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Rooftop Solar Panel Fire Prevention

Background

Necessity

In 2021, The global rooftop solar PV market was valued over US\$ 97.3 Bn, and expected to cross the value of US\$ 397.3 Bn by the end of 2031, it is estimated to grow at a CAGR of 15.1% during this ten years

In the other side, rooftop solar panel shows a more and more critical fire source these years, giant users like Apple, Tesla, Walmart, IKEA all have suffered related fire and bring property loss.





Requirement Analysis

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Rooftop solar panel is widely used in large factories and government/parking/shopping mall buildings. In some of conditions, power generated by rooftop solar panel can cover 20%-30% general electrical use to save cost.

In some countries, there are policies which support the installation of rooftop solar panels. For example n Thailand, related cost can calculated in tax refund; in Korea, government provide 90% of installation cost and solar panel at low rate interest.





Government & Mall Buildings



Why rooftop solar panel need fire prevention ?

- Abnormal working status of solar panel (high temperature point; shortcut; broken unit) caused by accidents are probably lead to fire hazard.
- Rooftop system contains lot of electrical facilities like inverter/rectifier/power storage. Changes in external environment may cause fire as well.
- Due to the location reason, an existed fire cannot be detected and put out in real time, which may set fire to ٠ entire factory building, leads to property damage, life-threatening and user may break the related law.



Fire caused by solar panel shortcut

Key Technology

What is thermal technology?

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Thermal Technology

Principle

Hikvision thermal cameras can efficiently identify temperature anomalies with visualized image. When the surface temperature of an object is abnormal, the camera will immediately trigger the alarm for timely troubleshooting.



Fire Prevention – Thermal Highlights

Why thermal cameras better than other solution ?



Early-warning before damage occurs, caught fire risk in real time, helps protect your property

Non-contact method fire prevention without affect normal working of monitor area, can cover open the area which normal sensor cannot Heating distribution could be caught clearly help in locate risk point easily. Due to features of environment adaptable, thermal cameras can reach the fire up to miles, suitable for large solar panel area.

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Fire Prevention – Performance

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How thermal cameras works ?



Fire-prevention distance (0.5 x 0.5 target)

Model	FOV (H × V)	Distance (0.5mx 0.5m high temperature risk)
DS-2TD2137T-7/P (bullet)	$60^{\circ} imes 44.1^{\circ}$	38.3 m
DS-2TD2167T-7/P(bullet)	$88.5^{\circ} imes 73.2^{\circ}$	
DS-2TD2637T-10/P(bullet)	$37.5^{\circ} imes 28.5^{\circ}$	57.1 m
DS-2TD2637T-15/P(bullet)	$24.5^{\circ} imes 18.5^{\circ}$	88 m
DS-2TD2667T-15/P(bullet)	$42.5^{\circ} imes 33.6^{\circ}$	
DS-2TD4137T-9/W (PTZ)	37.9 $^\circ$ x28.7 $^\circ$	55 m
DS-2TD4167T-9/W (PTZ)	72.0 $^{\circ}$ x56.1 $^{\circ}$	
DS-2TD4137T-25/W (PTZ)	$14.9^{\circ} imes 11.2^{\circ}$	147 m
DS-2TD4167T-25/W (PTZ)	24.5 $^\circ$ $ imes$ 19.7 $^\circ$	
DS-2TD6267T-25H4L/W (Positiong system)	$24.6^{\circ} imes 19.8^{\circ}$	
DS-2TD6267T-50H4L/W (Positiong system)	$12.4^{\circ} imes 10^{\circ}$	294 m



We take 0.5 m x 0.5 m as the high temperature risk in outdoor scenarios. This size means how large high temperature risk will trigger the alarm.

The smaller is the target size, the shorter will be the distance.

This video show fire prevention as well as smoke detection function in the same time.

Fire Prevention – Hikvision Thermal Feature Solutions By Function

Why choose Hikvision thermal cameras?









High temperature/low temperature/temperature difference / Temperature rising alarms



Camera	DS-2TD41X7(T)-XX/WY DS-2TD26X7(T)-XX/QY	
ecorders	DS-9632NXI-18	
VMS	HikCentral Professional	

Fire Prevention – Products & Designs

How to design thermal solutions?



DS-2TD4137(T)-25/WY

Optical resolution: 2688×1520 (4MP), 40x **Temperature measurement accuracy:** ±2°C (Model Features: Fire and smoke detection Rules: 10 areas, 10 points, 1 line for each preset

DS-2TD2637(T)-15/QY

Thermal resolution: 384 × 288 **Optical resolution:** 2688×1520 (4MP) fixed Temperature measurement accuracy: ±2°C (Model with T) $\pm 8^{\circ}$ C (Model without T) **Features:** Fire detection Image: Bi-spectrum image fusion Rules: 10 areas, 10 points, 1 line

Notes:

- Large area try using speed dome , while small area try using bullet
- The target of fire point of these designs are 0.5*0.5 meters
- Dome coverage big but it is always cruise, which means it is not totally real time
- Dome is around double the price of bullet when ۲ their resolution and focal are similar



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Fire Prevention – Thermal Design Tool

Which tool we use to design thermal solutions?



https://tools.hikvision.com/#/lensSelection-thermal



Keep Your Data Safe



Easy to use Just type the URL and play

> ata safe ur personal data saved only in your laptop

Visualized Solution Report

One-click to export visualized solution report. What you see is what you get.



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Fire Prevention – Successful Stories

IKEA rooftop solar panel fire prevention in Piacenza, Italy.



Background

IEKA in Piacenza has built on the roof a photovoltaic power station, a system made by 66.000 solar panels, able to produce 7 millions and 405 MWh of clean energy per year.

Product Involved

Devices: DS-2TD2637-10/P × 16pcs & DS-2TD2667-15/P × 19 pcs **Platform & Backend:** I-series NVR & HCP & Hik-Connect

) Applications

- Bi-spectrum thermal bullet cameras to monitor solar panels on roof of a building 24/7 for continuous electricity production.
- Thermal solution with temperature measurement functions for fire prevention as a complementary solution since conventional fire detectors are inconvenient for such an application.

• The user draws temperature measurement by area in real use





The Sun-reflection cannot cause false alarm

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Defect checking – Products & Solutions

Detect abnormal high temperature, prevent risk in advance

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Compared with fixed cameras, handheld thermography have the advantages of flexible without the restriction of installation and power. It is much suitable for patrolling , in which way users can quickly troubleshoot faults on-site.

For solar panels, different defects shows various appearance such as shortcut, overload or panel broken, which helps in rapid troubleshooting.

Normally all solar panels need 2 to 4 times checking each year in case accidents happens.





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