360° FIRE SAFETY REIMAGINED

AI-Driven Surveillance For Smarter Detection and Safer Spaces

Evolving threats demand smarter, integrated security — it's essential

Traditional Security Systems Are Outdated

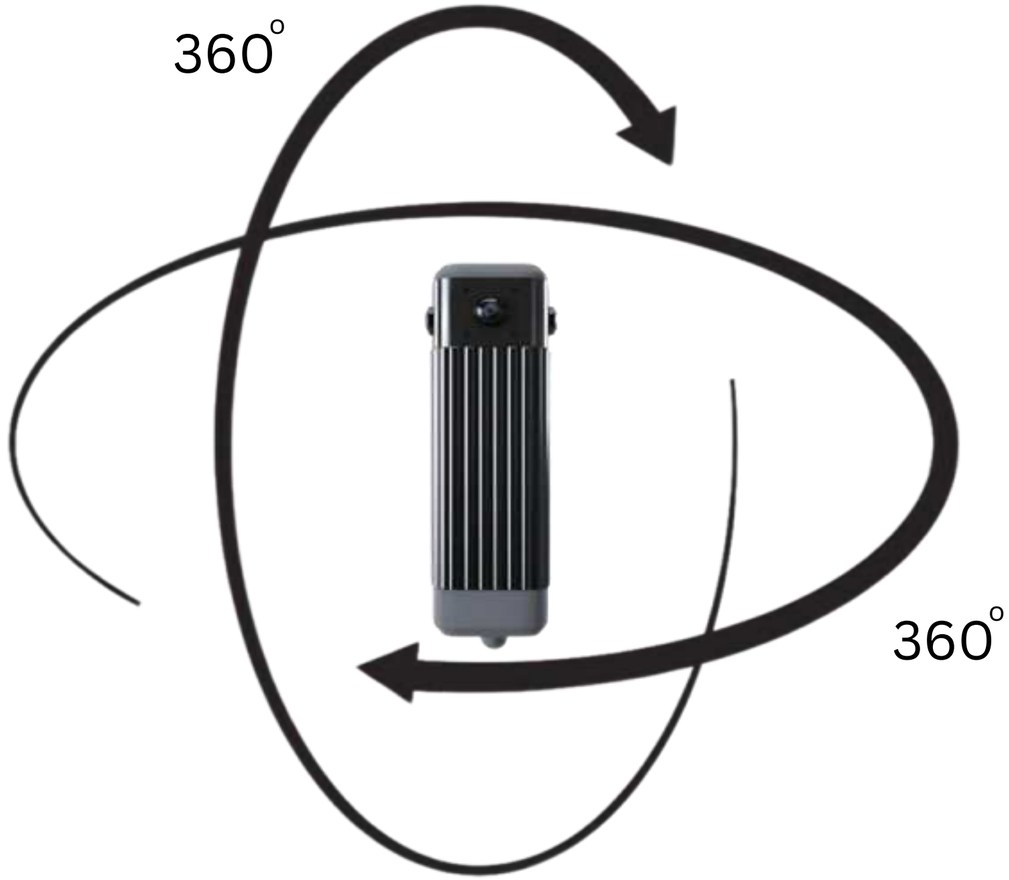
- Static surveillance = reactive, not proactive
- Manual monitoring = delayed responses
- Siloed data = limited situational awareness
- Rising complexity = increased compliance risk

Limitations of Current Fire Detection

- Narrow field of view with blind spots
- Delayed detection and high false alarms
- Multiple cameras needed per site
- High cabling and maintenance costs
- Minimal integration with operational workflows


CCTV

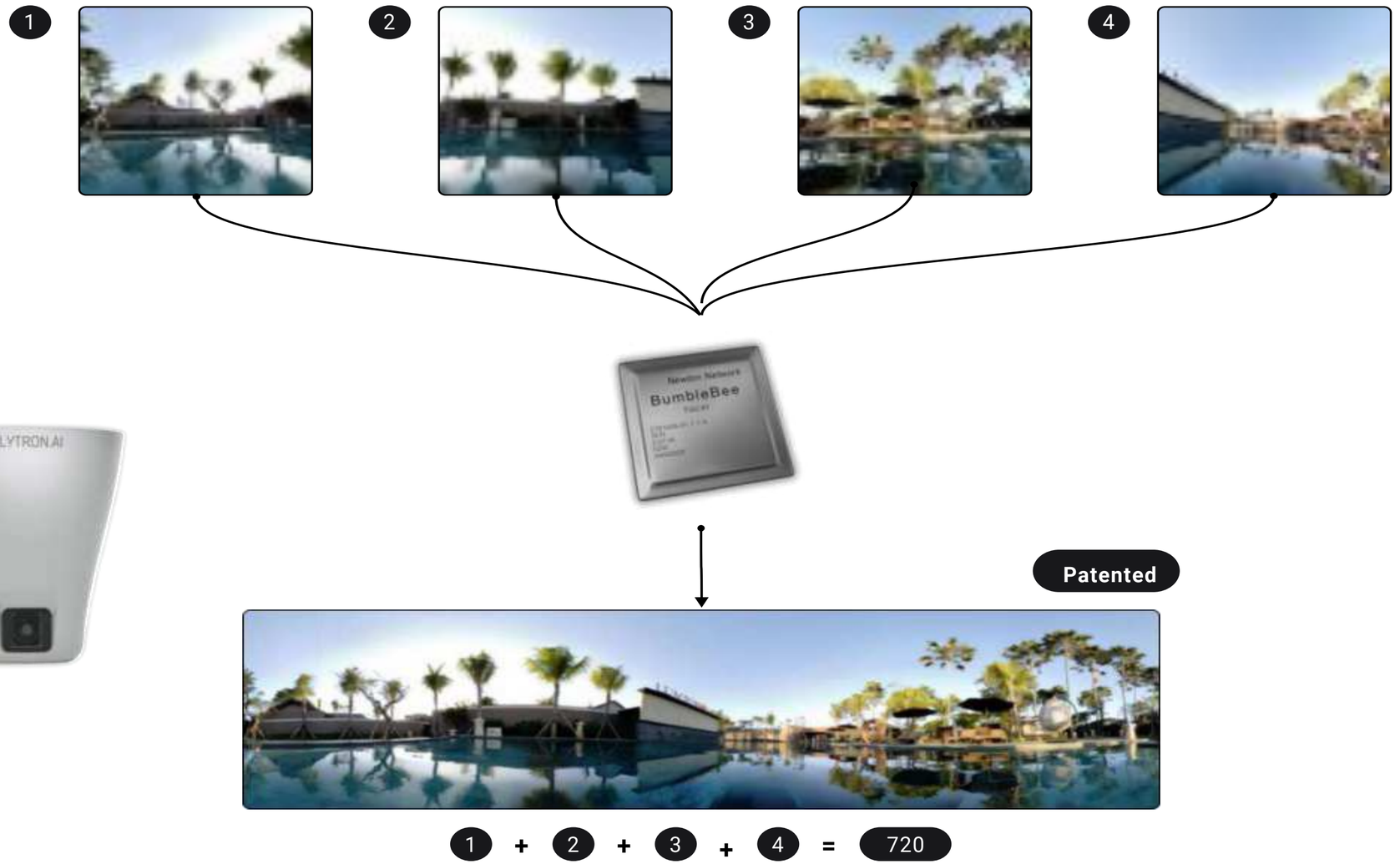
vs



Conventional Camera vs 360° Camera

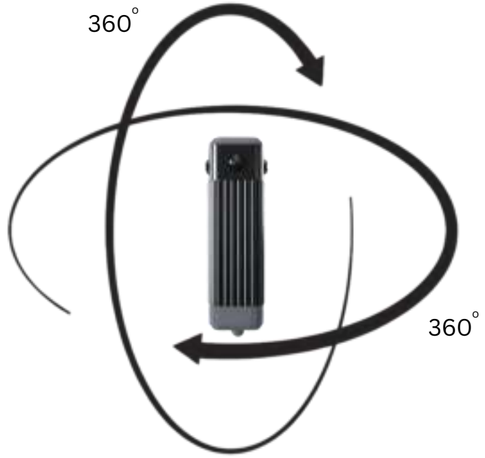
360 Panoramic 4K / 8K
7 nm AI Video SOC
20 - 100 MegaPixel
WI-FI 6 / 5G
512 / 1 TB GB on-board Storage
4 TOPS AI Co-Processor
Optical Zoom 20x
Infra Red Night Vision
IP-67 dust-proof & water-proof
Detachable Lens Design (Patented)

190 FOV Horizontal & Vertical

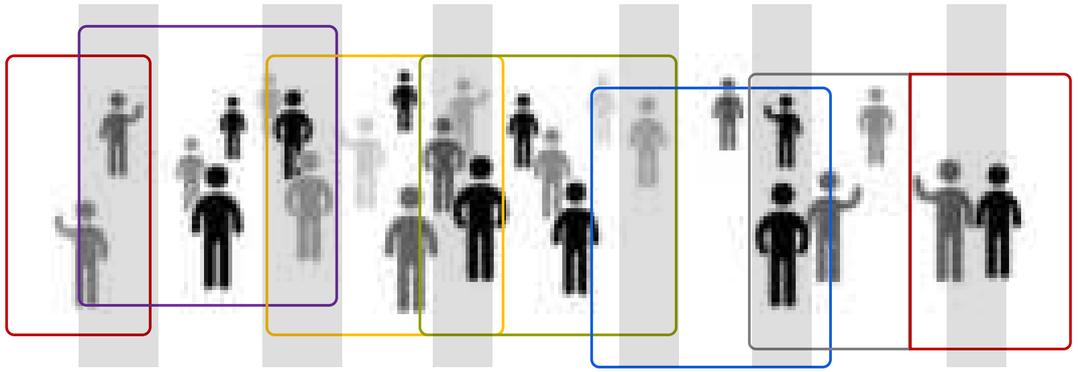


Real-time video stitching performed directly **on-chip**, enabling ultra-low-latency processing without offloading to external hardware.

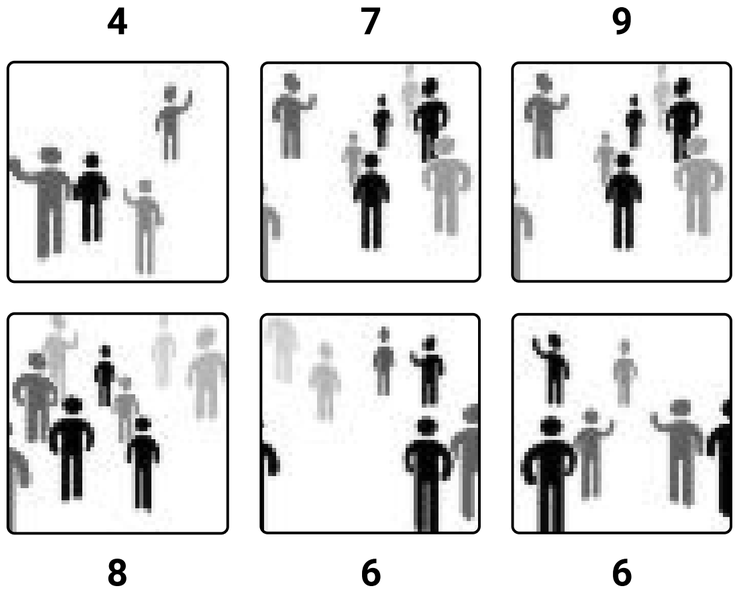
PEOPLE COUNTING



360 Panoramic Scene



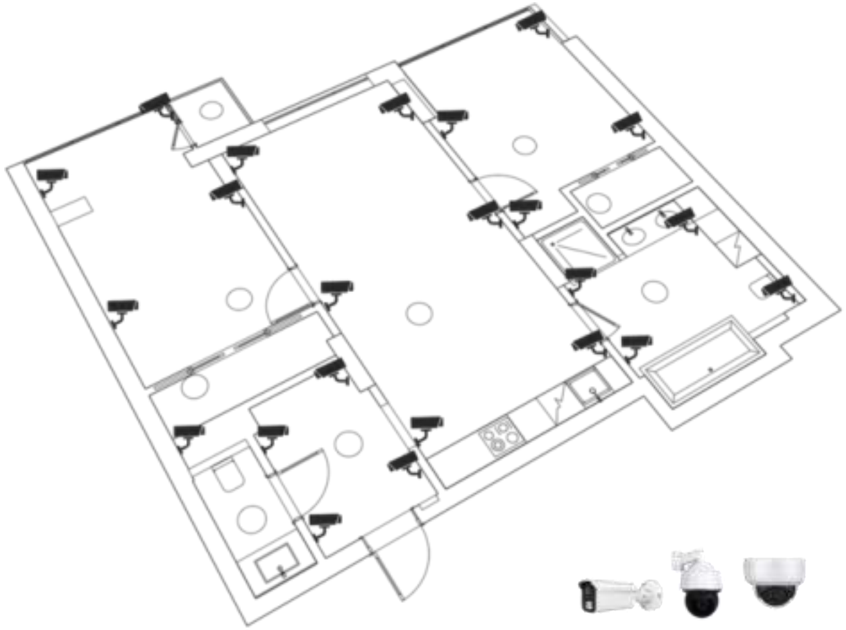
= 26



= 40

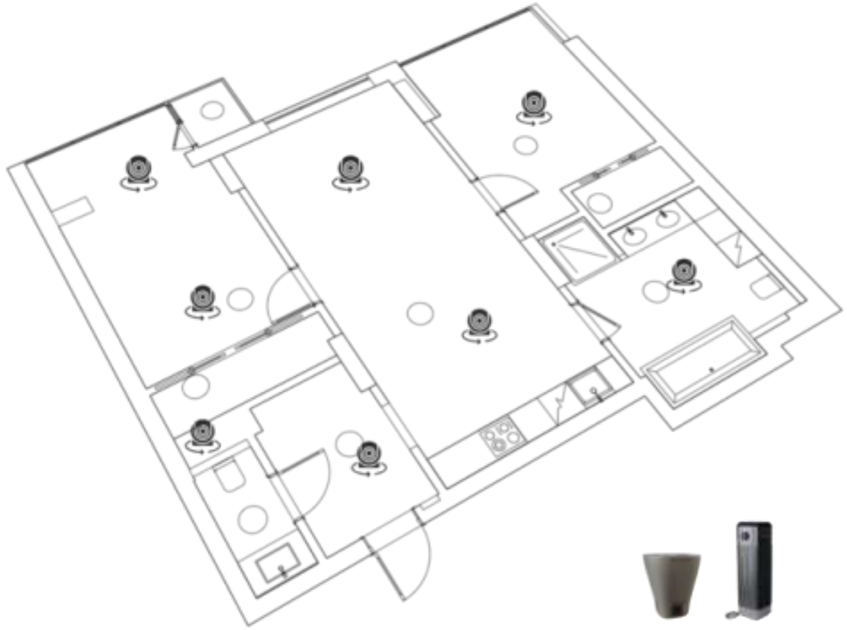
Inaccurate due to splt-screen overlapping numbers

157 Cameras



Conventional PTZ, Bullet, DOME, Box Camera

40 Cameras



AI-POWERED 360 Camera

Reduced Total Cost of Ownership – By requiring fewer cameras, simplifying installation, and minimizing maintenance costs, the overall expense is significantly lowered. This streamlined approach leads to lower initial investment in equipment, as fewer units are needed to cover the same area. Additionally, the reduction in installation complexity saves both time and labor, while the durability and advanced technology reduce the need for frequent maintenance or repairs. Together, these factors contribute to substantial long-term savings, making the solution more cost-effective and efficient over its lifecycle.

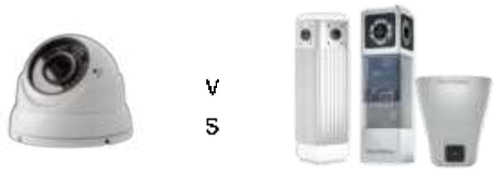
	IP Camera	360 Camera
Number of Camera	157 Pcs	40 Pcs
Number of Network Switches	7 Pcs	2 Pcs
Number of Ethernet Cable	157 Pcs	40 Pcs
Storage (180 Days)	157 Tb	282 Tb
Number of NVR (365 Days)	5 Pcs	8 Pcs
Cost of Cameras	US$39,250	US$32,000
Cost Of Switches (~ US$770/pcs)	US$ 5,390	US$1,540
Wires And Installation (~ US$310/pc)	US$ 48,670	US$12,400
Cost of NVR (~ US$6150/pc)	US$ 30,750	US$49,200
Power Consumption Of Switches	5,370w * 7 Pcs = 37,590w	5,370x * 2 Pcs = 10,740w
Power Consumption Of NVR	500w * 5 Pcs = 2,500w	500x * 8 Pcs = 4,000w

Reduced No. of Switches

Reduced Installation Cost

Reduced Cabling Cost

40 360° cameras replace 157 conventional IPCAMs



Reduced No. of Camera

AI-POWERED NO-CODE VISUAL ANALYTICS

Next-Gen Video Intelligence Powered by Multi-Modality AI with Human-Like Sensing - Image, Video, Audio

+

+

VIDEO UNDERSTANDING AI

Built to observe everything,
not just some things

Mult-Modal Visual Reasoning
Fine-Tuned for Security & Surveillance Purpose

Built to write advanced **PANOPTIC** video analytics
Powered by a mix of purpose-built Frontier Models

No Programming needed. AI Converts Natural Language (Text or Speech) to Video Analytics Code.

AI-Powered VMS

VIDEO AI Powered by **Agentic Vision**

Self Learning **VISION AI**

NO Code Analytics Platform

Powered by Full-Scaled AI Model

Advanced Multi-Modal Reasoning

Zero Shot Learning

YOLO vs Multimodal Analytic

Dimension	Traditional YOLO (Vision-Only AI)	Multimodal Analytic (World Model AI)
Data Input	Single modality – 2D video (RGB)	Multimodal – 360° video, 3D spatial data, audio, IoT sensors, text
Scene Understanding	Detects objects, weak on behavior & context	Rich semantic understanding (behaviour, intent, anomalies)
Spatial Awareness	Needs multiple cameras, blind spots remain	360° coverage, real-time digital twin (3D/4D)
Adaptability	Requires retraining, limited zero/few-shot	Zero-shot & few-shot capable through LVM fusion
Performance	Lightweight, ultra-fast FPS	Heavier compute demand, higher latency risk
Deployment Cost	Lower upfront hardware/software costs	Higher infra cost, but fewer cameras/devices needed
Integration	Easier to embed in existing pipelines	Complex integration with VMS, IoT, cloud, 3D twins
Privacy & Compliance	Lower risk – only video feeds	Higher risk – fuses identity, movement, voice, behavior data

This is AI That Can See The Whole Story.

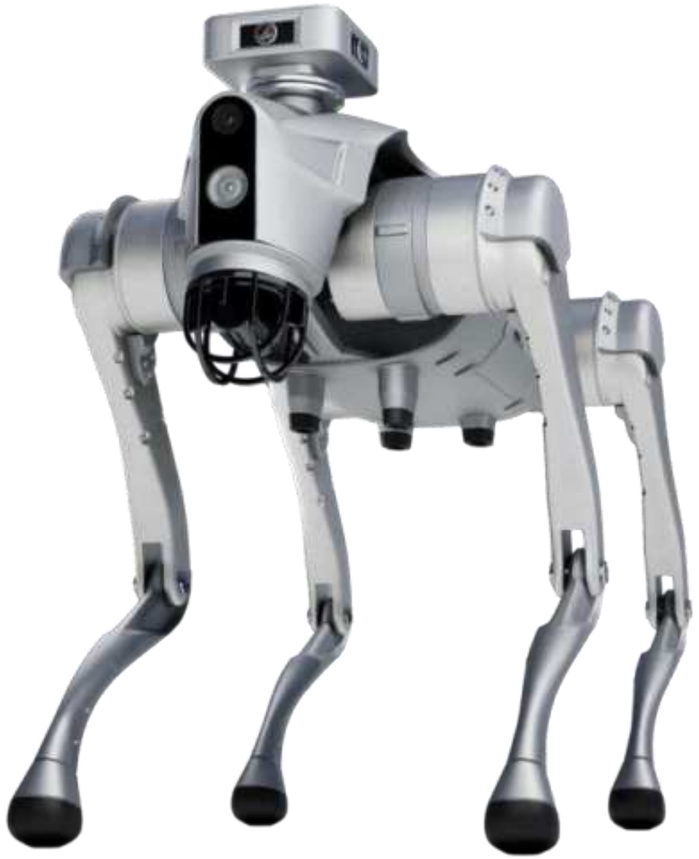
Human-level comprehension of video.
Understanding not just objects and motion,
but context, relationships, and meaning.

POLYTRON
360
AI Camera

POLYTRON ONE
AI-Powered
VOS

96GB Unified Memory
Small Purposeful AI Model
CUDA
No GPU Needed

WORK IN
PROGRESS



Final Miniaturised
Version


POLICE


05
HLF


AMBULANCE


POLICE
POLICE

Remote Monitoring

Infrastructure Anywhere

From deserts to coastlines, critical infrastructure and remote sites often operate without connectivity, power, or personnel - leaving them exposed to risk and inefficiency.

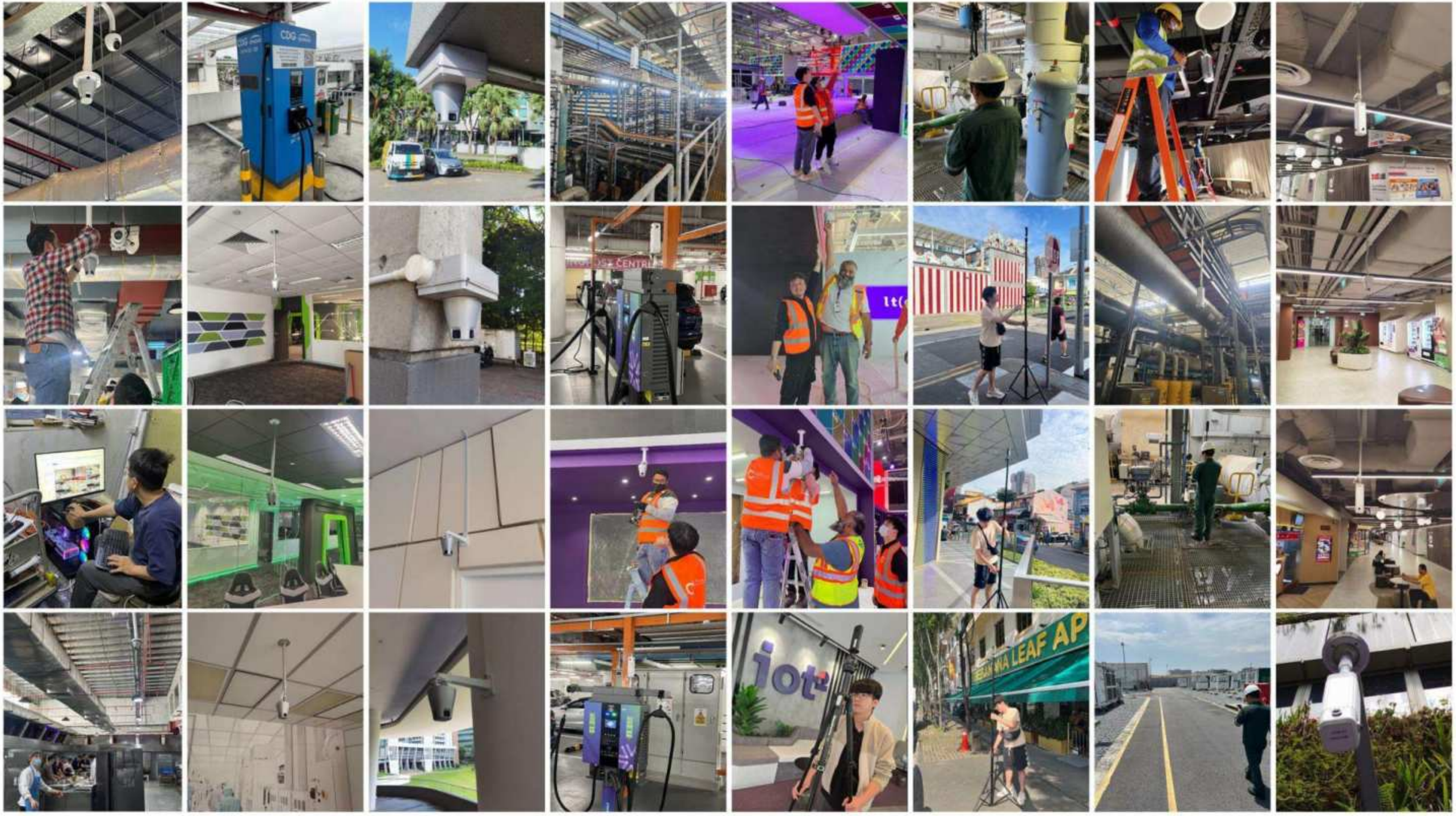
Polytron's solar-powered, 5G-connected remote monitoring kit brings real-time visual intelligence to even the most inaccessible environments. Designed for autonomous operation, the system enables 24/7 surveillance, analytics, and alerts—without the need for on-site staff or wired infrastructure.

Whether monitoring pipelines in the desert, flood zones in lowlands, or power substations in rural regions, Polytron ensures visibility where it's never existed before.

SOLAR Powered
360 POLYTRON Camera

5G
Connectivity

LLM Enabled
VISION AI EDGE Server


CDG
iot

Safety, Environmental & Operational Benefits

- Early detection protects lives, assets, and operations
- Minimises toxic emissions and fire-related environmental damage
- Real-time alerts enable faster mitigation and reduced downtime
- Supports regulatory compliance and digital transformation

Public Safety in Residential & Urban Spaces

AI-Powered Surveillance to Prevent Fires, Arson, and Unsafe Behaviours

- Early Fire Detection: Spot smoke or flames in HDB estates, apartments, and community spaces
- Hazard Prevention: Deter illegal dumping of flammable materials and arson attempts
- Suspicious Activity Alerts: Detect loitering, unattended objects, and abnormal behaviour patterns

Enhancing safety in shared spaces with intelligent monitoring and real-time hazard alerts.

Industrial & Commercial Safety Monitoring

AI Surveillance for High-Risk Zones and Hazardous Materials

- Early Fire Detection: Identify smoke, flames, and thermal anomalies for rapid response
- Hazardous Storage Violations: Detect unauthorised placement of chemicals, gas cylinders, and flammable materials
- Code Compliance Monitoring: Flag fire safety violations in real time

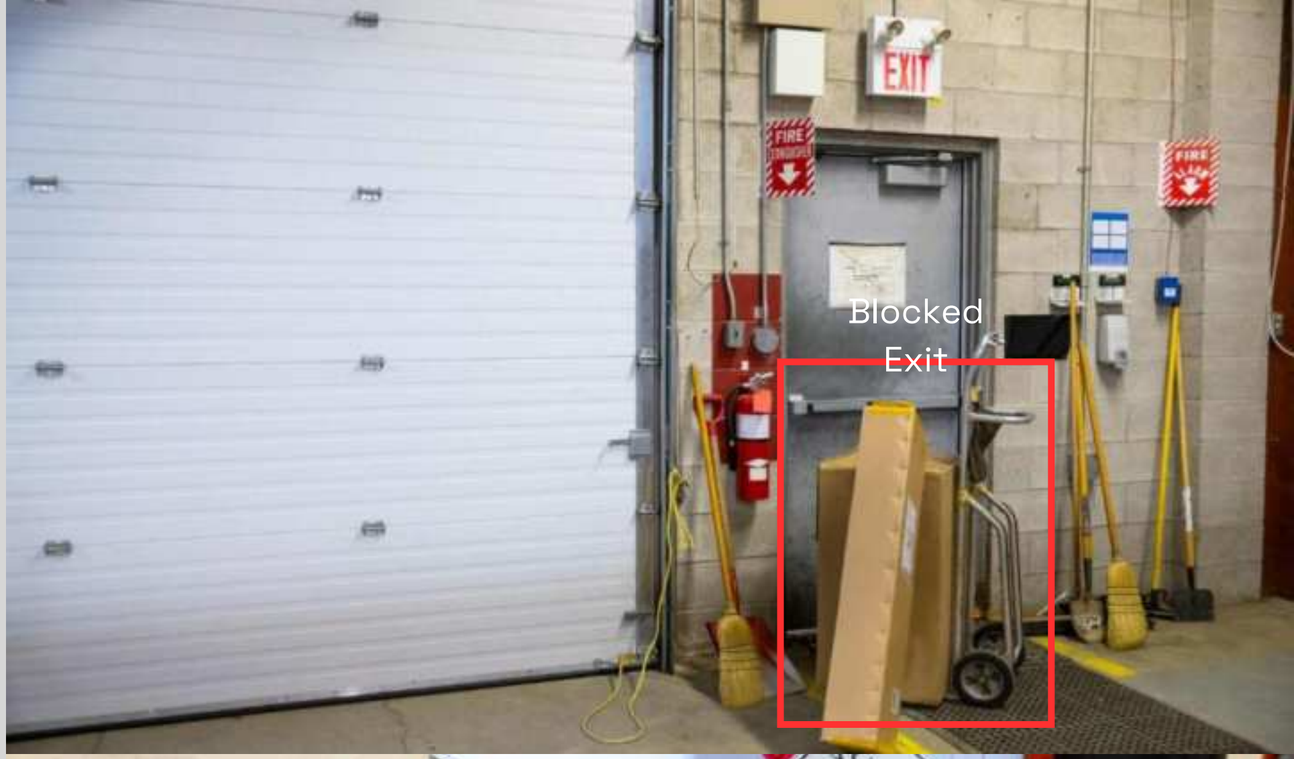
Safeguard industrial zones with intelligent monitoring that detects threats before they become disasters.

Fire Safety Violation Detection

Automated Monitoring of Common Fire Hazards & Regulatory Breaches

- Exit Obstructions: Blocked doors, cluttered escape paths
- Faulty Equipment: Broken alarms, expired detectors, missing signage
- Unsafe Storage: Flammables near heat sources, unlabelled hazardous goods
- Electrical Hazards: Overloaded sockets, tangled wiring, exposed circuits
- Neglected Fire Protection: Inaccessible extinguishers, obstructed sprinklers, poorly maintained fire doors
- Compliance Gaps: Expired certifications and non-standard emergency systems

Polytron enables early identification of fire risks—ensuring faster response and improved code compliance.



Kitchen Safety & Compliance in Food Service

Fire Risk Prevention and Hygiene Monitoring for High-Traffic Food Environments

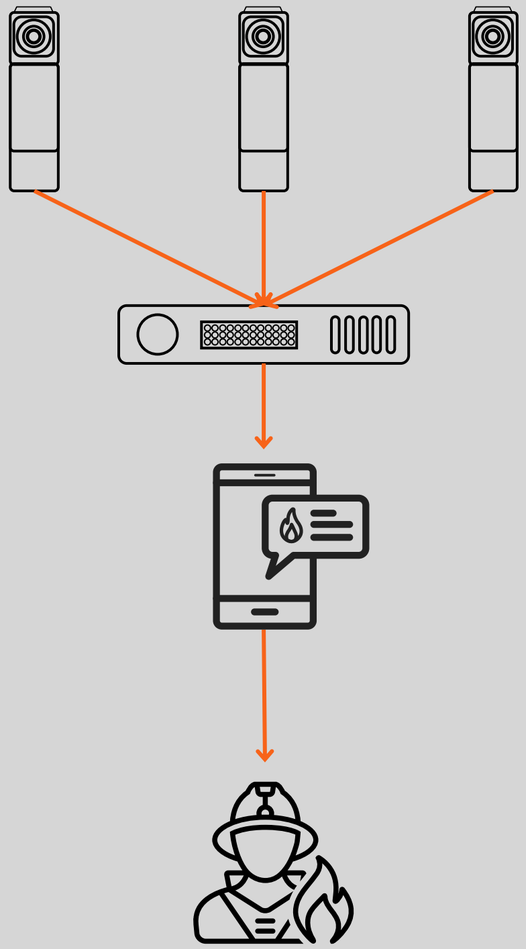
- **Fire Detection:** Identify smoke, flames, or overheating appliances in kitchens before escalation
- **Hygiene Enforcement:** Monitor PPE compliance (masks, gloves, hairnets) and unsafe food handling
- **Zone Monitoring:** Detect unauthorised access or unsafe crowding in restricted food prep areas

Safeguard staff and guests with intelligent kitchen surveillance that enforces hygiene standards and reduces fire risks.

Safeguarding Critical Facilities with Intelligent Fire Detection

AI-Driven Fire Safety for High-Risk, High-Occupancy Environments

- **Government Buildings:** Protect public offices with early fire detection and rapid alerting systems
- **Schools & Universities:** Deter arson, monitor high-traffic areas, and accelerate emergency response for students and staff
- **Clinics & Hospitals:** Ensure patient and staff safety in sensitive, high-dependency zones
- **Prisons:** Enable immediate alerts for fire outbreaks in secure and confined environments
- **Hostels & Dormitories:** Provide 24/7 fire risk monitoring to protect sleeping quarters and communal spaces



Monitoring Major Incidents in Real Time

AI-Driven Situational Awareness for Crisis and Emergency Events

- **Fire Outbreaks:** Detect and respond to fires in buildings, refineries, forests, and industrial zones
- **Flood Monitoring:** Track rising water levels and movement in real time using 360° surveillance
- **Natural Disasters**: Enhance response during earthquakes, typhoons, and structural collapses with remote visibility

Polytron’s AI cameras and Vizzio's digital twin platform deliver actionable insights when every second counts.

Real-Time Monitoring for Emergency & Crowd Control Operations

Disaster Response

Monitor large-scale fires, floods, and other emergencies with 360° situational visibility and AI-based detection.

Crowd Intelligence

Track movement patterns, identify flashpoints, and manage high-density gatherings with real-time alerts.

Public Order Management

Support riot control and protest surveillance by detecting aggression, fights, and illegal assemblies.

Command-Centre Integration

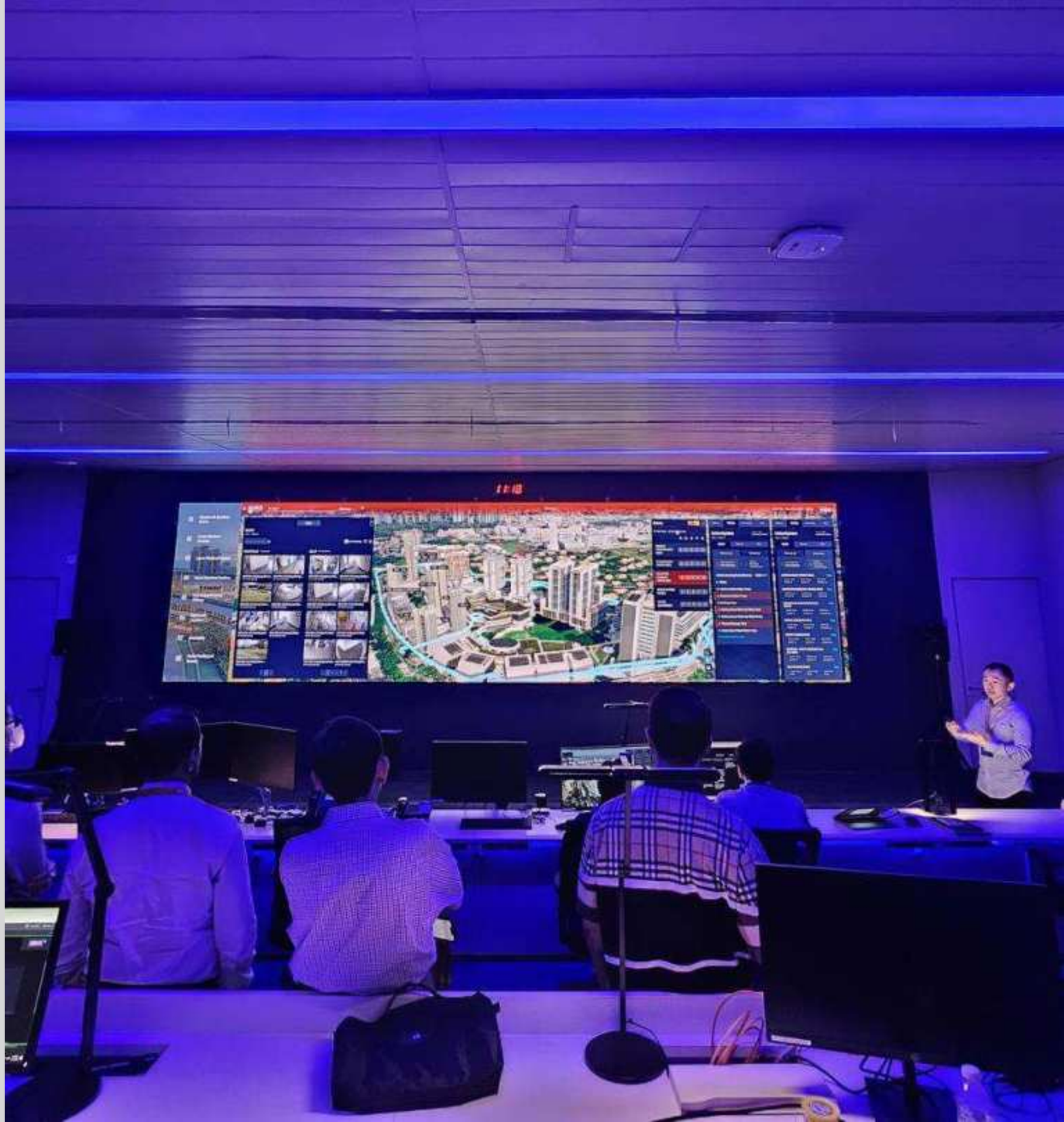
Deliver instant insights to security forces for faster, data-driven decision-making during high-risk events.

Digital Twin for Command & Control

Live 3D Intelligence for Real-Time Situational Awareness

- **Operational Clarity**: Visualise incidents and assets in a live, geospatial 3D environment
- **AI-Driven Detection:** Identify threats instantly to support faster decisions and coordinated response
- **Mission Planning & Simulation:** Rehearse operations, test response strategies, and assess vulnerabilities
- **Immersive Training:** Prepare teams using realistic, consequence-free virtual simulations

Empower command centres with a unified, AI-enhanced 3D view of every zone, asset, and unfolding event.



CUSTOMER USE CASES

STRAWBERRY MUSIC FESTIVAL

Enabling Safer, Smarter Monitoring for 120,000 Festival Attendees

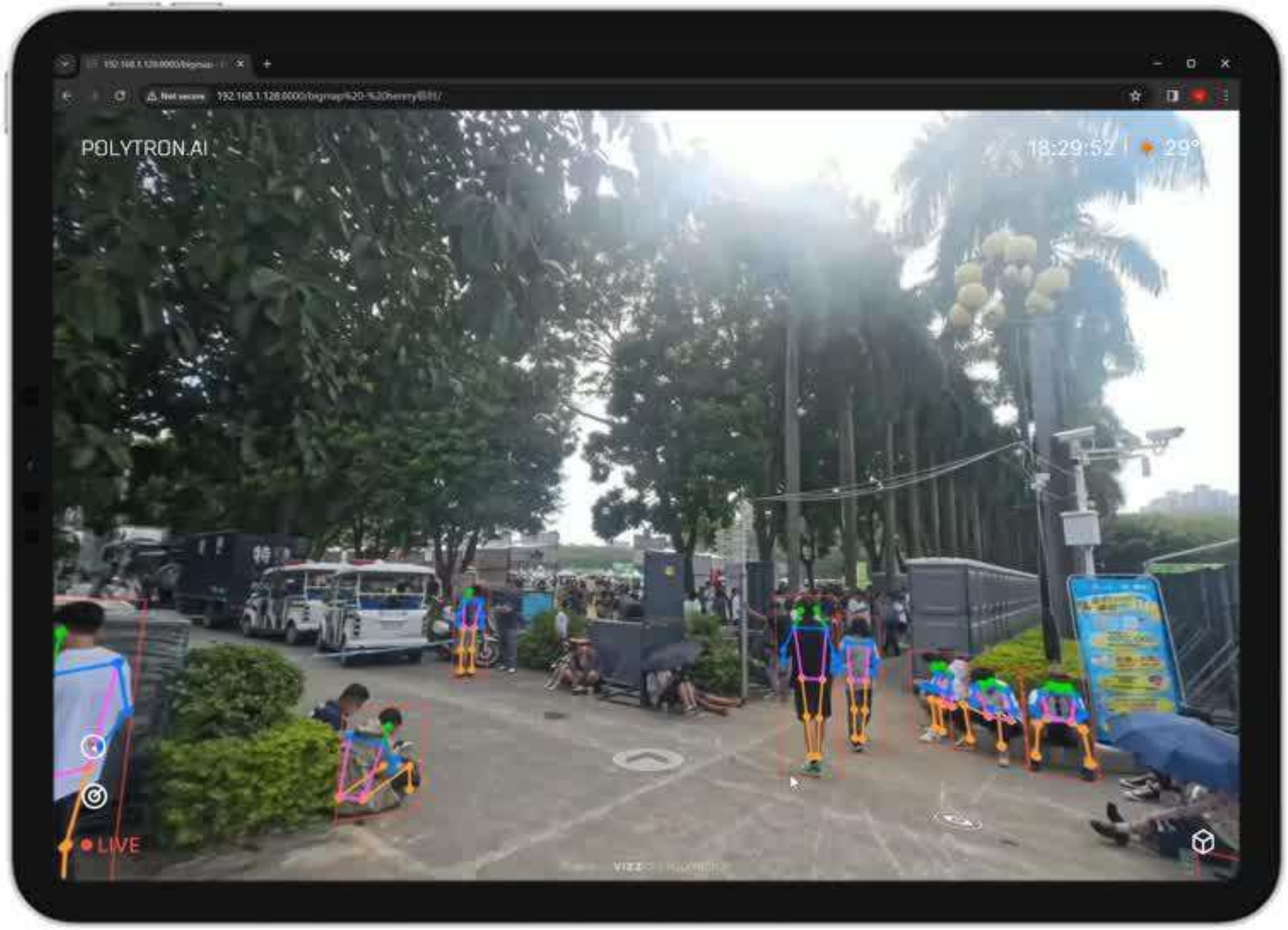
In 2024, Polytron and Vizzio partnered with Chinese authorities to manage 120,000 attendees at the Dongguan Music Festival—China's largest live concert broadcast—using just 18 POLYTRON 360° cameras and POLYTRON ONE VMS.

A digital twin of the venue was generated in under 2 hours, integrating 360° video, street view, and satellite data. The system delivered real-time 3D monitoring, enabling security teams to track movement, detect anomalies, and respond faster—all visualised on a live, immersive 3D map.









Catching hygiene infringements in commercial kitchens to improve food safety

In 2025, Polytron and Vizzio partnered with Saudi Arabia's Ministry of Municipal and Rural Affairs (MoMRAH) to deploy a city-scale kitchen hygiene and safety monitoring system across Medina and Makkah—two of the holiest and most complex urban environments in the world.

This pilot demonstrates how AI-powered 360° surveillance, paired with real-time analytics and digital twins, can elevate operational hygiene standards, support regulatory enforcement, and improve public health outcomes during peak pilgrimage seasons.

- Real-time alerts for hygiene breaches, including face-touching and contamination risks
- Centralised oversight via digital twin of kitchen environments for MoMRAH officials
- Significant reduction in manual inspection time and cost during Hajj operations

POLYTRON ONE **ANALYTICS FOR KITCHEN HYGIENE MONITORING IN MAKKAH AND MADINAH**

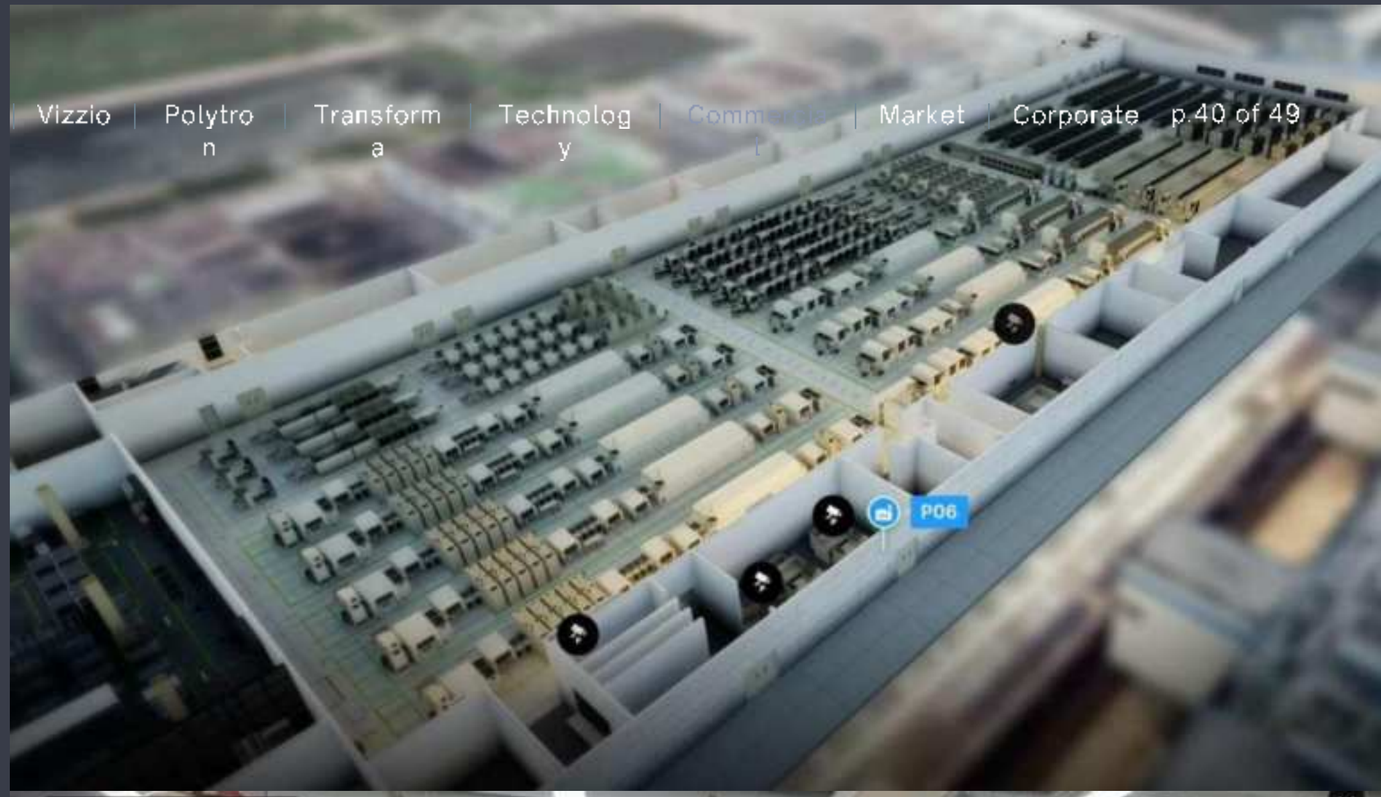
FOXCONN

Accelerating Smart Manufacturing with Real-Time 3D Factory Intelligence

In 2024, Vizzio partnered with FOXCONN Industrial Internet (FII) to deploy the world's first LIVE 3D digital twins across its World Economic Forum-certified Lighthouse Factories, starting with the Ingrasys facility in Taiwan.

Combining satellite imagery, AI, and POLYTRON 360° cameras, Vizzio created fully interactive 3D factory environments—enabling real-time monitoring, predictive maintenance, and remote factory tours.

- LIVE 3D virtual walkthroughs across global FII sites
- Digital twins built in hours via AI and satellite mapping
- AI-driven insights for operations, maintenance, and ESG
- Reduced site visits through immersive remote access



Foxconn Industrial Internet

AI VIRTUAL PATROL

Monday 6 May 2024
11 : 57 : 38

Vistors	Alarms	Violation
128	49	5.5%

16 CPUs : Linux	2.0%
515473.13 MB RAM	5.0%
Primary Disk :	0%
Second Disk : 0	0%
Active Monitors	16 / 16

- LIVE View
- Playback
- Time-Lapse
- Cameras
- Notification Log 0 2

No PPE
杨佳豪 ID: 154977
Location: P06 SENTRY
6/4/2024 11:31:28

Bending Over
杨佳豪 ID: 154970
Location: P06 SENTRY
6/4/2024 11:29:28

- System Settings
- Manage Users
- Logout

POWERED BY VIZZ | POLYTRON.AI

AI VIRTUAL PATROL


FIRE & SMOKE Detection Test

POLYTRON ONE

http://localhost:8869/#/AiStudio

POLYTRON.AI

LIVE View | Playback | Cameras | Notification | AI Studio

Overview

Cameras: 1 | Online: 1 | Offline: 0

32 CPUs : Win32 12.0%

RAM : 63.6 GB 36.3%

Disk : 363.7 GB 80.3%

Alerts

Violations: 0 | Pending: 0 | Resolved: 59

Notifications

No Notifications

AI Studio

POLYVISION 1.0 | EN (English)

Video Stream: rtsp://192.168.1.101:8554/Camera157

Add Prompt

Enter Analytics Name

Enter Prompt

Clear | Preview | Optimize | Add Prompt

Detection Library

Environment

Fire Detection

Analyze the image or video to determine if there is fire or smoke in the environment. Respond with "Answer: YES" if fire or smoke is detected, or "Answer: NO"

Clear | Preview | Save

Fire 2

Deployed Analytics

Fire Detection

[2025-04-02 14:50:41] Fire Detection : NO

[2025-04-02 14:50:38] Fire Detection : NO

[2025-04-02 14:50:35] Fire Detection : NO

[2025-04-02 14:50:32] Fire Detection : NO

[2025-04-02 14:50:28] Fire Detection : NO

100

FIRE & SMOKE Distance: 2m

Video Analytics Test Report

List of Staging Areas for Scenario Simulation

Analytics Category	VA No.	Analytics Description	Proposed Site / CCTV in MOS
Base Analytics	1	Geo Fencing (Smart Zones)	1. Back Cookarea D17 2. Back Cookarea D18 3. New Fencing E9
	2	People Counting / Tracking	1. Cam23 Carpark F5 2. Staff Entrance in F4
	3	Facial Detection	1. Cam23 Carpark F5 2. Staff Entrance in F4
	4	IDLE Time	1. D9 Passageway to Blk B
	5	Line Crossing	1. Back Cookarea D17 2. Back Cookarea D18 3. New Fencing E9
	6	Crowd Detection	1. D26 Drop Off Point 2. Shuttle Bus Area F7
	7	Mask Detection	1. Cam23 Carpark F5 2. Staff Entrance in F4
	8	Video Motion Detection	1. D9 Passageway to Blk B
Advanced Analytics	A1	Fire & Smoke Detection	1. Old Shared Kitchen Area 2. Dining Area 3. Rubbish Dump, compactor room No Existing Cameras, Need to deploy 1 makeshift polytron 360 camera on site
	A2	Smoking Detection	1. D26 Drop Off Point
	A3	Fighting / Violence Detection	1. D26 Drop Off Point 2. Shuttle Bus Area F7
	A4	Vandalism Detection	1. D9 Passageway to Blk B
	A5	Suspicious Package Detection	1. D26 Drop Off Point 2. Shuttle Bus Area F7
	A6	Slip & Fall Detection	1. D9 Passageway to Blk B
	A7	Weapon Detection	1. Cam23 Carpark F5 2. Staff Entrance in F4
	A8	Suspicious Behavioural Analysis	1. D9 Passageway to Blk B
	A9	PPE Compliance Detection	1. Back Cookarea D17
	A12	Cart Abandonment Detection	Can explore bringing a cart on site or found around the dorm and stipulate an area below for testing. 1. Shuttle Bus Area F7
	A13	Animal Intrusion Detection	Rubbish collection box to monitor cats going through rubbish No Existing Cameras, Need to deploy 1 makeshift polytron 360 camera on site
	A14	Parking Violation Detection	1. D26 Drop Off Point 2. Shuttle Bus Area F7
	A15	Workplace Safety Compliance	Select a room or Level from Main Con CCTV facing the worksite to monitor and simulate PPE compliance with a subject wearing PPE versus one not wearing standing in the cordon off area
	A16	Alert unclosed rubbish bins	Rubbish collection box area No Existing Cameras, Need to deploy 1 makeshift polytron 360 camera on site
	A17	Sleeping	Select a room or office from Vizzio

Figure 3: List of Staging Areas

isems

Figure 8: Mobile Portable VA for Video Analytics testing of Fire and Smoke Detection, Animal Intrusion and Rubbish Bin Detection.

isems

Figure 9: Cameras from Main Contractor on-site VMS for Video Analytics testing of PPE Compliance and Workplace Safety Compliance.

2.7 Selected Cameras and Perspectives

isems

Figure 4: Cameras D17, D18, E9 for Video Analytics testing of Geo-Fencing, Line Crossing and PPE Compliance

isems

Figure 5: Cameras F4 and F5 for Video Analytics testing of Mask Detection, Weapons Detection, and Facial Detection and Line Crossing.

Conclusion – From Surveillance to Saving Lives

- For decades, surveillance was reactive — recording after events. Too little, too late.
- With AI-powered 360° edge cameras + multimodal analytics, surveillance becomes proactive guardianship.
- Not replacing firefighters or safety officers — but empowering them to:
    - See earlier
    - Decide faster
    - Act smarter
- The shift:
    - From reactive firefighting → proactive fire prevention
    - From blind surveillance → predictive protection
    - From watching → saving lives

Thank You