



THE FUTURE OF
SECURITY
& **SURVEILLANCE**

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Introduction

Security and surveillance systems fulfill one of the most crucial requirements we seek – the feeling of being aware of what happens around us. With peace of mind knowing that we have a watchful eye on our valuable assets, be it property or professional resources, gives the much-needed confidence and sense of security.

In the US, internal theft within businesses alone costs them [\\$50 billion](#) a year. Moreover, [30 percent](#) of businesses face bankruptcy only from employee theft. If we expand this data set to include home thefts and auto thefts, the number increases manifold. Therefore, it makes sense that individuals and businesses invest in surveillance and security systems.

With massive investment inflow, the video surveillance systems market is projected to grow at a [CAGR of 10.06%](#) over the forecast period 2021 to 2026.

The future of security and surveillance systems is promising considering the solid growth rate in the industry and companies in this space choosing to push the envelope with cutting-edge software and hardware systems.

This whitepaper explores how surveillance is evolving from traditional closed-circuit cameras and digital video recorders to cloud-based, AI-powered, and intelligent security systems. The paper also discusses what the future of security and surveillance will look like with further advancements in AI and sensor technologies.

Security and Surveillance Systems of Today

Today, customers can choose from various brands and technologies when installing security systems in their homes and workplaces. The current systems highlight IoT as a defining feature. These products have wireless protocols like WiFi or Zigbee to communicate with other devices, enabling users to monitor live video feeds from the cameras on their phone or laptop from anywhere in the world.

Some of the other critical features seen in modern security and surveillance systems include:



HD video feed:

With the advancements in camera sensor technologies, surveillance and security systems can now capture high-quality footage. Modern surveillance cameras can record the high-definition video feed, with some high-end products even offering 4K video recording.



Night vision cameras:

External theft usually occurs during the night when most people are asleep. This means fewer people on the streets and offices would be closed. It is easy to perpetrate crime in the absence of daylight, as the chances of people catching the thief are significantly less. Night vision cameras can put out a clear video without losing much detail. However, the downside is that the video will be black and white.



Motion sensors:

Combining motion sensors with surveillance systems yields impressive results. The advantage of such a system is that the camera starts recording only when it detects a movement. This drastically cuts down the number of redundant footage on the storage, thereby saving high amounts of space on the drive.



Cloud backup:

The hit on storage space can be massive when recording footage in high resolution. This is where cloud backup comes in, which allows users to store a large amount of data without running out of storage.

Today's surveillance and security systems have certainly increased their arsenal of tools. **However, they haven't caught up with the level of technology that we have today.**

For example, the motion sensor cameras are great at switching on and alerting the user when it detects movement. **However, the system cannot differentiate between people and animals. Hence, it will trigger a lot of false positives.**



The Road Ahead for Current Security and Surveillance Systems

The camera sensors we use are predominantly of HD quality. However, that doesn't give a complete picture of how much detail it captures. It is critical to start using sensors that can take in more light, enabling high-quality video feed even in very low-lit conditions without switching to night mode.

The sensor technologies have also come a long way. Apart from motion sensors that often use infrared sensors, LiDARs are also a viable choice to detect movement. The advantage of LiDAR is that it has an increased range compared to infrared sensors and can be easily concealed behind a casing. Also, the detection sensitivity of LiDAR is adjustable, so the number of false positives can also be considerably reduced.

Hardware aside, the software available in today's security systems also needs a considerable upgrade. With AI making its way to refrigerators and washing machines, the technology can make a huge difference to surveillance and security systems and improve their efficiency.

Fortunately, the industry is moving towards upgrading the existing systems to meet future needs.

The Future is Intelligent Surveillance



Intelligent surveillance is a concept that aims to improve traditional surveillance by introducing real-time computing of the video feed. For example, in a conventional surveillance system, the camera starts the live feed and alerts the user if it detects any movement. However, an intelligent surveillance system computes the image it captures and only alerts the user if it is a matter of importance. For instance, the alarm will not get triggered if the system detects recognized objects and faces in its feed.

While this is an overly simplified example, intelligent surveillance aims to offer a lot more, from facial recognition to systems that can interpret susceptible behavior. Let's look at what we have in store for the future of surveillance.

○ The Rise of AI in Surveillance

AI will largely influence the future of surveillance. One key advantage of AI is that it helps with real-time computing, bringing numerous benefits such as object tracking and recognition. With continuous learning and improvement, these AI-powered security systems can become more capable of recognizing patterns and possible theft scenarios. Also, AI will be able to pinpoint timestamps within the recorded video for easy playback

○ Facial Recognition

Facial recognition algorithms have already made their way into basic devices like smartphones. In the near future, even the surveillance and security systems will leverage facial recognition features to beef up security. This capability will enable the surveillance system to tag objects that it records. In homes and offices, such a system will initially build a database with all the regular faces. Then, it will track the activity of the people who are present in the database and spot new faces that do not belong to the household or organization.

This data can then be used to spot strangers and identify any abnormal activities outside of business hours. For example, in homes, facial recognition will help owners identify strangers on their property or keep track of their children or pets in the house. For organizations, facial recognition can help track employee activity and even sign them in.

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○ Gait Recognition

Gait recognition is the process of identifying a person from their physical traits. This technology is in its initial stages and possesses great potential. The idea behind gait recognition is that a person's gait, i.e., how their body moves, is as unique as their fingerprint.

So a system that can recognize gaits can easily connect them with the respective person. Another significant advantage of gait recognition is that its recognition can be made even from low-resolution video, making it better at recognizing people at a low resolution when compared with facial recognition.

○ Better Cybersecurity

Cybersecurity is a major concern when it comes to devices that collect data. For example, tapping into surveillance systems gives the intruder access to the video data. Hence, companies are working to secure their security systems against such cyberattacks.

Encryption methods are still the most popular for keeping data safe. However, since security systems need an internet connection and other wireless communication features, hackers have more potential points of access. For the future of surveillance, developing secure communication and data storage systems is still a high priority.

○ Better Sensors for Surveillance

As discussed, future surveillance systems will need to use the latest sensor technologies to become better at sensing everything they see or record. The latest technologies like LiDAR offer broad coverage and better detection than IR systems. They are also easier to implement and design.

Similarly, camera sensors are also in line for an upgrade. Companies have started experimenting with low-light imaging that lets the camera capture usable images or video feeds without switching to night mode.

In pitch-black conditions, low light imaging will not work, and the cameras must switch to night mode, which results in a black and white video feed. However, new color night vision technologies are being developed to provide close to true color video feeds even when there is no auxiliary lighting present.

The Need for Accountability and Privacy



The improvements in surveillance technologies with advanced sensors and software also mean that these devices will be able to easily recognize people and store their presence in video feeds.

Implementing such a solution should not come at a cost to privacy. As these systems become more self-aware and data-dependent, in the future, we will likely see regulations to prevent the technology from being used for mass surveillance and be reserved for meaningful scenarios.

The Future of Security and Surveillance

Today's video surveillance systems are increasingly incorporating AI and machine learning capabilities. While there are differing opinions on the legality and regulation of these intelligent security and surveillance systems, we will likely see an increased interest in these solutions in the future. **With powerful capabilities, these systems will undoubtedly provide households and businesses the tools to protect their valuable people and assets.**



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