

An aerial photograph of a dense forest of evergreen trees, with a few trees showing yellow foliage. The Sony logo is in the top right corner.

SONY

Harness the skies

How to address the
challenges of commercial
drone photography and
boost your business



Read this paper to...

learn about opportunities and applications for drones and drone imaging, assess the demands on camera equipment and understand what is needed to satisfy the different end user verticals. Gain insights into Sony camera solutions and the software development kit (SDK), which have been designed to aid integration with drone control and communication functions.

Contents

Executive Summary	3
Introduction	4
Section 1: Market pain points and requirements	5
Mapping and Surveying	8
Inspection	12
Surveillance and Security	15
Section 2: Sony cameras	17
Sony Alpha 7R IV	19
Sony Alpha 7C	19
Sony Alpha 7S III	20
The Sony Alpha 1	20
Section 3: Camera Integration	22
Section 4: Conclusion	24
Section 5: Sony company overview	26

Executive Summary

Drones have transformed the world of aerial photography. From a global market value of \$3.4 billion in 2020, drone services are projected to achieve \$126.1 billion by 2027ⁱ. In the UK alone, by 2030 there will be 628,000 people working in the drone economyⁱⁱ.

Although drones reduce the cost and turnaround times associated with capturing images from the sky, they also create challenges around image quality. Motion blur, poor focusing, image vignetting and low image resolution are just some of the problems that can occur without careful camera selection.

Yet offering the right camera options for specific applications allows manufacturers to build a competitive edge in an increasingly demanding and highly fragmented industry. As a wide range of players battle for significant market share, camera choices could mean the difference between being a leader in the field and becoming a lower tier brand.

Three key drone camera marketsⁱⁱⁱ to consider are:

- **Mapping and surveying (total global industry value estimated at \$32 billion in 2020^{iv})**
- **Inspection (global drone value estimated at \$9.1 billion in 2021^v)**
- **Surveillance and security (global drone value estimated at \$355 million in 2019^{vi})**

Each of these have their own particular imaging requirements, though there are a number of overlaps.

Sony's five fundamentals of a high-performing professional camera combine to deliver a versatile range. This includes camera models that are highly effective in drone situations. Sony's five fundamentals are:

- **Lens**
- **Image quality**
- **Speed**
- **Battery life**
- **Compactness and low weight**

With its range of high-performing Alpha full-frame mirrorless cameras such as the Alpha 7R IV, Alpha 7S III and Alpha 7C, Sony can deliver solutions that ensure outstanding photographic results and ease of use. They also support pilots' needs for manoeuvrability and the longest possible flying time.

Through the C++ (and C#) compatible software development kit (SDK) for Linux, Windows®, and macOS®, Sony makes life easier for engineers tasked with integrating the high-performing camera seamlessly into the overall drone control system, as well as the ensuing workflow. This makes aerial photography as easy and as intuitive as it can be.

“ by 2030 there will be 628,000 people working in the drone economy ”

Introduction

Drones are reshaping the world of aerial photography, and the opportunities for manufacturers continue to accelerate. From a global market value of \$3.4 billion in 2020, drone services are projected to achieve \$126.1 billion by 2027^{vii}. In the UK alone, by 2030 there will be 628,000 people working in the drone economy^{viii}.

What's more, the aerial photography and remote sensing segment is leading the way, on track to achieve a 74.1% CAGR to reach \$54.9 billion worldwide by 2027^{ix}.

There's no doubt that drones reduce the costs and turnaround times associated with capturing images from the sky. They eliminate administrative barriers, diminish risk, and enable missions that are dangerous or impossible using conventional manned aircraft. But they can also present challenges around image quality, with problems that include motion blur, poor focusing or image vignetting.

In an increasingly mature and segmented industry, manufacturers need to work hard to maintain the relevance and competitiveness of their offering. This is becoming increasingly important, as a wide range of players battle for significant market share.

Many manufacturers are spending heavily on technology and introducing new features. And with changes in drone regulations made by the European Union Aviation Safety Agency (EASA) supporting the deployment of drones^x, the opportunities are vast. Yet without addressing the high-quality photography needs of end users, some manufacturers could get left behind.

However, picture quality must be viewed as part of an overall balancing act. Given the technical constraints of drone flight, manufacturers must also consider camera size and weight, low light performance, battery capacity and SDK integration.

And in the battle for market relevance and leadership, there are three main application fields that need to be satisfied:

- **Mapping and Surveying**
- **Inspection**
- **Surveillance and Security**

In this paper, we will explore the overall challenges and opportunities for drone manufacturers and OEM equipment providers. We will also drill down into the specific pain points encountered within mapping and surveying, inspection, and surveillance and security, as well as the requirements of the target audiences and the solutions that are available.

We will also examine Sony camera solutions in more detail, focusing on the products within the Sony Alpha range. The compact size and low weight of Sony's Alpha cameras make them easy to integrate into a drone airframe, while Sony's SDK seamlessly pairs the cameras with electronic systems for communication and control. This combination preserves the vehicle's manoeuvrability while also maximising camera control and minimising demand on the main battery, extending flight time. Depending on the drone usage requirements, different Sony Alpha cameras will be recommended, to alleviate the pain points of the end user.

Section 1: Market pain points and requirements

General pain points for drone photographers

Drone photographers' capabilities are limited by the extent of their vehicle's capabilities and prevailing environmental factors such as wind and rain.

The battery runtime of any drone places a significant limitation on the operations that are possible. A typical drone may be able to fly for up to 30 minutes, depending on the overall weight, motor power, the desired flying speed and atmospheric conditions.

The duration of any flight also needs to be kept within the battery runtime by some margin to ensure safety.

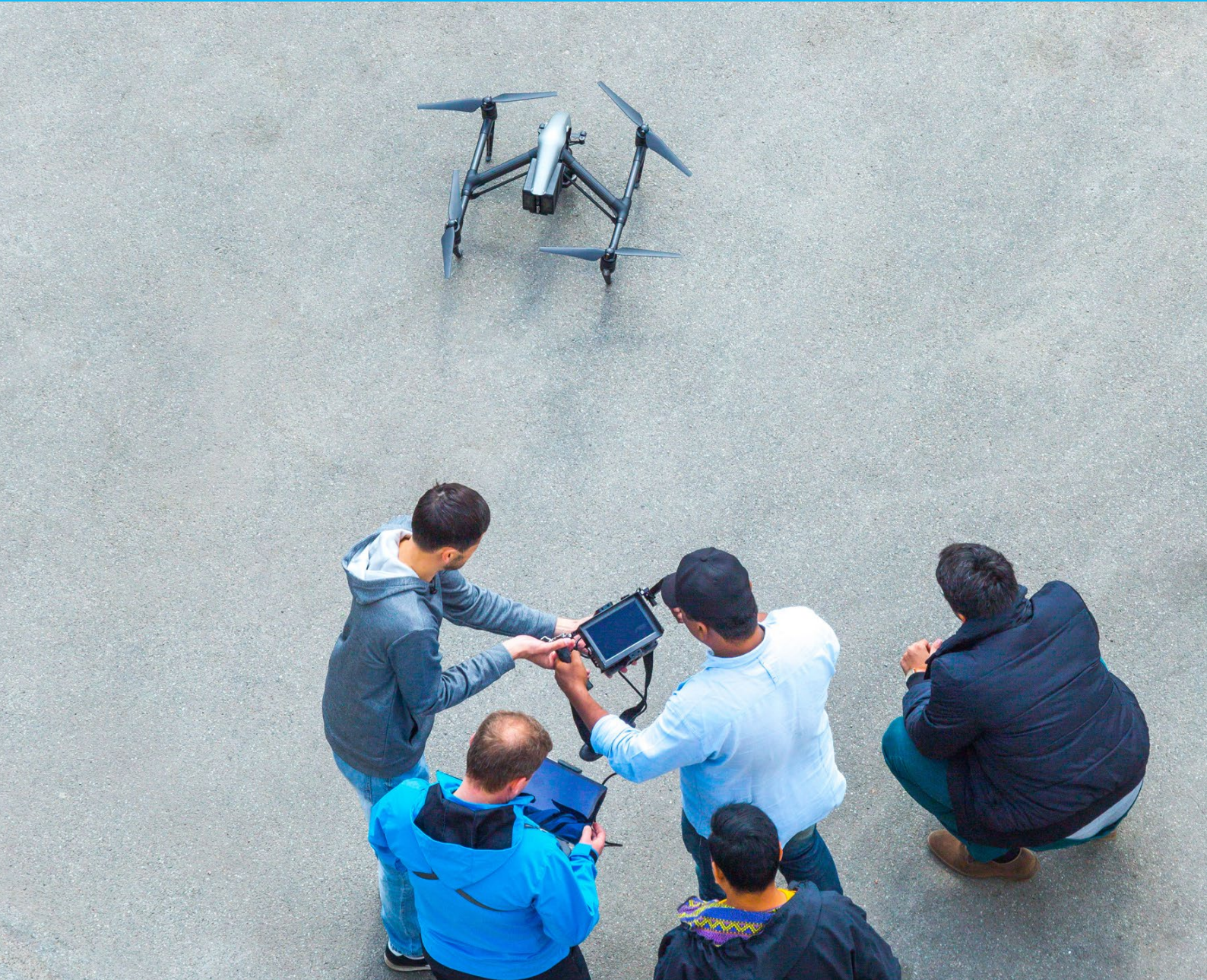
The agility of the drone can be compromised by the weight of the attached equipment including the camera. As a result, a lightweight camera is desirable, and its positioning on the drone can be critical to balance and manoeuvrability.

Sony cameras deliver a wide range of advantages to the drone pilot, allowing drone manufacturers to accentuate their capabilities within the marketplace. From light body and lens weights to long battery life, Sony leads the way.

With Sony, it's not just about what happens in the air. Data transfer is a key part of a drone pilot's workflow, too. That's why Sony equipment incorporates SuperSpeed USB up to 10Gbps (USB3.2) compatible ports for high-speed image transfer, as well as CFexpress Type A compatible media slots for higher overall capacity and faster read/write speeds.

Mapping and surveying, inspection, and surveillance and security all have their own drone and camera requirements, but equipment weight and transfer speed considerations are key requirements across all verticals.





Flying Drones Beyond Visual Line Of Sight (BVLOS)

In many countries, pilots are legally required to keep their drones within line of site at all times. However, permission to fly BVLOS could considerably expand the practical uses of drones, increasing the interest in, and value of, the drone market.

Legal BVLOS drone operations could offer greater potential for extending mapping, surveying, inspection and surveillance missions. On-board cameras will therefore be expected to capture more data per flight, and faster, higher-resolution models will deliver better results.

BVLOS will allow pilots to be located far from hazardous sites, which can help improve safety. Generally, the need to repeatedly reposition operators to cover a large area can be avoided. However, if a drone flies further, the camera battery must have a longer runtime.

Lowering overall weight, including choosing lightweight cameras, is important to extend the operating range.

Mapping and Surveying

The total global market for surveying and mapping services was estimated at \$32 billion in 2020 and is projected to achieve \$39.1 billion by 2026^{xi}. Drones continue to capture an increasing portion of this total, with investments in drones, 3D laser scanning and cloud technologies driving the market forward.

Mapping and land surveying plays an integral role in a wide range of industries, including:

- **Construction**
- **Civil Engineering**
- **Real Estate**
- **Architecture**
- **Mining**
- **Agriculture**

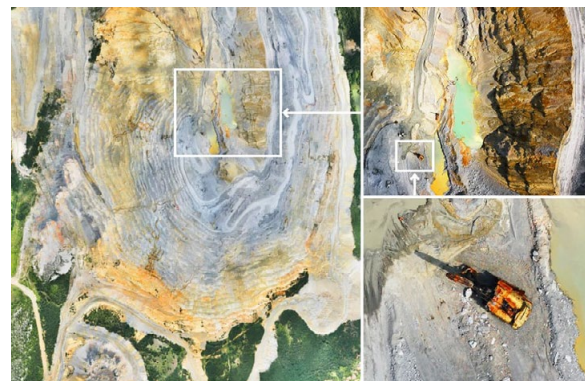
The benefits of drone usage in the mapping and surveying segment are enormous. In planning and surveying for the construction industry, for example, a site survey can be carried out up 400 times quicker and can deliver cost savings of around 40%^{xii}.

Market entrants fall into one of two groups. They are either existing land surveying professionals who are turning to drones, or drone pilots who are moving into the mapping and surveying arena.

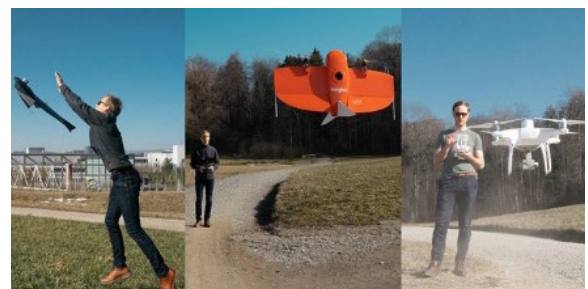
In-house drone capabilities are a viable consideration for mapping and surveying firms. This is due to the challenges of producing highly accurate topographic data and understanding the workflow needs of field survey staff.

Surveyors are already highly skilled technology operators, using clinometers, theodolites, and prism systems in their daily duties. As a result, it can be a simpler process to train a surveyor in how to use a drone, than train a drone pilot to fulfil the aerial needs of surveyors.

Drone manufacturers need to be mindful of these two very different target audiences when gaining or improving their foothold within the mapping and surveying vertical.



Orthomosaic map stitched out of hundreds of single images and a zoom-in view (image courtesy Wingtra).



Drone use in mapping and surveying has been increasing for the last decade (image courtesy Wingtra).



The WingtraOne PPK drone

WingtraOne is a vertical take-off and landing drone, allowing it to carry better cameras. It's able to fly in the air as far and stable as a fixed-wing aircraft, and take-off and landing are smooth, even on gravel. That's because a VTOL plane can hover like a multicopter, ensuring not only the safety of the drone and its operator, but also that of the onboard high-end camera.

With fixed-wing drones, this isn't the case. Heavier sensors mean heavier drones, resulting in an increased impact energy during a crash. Therefore, most fixed wing drones are equipped with 20 MP or

lower resolution cameras, as high-end cameras are too heavy and would also require a catapult for take-off.

The VTOL WingtraOne's flagship camera is the 42 MP full-frame Sony RX1RII, with high-resolution imagery that delivers more than double the pixels of a 20 MP camera. The WingtraOne GEN II has also arrived on the market, featuring a new oblique camera configuration for high-quality 3D data capture using the Sony A6100.

Drone-based mapping and surveying: challenges and solutions

Regardless of the entry route, the challenges for drone-based cameras in mapping and surveying applications are the same. It all comes down to stitching, and stitching failures.

Stitching involves capturing and combining multiple photos of all distinctly recognisable features and landmarks in the area being surveyed. Elements like crops, buildings, trees, and machinery are shot from multiple angles, then fed into the mapping software.

The stitching process of identifying, matching, and aligning the images is highly complex. When something goes wrong with the capture, unstitched regions will appear as holes in the map. These failures can be attributed to:

- **Motion blur**
- **Unfocused cameras**
- **Vignetting**
- **Insufficient image overlap**
- **Low altitude photography**
- **Homogenous imagery**

However, most of these problems can easily be reduced by pairing the drone with the right camera.

Overcoming motion blur

Motion blur can be caused by fast-moving drones or by vibration. The best way to solve this problem is to increase the camera shutter speed. Also, using a camera with a rolling shutter, rather than a global shutter has benefits when it comes to image quality.

When you compare the performance of two equivalent sensors, one paired with a global shutter and the other with a rolling shutter, the sensor with the rolling shutter will have less noise. It will also have a wider dynamic range. With a rolling shutter, you get solid performance while keeping costs down.

You should also look for superior ISO performance, which will allow quicker shutter speeds while reducing noise and blur.

Overcoming unfocused images

When using manual focus, businesses can take advantage of Sony's Extreme Dynamic Linear Motor lens technology for consistent and smooth focusing. The XD (extreme dynamic) linear motor has been developed to deliver higher thrust and efficiency

when compared with previous options. This makes the most of the rapidly evolving speed performance of current and future camera bodies.

Alternatively, if you don't want to compensate your precision with a deeper depth of field, use hybrid autofocus that incorporates contrast and phase detection autofocus. Hybrid autofocus speeds up the focusing time, using phase detection to quickly, but loosely, focus on the object. It then switches to contrast detection to refine the edges of objects and bring them into sharp relief.

This provides fast focusing potential, far quicker than using contrast detection alone. It's also sharper than using phase detection alone, which can focus slightly forward or backward of the chosen subject.

Overcoming vignetting

Vignetting is caused by a lack of light, due to either too much cloud cover or dust particles on the lens. This can manifest itself as dark corners within the photos and can also occur when the aperture is stopped down. If necessary, choose the aperture range that delivers the sharpest image from your lens.

All Sony camera lenses are optimised to avoid vignetting, with automatic digital compensation that helps to reduce any cloud cover or shading problems.

Overcoming low altitude challenges

Low altitude photography lowers the surface area per image. This can make it more difficult for images to be stitched together, because there's likely to be less overlap between adjacent images. Less overlap makes it more difficult for the software to find tie points, which could result in unstitched regions.

It also means that you won't cover as much ground in a single flight as you'd be able to if you were flying at a higher altitude. However, higher altitude will result in lower resolution imagery. You need to choose a camera and lens combination that will allow for a higher resolution image, enabling the drone to operate at higher altitudes.



Overcoming homogenous imagery

When you're mapping or surveying a field with full crop cover or other homogenous imagery, there isn't much visual variation to distinguish individual elements. And when patterns are hard to determine, the stitching software can have problems identifying the locational differences between images.

To overcome this problem, choose a camera and lens combination that will allow for a higher resolution image.

Beyond survey grade accuracy

For drones to replicate traditional, intensive land surveying grade accuracy, each pixel in an orthomosaic map needs to be able to represent 3cm horizontally and vertically^{xiii}.

However, with a 42 MP Sony RX1R II and a WingtraOne PPK drone, companies are using drones to build 3D digital land models that are accurate down to 1cm^{xiv}.

Other considerations for mapping and surveying

When everything else is considered, fundamental camera requirements for surveying and mapping include high resolution and low weight. Flights must typically cover a large geographical area, and low camera weight helps minimise the battery energy needed for lift, thereby enabling longer flying times.

Camera choices for mapping and surveying

The Sony Alpha 7C and Sony Alpha 7R IV are both exceptional camera choices for drone mapping and surveying requirements. Full details and technical specifications of both these cameras are covered later in this paper.

Inspection

The global drone inspection and monitoring market is projected to grow from \$9.1 billion in 2021 to \$33.6 billion by 2030, at a CAGR of 15.7%^{xv}. Inspection drones play an integral role in a wide range of industries, including, but not limited to:

- **Oil and Gas**
- **Utilities**
- **Construction**
- **Manufacturing**
- **Civil Engineering**
- **Mining**
- **Insurance Investigation**
- **Agriculture**

Unlike conventional aircraft, drones can operate safely in close proximity to structures, capturing information in detail. Inspections can be carried out quicker, more safely and in greater detail than traditional approaches typically allow.

Keeping operatives on the ground is one of the most obvious benefits of drones. Spot checks can be carried out at short notice, with minimal setup time and with rapid inspection capabilities.

When surveying wind turbines, a drone can inspect 100% of a blade within 10 minutes. That means a full inspection of all three blades may take 40 minutes in total^{xvi}. That's a huge time, safety and cost saving on having somebody carry out a climb-based inspection.

Moreover, the low operating costs, small size and manoeuvrability of drones makes aerial photography for inspection purposes an option where it wasn't previously practicable.

Drones also provide the opportunity to carry out indoor inspections, such as inside large warehouses. Manmade and natural subterranean spaces are also readily accessible for drones, where it may have been an impossibility to inspect safely or would require scaffolding, adding time and cost to the project.

Drones are already revolutionising telecommunication tower inspection, where a drone can be used to carry out monitoring activities at a fraction of traditional costs and time.

They also provide opportunities for surveying companies to assess areas that humans cannot enter, such as industrial sites after an accident, to inspect fire damage, or where the risk of hazardous waste could delay or prevent access by inspectors.



Drone-based inspection: challenges and solutions

The end users of drones for inspection purposes have their own distinct photographic requirements. In particular, situations often involve low light or restricted light conditions in confined spaces, especially when used in mining and construction verticals. When inspecting white objects at height in daylight, such as wind turbines, the opposite problem can occur, and over-exposure becomes a challenge.

To ensure a full evaluation of the object under investigation, real-time adjustment of focus and zoom is also an important requirement. Depending on the choice of camera and manufacturer, this is not always possible. However, with Sony's SDK the end user maintains full control of both these parameters.

In addition, when inspecting fast moving objects, the chances of motion blur increase dramatically. Then there's the need for inspection images to be blown up significantly when viewing on a computer, while still retaining a high level of detail. This can be crucial when investigating the effects of a lightning strike on a wind farm operation, for example.

As a result, the main image capture problems associated with the inspection market are:

- **Under-exposed or over-exposed images**
- **Motion blur**
- **Poor focusing**
- **Low resolution images**

Many of these problems can be reduced by manufacturers pairing their drones with the right camera.



Overcoming under-exposed and over-exposed images

Under exposure is caused by a lack of light, due to either too much cloud cover or operating in dimly lit internal conditions.

Superior ISO performance will allow quicker shutter speeds while ensuring low light conditions don't detract from the quality of images. Sony has diverse ISO capabilities within the camera range, so choose a camera that is suitable for your needs. The Sony A7S III and A6400 are our best offerings, though if you're not flying in very dark conditions, other Sony models have suitable ISO adjustment at less cost.

Over exposure can also be a challenge, particularly when inspections are carried out on cloud-free sunny days. For these conditions, you'll need a camera that has a high dynamic range. One that can capture the detail and handle the high contrast between the bright sunshine and the dark shadow areas.

When fitted with the right high-performance Sony camera, a drone can capture high-quality images even when lighting conditions are unfavourable.

The option to choose from a variety of high-quality Sony lenses offers excellent optical performance and light weight, enabling the drone user to capture close-up details. Telephoto lenses are also an option. Although these are heavier in weight than other lens options, Sony's telephoto lenses are lighter than similar offerings from competitors.

Overcoming motion blur

As with mapping and surveying, motion blur can be caused by fast-moving drones or by vibration. However, using drones for inspection means that motion blur can be amplified, as the drone tends to be closer to its intended subject. Motion blur may also be caused by inspecting moving objects.

As with surveying, the best way to solve this problem is to increase the camera shutter speed. The Sony Alpha 1 can reach up to 1/32000 to 1/2 sec continuous shooting with its silent electronic shutter in still images mode. Combining this with the superior ISO performance, which is also a contributing factor to overcoming motion blur, will allow for quicker shutter speeds while reducing noise and blur.



Overcoming unfocused images

Inspection work requires highly focused, crisp images at all times. Ensure you choose a camera with robust and reliable autofocus capabilities. You may want to consider choosing a camera with hybrid autofocus that incorporates contrast and phase detection autofocus.

Hybrid autofocus speeds up the focusing time, using phase detection to quickly, but loosely, focus on the object. It then switches to contrast detection to refine the edges of objects and bring them into sharp relief.

This provides even faster focusing potential, far quicker than using contrast detection alone. It's also sharper than using phase detection alone, which can focus slightly forward or backward of the subject.

Overcoming low resolution images

Lower resolution images result in smaller file sizes, which are easier and faster to transfer, store and manipulate. They also allow images to be captured at higher frame rates. However, when you're carrying out drone-based inspections, these advantages are outweighed by the disadvantages.

As a result, make sure you choose a camera and lens combination that will allow for a higher resolution image, creating a high output size and enabling end users to zoom in on the final images without loss of detail or clarity.

Other considerations for inspection

Similar to the mapping and surveying cases, a high-resolution camera is needed to capture information about the condition of equipment such as cables, roof beams, or bridges. Again, low camera weight is needed to extend the operating window of the drone and so allow assignments to be completed as quickly and efficiently as possible.

Camera choices for inspection

The Sony Alpha 7C and Sony Alpha 7R IV are both exceptional camera choices for inspection purposes. Full details and technical specifications of both these cameras are covered later in this paper.

Surveillance and Security

The global market for surveillance and security drones was estimated to account for \$355 million in 2019 and is expected to grow at a strong CAGR of 34.7 % by 2027^{xvii}, culminating in a market value of more than \$3.8 billion.

The rapid despatch and ability to travel fast to any location makes drone usage highly effective within surveillance and security. Whether used when alarms trigger, to help security guards safely assess a situation or to patrol autonomously, they have the advantage of being extremely difficult for intruders to avoid once they've been discovered.

In security applications, drones effectively provide mobile surveillance cameras that are impossible to tamper with and extremely difficult to evade.

Drone-based surveillance and security: challenges and solutions

Sharp image resolution and clear picture quality are essential in this market. Security guards need to quickly understand situations that arise and to capture high-quality evidence as effective support for any legal proceedings.

Similar to the inspection market, the main image capture problems associated with surveillance and security are:

- **Under-exposed images and over-exposed images**
- **Motion blur**
- **Poor focusing**
- **Low resolution images**

In particular, high sensitivity in low-light conditions is an important camera attribute. Drones must be able to operate unimpeded and continuously, whatever the lighting, from bright sunlight to night-time deployment.

Real-time adjustment of focus and zoom is also an important requirement of surveillance and security.

Depending on the choice of camera and manufacturer, this is not always possible. However, with Sony's SDK the end user maintains full control of both these parameters.

These challenges can be reduced by manufacturers pairing their drones with the right Sony cameras. Solutions for surveillance and security are very similar to those prescribed for inspection, though under-exposed images are even more of an issue in this market.

Overcoming under-exposed and over-exposed images

Insufficient light, due to either too much cloud cover, operating at night or in dimly lit internal conditions can be a key challenge for drone-based surveillance.

Superior ISO performance will allow quicker shutter speeds, reducing the incidence of under-exposure, while ensuring low light conditions don't detract from the quality of images. Sony has diverse ISO capabilities within the camera range, so choose a camera that is suitable for your needs. As previously mentioned, the Sony A7S III is our best offering, though if you're not flying in very dark conditions, other Sony models have suitable ISO adjustment at less cost.

Over exposure can also be a challenge, particularly when surveillance is carried out in flood lit spaces or on cloud-free sunny days. For these conditions, you'll need a camera that has a high dynamic range, like the Alpha 9 II and the Alpha 1. The stacked CMOS sensor paired with the latest BIONZ XR processor ensure high-quality details retained in shadows and highlights too.

When fitted with the right high-performance Sony camera, a drone can capture high-quality images even when lighting conditions are unfavourable.

What's more, the option to choose from a variety of high-quality, lightweight Sony lenses offers excellent optical performance enabling the drone user to capture close-up details.

Overcoming motion blur

Motion blur can be caused by fast-moving drones, by vibration or by people on the ground during drone surveillance.

The best way to solve the problem of motion blur is to increase the camera shutter speed. You could also consider using a Sony camera with advanced electronic shutter capabilities. Not only does this allow for fast shutter speeds, it also ensures noiseless operation, which is an important consideration when undertaking surveillance.

Similar to handling under-exposed images, you should also look for superior ISO performance. This will allow for quicker shutter speeds while reducing noise and blur.

Overcoming unfocused images

Surveillance and security operations are built on highly focused, crisp images. Ensure you choose a camera with robust and reliable autofocus capabilities. It's likely you'll also need to focus in on people.

Sony's AI-based subject recognition technology, Eye AF, uses autofocus technology to automatically focus on eyes rather than the surrounding environment. This makes it easier to capture faces and enables fast, precise, automatic detection and tracking.

You may also want to consider choosing a camera with hybrid autofocus, incorporating contrast and phase detection autofocus.

Overcoming low resolution images

Choose a camera and lens combination that will allow for a higher resolution image, enabling end users to zoom in on the final images without loss of resolution or clarity.

Camera choices for surveillance and security

The Sony Alpha 7S III is an exceptional camera choice for surveillance purposes. Full details and technical specifications for this camera are covered later in this paper.

Pain Point	Mapping and surveying	Inspection	Security and surveillance
Camera weight	✓	✓	✓
Low data transfer speeds	✓	✓	✓
Homogenous imagery	✓		
Insufficient image overlap	✓		
Low altitude photography	✓		
Low resolution images		✓	✓
Motion blur	✓	✓	✓
Poor focusing	✓	✓	✓
Under-exposed images		✓	✓
Over-exposed images		✓	✓
Vignetting	✓		
Recommended cameras	Sony Alpha 7C Sony Alpha 7R IV	Sony Alpha 7C Sony Alpha 7R IV	Sony Alpha 7S III

Section 2: Sony Cameras

Section 2: Sony cameras

Sony Camera Solutions

Sony Alpha full-frame mirrorless cameras are the choice of professionals in visual communications everywhere. They are trusted because of their unbeatable attributes, embracing Sony's five fundamentals of a high-performing professional camera:

- **Lens**
- **Image quality**
- **Speed**
- **Battery life**
- **Compactness and low weight**

In drone-based applications, the compact size and low weight of Sony's Alpha cameras make them easy to integrate with the airframe and with electronic systems for communication and control. They preserve the vehicle's manoeuvrability while also minimising demand on the main battery, extending flight time.

Thanks to the low-power electronic design that characterises the Alpha range, the camera battery achieves long runtime when shooting stills or movies. As a result, end users gain extra flexibility to plan each mission and optimise the flight profile.

Ultimately, they cover greater area and capture more pictures, faster, resulting in greater productivity. We deliver solutions that ensure outstanding photographic results for drone users.

Four cameras from the Sony Alpha series offer features that are ideally suited to the drone applications covered in this paper; namely the Alpha 7R IV, Alpha 7S III, Alpha 7C and Alpha 1.

All can be mounted directly on-board the airframe and feature high-speed autofocus. They can be used with any Sony E-mount lens, with more than 50 currently available.

Sony is also the world's leading CMOS image-sensor supplier, with close to 50% market share. Our range of camera, lens, software and support solutions have been developed for outstanding performance in all drone situations. With uncompromising performance and superior build quality, you can count on Sony to excel in demanding environments and extreme conditions.

And because our main camera and lens components are all developed in house, that means we can guarantee our components are built to last. We can also stay ahead of the competition, by designing products with future component technologies in mind.

When it comes to cost considerations, Sony's premium imaging technology is robust and reliable. As a result, your replacement budgets are considerably lowered, with no reduction in quality. Also, our free, frequent and regular software updates mean you can enjoy the latest innovation without having to replace your hardware.





Sony Alpha 7R IV:

The super high resolution choice for inspection, mapping and surveying

Based on Sony's Exmor R™ sensor optimised for high-resolution, with 61 megapixels, the Sony Alpha 7R IV delivers high-speed processing and unprecedented resolution, perfect for mapping, surveying and inspection applications.

- Detailed and accurate images can be captured at high-speed with the high pixel resolution and high-speed image processing
- Excellent image quality with smooth transitions from shadows to highlights, accurate colour reproduction and minimal noise, thanks to the powerful image sensor and BIONZ X image processing engine
- Super low shutter vibration is achieved by an internal damper structure
- Excellent photographic results with minimal impact on drone manoeuvrability and flying time, due to a weight of 665g with battery and memory card included
- High speed data transfer with Multi/Micro USB SuperSpeed USB 5Gbps (USB 3.2) compatible
- Compact flight size of (W X H X D) Approx. 128.9mm x 96.4mm x 77.5mm



Sony Alpha 7C:

The smallest and lightest choice for inspection, mapping and surveying

Bringing together the Exmor R™ sensor and BIONZ-X image-processing engine with 24.2 megapixels, the Sony Alpha 7C is the world's smallest and lightest* interchangeable-lens camera, ideally suited to surveying, inspection and mapping applications.

- Agility combined with an extremely competitive price
- Movie shooting capabilities, a wider dynamic range, lower noise and higher resolution than alternatives of comparable size and weight, due to fast hybrid AF (phase-detection AF/contrast-detection AF)
- Lock and hold onto fast-moving subjects with high-value features of the Alpha full-frame range, such as real-time Eye AF and AI-based real-time Tracking
- Excellent photographic results with minimal impact on drone manoeuvrability and flying time, due to a weight of just 509g with battery and memory card included
- High speed data transfer with SuperSpeed USB 5Gbps (USB 3.2) compatibility
- Compact flight size of (W X H X D) Approx. 124.0mm x 71.1mm x 59.7mm

*Among full-frame interchangeable-lens digital cameras with optical in-body image stabilisation mechanism. As of September 2020 press announcement. Sony survey.

Sony Alpha 7S III:

The full-frame, high sensitivity choice for surveillance

Leveraging the 12 megapixel Exmor R™ sensor, optimised for sensitivity, the Sony Alpha 7S III delivers the unwavering performance needed for drone-based surveillance and security activities.

- Consistent image quality in wide-ranging lighting conditions, thanks to the BIONZ XR™ image-processing engine, which ensures high-performance with minimal latency and real-time processing
- More dynamic range, due to expanded ISO up to 409,600 and a low contrast S-Log3 tone curve
- Designed for video and stills photography, recording 1080p footage at up to 222Mbps internally with the capability to output 4K video



- Stable and precise autofocus for outstanding image quality using focal plane phase-detection AF
- Enhanced tracking of fast-moving subjects for smoother image quality, with fast hybrid AF, combining focal plane and contrast-detection modes
- High-speed data transfer with multi/micro USB SuperSpeed USB 5Gbps (USB 3.2) compatibility
- Compact flight size of (W X H X D) Approx. 128.9mm x 96.9mm x 80.8mm

The Sony Alpha 1:

An advanced all-rounder, whatever your drone requirements

The Alpha 1 delivers features that are compatible with pro cine cameras and the Hybrid Log-Gamma (HLG) wide-gamut colour space. It's a camera that delivers a high-performance everywhere.

- Faster processing, with Sony's advanced stacked 50.1 MP Exmor RS™ CMOS sensor, with separate pixel and circuit layers and advanced A/D conversion
- Superior image-quality and greater speed from the latest BIONZ XR image processing engine



- Capable of 8K 30p recording, and 4K video at up to 120fps for smooth slow motion
- Optimal image compensation in all shooting modes, with active-mode image stabilization dedicated to movie shooting
- High-speed data transfer with multi/micro USB SuperSpeed USB 10Gbps (USB 3.2) compatibility
- Compact flight size of (W X H X D) Approx. 128.9mm x 96.9mm x 80.8mm

High-Performance Lenses for Optimum Image Quality

Sony lenses for Alpha cameras are engineered to deliver the best possible image-quality in all conditions. Aspherical optics ensure superb sharpness and contrast up to the maximum enable a compact and lightweight lens.

In addition, Sony's low-dispersion glass technologies, including Extra-low Dispersion (ED) and Super ED glass, prevent chromatic aberration to ensure superb colour quality, contrast and resolution across the entire image. Fluorite Lens (FL) technology compensates chromatic aberration while also saving even more weight.

With Sony's original anti-reflective nano-coating formulas that repel liquid and other contaminants, alongside the performance-affirming Zeiss® T mark, these lenses enhance image clarity and capture flawless shots under all conditions.

There are also numerous innovations that ensure noiseless, responsive autofocus and zoom, such as the XD (extreme dynamic) linear motor, assuring users of great results, every flight.



Section 3: Camera Integration

Camera Integration

SDK for Camera Integration

To ensure Alpha cameras are quickly and seamlessly integrated with drone control systems, Sony provides a Linux, Windows and MacOS software development kit (SDK). This includes the software library to control the camera, the API specification, as well as demonstration code.

This contains examples showing how to exercise all the camera control functions. Programmers are free to reuse the code in their own applications. The SDK can be downloaded free of charge and is compatible with C++. A C# version can be provided on request.

Sony is always delighted to respond to customer experiences while using the SDK, to develop new and improved features for future releases.

Functional Requirements

To allow seamless drone photography, the camera needs to be smoothly integrated with the drone control system. Sony's SDK puts the user in full control of the situation. Depending on the drone make and model, the configuration and control application, the camera may be controlled autonomously by the drone or by the pilot on the ground.

A mapping or surveying drone may be programmed to follow a preset flight plan autonomously, taking photographs at regular intervals without human intervention. The images are then imported into a separate application for analysis.

On an inspection mission, the pilot may want to fly the drone to a site of interest by referring to a continuous video feed. When the drone is in position, the pilot may aim the camera to capture selected still images or video sequences.

Similarly, a drone used for security or surveillance may fly autonomously according to a pre-programmed route or may be controlled directly by a pilot. It will likely stream continuous video to the pilot in real-time and to a control room for analysis and recording. Advanced features such as object recognition or activity detection may also be included.

Sony's SDK provides you with a wider range of control choices, ensuring you deliver an enhanced experience to the end user.

Supporting Your Camera Integration Project

As well as developing SDK, Sony has helps customers to successfully integrate their chosen Sony camera as a drone payload.

Through our network of local business development managers, we can connect customers with our R&D team based in Europe to help eradicate any technical challenges, should they arise. Our European team, in turn, is closely connected to Sony support engineers in Japan.



Developing the Auterion Drone Platform

Auterion has integrated the Sony SDK into their platform, allowing professionals to experience the leading image quality of products like the Alpha 7R IV, opening up a new world of commercial application possibilities.

The Auterion software platform enables enterprise and operators to run drone fleets that are connected to the back office in real-time, to streamline and automate their workflows. They can manage a variety of airframes, payloads, and third-party applications on a single platform, to meet multiple use cases without needing to run multiple systems.

And drone manufacturers can do this without writing a single line of code. It's user friendly and can be implemented quickly and seamlessly.

The integration between the Auterion software platform Sony drone cameras includes access to camera parameters, live video stream, data on the SD card and geotagging.

Companies can take advantage of the Auterion platform to choose a drone, choose a payload, and quickly create a turnkey drone photography solution ready for end users.

The development path chosen by Auterion is open to any Sony customer to create their own solution by bringing together their chosen Sony Alpha 7 camera and drone.

Section 4: Conclusion

Conclusion

Commercial drone photography is a market on the rise. We've already covered the market growth statistics in this whitepaper, and they are all experiencing upward pressure as new technologies, new manufacturers and new opportunities combine.

The market delivers tangible benefits for many sectors, allowing businesses to diversify, improve services, reduce timescales, and cut costs. It's also producing a new uprising of companies that deliver value-add products and services across the supply chain and through to the end user. These include:

- **Hardware companies**
- **Drone industry news outlets**
- **Flight operation management**
- **Data processing tools**
- **Career marketplaces and databases**
- **Drone-specific funding and investment companies**
- **Drone delivery**
- **Drone conferences and events**
- **Training and education**

For drone manufacturers, all this activity means they need to stay relevant and deliver an optimum experience to ensure they cut through the industry noise. They also need to focus on the key growth segments of drone photography:

- **Mapping and Surveying**
- **Inspection**
- **Surveillance and Security**

All three of these markets demand high-quality camera equipment that eradicates the many image capture problems that can occur. These include under-exposure, motion blur, poor focusing and low-resolution imagery. End users also demand a compact flight size, light weight and high-speed data transfer.

Sony Alpha full-frame mirrorless cameras are the ideal partner for these high-end, quality-critical drone applications. Our products are compact and light, and easy to integrate with the airframe and electronic systems. That means the drone preserves manoeuvrability while minimising demand on the main battery, extending flight time.

Sony supports you in helping your customers cover greater area and capture more pictures, faster. And this results in greater productivity. Ultimately, we deliver solutions that ensure outstanding photographic results for drone users.

We also provide easy access to our SDK, plus individual technical support, to help customers integrate their chosen camera with the drone control and communications system in the best way possible.

Why not take a closer look?



Your partner in drone photography

We're here to support your drone business. By delivering the very best cameras for the job, combined with unsurpassed service, we've built a solid reputation in your industry. From lenses, image quality and speed, to battery life, compact size and low weight, Sony products deliver the full drone photo package. Get in touch today and let's discuss how, together, we can help your business move forward with strength.

Get in touch



Section 5 **Sony Company Overview**

Sony Company Overview

About Sony Digital Imaging Business Solutions

Sony Digital Imaging Business Solutions, part of Sony Corporation, offers Sony's industry-leading innovations in mirrorless cameras and unrivalled lenses for the world of business.

The industry-leading technology, combined with Sony's Camera Remote SDK, allows businesses to design bespoke applications tailored to industrial needs.

Industries including size-critical drone and speed camera systems and other medical, education, government, and e-commerce functions all benefit from Sony Digital Imaging Business Solutions.

sony.eu/businesssolutions



sony.eu/businesssolutions

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