

Safe and Sound

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With an ever-increasing number of video detection systems coming into operation, traffic control centres are turning to video image processing techniques to keep up with global security plans

The popularity of ITS is due to a combination of factors: cost-effective ways to reduce congestion, transportation security concerns and limited resources for expanding highway capacity.

Based on video image processing techniques, automatic incident detection systems raise an alarm for incidents or accidents occurring on the road network such as stopped vehicles, wrong way traffic, slow downs and so on.

Because it addresses a large detection area with great efficiency, video detection has become the standard for automatic incident detection. This is paramount because it enables operators to:

- Quickly detect incidents;
- Investigate incident nature and causes;
- Respond quickly and appropriately;
- Prevent secondary accidents from occurring.

Knowing that incidents cause more than 50 per cent of traffic jams (which causes even more crashes) it is clear that automatic incident detection can dramatically increase the reliability of traffic management systems.

Above all, it is the ability of video detection systems to provide a permanent digital recording of the pictures from all the cameras that is a key feature allowing traffic operators to evaluate the cause of an ongoing incident or to perform an off-line analysis after the incident has been cleared from the area.

Finally, automatic incident detection systems bring a better understanding of what is happening on the entire surface transportation system at any given time.

The European experience

In December 2002, the European Commission proposed a new directive to define common technical and operational safety requirements for road tunnels.



The memo emphasises the human cost of incidents: 62 people lost their lives over the past four years in road tunnel accidents (11 in the St. Gotthard accident, 39 in the Mont-Blanc accident and 12 in the Tauern accident).

The European Commission memo also reminds us that recent tunnel fires cost Euro210 million per year. This does

not take into account indirect costs on the economy resulting from the closure of the tunnel. The memo estimates that in the case of the Mont-Blanc Tunnel – and for Italy alone – these amount to Euro300-450 million per year. The memo then lists the minimum equipment for all tunnels and states that video monitoring systems need to be installed in tunnels longer than 1,000 meters, including automatic incident detection. However, the traffic and tunnel management center did not wait for the European memo to address the issue of safety in their tunnels.

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have been tested and deployed in tunnels from 150 meters to 12 kilometres long.

What next?

State government agencies need to know exactly who and what is moving around their bridges, tunnels and roadways. This has rapidly created an expansion of CCTV systems. In the past, cameras were only on the roadways to monitor accidents, stalls and congestion. They are now also aimed at knowing who's doing what and where, or indeed anyone being where they shouldn't be.

PTZ cameras are heartily approved by operators because they enable the observation of traffic and the road infrastructure from various angles. Leaving no blind spots, CCTV cameras provide traffic and security operators with much more data that they can possibly deal with. It is now common to see operators dealing with hundreds of cameras monitoring hundreds of miles of highways.

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Since 1998, i.e. prior to the Mont-Blanc disaster, video detection systems

have been tested and deployed in tunnels from 150 meters to 12 kilometres long. With over 70 tunnels equipped, video detection has emerged as the de facto standard for automatic incident detection. Spain alone has now equipped nearly 30 of its tunnels with video detection over the past three years including



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This concept can be referred to as ‘active video surveillance’. With such tools, the traffic and security operators can concentrate on other tasks, in addition to pure surveillance duties.

Handling critical infrastructures

Most incidents occur on particularly difficult to monitor sections of highways and expressways like: bridges, viaducts, tunnels, interchanges or large intersections. These key infrastructures are important to monitor not only in terms of safety but also in terms of security. They need to be looked at from various angles.

Both tunnels and bridges are critical road infrastructures. Designed to grant

easy access from one point to another, they are also the ‘weakest link’ of the overall road infrastructure.

Tunnels and bridges are also difficult to access in case of incidents or accidents. Response time and incident clearing time are therefore of the greatest importance. No wonder then that bridges and tunnels are the focus for automatic incident detection especially on expressways, ring roads and corridors.

The 128 cameras of the Melbourne CityLink system detect incidents on a six-lane Freeway, a bridge over the Yarra River and two three-lane tunnels. The situation is the same in Shanghai with the Yan’an Tunnel and the 8,346 meter Nanpu Bridge, or in Lisbon with the 17,185 meter long Vasco de Gama cable-stayed bridge .

Safety and security

Initially designed to address only road safety applications, video detection systems now fully contribute to infrastructure security worldwide.

“Before 9/11, a breakdown was a breakdown, but now we always wonder ‘is it?’” noted a traffic control center manager in the US.

In the end, the concept of active video surveillance allows the growth of traffic monitoring systems and new security issues to be addressed while keeping overall efficiency at the highest level. ■

Nothing sums it up better than this extract from the ITS America briefing about the contribution of ITS to homeland security: “I see CCTV as an ITS technology that will most effectively enhance homeland security because it provides a snapshot of what is occurring. CCTV can aid in the protection of the transportation system, especially overpasses and bridges. This snapshot will allow protective agencies (police) to stop an attempt prior to disaster. The problem with CCTV is the ability to view all cameras, all the time. There are not enough eyes; there are some shortcomings that would need to be resolved.”

Turning data into information

If we consider that CCTV is crucial for safety and security issues, it is extremely unlikely that we will see the numbers of CCTV cameras decrease in the years to come. The challenge is then to turn the data into useful information; i.e. reducing the quantity of information presented to operators and at the same time improve its quality. This is where video detection fits into the picture: by providing a system that will warn operators of any incident within the field of view of a camera.

The system works in the background on all the pictures of the network, all day every day. It therefore provides a true assistance to the operators, only attracting their attention when it is necessary.