FIRE DETECTION

Fire and Fire Risk Detection Algorithms

Embedded fire detection and risk of fire software are highly accurate algorithms that can be embedded in the Sii and Accuracii line of products. Adding these algorithms turns the cameras into versatile systems that can provide both safety and security of equipment and personnel.

The fire analytic algorithms can detect an active fire with the Active Fire Detection Algorithm as well as detect when a fire is about to occur with the High Risk of Fire Detection Algorithm so that fires can be prevented and contained with minimal or no damage to facilities.

Key Benefits

- **Fire Detection -** Detects fires even without smoke present at up to 6km away, day or night

- **Risk of Fire Detection -** Detect a potential fire before it occurs or monitor equipment for thermal failure

- **Multiple Alarm Types -** Visual, Serial Communication, and Contact Closure alarms signal an alarm state

- **Versatility -** Can be used for fire detection/prevention, security, and equipment monitoring; all at the same time

- **Analog or IP -** Full functionality available when using either analog or IP camera systems

- **Rugged Design -** Vumii cameras are designed to survive in extreme environments including hazardous industrial areas

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Active Fire Detection

The proprietary Fire Detection algorithm is able to detect and identify a nearly unlimited number fire sources while avoiding false alarms from hot spots in the scene. When Fire Detection is implemented in the Accuracii PTZ camera system, one camera could be used to monitor several preset locations and a limitless number of fire sources. When panning and tilting, the camera requires 5 seconds after each movement to detect a fire in the new scene. The Fire Detection algorithm is accurate at detection large fires at up to 6km in the longest range configuration.

- **Time to Detect -** From 2 - 10 seconds dependent on application
- **Number of Detected Events -** Nearly unlimited
- **Alarm Types -** 3 (visual, serial or IP communication, contact closure)
- **Alarm Metadata -** X/Y pixel coordinates of fire location
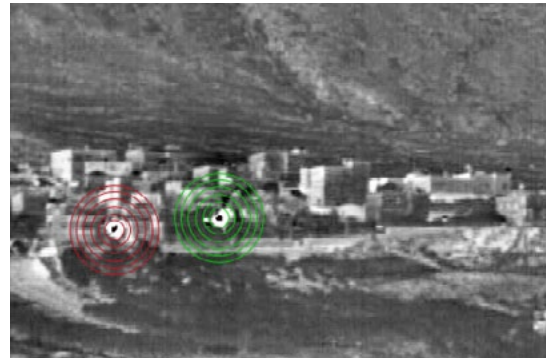
Visual alarms for multiple fires

Risk of Fire Detection

The High Risk of Fire algorithm (often called Hot Spot Detection) is able to examine a scene and determine which pixels have exceeded a user-defined temperature threshold. Once set, the algorithm will show the area that exceeds the user-defined threshold as a red pixel that so that it is clearly visible in the video image. In the image at right, the coffee cup and soldering iron have exceeded the user-defined threshold of approximately 93° C (200° F). An ambient temperature adjustment, available in the configuration settings, can increase reliability in some situations.

- **Time to Detect -** Immediate
- **Number of Detected Events -** Unlimited
- **Alarm Types -** 3 (visual, serial or IP communication, contact closure)

Hot Spot Detection set to alert >93°C (200°F)

Thermal Cameras for Security

Thermal imaging cameras are an integral part of any security system; they provide video images with very high contrast and wide area awareness day or night. This type of imaging enables threats to be detected from long ranges through fog, smoke, dust, and foliage and is immune to glare caused by bright sources such as street lamps, headlights, or flashlights.

When used in conjunction with video analytics, thermal cameras provide unmatched threat detection with very low rates of false alarms. All types of video analytics software can be used concurrently with the fire detection algorithm.

Thermal imaging cameras are complemented by daytime CCD cameras and nighttime illuminated CCD cameras that can provide additonal details about the subject.
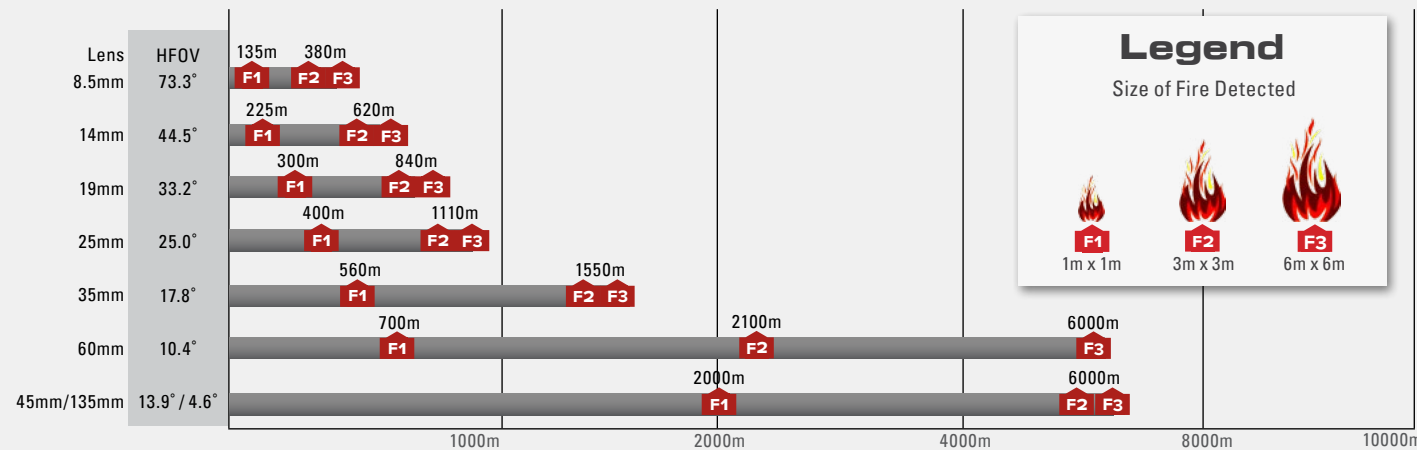
Vumii thermal cameras use low power, are highly reliable, and integrate seamlessly into larger systems.
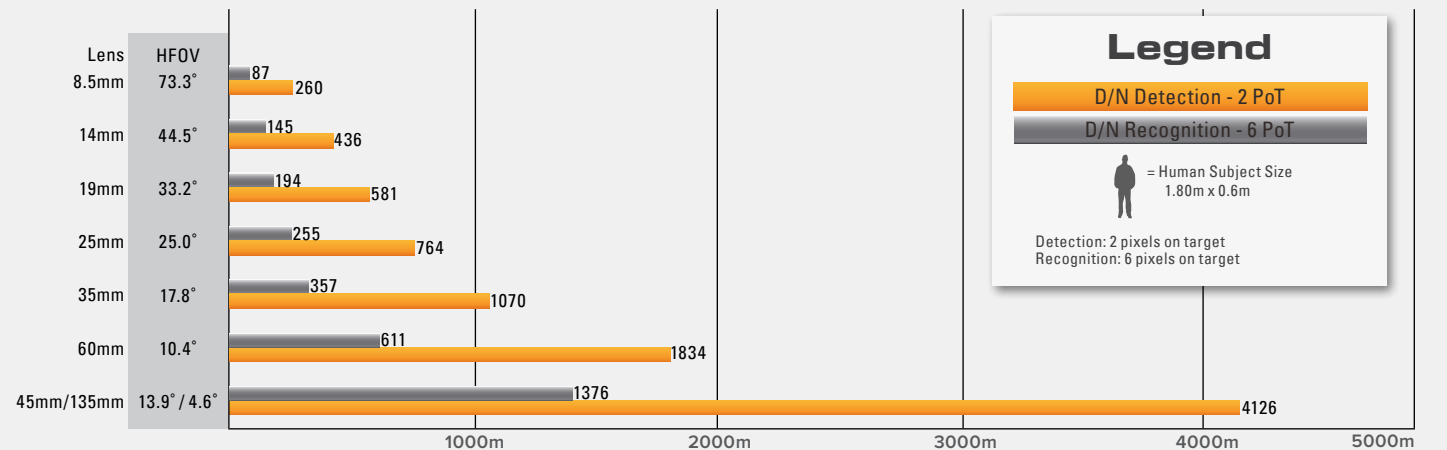
- **Wide area situational awareness**
- **Can be used day and night**
- **Long range detection capability**
- **Can see through light fog, rain and smoke**
- **Difficult to avoid detection**
- **Can combine with video analytics software**
- **No downtime, low maintenance cameras**

Fire Detection can run seemlessly with other thermal video analytics

Fire Detection Range Performance

Lens	HFOV		
8.5mm	73.3°	F1 135m	F2 F3 380m
14mm	44.5°	F1 225m	F2 F3 620m
19mm	33.2°	F1 300m	F2 F3 840m
25mm	25.0°	F1 400m	F2 F3 1110m
35mm	17.8°	F1 560m	F2 F3 1550m
60mm	10.4°	F1 700m	F2 2100m / F3 6000m
45mm/135mm	13.9° / 4.6°	F1 2000m	F2 F3 6000m

Legend

Size of Fire Detected

F1	F2	F3
1m x 1m	3m x 3m	6m x 6m

1000m 2000m 4000m 8000m 10000m

*Performance Dependent on Atmospheric Conditions

Security Range Performance

Lens	HFOV	D/N Detection - 2 PoT	D/N Recognition - 6 PoT
8.5mm	73.3°	87	260
14mm	44.5°	145	436
19mm	33.2°	194	581
25mm	25.0°	255	764
35mm	17.8°	357	1070
60mm	10.4°	611	1834
45mm/135mm	13.9° / 4.6°	1376	4126

Legend

D/N Detection - 2 PoT
D/N Recognition - 6 PoT

= Human Subject Size
1.80m x 0.6m

Detection: 2 pixels on target
Recognition: 6 pixels on target

1000m 2000m 3000m 4000m 5000m

*Performance Dependent on Atmospheric Conditions

Fire Detection

Fire Detection is available in these camera systems:

17μ: 640 x 480   Sii AT   Sii ML   Accuracii ML

Thermal Engine Characteristics	
Effective Pixels	17μ: 640 x 480 (NTSC / PAL)
Imager Type	Uncooled Microbolometer 7.5-14μ
NETD	< 50° mK
Video Output	RS-170 (30Hz) / CCIR (25Hz), 1.0V p-p, 75ohm

Applications

- Emergency Operations
- Chemical Refineries
- Oil & Gas Pipelines
- Equipment Monitoring
- Critical Infrastructure

- Wildfire Early Warning
- Refuse Yards
- Transportation Hubs
- Flame Out Monitoring

Application Highlights
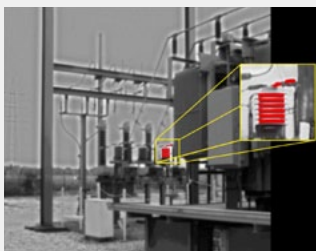
Electricity Substation Monitoring
When monitoring the temperature of sensitive equipment at electrical substations the system can automaticically alert technicians if equipment is nearing its failure point. Technicians can be dispatched to repair the issue before a catastrophic power loss to the grid occurs.

Flame Out Monitoring
The Fire Detection algorithm can be just as useful when used with reversed functionality. In this configuration the camera will alert when the presence of a flame is missing. At on or offshore oil drilling sites, an alert of a flameout can improve site safety and avoid fines by environmental protection organizations.

* Some countries may be subject to thermal camera export licensing requirements

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