

Video and Thermographic Fire Monitoring and Detection for chemical industry



Fire safety challenges in chemical industry

The chemical industry is a vital sector focused on the production, processing, and distribution of a broad range of chemical products. These products include essential chemicals like acids, solvents, and salts, alongside more complex compounds such as polymers, fertilizers, and pharmaceuticals. The industry serves as a cornerstone for numerous sectors, including agriculture, construction, healthcare, and manufacturing, driving innovation and enabling essential processes across the global economy.

UNIQUE FIRE SAFETY CHALLENGES

Fire safety is a top priority in the chemical industry, given the significant hazards associated with the production, handling, and storage of chemicals. The risks of fires and explosions are higher in this sector than in many others due to the presence of **flammable and combustible materials**, as well as **heating processes** that can cause materials to ignite. In these high-risk zones, thermographic fire monitoring provides an added layer of safety by detecting abnormal temperature rises before a fire ignites.

The consequences of a fire in a chemical plant are severe. Burning chemical products can cause substantial **environmental pollution** and pose a direct **health threat** to local residents. **Business interruption** is another major concern, as restarting a continuous process can be cumbersome and time-consuming.

The generation of **steam, moisture, and dust** can create additional challenges for fire detection systems. However, the humidity- and temperature-resistant housings of Araani's VFD and TFD detectors are specifically designed to withstand these harsh environments. Beyond their robust hardware, Araani's advanced algorithms offer customizable options to filter out smoke-like or flame-like phenomena that are inherent to the process - ensuring reliable detection without unnecessary false alarms.

Many chemical processes occur in **complex systems** with extensive piping, **outdoor** environments, or heavily ventilated areas where traditional fire detectors may be less effective. Video Fire Recognition is an ideal solution for these challenging conditions, as it can visually detect smoke or flames even in dynamic settings.

Additionally, chemical plants often require **explosion-proof (EX) equipment** to operate safely in hazardous areas. Araani software is fully compatible with Axis EX cameras, making it a reliable solution for fire monitoring in ATEX-certified zones or other dangerous environments. VFD also performs well in harsh conditions, including corrosive or poisonous atmospheres, where traditional detection systems might struggle.

To further enhance safety, Video and Thermographic Fire Recognition generate live video from events that can be recorded, providing valuable evidence for incident investigations, safety audits, and insurance reporting.

By integrating Araani's Video and Thermographic Fire Recognition, if needed with Axis EX cameras, chemical plants can enhance their fire safety strategy - protecting people, processes, and the environment.

Why choose Video / Thermographic Fire Recognition

SMOKE RECOGNITION

Araani **Video Fire Recognition** uses advanced analytics to detect smoke within a camera's field of view. By analyzing the physical behavior of smoke clouds, Araani technology distinguishes real threats from routine process-related disturbances. It detects smoke regardless of its shape, color, speed, or movement direction-even when the fire source is outside the camera's view.

FLAME RECOGNITION

Araani's Video Fire Recognition and Thermographic Fire Recognition use advanced analytics to detect flames with exceptional speed and accuracy.

- **Video Fire Recognition** (Visual Cameras): Recognizes flames based on color and their dynamic nature, distinguishing real threats from process-related phenomena like rotating beacons.
- **Thermographic Fire Recognition** (Thermometric Cameras): Detects flames by analyzing temperature and their dynamic nature, ensuring accurate differentiation from hot spots. Moving flames can either be suppressed or enabled for specific applications such as conveyor belts.

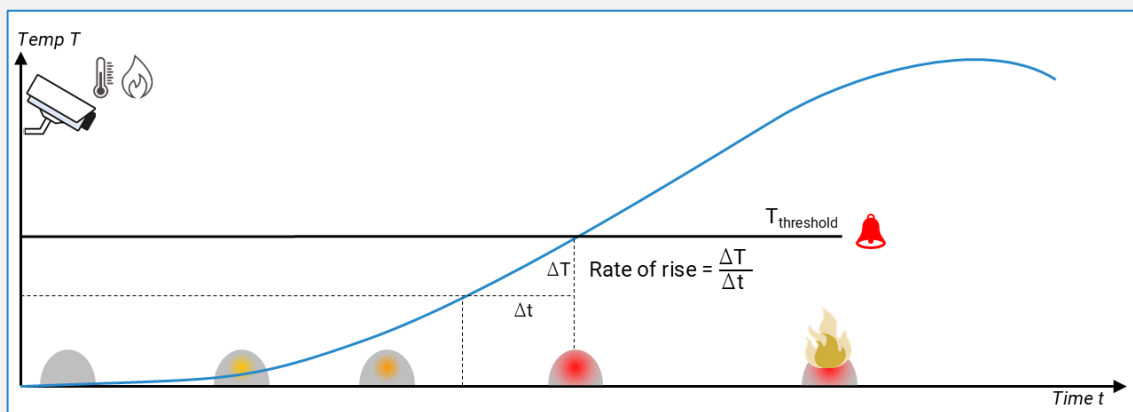
No ambient light is required, making flame detection effective in all lighting conditions.

Ultra-fast recognition enables early detection of even the smallest flames at the fire source.

HOT SPOT RECOGNITION

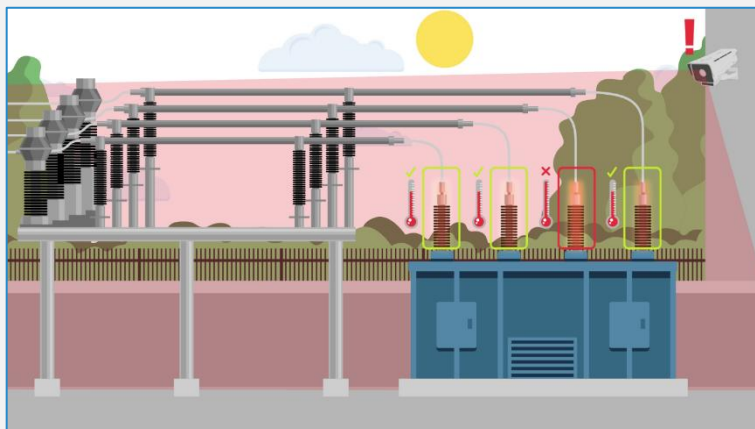
Araani's **Thermographic Fire Recognition** uses advanced analytics to detect hot spots within a thermometric camera's field of view.

- Customizable detection: Hot spots are identified based on either:
 - **Temperature thresholds** (excessively high or low temperatures sustained over time).
 - **Rate of temperature change** (rapid heating or cooling).
 - Configurable **tolerance** to filter out short, non-critical temperature variations.
- Adaptive alarm logic: advanced rules allow precise customization to match complex processes.
- Intelligent hot spot tracking with trajectory prediction: moving hot spots can be enabled or suppressed for specific applications, such as conveyor belts or moving machine parts. The tracking can even recover from temporarily excluded moving objects, e.g. bulldozers driving behind poles.



TEMPERATURE ANOMALY RECOGNITION

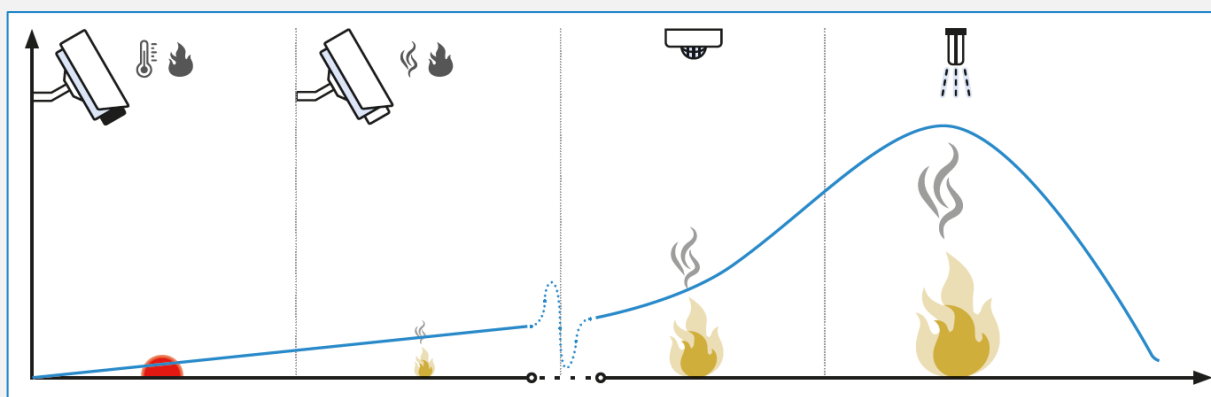
Araani's **Thermographic Fire Recognition** can continuously monitor and compare temperature levels across zones, reference areas, or the surrounding environment. By detecting temperature anomalies, our technology accurately distinguishes real fire risks from normal heating caused by environmental factors or routine process-related temperature changes. This advanced detection method is invaluable for protecting critical industrial and outdoor installations, especially in harsh conditions.



Excessive heating was detected, compared to neighboring conductors in an outdoor power station.

VERY EARLY WARNING

Video Fire Recognition detects flames or smoke directly within the camera's field of view, enabling **fire detection right at the source**. Unlike traditional heat-based detection systems such as linear heat detectors and sprinklers, it does not rely on heat reaching a sensor. Additionally, unlike point smoke detectors, it can identify smoke even when it is distant from the camera. As a result, the Video Fire Recognition algorithm enables early fire detection - often faster than conventional fire detection methods. Thermographic Fire Recognition identifies abnormal temperature increases before visible flames or smoke appear. By detecting early-stage overheating at a potential fire source, this technology enables proactive intervention-preventing fire outbreaks before they even start.



Heat, flame and smoke detection during fire stages by different detector technologies.

SEE WHAT'S HAPPENING

Araani's Video Fire Recognition and Thermographic Fire Recognition algorithms run directly on Axis cameras, which generate live video streams for real-time monitoring. These streams can be accessed via the camera's web interface or seamlessly integrated with Video Management Systems (VMS).

Rapid analysis of fire conditions-such as location, source, and spread-is critical for an effective response. This technology helps both local safety teams and emergency responders assess:

- Where the fire is located
- What is burning
- Whether people are at risk
- How quickly the fire is growing

By delivering instant, visual intelligence, Araani's technology enables faster, more informed interventions, minimizing harm to people, infrastructure, and operations.

Additionally, recorded incident videos support post-event analysis, offering valuable insights to prevent future incidents and improve fire safety strategies.

BURNT-IN METADATA OVERLAY

To enhance situational awareness, Araani's Video Fire Recognition and Thermographic Fire Recognition overlays key data onto the streaming video, including bounding boxes, alarm statuses, and temperature readings, clearly highlighting fire sources.

By delivering instant, visual intelligence, Araani's technology enables faster, more informed interventions, minimizing harm to people, infrastructure, and operations.



CONFIGURABLE DETECTION ZONES

Araani Fire Recognition offers advanced configurability with multiple polygon detection zones and exclusion zones, allowing you to fine-tune fire detection to match the unique needs of any environment:

- **Target high-risk areas:** focus detection on specific zones where fire risk is highest.
- **Exclude non-critical zones:** prevent false alarms by excluding areas with no risk or frequent fire-like phenomena.
- **Tailor detection sensitivity:** apply customized detection logic and alarm thresholds for each zone, adapting to varying risk levels and potential fire behavior.
- **Pinpoint alarm locations:** enable precise alarm localization for automatic responses, such as directing extinguishing cannons to the exact source of danger.

ADVANCED CONFIGURATION AND FINE-TUNING

Araani's Fire Recognition algorithms come with advanced **configuration** options, empowering you to tailor the detection to your unique environment. By adjusting settings such as sensitivity, alert logic, rotating beacon suppression, moving flame and hot spot suppression or activation, etc., you can optimize performance and minimize false alarms.

Every Araani Fire Detection system connected to a fire control panel undergoes expert monitoring and **fine-tuning** for approximately one month. This ensures optimal performance and accuracy before acceptance testing or approval by local fire safety authorities, giving you complete confidence in your fire protection solution.

Araani ensures reliable fire detection, whether in complex industrial facilities, large warehouses, waste management or any other critical environment.

PRECISE FIRE DETECTION WITH SMART THERMOMETRIC TEMPERATURE MEASUREMENT

Araani Thermographic Fire Recognition leverages a proprietary algorithm to convert thermal energy readings from the sensor into accurate absolute temperatures. This complex conversion process accounts for various factors that influence thermal measurements, ensuring more reliable fire detection in even the most challenging environments.

Key factors that impact temperature accuracy include:

- **Material thermal characteristics:** Different materials absorb, reflect, and emit heat uniquely, defined by a property called emissivity. For example, polished metals reflect heat and appear cooler, while organic materials like a compost heap emit heat more directly. Araani's solution adjusts for these variations to prevent false readings.
- **Distance to the observed space:** Thermal radiation diminishes over distance and can be affected by atmospheric conditions. Araani's algorithm compensates for this effect, enhancing detection accuracy even in large areas or outdoor environments.
- **Reflected heat from surroundings:** Nearby heat sources (like machinery) or natural factors (like sunshine) can cause heat reflections, distorting temperature readings. The system accounts for these reflections to provide a more accurate picture of actual surface temperatures.

To ensure optimal accuracy, Araani Thermographic Fire Recognition allows you to customize thermal settings for each detection zone individually. By fine-tuning parameters like emissivity, distance, and reflection effects, the system delivers precise temperature measurements - and, most importantly, faster and more reliable fire alarms.

ACTIVITY MONITORING

There are situations where smoke-like occurrences, caused by human or machine activities like dust or damp clouds, can be misinterpreted as fire. In such cases, it might be useful to temporarily deactivate the smoke alarm, while still retaining the flame detection capability.

To tackle this issue, Video Fire Monitoring with smart activity monitoring algorithms can provide valuable information. The detectors can communicate with the fire control panel to automatically disable the smoke alarm for a specific duration, allowing for uninterrupted operations while still ensuring that the flame detection system is active.



TAMPERING & IMAGE QUALITY CONTROL

For Video Fire Recognition to operate effectively, a clear and high-quality video feed is essential. That's why Araani's Video Fire Recognition products feature a sophisticated image quality control algorithm that continuously monitors video integrity.

This advanced algorithm detects potential issues such as:

- Insufficient brightness or contrast.
- Dirty or obstructed lenses.
- Changes in the camera's field of view due to external impact.

On top of that, a proactive image quality alerting system notifies the user when image degradation (e.g. due to dirt) is getting critical before a fault occurs. This ensures that maintenance can be performed immediately, keeping fire detection capabilities fully operational and reliable at all times.

In a similar way, Thermographic Fire Recognition algorithms will automatically identify:

- Thermal lens or window is blocked.
- Changes in the camera's field of view due to external factors

When a problem is detected, the system generates a fault signal, notifying the fire control panel that the detector's functionality may be compromised.

With Araani's intelligent image quality control, you can trust that your fire detection system remains accurate, effective, and always ready to protect.



CONNECT TO EXISTING FIRE ALARM CONTROL PANEL (FACP / CIE)

Araani's Video and Thermographic Fire Detection solutions are designed to integrate seamlessly with your existing fire alarm system. Here is how it works:

- **Connection via relay contacts:**

The Araani system connects to the input modules of your Fire Alarm Control Panel through relay contacts. This is the same way that traditional smoke or heat detectors connect, so no special interface is needed - making installation straightforward.

- **Standard alarm and fault signals:**

Like traditional detectors, Araani solutions send:

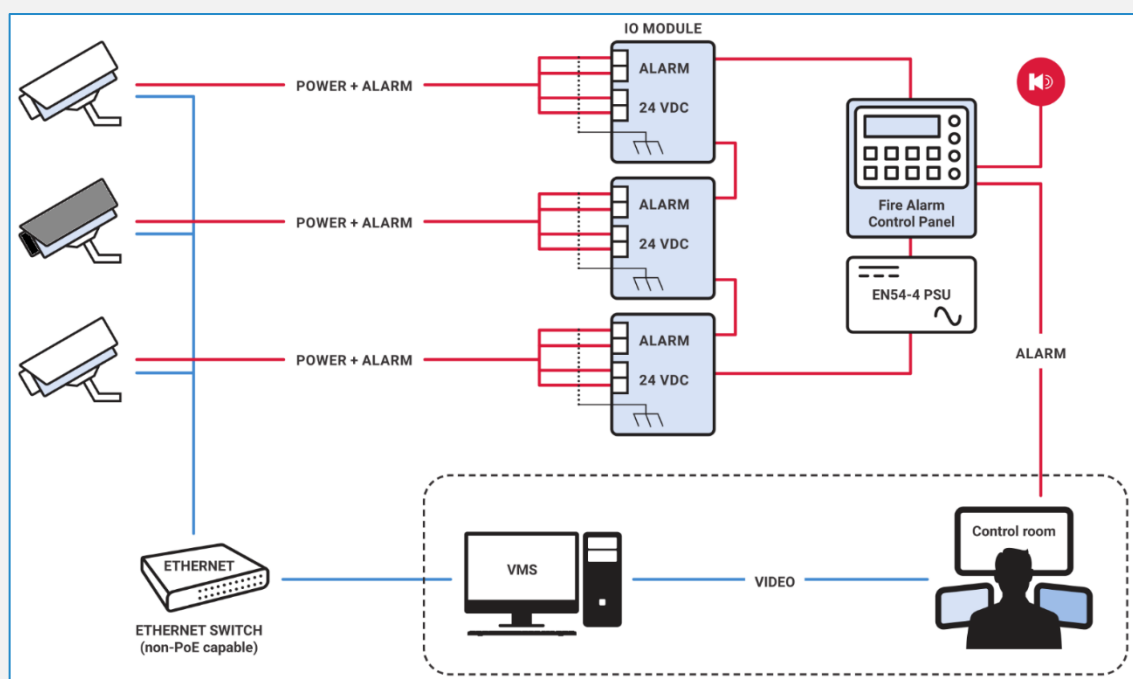
- Alarm signal when a fire or dangerous situation is detected.
- Fault signal if there is an issue with the detector or system.

- **Customizable extra outputs:**

In addition to the classic alarm and fault outputs, Araani systems offer two extra outputs that can be tailored to your needs. These can be used for a variety of advanced functions e.g.:

- Distinguishing between smoke, flame, hot spot.
- Activating signalling devices.
- Activity detection signal to the FACP for smoke alarm suppression.

This added flexibility lets you enhance your fire safety strategy with more advanced, proactive responses.



SEAMLESS INTEGRATION WITH YOUR VIDEO MANAGEMENT SYSTEM (VMS)

Araani's Video and Thermographic Fire Recognition solutions easily connect to most Video Management Systems (VMS) over LAN, providing a live video feed enriched with embedded metadata. This seamless integration allows you to monitor and manage fire detection cameras alongside your existing security infrastructure - without the need for additional platforms.

Visualize alarms directly within your VMS, with dynamic bounding boxes highlighting the exact location of the fire or heat source. Key information, such as date, time, source detector and type of incident, can be displayed as on-screen annotations, giving operators critical information at a glance. The camera's detector status can be overlaid on the video feed, indicating alarm states, faults, and when the detector is operational - ensuring continuous system verification and reliable performance.

Additionally, recording detector video provides a powerful tool for post-incident analysis. Reviewing footage helps you diagnose the cause of incidents, make informed decisions, and implement preventive measures to enhance safety and reduce future risks.

With Araani, you get more than fire detection - you gain a complete, real-time visual intelligence system for faster, more accurate incident response.

SMART AUTOMATION AND SEAMLESS INTEGRATION WITH AXIS CAMERA EVENTS

Araani's fire detection software seamlessly integrates with the dynamic event features of Axis cameras, turning alarms and status messages into powerful triggers for automated actions. This enables your system to interact with external devices and systems, enhancing safety and responsiveness.

With Araani and Axis, you can automate a wide range of actions, such as:

- Send notifications: push alerts, emails, or SMS with snapshots or video clips.
- Trigger SNMP traps: send alerts to management or monitoring systems.
- Publish MQTT messages: share event data with IoT platforms for real-time insights.
- Activate audio messages: play pre-recorded messages or warnings through connected speakers.

Axis cameras integrate smoothly with third-party systems (like Araani's fire detection) using ONVIF, Modbus, or HTTP commands - providing a flexible, future-proof solution for custom setups and smart building automation. With this powerful combination, you not only detect incidents early but can also automate an immediate and coordinated response.



SEAMLESS INTEGRATION WITH AUTOMATION SYSTEMS FOR A FASTER, SMARTER RESPONSE

Araani's Thermographic Fire Detection software optionally connects with automation equipment via Modbus TCP/IP, enabling a fully integrated fire detection and response ecosystem.

In addition to transmitting alarm signals, the software provides detailed incident data, including the exact location of the fire within the camera's field of view through a detection zone ID. This allows your automation system to precisely understand where the fire is occurring, enabling faster and more targeted responses.

This real-time data can be leveraged to:

- Trigger automatic extinguishing systems for rapid fire containment.
- Activate localized cooling systems to prevent fire spread.
- Control ventilation or smoke extraction systems to improve evacuation safety and protect equipment.
- Guide robotic or mechanical intervention systems to the affected area for a swift first response.

By combining video-based fire detection with automation, Araani empowers facilities to implement a fully automated first response - minimizing damage, reducing downtime, and enhancing overall safety.



PROTECT PEOPLE

When a fire alarm goes off in a public place, immediate evacuation is necessary until the cause of the fire is identified and all danger is neutralized. Failure to do so can have disastrous consequences for business continuity. Research has demonstrated that a significant portion of customers who are forced to evacuate shopping areas are unlikely to return, resulting in a significant loss of income for businesses.

Similarly, evacuating public transportation facilities can disrupt service plans and have knock-on effects for the rest of the day. Detecting fires early and bringing them under control can prevent unnecessary evacuations, which can be costly for businesses and inconvenient for the public.

Therefore, the ability to rapidly detect fires in their early stages and control them is crucial. This can prevent unnecessary evacuations and minimize disruptions to businesses and public services.

With Araani's intelligent fire recognition technology, companies can safeguard their operations and minimize evacuation needs or avoid it all together, ensuring business continuity.



PROTECT PROPERTY

Damage to production lines can have long-term consequences, including supply chain disruptions and loss of customers for months.

That's why early fire detection is essential. Video Fire Recognition and Thermographic Fire Recognition detect fires at their source and in their earliest stages, allowing for rapid intervention before they escalate. By detecting and addressing fire risks before they cause major damage, businesses can:

- Prevent or minimize infrastructure damage.
- Reduce financial and reputational risks.

With Araani's intelligent fire recognition technology, companies can safeguard their property and minimize fire damage risks, even in high-risk environments.

SUITED FOR HARSH AND CRITICAL ENVIRONMENTS

When mounted in an appropriate housing - as is the case with the FireCatcher Camera and ThermoCatcher Camera from Araani - a camera with Video Fire Recognition or Thermal Fire Recognition algorithm will work without problems in environments with dust, damp, humidity or other atmospheric disturbances. This is a major advantage compared to open point detectors.

With the right ingress protection, the detector can work in acidic atmospheres. Axis even has several EX-certified visual cameras which are capable of running Araani Video Fire Recognition software. Some Axis thermometric cameras that can run Araani Thermographic Fire Recognition software are also qualified for zone II EX environment.

In extreme cases, visual cameras can be mounted behind protective windows to guard places that have a destructive impact on electronics, e.g. radioactive areas, areas with high electromagnetic radiation, etc.

SUITED FOR GREAT HEIGHTS

Video Fire Recognition and Thermographic Fire Recognition are particularly well-suited for use in tall buildings or large indoor spaces where traditional smoke, beam or aspirating detectors may not be effective. In such environments, smoke generated by a fire may not reach a conventional smoke detector due to a process called stratification, which hinders the upward movement of smoke.

As smoke rises, it cools down, while the upper air layers in a building are typically the warmest due to hot air rising and being heated by the sun-exposed roof. This results in the smoke floating halfway, where the different temperature layers meet. As a result, point smoke detectors on the ceiling may not detect any smoke, and even beam detection systems may be positioned above the smoke layer.

In contrast, Video Fire Recognition can identify smoke and flames at any height within its field of view. Thermographic Fire Recognition will recognize heat and/or flames from any height down at the source. This makes it ideal for detecting fires in large indoor spaces and tall buildings where traditional detectors may not be effective.



SUITED FOR OUTDOOR APPLICATIONS

Protecting outdoor areas or covered spaces exposed to outdoor elements can be challenging with traditional fire detection methods. Factors such as airflow can disperse heat and smoke, and harsh weather conditions may render traditional detectors ineffective. Additionally, the lighting can vary greatly from bright sunshine to dark shadows, posing further difficulties.

With Video Fire Recognition technology utilizing high-quality cameras, early-stage flame and smoke can be detected despite varying lighting conditions. With Thermographic Fire Recognition technology utilizing thermometric cameras, early-stage flame and hot spots can be detected, unaffected by light and weather conditions.

Moreover, cameras can be protected from the elements using IP protection to withstand precipitation and humidity. Camera accessories like weather shields and sunshields can also provide additional protection against heavy rainfall and sunlight.

This makes Video Fire Recognition and Thermographic Fire Recognition viable options for safeguarding critical environments such as outdoor fuel storage, EV charging depots, and outdoor scrap processing equipment.

Read more

Explore our free online e-books for in-depth insights into Video and Thermographic Fire Recognition. Learn how these technologies work, their applications across various industries, and the benefits they offer for early fire detection.

Video Fire Recognition explained

In this E-book, we explain what video fire detection and recognition are, and what it can do for you.

<https://www.araani.com/en/documentation/brochures/download-our-ebook-video-fire-recognition/>



Five unforeseen consequences of fire

In this eBook, we discuss five important, yet often overlooked consequences of a fire incident in your company.

<https://www.araani.com/en/documentation/brochures/five-unforeseen-consequences-fire-your-company/>



Best practices for Video Fire Detection

In this eBook, you discover why VFD is the best solution for critical facilities, such as chemical plants, waste storage bunkers or production facilities.

<https://www.araani.com/en/documentation/brochures/download-our-free-ebook-with-best-practices-video-smoke-detection/>



Video Fire Detection for waste management plants

Unlock the secrets of VFD as the ultimate solution for tackling fire detection challenges in the waste management and recycling industry.

<https://www.araani.com/en/documentation/brochures/download-our-ebook-vfd-waste-management/>



Video fire detection for e-bus depots

Discover how VFD can play an important role in tackling fire detection challenges in depots for electric buses.

<https://www.araani.com/en/documentation/brochures/download-our-ebook-e-bus-depots/>



Video Fire Recognition and Artificial Intelligence

Discover the role of artificial intelligence in the realm of video-based smoke and flame recognition through this downloadable e-book.

<https://www.araani.com/en/documentation/brochures/download-our-ebook-video-fire-recognition-and-artificial-intelli/>



Company brochure

Discover Araani's Video and Thermographic Fire Monitoring and Detection solutions.

<https://www.araani.com/en/documentation/brochures/download-company-brochure/>



Video and Thermographic Fire Recognition Products

Araani's fire recognition products come in two flavors. Both solutions are designed for Axis cameras.



FIRE MONITORING is supporting your fire safety measures in situations where no fire detection is mandatory and/or is used to generate an early warning where conventional fire detection is already installed.



FIRE DETECTION on the other hand can be used as a primary detector, linked to your Fire Alarm Control Panel. Fire Detection is often subject to product and installation regulations.

Araani provides two distinct technologies to address diverse fire risks effectively.



VIDEO

Araani's Video Fire Monitoring (VFM) and Video Fire Detection (VFD) software is designed for smart visual cameras, enabling the reliable recognition of smoke and flames.

Equipped with Axis camera Lightfinder technology, these sensors deliver outstanding performance even in low-light conditions, operating effectively at levels as low as 1 lux.



THERMOGRAPHIC

Araani's Thermographic Fire Monitoring (TFM) and Thermographic Fire Detection (TFD) software operates on advanced thermometric cameras, capable of detecting flames, hot spots and temperature anomalies.

Unlike traditional cameras, thermometric cameras detect heat instead of visible light, providing precise object temperature readings. These cameras can function flawlessly in complete darkness without the need for artificial lighting.



ARAANI Fire Guard

VIDEO FIRE MONITORING

Araani Fire Guard software for Axis cameras recognizes and warns you of smoke and/or flames much earlier than a conventional smoke detector.

ARAANI Thermo Guard

THERMOGRAPHIC FIRE MONITORING

Araani Thermo Guard is an intelligent software for Axis thermometric cameras, that monitors flames and hot spots to identify and prevent fire outbreaks at the earliest stage.

FireCatcher®

VIDEO FIRE DETECTION

FireCatcher software for Axis cameras delivers excellent smoke and flame detection and can connect to your Fire Alarm Control Panel. Tamper detection, image quality control and activity monitoring contribute to a failsafe and reliable detection.

ThermoCatcher®

THERMOGRAPHIC FIRE DETECTION

ThermoCatcher is an intelligent software for Axis thermometric cameras, that detects flames, hot spots and temperature anomaly.

FireCatcher® CAMERA



CERTIFIED VIDEO FIRE DETECTION

FireCatcher Camera is a fully integrated video fire detector camera that is certified (BOSEC and CNPP) for use as primary detector. It's built-in I/O connects seamlessly to existing fire control panels.

ThermoCatcher® CAMERA



**Certification
pending**

CERTIFIED THERMOGRAPHIC FIRE DETECTION

ThermoCatcher Camera is a fully integrated thermographic fire detector camera that is certified for use as primary detector. It's built-in I/O connects seamlessly to existing fire control panels.



About Araani

Araani is a Belgian technology company specializing in Video-based Fire Recognition for critical and complex environments. With our intelligent software solutions, we enable early and reliable detection of smoke, flames and hot spots in areas where traditional fire detection systems fall short.

Our flagship technologies use advanced video analytics to monitor for fire hazards in real time, even under challenging conditions. Trusted by leading companies in sectors like waste processing, public transport, logistics, and manufacturing, Araani helps protect people, property, and processes with innovative and proven fire detection solutions.

At Araani, we are committed to redefining fire safety -by combining vision technology with industry expertise.

Contact

Araani NV - Belgium
Luipaardstraat 12
8500 Kortrijk, Belgium
tel: +32 (0) 56 49 93 94
info@araani.com
www.araani.com