

Developing an effective vape detection solution

Get an in-depth understanding of vape detectors and how to integrate the technology into your security system.





What are vape detectors?

Vape detectors are specialized sensors designed to detect the presence of vaping, particularly in areas where it is prohibited. While multiple types of vape alarms are available to business owners and facility managers, most devices function similarly, with sensors configured to identify specific particulates associated with vaping.

Vape sensors and tobacco detectors are commonly installed in private businesses, colleges, schools and other locations where smoking and vaping are prohibited by law. The deployment of vape smoke detectors is intended to support facility managers in better identifying and addressing vaping incidents and act as a visible vaping deterrent.



How do vape detectors work?

Vape detectors work by continuously monitoring the air in a specific environment for signs of certain chemicals and particles associated with vaping. Most vape sensors measure the concentration of vaping particles in the air and then compare these values to normal air quality data to determine whether vaping is taking place.

If the detected concentration of vaping particles surpasses a predetermined threshold, alerts will be sent to stakeholders remotely requesting a response. In addition, audible alarms may be triggered to warn offenders of their infractions and highlight the event's location.

Common types of sensors used in vape detection systems include:

Particulate sensors

Laser scattering technology detects vape aerosols suspended in the air, including fine vegetable glycerin, propylene glycol and nicotine particles, the presence of which will automatically trigger the sensor system's alarms.

Gas sensors

The presence of specific gasses associated with vaping and smoking are detected either by changes in electrical resistance or the absorption of infrared radiation; if levels surpass a predefined threshold, connected alarms will be activated.

Combination sensors

Some vape monitors use a combination of particulate, gas and additional sensors like THC oil and temperature sensors to improve the accuracy of detection processes and identify a wider variety of smoke-related incidents.

Integration with wider security technologies can strengthen vape sensors and nicotine detectors. For example, Internet of Things (IoT) sensors may be linked to vape monitors to add extra context to readings, while existing [IP security camera](#) systems may be connected to nicotine sensors to automatically flag footage of suspected vaping incidents.



Why vape detector technology is in high demand for businesses and educational spaces

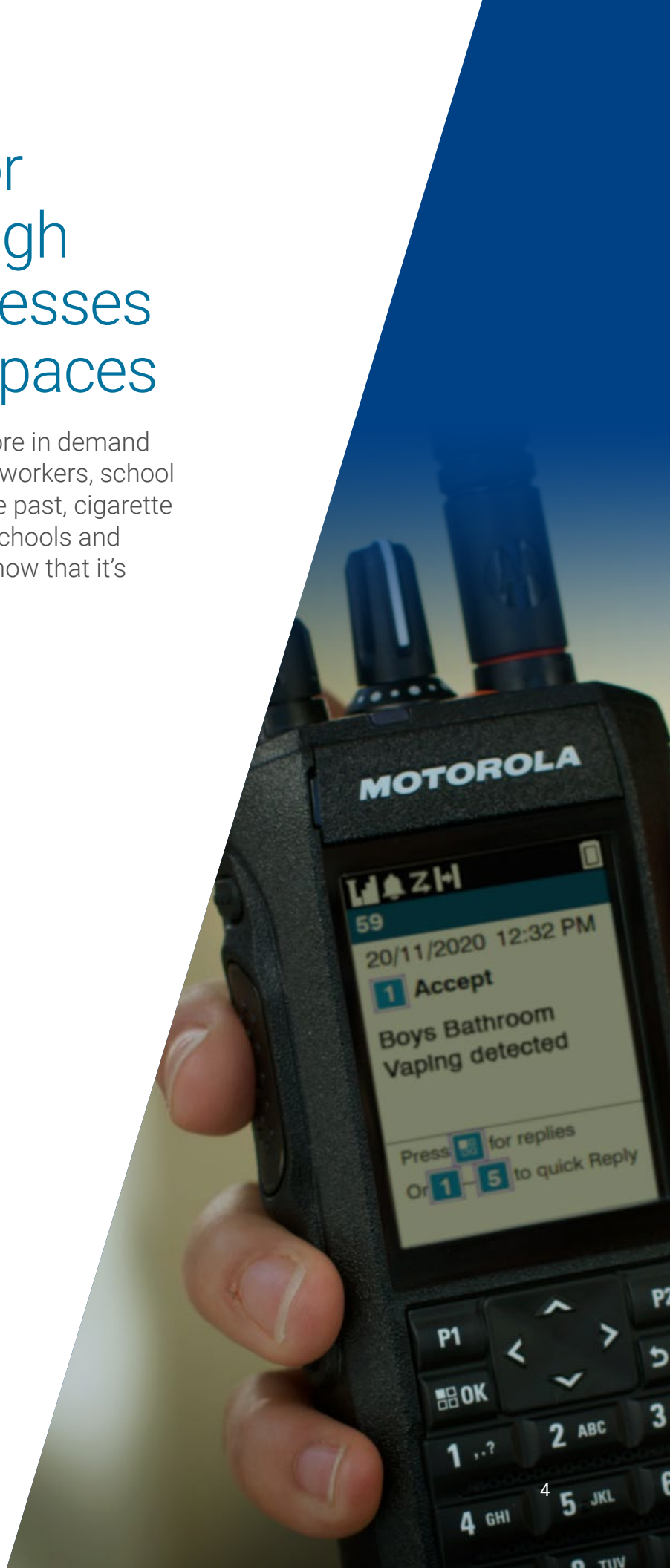
Vape detector technology is becoming more in demand due to changes in smoking habits among workers, school children and others in public spaces. In the past, cigarette smoking was a critical security issue for schools and businesses to deal with, but now trends show that it's being replaced by vaping.

In fact, vaping is now more common than cigarette smoking among young people, too. Between 2020 and 2022, monthly sales of vape products grew from [15.5 million to 22.7 million units](#), a 46.6% increase. As of 2024, [Single Care](#) estimates that 1 in 20 Americans vape, with youth usage increasing by 1,800%.

As the prevalence of vaping among teens within educational settings increases, many security leaders are turning to vape detectors to curb unwanted usage in these spaces.

There are many reasons vape detector technology can be a vital asset for your security team, including:

- Automatic detection can work as a deterrent and make it much easier for security and staff to identify vaping while saving time and resources.
- The technology eliminates the need for manual searches, making it safer to police the usage of these unwanted products.
- Vape detectors reduce unwanted vaping incidents, making public places like schools, businesses, restaurants and airports a safer place.



The sensitivity and accuracy of vape smoke detectors

For business owners, school administrators, residential property managers, and any other persons considering the installation of vape detectors on their properties, it's essential to understand the abilities and potential limitations of modern devices. The simplest way to illustrate this is to briefly discuss both the accuracy and sensitivity of standard vape alarms.

Vape alarm sensitivity

While exact figures may vary depending on the specific types and number of vape sensors deployed within certain environments, some information regarding the sensitivity of modern vape detection devices is readily available. For example, one study found that the particulate matter yield emitted when vaping can be up to [10 times](#) lower than values observed in cigarette smoke. This means vape sensors must be significantly more sensitive than smoke detectors.

Generally speaking, commercial vape detection systems can detect particulate sizes down to around 0.3 microns, but multiple environmental factors can impact the efficacy of vape detector installations. To ensure effective deployments, consider the following factors:

Airflow

Vape alarms rely on particulate matter passing through internal sensors to detect vaping. Therefore, devices must be installed with the natural airflow of a room in mind. If a room has too much or too little airflow, sensors may struggle to work as intended.

Coverage

Most vape monitors can only accurately detect particulate matter within a specific area of

coverage. The style and number of sensors will affect this value, though as a general rule, one sensor should be able to cover a 12' x 12' area.

False positives

Some vape detection devices may be accidentally triggered by fine particles associated with non-vaping stimuli; steam, aerosols, cleaning product fumes and dust particles can trigger some tools, so consider this when planning installations.

Vape detector accuracy

While there have been reports of vape and nicotine detectors being circumvented by actions like obscuring sensor units and filtering vapor through items of clothing, modern devices are considered to be highly accurate. This is primarily because modern vape alarms can identify particles much smaller than those filtered out by common clothing materials.

Other factors can impact the accuracy of e-cigarette detectors, but this mainly concerns the installation considerations mentioned above. Most modern devices should be highly accurate if vape detection devices are installed according to these considerations and wireless vape detectors are regularly checked for potential battery-related issues.



Challenges of implementing vape detection

Vape detection technology offers a practical, robust solution to prevent unwanted vaping in public spaces. Yet, several challenges must be considered to fully utilize the technology.

Consider these challenges to ensure your vape detectors are being used properly.

Technical challenges

Vape detectors need to distinguish between vapor and similar substances like steam or aerosol spray to prevent false positive readings. If a vape detector alarm is set off incorrectly, it can lead to a lack of trust and accuracy in the security measure.

Devices need regular maintenance to improve accuracy. This ensures they're calibrated correctly and that damages or other technical issues aren't compromising their performance. A faulty system may falsely detect regular changes in air quality as a sign of vaping, so maintenance is vital in building a system you can rely on.

Privacy concerns in sensitive areas

To ensure comprehensive coverage, vape detector technology must be installed in private areas such as changing rooms and restrooms. Although these locations see the most common vape usage, deploying the technology in these areas can raise privacy issues.

Clear communication about vape detectors and responsible monitoring practices can help avoid backlash. Vape detectors can track the time, location, and frequency of incidents. This data needs to be handled securely to avoid breaching privacy regulations.



Legal and ethical considerations

To use vape detectors effectively, you must ensure compliance with local, state, and federal laws. As they're a type of surveillance, regulations around vape detection technology must be followed to avoid problems.

Security and staff must also consider the ethical implications of finding unwanted vape usage in schools. Anyone under 21 is prohibited from purchasing vapes in the U.S., so alerts need to be dealt with appropriately.

Operational challenges

Comprehensive implementation of vape detectors across your entire building infrastructure can be expensive to set up and maintain. Overall costs can become a challenge for schools and businesses with limited funding, who instead may have to focus on strategically placing vape detectors in crucial areas.

Time and resources will also need to be spent training staff to effectively react to a vape detection alert and handle incidents correctly. This can incur additional costs that must be factored into budgeting for the equipment.

Environmental factors

Each environment in which a vape detector is deployed will be unique. This means that systems need to be bespoke for each specific area to ensure effectiveness. Even within a single building, factors like ventilation, humidity and air quality can differ, leading to specific calibration for each device.

A customized approach to vape detection technology ensures optimal operation and safeguarding.



Industries that benefit from vape detection systems

Developing and deploying bespoke vape detection systems can help property owners and managers across most major industries tackle issues with indoor vaping. Through integrations with security cameras, employees can receive instant notifications warning of vaping incidents and observe unfolding events remotely, helping to improve incident responses.

Commercial businesses

Owners and operators of commercial businesses such as offices, factories and retail stores can use vape sensors to reduce the impact of on-site vaping. Detectors can be installed in high-risk locations like bathrooms, changing rooms and similarly secluded areas to both deter and address vaping events. These can be supported by integrations with existing security solutions.

Automated responses can be programmed to instantly alert admins of triggered alarms, and cloud-based [commercial security systems](#) enable staff to analyze live data remotely. If nearby security cameras are linked to active vape sensors, staff can access live feeds to better understand unfolding events and program security cameras to record and flag footage of suspicious activity.

Hospitality businesses

Customer-facing hospitality businesses like hotels and resorts must provide guests with safe, clean and comfortable environments. Vape sensors installed in busy areas like shop floors and dining rooms help protect customers from the dangers of second-hand vape aerosols while demonstrating a commitment to guest safety. Additionally, vape detectors can be used to enforce and ensure compliance with non-smoking and non-vaping rules in hotel rooms.

Vape detectors may also be installed in areas like entrances, hallways and other locations where issues with loitering or antisocial behavior have been observed. Using visible vape sensors, real-time security cameras and relevant signage can help deter antisocial activity and collect evidence of prohibited behaviors to support security investigations.

Educational facilities

Vaping has become a serious problem for many school administrators in recent years, with data suggesting as many as [30%](#) of high school students and around 10% of middle school students use vapes regularly. In response to vaping being linked to numerous behavioral and health issues in children, many schools are exploring dedicated preventative measures.

Combination vape sensors can be particularly useful in school environments. Multiple types of sensors can be deployed to reliably detect vape aerosols, nicotine and THC and continuously analyze air quality for signs of gas leaks and pollutants. Installed sensors can be linked to [school CCTV](#) and access systems to enable the development of automated responses.



Residential properties

Vape sensors installed in individual units and communal areas around short and long-term rental properties can help property owners maintain vape-free environments. Sensors across multiple sites can be connected to a cloud-based management system, providing managers with the ability to observe, analyze, and address prohibited activities remotely at all times of the day. These sensors can also be incorporated into wider [apartment building security systems](#) to help enforce smoking policies across the facility.

Healthcare institutions

Unaddressed vaping in healthcare environments can place staff and vulnerable patients at risk, with e-cigarettes known to release harmful chemicals into the air like propylene glycol, formaldehyde and heavy metals. Long-term nicotine addicts may try to circumvent vaping bans while under the care of healthcare staff, causing serious regulatory and safety issues.

Vape detectors can be installed in private rooms where the use of other observational tools is not permitted, enabling staff to remain informed of vaping issues without breaching privacy regulations. Vape detection installations may also be linked to existing healthcare security technologies like cameras and access systems to provide a holistic view of unfolding events.

Public environments

Many local and state jurisdictions across the US have banned vaping in public spaces such as shopping malls, libraries and transit centers. Visible vape sensors and wider technologies like CCTV cameras and alarms can be deployed to help managers enforce restrictions, and to aid security teams in planning and performing informed responses to prohibited activities.



Choosing the right vape detector for your facility

When choosing a vape detector solution for your facility, it is important to consider the factors that could determine which product would be ideal for your unique needs. Below is a list of key factors to consider when choosing the right vape detector solution.

Use case

By understanding the use case for which you intend to use vape detectors, you can invest in a solution that will deliver what you need. For example, a school might need a vape detector that can also detect THC, while a hospital might need a vape detector that can integrate with air quality monitoring. Understanding and outlining the specific needs of your organization will help guide you to an appropriate vape detector system and allow for more efficient product research.

Privacy and legal concerns

Vape activity often takes place in private spaces, such as changing rooms and restrooms, where the use of video and audio recordings is not permitted to protect privacy.

Still, it is important to ensure that the vape detector is non-intrusive and to communicate with employees, visitors and customers about their use in privacy-conscious areas. By sharing clear communication and employing responsible practices that help you comply with local, state and federal laws in your industry, you can avoid any concerns around vape detectors in private spaces, avoid penalties and help reassure individuals that their privacy is protected.

Scalability

Consider the number of vape detectors you plan to install in your building or across multiple sites. This will impact the cost of procuring these solutions and raise running and maintenance expenditures. Can the vape detector solution integrate and scale with your existing video security system? If not, consider an alternate solution that enables your security operations to grow alongside your organization or business.

Integration capabilities

To help your security operations run as smoothly as possible, consider procuring a vape detector solution that seamlessly integrates with your existing security systems. These integrations can significantly improve your threat detection operation by increasing awareness of vape activity across a site and enhancing overall efficiency, leading to better security and cost savings.



Tips for developing an effective vape detection solution

For property owners and facility managers interested in developing a unique vape detection solution customized to the needs of their organization, below is a selection of six tips and best practices intended to help teams effectively utilize vape detection solutions.

1. Power source availability

Vape sensors are continuous monitoring devices that must always be powered to remain effective. If connecting sensors to a mains power supply is impossible in high-risk locations, wireless vape detectors should be considered, alongside plans to frequently check and maintain each device's battery supply during regular use.

2. False positive avoidance

When assessing where to install vape smoke detectors, teams must consider the presence of potential false positive-causing stimuli. For example, steam or aerosols may impact sensors in bathrooms and changing rooms. In this situation, particulate sensors are less appropriate than gas sensors designed to detect vaping chemicals.

3. Vandalism concerns

While visible vape and tobacco detectors can deter some offenders from committing offenses, others may try to tamper with sensors to avoid detection. When planning new installations, stakeholders must consider this possibility and either install sensors in difficult-to-reach areas or select tamper-proof vape detection devices.

4. Necessary coverage

Facility managers must consult vape sensor manufacturers regarding the coverage potential of different systems. Some high-risk areas may require the installation of multiple sensors to ensure no blind spots are present, while others may be negatively affected by environmental factors like airflow. Teams must consider these points carefully during the planning process.

5. Integration considerations

Modern vape monitors can often be integrated into existing security systems to help teams develop comprehensive threat detection and building management solutions. When connected to a broader cloud-based management platform, data collected from multiple solutions can be analyzed together. Some possible integrations worth considering include the following:

- Occupancy monitoring sensors
- Sound detection devices
- Motion and pressure sensors
- Temperature and humidity sensors
- Air quality index sensors
- Carbon monoxide monitors
- Video security systems
- Access control
- Alarm and alert systems

6. Maintenance and upkeep

To ensure your vape detection equipment's longevity and effectiveness, devices must be appropriately maintained. Some key aspects of maintenance include:

- Regular calibration and recalibration of devices to improve accuracy
- Routine cleaning of devices to prevent dust and grime build-up
- Software updates to eliminate potential bugs and improve performance
- Consistent inspecting and testing of components to identify faults
- Replacement of batteries for portable detectors
- Documentation of all maintenance activities





Securing grant funding for vape detection

Developing vape detection solutions can be costly, however, financial support is available to many types of businesses and institutions looking to implement such technologies. In recent years, the number of grant funds earmarked for developing vape detection solutions has increased, with various federal, state, private and lawsuit funding opportunities available.

In particular, funding opportunities aimed at schools and educational institutions have grown significantly. For example, over [\\$2 billion](#) worth of funding has been allocated to schools and school districts as part of a settlement with the e-cigarette manufacturer Juul. Much of these funds are intended to help schools finance anti-vaping solutions like vape detection devices.

Multiple state governments and local charities have also increased their spending on grants earmarked for anti-vaping measures. Examples include:

- Rotary Clubs offer almost [\\$10,000](#) in funding for vape detectors in local schools.
- Congress releasing [\\$1 billion](#) in national school safety grant funding during 2023.
- The Justice Department allocating [\\$5.8 billion](#) to community safety initiatives in 2024.

Schools and businesses can use resources such as Grants.gov to search for relevant grant opportunities. By entering appropriate keywords like “vape detectors,” “anti-vaping” and “safety grants” into the Grants.gov search bar, stakeholders can find information about federal funding opportunities intended to finance the purchase of anti-vaping measures and devices.

School administrators and business owners will need to write a compelling grant proposal to successfully secure grant funding. This document will include information like

a statement outlining the need for funding, how purchased technologies will benefit the organization and a detailed budget, alongside information about implementation and maintenance plans.

When developing a budget plan, proposal teams must include the following details:

- An itemized list of expected costs.
- A thorough cost-benefit analysis.
- How funds will be saved for contingencies.
- A breakdown of expenses by category.
- A list of well-defined financial goals.

In addition to selecting an appropriate grant and collecting the above information, proposal teams must review the unique Request for Funding Proposal (RFP) instructions issued by their grant’s awarding body.

A typical RFP will contain the following information:

- Acceptable formatting and font size instructions.
- Deadlines for the submission of key documents.
- Required attachments, evidence and forms.
- Instructions for how to submit the grant proposal.

The most common reasons for the rejection of grant applications often involve a proposal team’s failure to meet RFP requirements, so carefully reviewing this information is essential.

It’s also important to note that some grants contain a “cash match” condition that requests schools or businesses match a percentage of the proposal’s total cost using their funds. If such a condition exists, proposal teams must provide evidence that the organization has access to required funds as part of their grant proposal.



Checklist for implementing vape detectors on your properties

Planning:

- Assess the extent of vaping issues in your location
- Gather data on past incidents.
- Define specific goals such as reducing incidents and improving health and safety.
- Create a budget covering initial costs, installation, maintenance and training.
- Conduct a cost-benefit analysis.
- Consult with key stakeholders about the implementation.

Implementation:

- Identify the key areas where vape detection will be beneficial.
- Identify the proper vape detection solutions for your needs.
- Confirm that the selected vape detection technology is compatible with your building layout.
- Confirm that the vape detection technology is compatible with your current IT systems.
- Ensure the vape detectors provide adequate coverage for the areas of concern.
- Calibrate each vape detection device for its specific area of use.
- Ensure there are sufficient power and network connections at installation sites.
- Configure the vape detection system to your particular requirements.
- Test the vape detectors to ensure they work accurately.
- Allow time for adjustments based on initial test results.

Legal and regulations:

- Review local and state rules about vape detection.
- Comply with data protection and privacy laws.
- Inform the public about the presence and purpose of vape detection technology.
- Create written policies regarding vape detection and data handling.

Training:

- Train staff to respond to a vape detection alert.
- Create a procedure to follow in the event of a vape detection alert.
- Train staff to monitor and maintain the devices.
- Schedule regular re-training.

Maintenance:

- Establish a calibration schedule.
- Plan periodic cleaning.
- Ensure timely system updates.
- Create an inspection and testing schedule.
- Obtain the equipment needed to make repairs.

Monitoring:

- Begin continuous monitoring and reporting in place.
- Establish a way to collect feedback about the vape detection system.
- Keep records of all incidents detected and actions taken.
- Analyze data to find trends for further prevention.
- Find out if the vape detection technology integrates with other security technology.



Integrating vape detectors with security camera systems

Integrating vape detectors with security cameras and [video management systems](#) can offer significant benefits. This enhanced ecosystem of technologies provides security teams and management with greater situational awareness, enabling better threat detection, more efficient response and valuable insights into emerging trends.

For example, when a vape detector alerts the security team to the presence of vape in an environment, the video security team can instantly gain greater visual context on the same platform by viewing live video of the scene from nearby security cameras. This enhanced awareness can lead to a faster and more informed response to the threat, resulting in safer outcomes.

Like the most advanced vape detectors on the market, Pelco's powerful [security cameras](#) and devices are built on an open platform. This brings enormous benefits to organizations and businesses seeking a fully flexible, easy-to-integrate and intuitive security solution. It allows security teams to replace outdated cameras with Pelco's smart security devices without procuring an entirely new video security setup, and it also brings a plethora of advanced AI analytics, cloud technology and significant cost savings.



From problem to solution: Vape detectors in action

Find out how organizations utilized Motorola Solutions' HALO Smart Sensor to help prevent vaping, collect comprehensive health and safety data and capture the visual context of incidents by integrating it with video security.



Plymouth-Canton Community Schools takes a proactive approach to school safety

With vaping a major concern for schools nationwide, Plymouth-Canton Community Schools (P-CCS) was proactive in combating this issue by installing the HALO Smart Sensor in areas where video security cameras would not be appropriate, such as restrooms. With this in place, P-CCS can detect vaping in privacy-concern areas in real-time.

Additionally, the HALO Smart Sensor was integrated with the school's video security solution, enabling security teams to receive vaping alerts via its video management platform. Operators can also use the same platform to view live and recorded video of the scene outside these privacy-concern areas to identify who entered the space at the time of the vape detection. This helps the security team understand who could be responsible for vaping. As a result, the school district has improved student safety and proved to parents that they are taking the issue of student vaping seriously.

[See the vape detector](#)



The Saratoga Springs Housing Authority addresses vaping and smoking violations

The Saratoga Springs Housing Authority (SSHA) faced challenges enforcing a smoke-free policy in their apartment units. With a history of fire hazards, including an incident caused by a resident smoking indoors, the SSHA needed a reliable way to detect smoking and vaping in areas where video security was not an option.

In 2023, SSHA installed 12 HALO Smart Sensors to help identify smoking incidents in real time. The sensors provided instant alerts, enabling staff to address the issue directly with residents who violated the no-smoking rule. This allowed SSHA to stay compliant with the U.S. Department of Housing and Urban Development (HUD) smoke-free mandate and mitigate fire risks, improving the overall safety of the housing complex.

[See the solution](#)



Discover the award-winning vape detection solution



The HALO Smart Sensor is an all-in-one sensor with the ability to detect vaping, smoking, and a plethora of other safety and health concerns.

The award-winning sensor is used by over 10,000 organizations globally for its innovative ability to combine dozens of sensor reading abilities into a single device. The sensor is able to provide enhanced security and hazard detection without recording audio or video, making it a non-intrusive vape detection solution for any area of a facility.



Vape and smoke detection

Vape and vape masking: Detect instances of vaping and vape masking, where an individual will use aerosol to cover up the smell.

THC: Detect THC oil traces from traditional smoking and vape devices.

Smoking: Detect when an individual smokes a cigarette.



Air quality and health

Health index: Identify the potential risk for the spread of airborne infectious disease.

Air quality index: Observe air quality conditions to help ensure a healthy environment.

Carbon monoxide, carbon dioxide and nitrogen dioxide: Detect potentially dangerous gas levels in the air.

Humidity and temperature: Observe humidity and temperature levels to maintain a safe, comfortable environment.

Volatile organic compounds (VOC) and particulates: Detect the levels of VOC particulate matter in the air.



Safety enhancements and alerts

Help (spoken word): Detect specific keywords spoken by an individual seeking help.

Panic button: Users can trigger a third-party panic button connected to the HALO Smart Sensor to share the emergency location.

Gunshot and aggression: Pick up abnormal audible disturbances that could indicate a fight or a gun being fired.

Motion: Identify and alert on movement for occupancy and trespassing.

Occupancy: Identify how many people are within the location of the HALO Smart Sensor and receive alerts when the level reaches a pre-defined threshold.

Light level: Observe light levels to support the sensors in detecting anomalies.

Tamper: Detect vibrations that could signal someone tampering with the device.

When the HALO Smart Sensor is integrated with a video security solution, security teams receive site-specific, real-time threat alerts. This enables security teams at schools, hospitals, retail stores and more to respond to events faster, helping to establish a safer environment.

[Learn more](#)





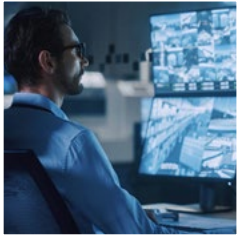
Conclusion

For property owners, facility managers and school administrators to comply with current vaping regulations and help protect their properties from potential vape and smoke-related damage, teams must find a way to detect and deter vaping incidents reliably. While in-person security can be effective, the subtle nature of vape smoke can make it hard to detect.

By installing specialized vape detection devices in critical locations, stakeholders can reliably identify the presence of vape smoke, as well as deter offenders from committing vaping and smoking offenses. Provided environmental factors and installation considerations are carefully reviewed, property owners can create unique vape detection systems designed to warn on-site teams of incidents in real time to best address vaping and smoking incidents



Related Resources



[Physical Security Guide](#)

The ultimate guide to get you started on your physical security journey. Learn about common threats, plus the most effective tools and methods.



[Security Technology Trends](#)

Discover the latest cyber and physical security trends. Read this guide and find out what you need to know to keep your business safe and secure.



[School Vape Detectors Guide](#)

Learn about the benefits, use cases, and specific considerations of implementing vape detectors in educational facilities.

To learn more, visit: www.pelco.com



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