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# INTELLIGENT TRANSPORTATION SYSTEMS

Ensuring safe, efficient travel on motorways,  
bridges, tunnels, and intersections



# ALWAYS ON DETECTION FOR SAFER, MORE EFFICIENT TRAFFIC FLOW

Cities and road networks are getting more complex. Intersections grow busier. Tunnels and bridges handle more vehicles than ever. Meanwhile, the pressure to improve safety and traffic flow—especially for pedestrians and cyclists—keeps increasing.

Technology can help, but only if it works when it matters most: both day and night, in glare, shadows, headlights, smoke, and harsh weather—without false alarms, manual checks, or guesswork.

## **Reliable detection when it matters most**

That's why intelligent transportation systems are changing. Modern traffic managers need reliable detection, the ability to anticipate risk, see patterns earlier, and prevent problems from becoming emergencies.

With Flir thermal and visual solutions for all traffic environments, these goals become attainable: safer crossings, smoother flow, and quicker response. Thermal sensing, edge AI, and visual analytics work together to provide reliable awareness—at intersections in the city and on highways, tunnels, and bridges beyond it.

Traffic moves. People move. And systems need to keep up.

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### When visibility drops

Glare and headlights, darkness and shadows, rain, smoke, or any other poor conditions can hide what matters most. When detection becomes unreliable, confidence drops and decision-making slows. Traffic solutions that provide clear visibility, 24/7, can ensure operators have the information they need to make sound decisions.



### Operational realities

High false alarm rates and manual checks consume time. Harsh environments raise maintenance needs. The drive to maintain data integrity and cybersecurity adds further pressure. Operators need systems they can trust continuously and in real conditions.

### The outcomes you need:

- Safer crossings for pedestrians and cyclists
- Earlier awareness of incidents and fire risks
- Smoother flow with smarter timing
- Fewer false alarms
- Faster verification
- Lower operational cost
- And above all: reliable data that enables confident, proactive decisions.

*“Pedestrians will take risks to avoid delays. They push the button, look around and cross regardless of whether the call for green has been activated. With a call cancellation approach, based on pedestrian detection, we are making signalization in our city more efficient.”*

*—Gaby Steenhoven, Traffic Light Control for Haarlemmermeer, Netherlands.*



# PROTECTING VULNERABLE ROAD USERS

Pedestrians and cyclists are central to modern urban mobility, yet they're also the most exposed. Traffic signals are often based on assumptions rather than real presence, which can lead to unnecessary delays, risky crossings, and frustration for everyone on the road. While generic, open-source AI traffic cameras can detect shapes and movement, the reality of traffic is more complex: changing light, dense flows, glare, harsh weather, and unpredictable behavior at crossings all need to be taken into account.

Flir thermal imaging improves that picture. It provides reliable detection, day and night, without depending on visible light. When combined with traffic-trained analytics, thermal imaging reduces missed detections, supports confident timing decisions, and helps cities protect people while keeping traffic moving.

## Practical improvements for your city



### Adaptive crossings

- Pedestrians cross before signals change, creating risk and delay.
- Thermal detection confirms presence and adjusts timing.
- Safer crossings, shorter waits, fewer unnecessary red lights.



### Bicycle priority

- Cyclists cross where vehicles are turning, sometimes with deadly results.
- Early detection provides lead time and extended clearance.
- Smoother starts, fewer near-misses, better flow.



### Smart signal control

- Queues persist even when crossings are empty.
- Occupancy and travel-time data shape signal timing.
- Less congestion and more consistent movement.

# FASTER DETECTION, SAFER RESPONSE

Highways, bridges, and tunnels are built to move people and goods around quickly and safely—but when something goes wrong, the stakes rise fast. Vehicles stop. Visibility drops. Secondary accidents become more likely.

Generic systems often struggle to verify events in real time, especially in difficult visual conditions. Thermal sensing and traffic-trained analytics from Flir change that picture. By detecting incidents—wrong-way drivers, queues, fallen cargo—much faster and supporting quicker verification, they reduce uncertainty, improve operator confidence, and help keep traffic flowing.

## Practical improvements for interurban safety



### Reliable incident detection

- Low light or glare obscures a stopped vehicle in a tunnel or on a bridge.
- A thermal camera detects the stop and alerts operators.
- Quicker reaction, reduced risk of secondary collisions.



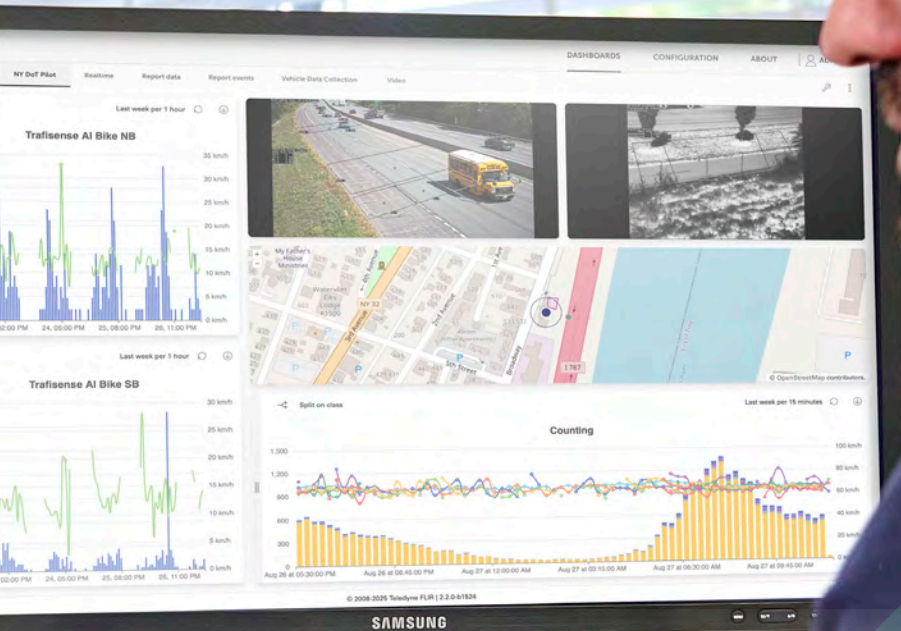
### Flow monitoring

- Incidents or road work delay traffic, increasing frustration.
- Speed patterns and travel-time calculations show congestion in real time.
- Reduced exposure, better flow, lower risk.



### Preventing wrong-way driving

- A driver enters a highway in the wrong direction.
- Movement against the flow is detected immediately.
- Rapid intervention: critical seconds gained for safety.



*“We can clearly see the detected incidents on the thermal image in our control room, which reduces the time to understand the situation and speeds up our decision-making process.”*

*—Anders Helle, Construction/Maintenance Manager at Norwegian Public Roads Administration (NPRA)*



# SEEING FIRE RISKS SOONER

Tunnels, bridges, parking structures, and service areas are highly vulnerable to fire. A small rise in temperature can quickly escalate into smoke, flames, and critical safety risks. Traditional systems rely on visible smoke or rising heat at the tunnel's ceiling, which can delay detection when seconds matter most.

Thermal imaging changes that dynamic. By detecting flames a lot earlier than traditional systems, Flir gives operators more time to act. Combined with traffic-trained analytics, this leads to faster alerts, clearer verification, and safer evacuation or response planning.

## Practical improvements for early fire detection



### Early flame detection

- Spotting flames the moment an overheating vehicle catches fire is critical to preventing disaster.
- Thermal cameras provide flame detection that's fast and reliable.
- Flame recognition reduces false alarms and improves safety.



### Seeing through smoke

- Smoke or glare hides critical sightlines.
- A thermal camera provides clear visibility through smoke and haze.
- Better situational awareness and safer decisions.

*Flir's fire detection capabilities proved effective when a car fire occurred in the Hundvåg tunnel in July 2020. Flir's dual thermal AID camera detected the fire within 7 seconds of visible flames, following an initial alert for a stopped vehicle and pedestrians.*

**Norwegian Road Tunnel Premieres AI-Based Incident Detection**

# FROM DETECTION TO ACTION

Reliable traffic management doesn't stop at detection. Turning traffic insights into action—quickly, clearly, and with confidence—adds to that reliability. Flir Intelligent Transportation Systems are designed to support that full journey, from sensing what's happening on the road to enabling informed decisions in the control room.

## 1. Detect what matters

Flir thermal and visual sensors continuously monitor traffic scenes at full resolution, day and night.



## 2. Understand the situation

Traffic-trained analytics run directly at the edge, inside the sensor. Using 3D tracking, the system distinguishes normal traffic movement from abnormal behavior and generates meaningful data such as speed patterns, queues, and stopped vehicles.

## 3. Trigger action

Detection and insight can directly support action. Systems can trigger traffic signals, change message signs, and share data with traffic management operations for safer interventions and a smoother traffic flow.

## 4. Verify and decide

When an event is detected, operators receive clear thermal and visual confirmation that helps teams understand what is happening and make decisions without guesswork.



# WHAT MAKES DETECTION RELIABLE?

## **Thermal imaging: detection based on heat, not light**

Visual detection systems are vulnerable to darkness, shadows, glare, and other difficult lighting conditions. That's why thermal imaging is more reliable for traffic systems. They turn heat signatures into an image that provides consistent awareness, day and night.

Thermal cameras are also a better solution for detecting vulnerable road users. The body heat from pedestrians and cyclists stands out clearly against the background, supporting safer crossings in complex environments.



Sun glare



Night



Shadows



Smoke

## **Traffic-trained AI, built on real-world data**

Reliable detection doesn't depend on sensors alone. It also depends on how intelligence is trained and applied. Flir traffic analytics are built on real traffic behavior: urban complexity, interurban flow, incidents, and edge cases. This traffic-trained deep learning is designed specifically for mobility applications; it improves consistency, reduces false alarms, and limits missed detections—even in complex environments.

Flir AI delivers reliable detection without identifying people or processing biometric data.

# TECHNOLOGY THAT CREATES MEASURABLE OUTCOMES

Technology only matters if it improves real-world performance. Flir Intelligent Transportation Systems (ITS) capabilities are designed to translate reliable detection into safer roads, smoother flow, and more confident operations.

## MORE INCIDENT DETECTIONS. FEWER FALSE ALARMS

### **Technologies:**

- Edge AI & 3D tracking for precise classification and trajectories.
- Thermal detection for uninterrupted 24/7 coverage.

### **What it delivers:**

- Lower false alarms in glare, night, and complex scenes.
- Consistent performance across global deployments.

## FASTER RESPONSE, BETTER PRIORITIZATION

### **Technologies:**

- Connected sensors with event-based alerting.
- Signal and VMS triggering for immediate action.

### **What it delivers:**

- Faster time to verify incidents.
- Clearer prioritization.
- Reduced risk of secondary incidents.

## SMOOTHER FLOW, LOWER EMISSIONS

### **Technologies:**

- Traffic analytics (counts, occupancy, travel time).
- Adaptive signal control.

### **What it delivers:**

- Smarter signal timing.
- Reduced congestion.
- Lower vehicle idling, fuel waste, and emissions.
- Measurable efficiency gains across the network.

## TRUSTED DATA, FROM SENSOR TO SYSTEM

### **Foundations:**

- Cybersecurity by design.
- ISO-certified processes.
- Privacy-first analytics.

### **What it delivers:**

- Audit-ready operations.
- Secure data pipelines.
- Reliable insights without compromising privacy.

# WHY TRAFFIC AGENCIES CHOOSE FLIR:



## **Looking beyond upfront cost**

Lower purchase prices don't always mean lower cost. Total cost of ownership matters over time.



## **Reduced operational expenses**

Flir solutions cut maintenance effort, truck rolls, downtime, and false alarms, reducing day-to-day operating costs.



## **The right decision support**

Flir software solutions are smart enough to assess and prioritize events, so traffic managers can focus where it counts to make fast, informed decisions.



## **Colombia — Automatic Incident Detection in Long Tunnel**

*Colombia's La Línea, the longest highway tunnel in Latin America, relies on Flir Automatic Incident Detection to monitor traffic in real time. Thermal and visual analytics detect stopped vehicles, queues, wrong-way drivers, and fallen cargo, enabling faster response, fewer secondary incidents, and safer movement through one of the country's most critical tunnel connections.*

# INTERURBAN SENSORS

## TrafiBot AI



### **Premium Visual IP Camera with Embedded AI Deep Learning**

TrafiBot AI supports intelligent traffic management and safer roads through embedded AI and advanced AID analytics. 3D tracking allows for reliable detection even when views are partially obstructed, while accurate, learning-based detection supports confident, real-time traffic operations.

## TrafiBot Dual AI



### **Automatic Incident Detection, Data Collection, and Fire Detection Camera with Embedded AI Deep Learning**

TrafiBot Dual AI combines 640 × 512 thermal and 4K visible imaging with embedded AI for reliable incident, traffic, and early fire detection. Patented 3D tracking anticipates vehicle speed and trajectories in tunnels and on highways, even when views are obstructed.

## TrafiBot3



### **Automatic Incident Detection & Traffic Data Collection**

TrafiBot3 combines Full HD visual imaging technology with advanced video analytics for effective detection along highways, bridges and inside tunnels. Advanced processing generates data-supported alerts on stopped vehicles, wrong-way drivers, pedestrians, lost cargo, smoke, and traffic flow.

# URBAN SENSORS

## TrafiCam AI



### **AI-Powered HD Traffic Sensor**

TrafiCam AI is an intelligent HD visible sensor with AI trained on years of traffic data for reliable detection and classification. Edge-based analytics track multiple objects, support adaptive intersection control, and deliver detailed traffic data for safer, more efficient city planning.

## TrafiSense AI



### **AI-Powered Thermal Traffic Sensor**

TrafiSense AI is designed to reliably detect and classify road users in complex urban environments. Featuring AI algorithms built on years of traffic detection and best-in-class thermal imaging, TrafiSense AI can track multiple objects and effectively control intersections.

## TrafiCam3



### **Smart City Sensor**

TrafiCam3 is an affordable sensor for traffic monitoring and dynamic signal control. Visual imaging plus Wi-Fi technology combine to detect vehicles and generate basic count data for adaptive signal control, helping traffic engineers improve vehicle flows, monitor congestion, and enhance safety.

## TrafiOne



### **Smart City Sensor**

TrafiOne is an all-in-one traffic sensor for monitoring and adaptive signal control. It uses thermal imaging to detect the presence of vehicles, bicycles, and pedestrians in urban environments in any lighting or weather conditions, supporting dynamic signal control.

## TrafiSense Dual AI



### **Premium Dual Sensor Solution with Embedded AI Deep Learning**

TrafiSense Dual AI combines thermal and visible imaging with deep learning analytics for reliable detection and classification of road users. The system delivers detailed traffic data, with 3D tracking support for precise intersection control and multi-object movement, even in complex scenes.

# TRAFFIC MANAGEMENT SOFTWARE

## Cascade



### **Intelligent Video Detection Management Software**

Cascade is a centralized platform that filters, prioritizes, and correlates data and alerts across traffic sensors, turning them into actionable insights. This browser-based system integrates with Flir and third-party platforms for faster, more confident decisions.

## Acyclica by Flir



### **Smart City Platform**

Acyclica is a smart city analytics platform that turns large volumes of traffic data into clear insight on congestion, travel times, and movement patterns.

From real-time congestion mapping to origin-destination analysis, it helps agencies understand how people move through the network. Automated reports, intuitive dashboards, and open APIs ensure data is accessible when and where it's needed.

## Cameleon ITS



### **Advanced transportation management software**

Cameleon ITS is a centralized platform for monitoring and managing transportation networks, with control for devices from cameras and detectors to message signs, gates, and incident detection systems. Built-in video management gives operators a unified view of the network, supporting fast coordination and effective traffic operations.

# GET THE MOST OUT OF YOUR TRAFFIC SOLUTION

## Flir ITS Academy

Flir ITS Academy provides practical training to help traffic professionals get the most out of their Flir ITS solutions. Whether you're working with existing systems or planning a broader traffic management setup, Flir experts support you with the right knowledge at the right time.



The Academy offers a flexible mix of instructor-led training, virtual sessions, e-learning modules, and on-demand webinars. Courses are available at different skill levels and focus on real-world use, helping teams stay up to date as traffic environments and technologies continue to evolve.

**Visit [academy.flir.com](https://academy.flir.com) and start your learning journey.**

# UPGRADE YOUR INTERSECTION

Every intersection is different. Traffic volumes change. Road users behave differently. And local priorities—safety, flow, sustainability—rarely look the same from one city or region to the next.

That's why Flir ITS works with traffic agencies to assess existing conditions, identify risks, and understand opportunities when designing the right solution for your network. We help you upgrade your intersection with reliable incident detection and future-ready analytics that turn detection into measurable outcomes.

**Let's define the right approach for your city, county, or region.**

## Request a demo

See how Flir ITS solutions perform in real traffic conditions and what they could deliver for your intersections.

### Contact Flir ITS

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