

Applying video analytics for accurate intrusion detection and effective visual verification

Table of contents

Human attention span	03
Perimeter security	03
Accurate detection	04
All video analytics are not equal	05
DAVANTIS DFUSION technology	07
Unique detection enhancing features	08
DAVANTIS' monitoring process	10
Architecture	11
DAVANTIS solution	12
Diversity of project sites	12
Open and integrated software platform	13
A powerful perimeter protecting solution	14
CMS for remote monitoring	15
Guard on-site at day and remote monitoring at night	15
Guard on-site 24/7 with VMS	15
CCR 24/7 with PSIM	15
CCR 24/7 for on-site verification and CMS for redundant solution	15
Simplified and effective deployment	16
Securing your investment	16
Effective for various property boundaries	18
Verticals	20

“

We are experts in perimeter security and provide a unique, highly effective solution that not only secures the perimeter more effectively, but also reduces monitoring costs and improves staff efficiency.

”

Human attention span

The human brain has a limited attention span, and it has been proven in several studies that after a short period (about 30 minutes), operators who continuously watch video cameras will miss significant activity, entirely. By applying advanced video analytics, this limitation can be overcome.

Perimeter security

Security camera systems are increasingly being applied to not only capture reactive evidentiary video footage, but to pro-actively detect and alert users to intrusions, to avoid or minimize property damage or loss from such intrusions. Care should be taken however, in deciding which video detection analytics technologies to apply.

The key criteria for evaluating a reliable video analytics solution is ALWAYS the detection of all real alarms, whilst reducing the number of false alarms and false positive detections.

High false alarm rates are very time consuming, inefficient and make the monitoring task unmanageable. But it is equally critical not to have any missed detections, which renders the analytics system ineffective, and lead to the risk of damage or loss to property and assets.



True Alarm



False Alarm



Missed Alarm

Accurate detection

Many video analytics solutions struggle to ensure accurate detection, especially in situations requiring long range detection with a low number of false alarms. For example embedded VMD (explained later) in cameras, or VMS software have much less processing power available than server-based solutions, and to achieve similar performance in the detection, they must be either increase their sensitivity for long range detection or use significantly more cameras, resulting in an unmanageable number of false alarms or alarms being heavily filtered for reliable detection, which often leads to critical missed detections.

It is critical that accurate detection remains the overall objective.

Whilst all monitoring companies and end-users desire to reduce false alarms, and true detections of non-intruders (false positives), the most critical objective always remains the accurate detection of a true intrusion.



Unbalanced detection - setup sensitive for long range detection, no missed alarms but a high number of false alarms.

Unmanageable



Unbalanced detection - filtered for reliable detection, low number of false alarms but a high risk of missed detections specially at long distances and in poor lighting.

Ineffective



Balanced detection - powerful server-based analytics with high-end performance ensures reliable detection in all conditions, with minimal false alarms.

Perfect for purpose

All video analytics are not equal

All technologies for perimeter protection have individual strengths and weaknesses, and all outdoor monitoring applications are extraordinarily complex, because of highly variable and unpredictable factors including weather and other environmental conditions (animals, vegetation, property demarcation, distances etc). These conditions, combined with a security system that aims to detect all intrusions in a perimeter/outdoor security area can cause easily false alarms, and requires powerful and flexible performance and quick and easy alarm verification.

Different products brands apply different detection technologies, each resulting in quite different detection results. Herewith a short synopsis of the currently available options.

Video Motion Detection (VMD)

This technology detects any pixel changes from frame to frame (that make up video footage). It was never intended to be used for detection, but rather to avoid video recording in areas without movement.

The original objective of this technology was to reduce storage. As such, it can be effective in sterile and static environments (indoors),

providing decent results. Yet in dynamic outdoor environments, this technology results in significant false alarms.

Research shows that within a short time span, this type of analytic is disabled, as it floods operators with information which is not useful. It is best to avoid any product that still utilizes this method.

The weakness is its excessive false alarm rate.

Machine Learning (ML)

This technology applies background modeling, and classification of various characteristics in movement and object outline, to determine whether motion constitutes an intrusion or not.

It typically requires careful calibration of the camera scene depth, requiring manual person sizes and viewing distances to be entered, for accurate configuration. Some smarter systems can auto-calibrate.

It is a significant improvement on VMD, being able to accurately detect intrusions in poor lighting and at longer distances. Yet it is not an accurate classifier of the object type that it observes – often resulting in false positive detections from objects similar in shape, size and/or motion to that of a human (i.e. deer and other

larger animals). It also often generates false alarms from things like spiders, rain and vehicle headlights that impact the image.

The weakness is the inability to accurately classify humans from other larger animals, and the inaccurate alarming for insects, spiders, adverse weather conditions, and penetrating lights.

Deep Learning (DL)

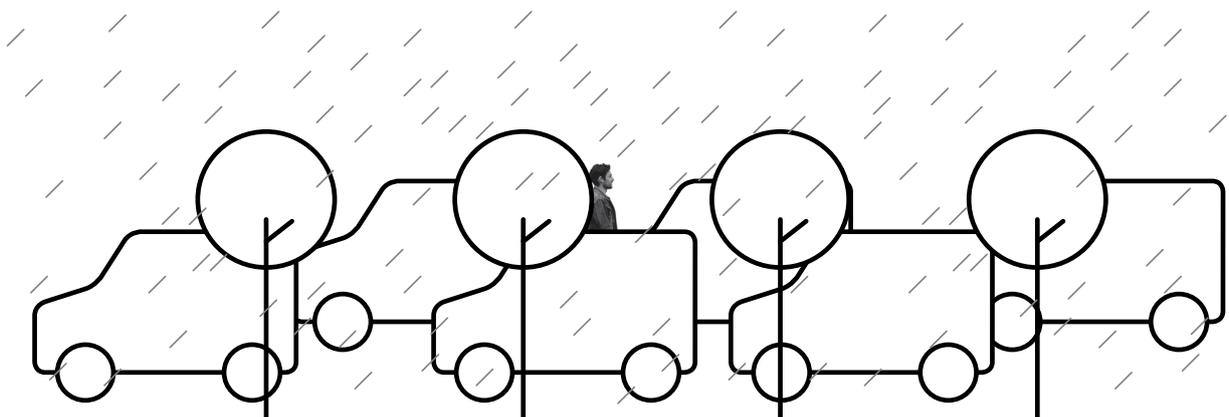
This technology applies accurate object classification and filtering to static images. Typically, a provider would offer to do cloud-based filtering of a few alarm images before transmitting to a monitoring station.

It is fully accurate where the objects are well illuminated and at least 70%

unobscured. Yet when lighting is poor, when objects are far away, or when they are partially obscured (by things like vehicles or low walls), alarms are often discarded by Deep learning filters. This is a significant risk of this technology, when used for filtering.

Some providers apply Deep learning as an actual detector, where they analyze both object and motion combined. But this is very uncommon, as it requires significantly more processing power. Yet this is the best possible use of deep learning for the purpose of perimeter protection and intrusion detection.

The main weaknesses of deep learning are the need for proper lighting, the inability to make accurate classifications at long range, and the need for objects to be mostly unobscured.



DAVANTIS DFUSION technology

DAVANTIS DFUSION video analytics combines both machine learning analytics, with the most advanced Deep Learning technology and generates real-time alarms based on defined conditions and rules customized to the monitored area, and requirements of the client. In so doing, Davantis applies the strengths of each technology, which coincidentally perfectly complements the weakness of the other.

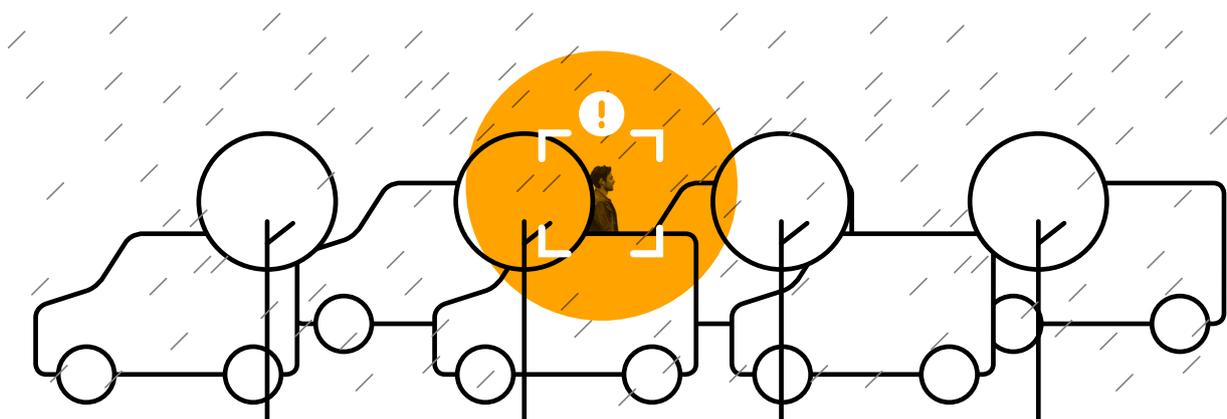
The DAVANTIS DFUSION system is a server-based solution. It offers increased processing power, enabling more intelligent detection analytics to be run. The server CPU is used exclusively for machine learning analytics and an additional GPU is dedicated to performing Deep Learning processes. These servers can perform many different computational steps simultaneously. Many state-of-the-art algorithms are processed at the same time, to ensure reliable detection, even

at long distances and in poor lighting conditions.

Detection analytics in the camera (also called edge analytics) as well as those that run on the VMS server (thus sharing processing resources with the recording software) cannot provide the same level of detection accuracy.



The system provides visual alarms in the form of a Snapshot and a short Video Clip in which the cause of the alarm trigger is clearly highlighted by a coloured box (bounding box). This allows the security guard on-site or the monitoring operator off-site, to verify and distinguish between real and false alarms quickly and easily. Only verified real alarms will then be escalated. The result is ZERO false alarms being passed to the end users (avoiding uncertainty and frustration).



Unique detection enhancing features

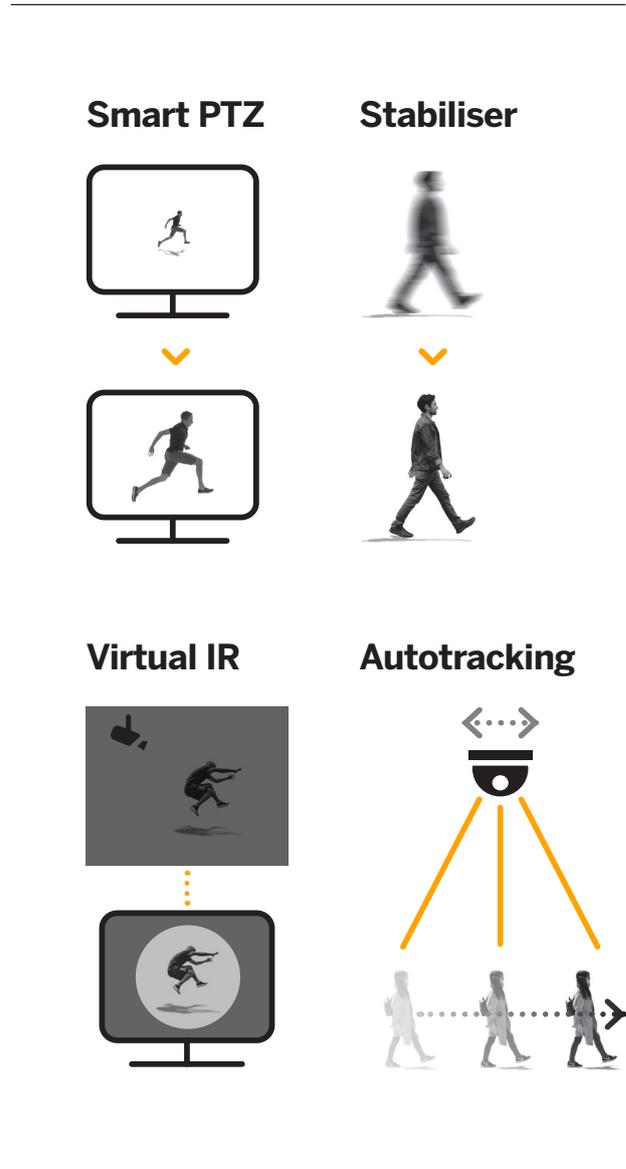
A combination of Intrusion Detection, Deep Learning Object Classification (Person, Vehicle or both), Object Tracking by PTZ, Thermal Contrast Enhancement, and Image Stabilization are all essential to provide effective outdoor detection.

Specially developed algorithms for high-performance detection with thermal cameras are used to enable long-range detection where large perimeter distances are required on larger sites such as critical infrastructures (Water, Food, Energy, Chemical plants, Airport, Harbours, Military Installations, etc.) or photovoltaic plants, factory premises, shopping malls, parking areas, etc.

Image Stabilisation reduces the effects of wind shake, and other adverse weather conditions to provide a stable image to be analysed – increasing detection accuracy and significantly reducing false alarms caused by small camera movements at long ranges.

Corridor View aspect ratios enable switching from horizontal to vertical camera views, increasing detection accuracy with a larger useable detection area - covering larger areas with less equipment.

Smart PTZ camera control can be deployed to automatically move PTZ cameras to the target detection area,



providing closer detail of any intruder. PTZ camera Auto-tracking (where available) can also automatically **follow intruders** as they move around - providing more information about the intrusion to the operator.

Our patented **Virtual IR technology for contrast enhancement in thermal cameras enables long range areas to be enhanced for improved and reliable detection at extreme distances.**

		DFUSION	DFUSION PRO
 Intruder		●	●
 Vehicles		●	●
 Entry / exit		●	●
 Tampering		●	●
 Loitering		●	●
 Appearance / disappearance		●	●
 Virtual Onvif		●	●
 Combination of rules		●	●
 Integration with VMS, CMS and PSIM		●	●
HR High resolution analysis			●
 Smart PTZ			●
 Virtual IR for thermal cameras			●
 Stabiliser for adverse conditions			●
 Anti-dead zone corridor view			●
 ATKPRO optional module			●
 Distance thermal camera		235 m / 257 yd	505 m / 552 yd
 Distance day/night camera		67 m / 73 yd	120 m / 131 yd

A wide variety of detection functions, all designed for reliable perimeter security (detecting persons, vehicles, camera tampering, loitering, entering, leaving, appearing, and disappearing in specified zones) make it possible to analyse behaviour accurately. Coupled with multiple user-defined detection rules, detecting intrusions can be optimized whilst unwanted alarms can be prevented/filtered. Loitering will detect intrusions into a protected area, and only raise an alarm when the intruder is not expected to stay more than a pre-determined length of time.

An unlimited number of rules can be created to ensure that intrusions meet very stringent criteria before triggering detection alarms. This functionality can further reduce the

effort required to monitor and react to such alarms. And it can amount to significant cost savings over time, as most monitoring providers charge for excessive false alarms.

Utilizing this technology also ensures fast response to intrusions by guarding companies and law enforcement personal, as they are certain of visually verified intrusions once they are dispatched. It also leads to more arrests being made, and often no (or very little) damage is done by the time response teams arrive on site. In addition, remote operators often utilize Davantis' talk-down feature to dissuade intruders to leave the premises immediately, or to return at a time when premises are open to the public.

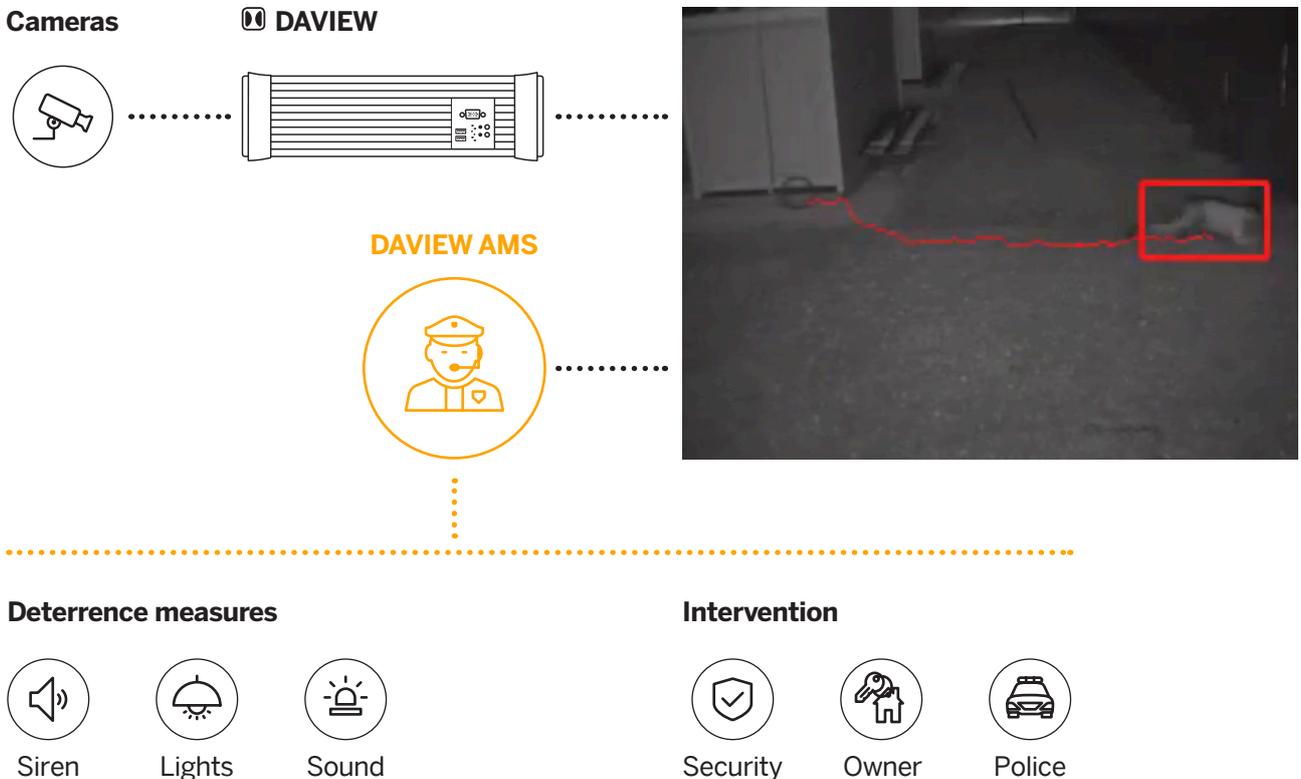
Thanks to such high-end performance, DAVANTIS DFUSION video analytics is a perfect and unique solution for connection with Central Monitoring Stations (CMS). Hundreds of CMS clients already work with DAVANTIS

solutions worldwide, and value the enhanced ability to maximise their manned monitoring resource. This has many business benefits - reducing cost, and requiring fewer monitoring staff to monitor more sites, more effectively.

DAVANTIS' monitoring process

Apart from the performance of the video analytics system, the alarm verification should be considered

carefully in every perimeter security project, be it on-site with a security guard or own Central Control Room (CCR) or remotely in a Central Monitoring Station (CMS).



Architecture

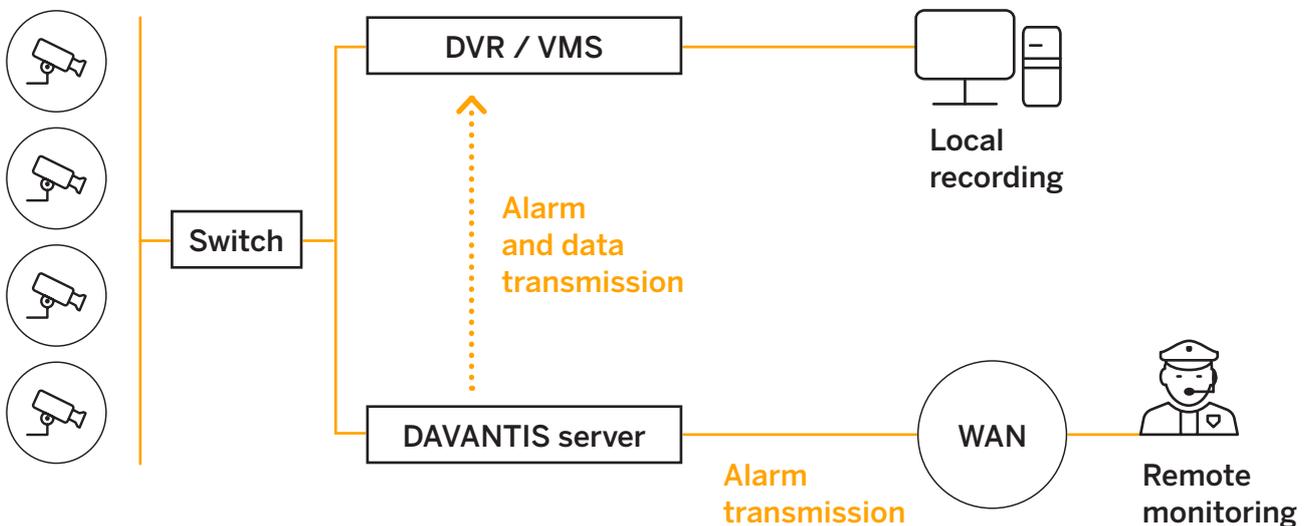
The DAVANTIS DFUSION appliance is installed on-site, parallel to the recording device. It analyses a secondary feed from the IP cameras. The main high-resolution camera feed still transmits directly to the recording device.

DAVANTIS analyses and transmit images and video clips by design, as this has a minimal network bandwidth impact (not requiring dual streaming of many high-resolution security camera feeds), and it enables us to transmit alarms in the shortest possible time (within seconds).

Competitor systems that use high-resolution camera feeds, typically take significantly longer to transmit alarm visuals, resulting in late response by operating staff.

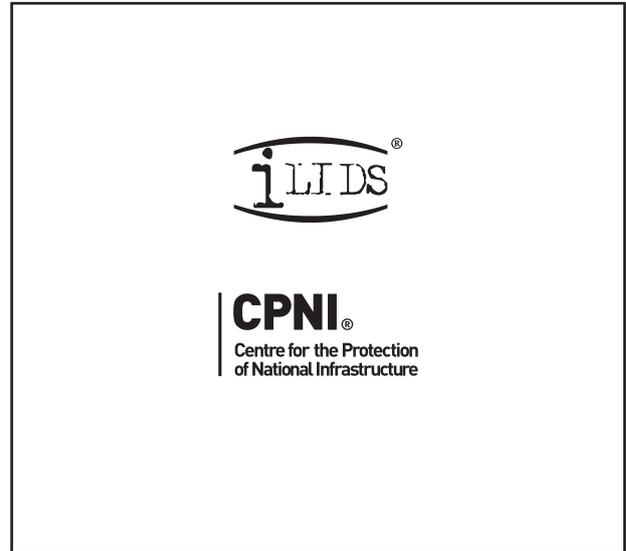
Alarm visuals are transmitted to remote monitoring providers and the DAVANTIS APP via secure internet connections.

It is an option to also configure the DAVANTIS appliance to transmit alarm metadata directly into the local recording system. Most popular brands of recording devices are already integrated.



DAVANTIS solution

DAVANTIS is a company dedicated solely to providing highly specialized perimeter security. Being focussed on one software application enables us to provide better quality software performance with increased product features relevant to real-world needs. UK Home Office CPNI Level 3 approval (formerly known as i-LIDS® - Primary Detection) means DAVANTIS is FIT for PURPOSE.



Diversity of project sites

All perimeter security projects vary by locations and sizes of the facilities, and can range from small family homes, to medium sized industrial and commercial sites, through to huge solar plants and critical national infrastructure. Installations such as perimeter protection of critical infrastructures have high security requirements and need appropriate reliability and performance.

There are many clients who want to improve their security and who do not have security guards on site. Others have on-site security guards and want

to optimize efficiency, and/or reduce their recurring security costs. Many of these clients already invested in video surveillance systems (cameras, recording devices, poles, cabling, network, construction works and more) and by adding a DAVANTIS analytics appliance, they immediately have an active real-time alarm system. Even when budgeting for a complete new install, adding Davantis analytics appliances enable better, more accurate and proactive detection and response.

The challenge is to find the right solution for each site, environment, and client - a versatile and open system.

Open and integrated software platform

The open software architecture of DAVANTIS DFUSION software provides clear and centralized interoperability between different devices and systems from a central server, for comfortable and accurate detection, easy alarm verification and immediate loss-preventing intervention.

DAVANTIS DFUSION video analytics software is ONVIF and RTSP compatible and can be incorporated into any surveillance platform, whether new or existing, analogue or IP networked, day/night or thermal. Being brand agnostic gives total freedom in the choice of camera, and all models can be customized for surveillance of outdoor security areas.

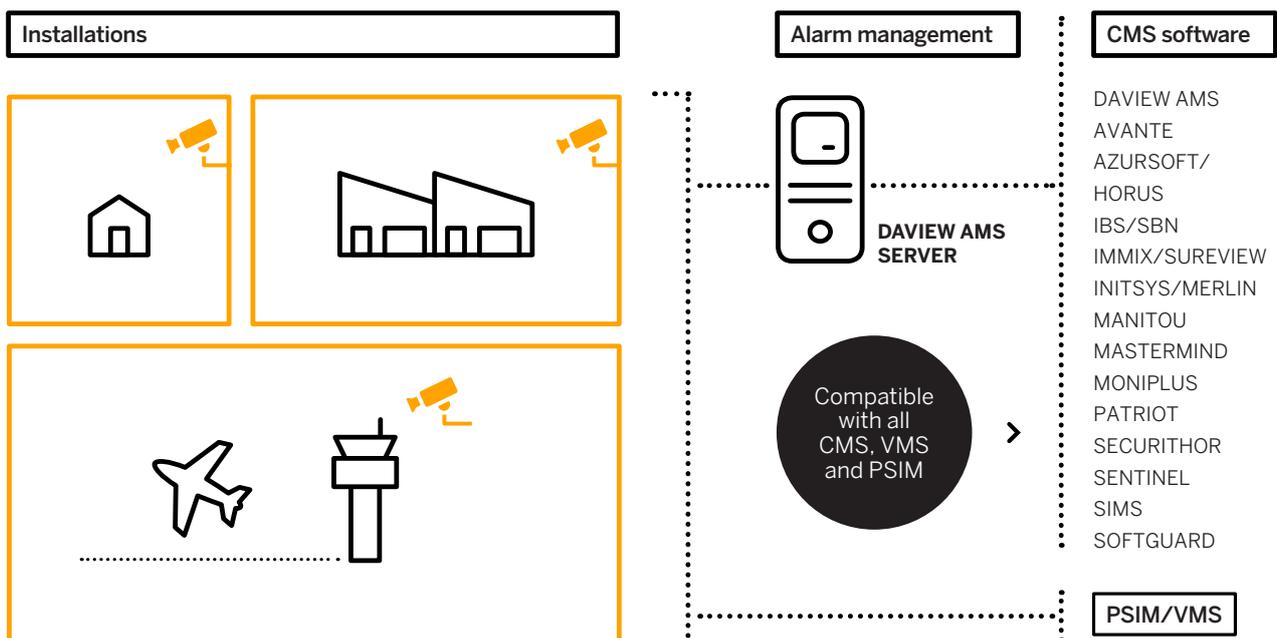
The solution is also integrated with

A. Most major Video Management Systems (VMS) such as Bosch, Exacq, Genetec, Idis, IndigoVision, Milestone, UltraView and more.

B. Physical Security Information Management (PSIM) systems such as Agora, Arquero, CNL, Cortech, Desico, and

C. Monitoring Automation Systems such as AzurSoft, Bold Technologies, IBS, MAS, Moniplus, SoftGuard, Immix SureView, Patriot Systems

This enables system integrators, security installers and engineering companies to easily integrate DAVANTIS into existing or new multi-vendor installations.



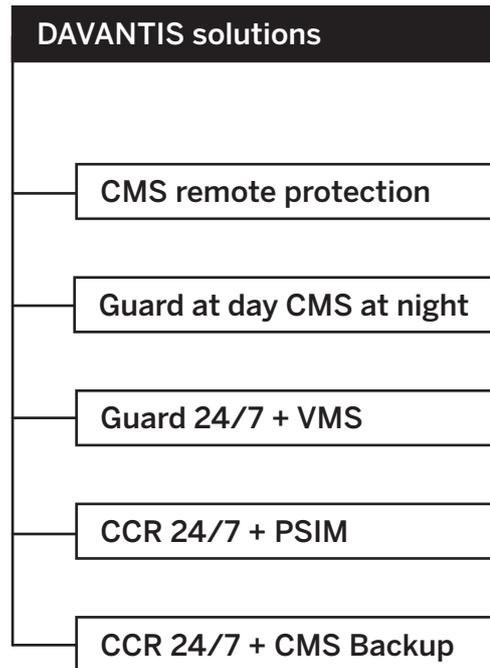
A powerful perimeter protecting solution

The DAVANTIS analytics do not sleep, do not take a break, and cannot be intimidated – and costs only cents per hour (compared to on-site security staff).

It is a powerful, intelligent perimeter security solution for demanding installations. The system provides Real-Time Alarms to prevent further offenses and unnecessary damage. Immediate countermeasures may be initiated by the security company, local Police or by linking remotely to a Central Monitoring Station.

Furthermore, DAVANTIS DFUSION can detect outside the property boundary and also within the internal areas. This is possible because the entire camera field of view can be defined as a security area.

All these features make DAVANTIS DEEPFUSION a high-security solution for every customer:



CMS for remote monitoring

- For customers without on-site security guards: Improve the security with remote perimeter monitoring, utilizing DAVANTIS analytics on-site with connection to a central monitoring provider.
- For customers who want to significantly reduce security costs: Complete replacement of security guards with DAVANTIS analytics on-site and connection with a central monitoring provider.
- For customers with large unprotected outdoor areas (such as solar plants) needing cost effective protection: Protect large areas with fewer cameras and a connection to central monitoring providers.

Guard on-site at day and remote monitoring at night

- For customers who want to reduce their security expenses: Deploy innovative DAVANTIS analytic technology, plus (fewer) security guards during the day. This offers better surveillance with fewer guarding personnel at a significantly lower price-point than current hourly guarding rates. Deploy DAVANTIS analytics integrated with the VMS system, and/or as stand-alone solution (ViewClient) on-site

for alarm verification by central monitoring provider at night.

Guard on-site 24/7 with VMS

- For customers with 24/7 security guards on-site and existing video surveillance systems: Upgrade from passive recording to an active real-time intrusion detection system that alerts guards to an intrusion via the current VMS recording system.

CCR 24/7 with PSIM

- For customers with high security requirements: DAVANTIS analytics with thermal cameras and integrated with PSIM system, which is additionally supported with PTZ cameras allowing verification and identification, in a Centralized Control Room (CCR).

CCR 24/7 for on-site verification and CMS for redundant solution

- For customers with high security requirements: DAVANTIS analytics with thermal cameras and integrated with PSIM, and additional support with PTZ cameras, providing both on-site verification in a Centralized Control Room PLUS additional remote verification by a central monitoring provider.
- For customers designated as HIGH SECURITY SITES such as

government, power generation and distribution, military, and homeland security: DAVANTIS is accredited with CPNI Level 3 (i-LIDS Primary) certification plus ISO 9001:2015 certification.

Simplified and effective deployment

An important part to consider in each project is the time and complexity of the setup. A reliable system needs few and uncomplicated settings to achieve satisfactory results. The system should be fast and easy to install, without the possibility to make critical configuration errors.

DAVANTIS appliances provide for quick, easy and cost-effective commissioning with a patented auto calibration tool and SmartWalk technology. For DAVANTIS installers, this means building a robust system while providing significant time and cost savings in training, installation, and support.

Furthermore, the simplified interfaces offer easy and intuitive operation. It provides uniformity in the video analytics configuration. The same interface and configuration process is used for any camera types and brand. This way the configuration is standardized, and fewer mistakes can occur. It makes for a robust system.

All DAVANTIS solutions are remote access ready. Remote Access provides a convenient and cost-effective tool to enable remote support to be available instantly, without requiring on-site presence and associated call-out charges.

Based on countless field tests and experiences in thousands of installations, DAVANTIS has created four predefined installation profiles with specific detection setting that matches the locations. Thus, much of the configuration is already completed and makes a quick, simple and cost-effective installation and commissioning possible.

Securing your investment

DAVANTIS offers you a dynamic system. Through online updates/upgrades, the system can always be kept up to date. The solution is scalable and can be expanded, updated and modernized at any time with more analytics channels/servers, newer algorithms and new product features. All these improvements can be applied to continually make your cameras smarter. This will guarantee and secure the investment of the customers.

Automatic detection and notification with visible alarms (Snapshot, Video Clip and Live Camera connections) eliminates the need to blindly dispatch expensive patrol services or law

enforcement. Each alarm can be visually verified within seconds.

Video cameras offer similar deterrence value than a security guard and, in conjunction with DAVANTIS video analytics, it offers even better protection, at a fraction of the cost. Security guards simply cannot be everywhere at once but can only be in one place and perform one task at a time.

DAVANTIS is an open system that is compatible with most camera brands and third-party security systems. DAVANTIS can be easily integrated into video surveillance systems without much additional labor and costs - utilizing the existing security infrastructure.

It is also an internationally certified video analytic solution that has proven itself in thousands of installations worldwide. Reliable video analytics is a must to secure your investment, as the expensive installation of a camera system for perimeter protection will be ineffective with sub-standard analytics detection performance.

DAVANTIS' server-based solutions are out-of-the-box solutions to provide easy and fast commissioning. The analytics servers are ready for use

by trained and licensed technicians. The servers are equipped with inputs to enable arming/disarming of the system by an external system such as an intrusion alarm panel.

Highly intuitive software, patented auto calibration tools and SmartWalk technology provides a quick and cost-effective setup. For DAVANTIS customers and users, this means significant savings in training, installation and support.

When used in combination with thermal cameras, reliable long-range detection is possible with DFUSIONPRO. This is a highly cost-effective solution, and no other detection technology provides the same accuracy, with visual verification and low maintenance – for large perimeters.

ClickThru™ Technology is a unique and simple 3-click alarm management technology. It allows the system operator to verify an alarm fast and efficiently. In connection with DFUSION and its low false alarm rate, more locations can be monitored at the same time, and with less stress - offering a high-end service to end users because only true alarms will be transmitted. Safe alarm verification in the shortest possible time.

Effective for various property boundaries

Apart of the different customer profiles, sites and installations, there are also many different property boundaries that cannot all be secured with the same conventional perimeter security system. The DAVANTIS solution is capable of protecting all environments.

DAVANTIS offers one perimeter security system for all types of property boundaries.



DAVANTIS solutions are very difficult to evade as they provide coverage across a very large part of the site being guarded. The technology explicitly detects movements in an area where there should be none. Evading the analytic is virtually impossible.



Fence



Wall



Gate



Hedges



Wood fence



Bollards



Moat



Stone wall



Conventional perimeter security systems like fence sensors, barriers, ground detectors, PIR, etc. are installed directly at the property boundaries and their radius of protection is usually also limited to this area. This makes it easier to enter the security area without being detected. These protection systems can also not be used to visually verify the cause of an alarm, which often has to be verified on-site by patrol service or law enforcement.



Due to the flexible definition of the detection zones, the system is very suitable for perimeters close to public areas, where pedestrians, bikes, dogs, etc. can trigger false alarms.

The public area can still be analyzed without triggering an alarm, but with knowledge of each person or vehicle in close proximity. This pre-analysis, enables immediate detection and alarming once a detection zone is entered.

Verticals

Industry and retail

Industrial units
Buildings
Supermarkets
Wholesalers
Junkyards
Quarries
Construction sites
Auto Dealerships
Manufacturing

Financial

Banks
Credit Unions
ATM protection
Vault protection
Data centres
Parking protection

Information and communication technology

Data Centres

Logistics

Logistics centres
Warehouses

Large perimeters

Photovoltaic plants
Factories
Shopping malls
DIY stores
Green areas

Hospital parking lots
Lots with cars, trucks, campers and heavy machinery

Transport and traffic

Airports
Stations
Harbours
Port facilities
Subways
Tunnels
Parking stations
Gas stations

Government and public administration

Prisons
Embassies
Disposal and recycling
Healthcare facilities
Military installations
Cemeteries
Sports fields
City halls
Swimming pools
Waste plants

Media and culture

Museums
Schools
Universities
Theatres
Professional sport

Residential

Private land
Retirement communities

Critical infrastructure

Water

Water supply

Food

Food manufacturers
Factories
Abattoirs

Energy

Solar parks
Power stations
Refineries
Pipelines
Gas, chemical, petrochemical installations

Leisure

Theme parks
Hotels
Residential
Racing circuits
Golf courses

DAVANTIS TECHNOLOGIES SL

Barcelona · Spain
Madrid · Spain
Nice · France
Luedinghausen · Germany
Bogota · Colombia
Singapore

DAVANTIS TECHNOLOGIES INC

Washington DC · USA

info@davantis.com
www.davantis.com

