

How to Choose an Outdoor IP Camera

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In some cities, nearly 50% of existing outdoor cameras are non-functional

CCTV surveillance cameras are now a common sight in cities around the world, with cameras used at major intersections to catch speeders and would-be runners of red lights. However, as many drivers have learned, outdoor cameras have a high failure rate, and consequently only a fraction of the cameras installed are actually operational.

Because of the high failure rate, maintaining a functioning outdoor video surveillance system can be prohibitively expensive. In fact, a recent government study in a major Asian city revealed a disturbing fact: Nearly half of the cameras deployed in that municipality were non-functional! As it turns out, the cameras were failing at such a high rate that there simply wasn't enough money in the city's coffers to replace them. Similar stories of poorly-maintained outdoor surveillance systems can also be found in North America and Europe.

The scenario described above can be considered as both an operational and maintenance failure. It goes without saying that if city engineers had sufficient budget and manpower to maintain their CCTV systems, then there wouldn't be problem. But the fact of the matter is that camera replacement is extremely costly, and past a certain point it becomes unreasonable to expect cash-strapped cities to be able to constantly replace their frequently-malfunctioning outdoor cameras.

In this paper, we describe an alternative approach to what could be labeled as the "frequent failure, wishful replacement" scenario by giving six desirable features to look for in your CCTV cameras. Installing cameras that enjoy all six of these features will not only keep your installation budget under control, but also drastically reduce the cost of maintaining your city-wide CCTV camera system.

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The logo for Moxa Inc., featuring the word "MOXA" in a bold, teal, sans-serif font with a registered trademark symbol (®) to the upper right of the letter "A".

Feature 1: High MTBF (mean time between failures)

Let's take a look at the root cause of the problem—the low reliability of outdoor CCTV cameras. If the outdoor cameras had higher MTBF and lower failure rates, then consistent camera coverage and uptime would be easier to achieve. Unfortunately, in many ways the unreliability of outdoor surveillance cameras is an intrinsic quality of their fundamental design.

It's important to keep in mind that one consequence of this dependence on the enclosure climate control system is that any time a malfunction in the heater or fan occurs, the operator must replace not only the source of the malfunction, but also the entire camera itself. Another way of stating this is that the entire camera system's MTBF actually depends on a combination of the MTBF of the heater, the fan, and the camera unit itself. With this vulnerability, it's hardly surprising that costs associated with outdoor camera maintenance often exceed the available budget. When cameras need to be constantly replaced, the cost of maintaining the system can quickly dwarf the cost of deploying it.

Feature 2: No fan, no heater

Most manufacturers of outdoor cameras are building on their core competence in commercial indoor video surveillance products, and consequently, many of the outdoor cameras used today are actually indoor cameras with an extra layer of protection. In practice, this means that the camera is placed in an enclosure with a miniature heater and fan that attempts to maintain temperature conditions similar to those the camera would encounter in its native indoor environment. The enclosure simply creates a miniature climate-controlled environment for the camera.

Remember: You should be buying a camera, not a camera plus fan and heater that requires onsite maintenance every 3 months!

The problem with this strategy is that camera heaters and camera fans add a serious vulnerability to the entire system. They are both points of failure that can destroy the camera when they malfunction. If the fan breaks, the camera goes down. If the heater breaks, the camera goes down. Even if the heater and fan perform as expected, the temperature in the enclosure could still exceed the camera's rated temperatures, causing the camera to fail.

Feature 3: Low maintenance and replacement costs

There are considerations beyond device replacement that contribute to the high total cost of operating an outdoor surveillance system. Another major factor is the amount of manpower required to continually replace cameras in the field. To avoid vandalism and preserve esthetics, outdoor cameras are typically deployed in out-of-the-way locations. However, this means that it's more difficult to access the camera for maintenance.

Feature 4: PoE

Since fans and heaters are power-hungry devices, applications that require fans or heaters are at a big disadvantage since power wiring can become complicated and expensive in the field. In fact, if you can keep the power requirements of your outdoor video surveillance applications to a minimum, you can consider using solar or battery power, or enjoy the convenience of PoE+ power, which does not require a separate power supply. When using these technologies, every watt counts, and consequently not needing a fan or heater gives you a big advantage.

Feature 5: Industry certification approvals

Outdoor IP cameras are used for a variety of applications, including in-town surveillance, or on highways, roadways, or even in mines. In fact, to ensure that the entire system is reliable, most applications require products that have specific industrial certifications, such as EN 50121 (railway waysides), EN 55022, C1 D2 ATEX zone 2 (process automation), and NEMA TS2 (highways). Using a camera that comes with the requisite certifications ensures reliable performance, even when the camera is exposed to extreme shock/vibration, high levels of surge/EMI, or when used in environments subject to a risk of explosion.

Feature 6: Wide temperature range, without fan or heater

An outdoor camera must be able to operate reliably in an actual outdoor environment. In India, for example, temperatures can reach as high as 45°C in the summer, and cameras installed inside a metal housing that is continuously exposed to the sun could easily reach a temperature of 70°C. Since most outdoor IP cameras must be used with a fan to reduce the temperature, you give yourself a huge advantage if your camera can operate reliably at temperatures as high as 75°C.

	Existing Outdoor Camera	Real Outdoor Camera
MTBF	Low	High
Fan	Yes	No
Heater	Yes	No
Maintenance cost	High	Low
Replacement cost	High	Low
Temperature range	-10 to 50°C	-40 to 75°C
Industry approvals	Limited	Yes

Conclusion

To summarize, you should look for an outdoor IP camera that has a very high MTBF to minimize replacement and maintenance costs, and which can operate reliably in a wide temperature range, without a heater or fan.

Introducing the VPort 36-1MP

The world's first "no fan, no heater" wide temperature IP camera

Unlike commercial manufacturers, Moxa's core competence includes building robust devices for use in harsh industrial environments. This experience has given Moxa a wealth of expertise in thermal design and building rugged devices. A prime example is the VPort 36-1MP, which is the world's first outdoor "no fan, no heater" IP camera. Each part of the VPort 36-1MP was built with thermal performance and reliability in mind, from the proprietary heat sink to PCB component layout to chip selection.

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