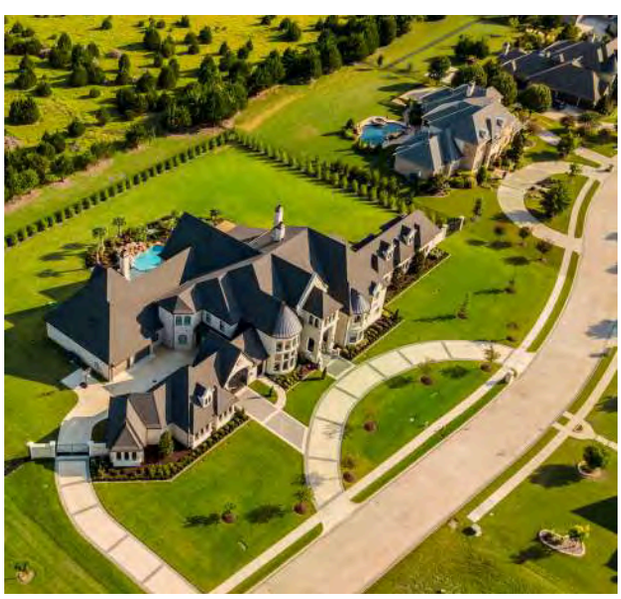
Scoopers and paparazzi can easily compromise protected information from a film or TV set, whilst sports fans can and have disrupted live sporting events. This disruption has become such a problem for Premier League football that rules have been updated to guide a referee on what to do should an issue arise with an unauthorised drone. The reasoning is that the unidentified drone could pose a possible terror threat to the teams, spectators or both. Less drastic would be a possible attempt to broadcast live footage.

However, malicious intent isn't always the reason behind a drone-related threat. Sometimes it's the result of an inexperienced user or someone who has lost control or connection to their drone. Unfortunately, this is a common occurrence that could easily lead to an individual or individuals being struck by an out-of-control drone. A rogue drone that's not monitored or supposed to be in that airspace becomes unpredictable and erratic at 300ft above the spectators. Control is lost, and this rogue drone drops out of the air into the crowd below. It's safe to say that being struck by this falling drone would cause significant injuries.

VIP Protection & Temporary Deployment

When they first appeared, drones were considered more of a novelty toy for those who could afford them. However, as the market developed, technological advances made drones more accessible and easier to fly. With minimal skill required to fly a quadcopter drone equipped with an HD camera, the sky soon becomes a playground for the morally ambiguous.

Whether it's the paparazzi or a political adversary, the logistics of protecting high-security personnel have significantly increased due to the potential threat a drone can bring. With them becoming more accessible, this once annoying toy can now become a tool to perform many nefarious acts. In 2018, Venezuela's President Nicolás Maduro survived an alleged assassination attempt after two drones primed with explosives were detonated overhead as he gave a live televised speech.



However, the presence of drones does not always mean danger. Many special forces and high-level security teams tasked to protect politicians and other high-security personnel already use drones to monitor their surroundings. Because VIP visits, international conferences etc., are usually temporary affairs, a flexible counter-drone deployment may be required for a short period. For this reason, any CUAV measures have to offer operational agility and the ability to determine a friendly UAV and what presents a potential security risk.

What Next?

LiveLink Aerospace has a development, integration and manufacturing base near the historic port city of Portsmouth in the south of the UK.

As part of our rapid development philosophy, regular, real-world testing is vital. Our test site hosts many of our new emerging technologies, along with our tried and tested products.

Demonstrations, case studies, and pilot schemes form the backbone of how we ensure our customers get the products and service they require with a high degree of direct contact from our engineering team so that upgrades, service and maintenance is fast and efficient.

We believe showing our products in action is the best way to develop engagement. We are always happy to host live in-person demonstrations on-site to pre-qualified potential customers, with an online equivalent for those unable to travel to our test site.

If you would like to understand more about how a superior, intelligent air picture at a low cost can benefit you, get in touch and let's start that conversation.

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