

# Intelligent intervention

A complete ITS platform with an integrated high-end automatic incident-detection system overcomes the problems traditionally associated with incident management

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(Above) **Incident detection is an integral part of modern traffic management**



Traffic management systems have two main purposes that usually overlap: optimizing traffic flow and increasing traffic safety. Thus, most subsystems involved in modern traffic management systems often act as incident-detection subsystems as well. To fully exploit all available information, most modern road traffic management subsystem components that are responsible for collecting information on traffic flow (such as CCTV systems) are used for incident detection as well. Such dual functionality can only be achieved if the software platform used for the integration of subsystems allows for their full functional and ergonomic integration at control center level.

The architecture, versatility and implementation capabilities of Telegra's TopXview make this traffic management software a true example of such a platform. TopXview has been implemented in more than 100 traffic management centers around the world and it keeps proving that ergonomics, functional integration and expertise are of vital importance to clients and end users when choosing a program platform. Throughout their 15 years of experience implementing integrated systems, Telegra's engineers have come across almost every possible (and almost impossible) subsystem available to users. TopXview currently supports more than 30 different subsystems, more than 150



standard and specific protocols, and more than 500 different types of devices.

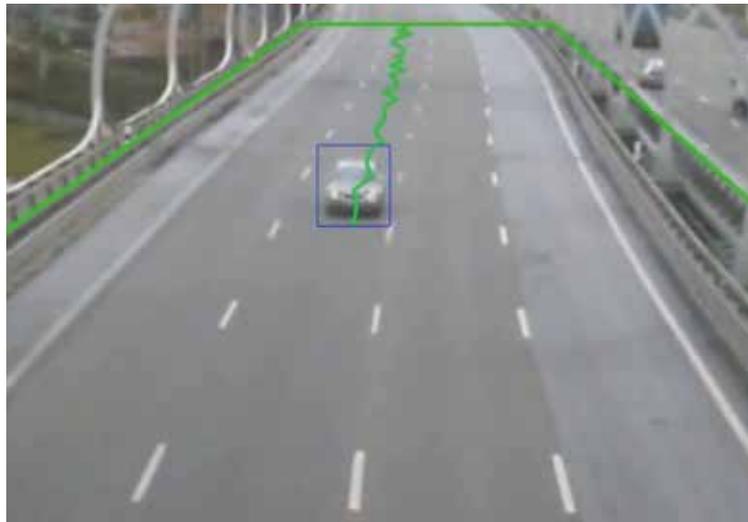
The main advantage of using such a program platform is that it integrates: a SCADA system for traffic management (traffic signalization for open roads); a SCADA tunnel system; a database with online and offline reporting capabilities; a high-end video supervision system; a high-end incident management system; a fleet management system; a traffic light management system; a parking management system; and a public transit management system.

Recently, TopXview added another premium component: integrated high-end video incident detection X-AID, available as an integral part of the incident management subsystem.

### Incident recognition

The main factor influencing incident management efficiency is the ability to make a decision in a stressful situation. Very often, despite the modern and complex technology available today, decisions are made by humans. Human error is, unfortunately, very common in stressful situations. In addition to adequate training for operators, the system must be designed to alleviate stress, offer an easy overview of the current situation, and enable easy and efficient decision making. This is accomplished by real-time data representation and automatic event classification, offering a limited set of unambiguously defined decisions and efficient executable action management. In order for the system to function as required, it is of extreme importance that the sources of information (various sensors and detectors) are reliable. False alarms have a very negative impact on system efficiency.

When it comes to recognizing incidents on the roads or in tunnels, automatic video incident detection (AVID) is of vital importance. Many users adopt this technology due to its instantaneous incident detection abilities. Also, a complex set of incidents can be detected. However, lately, with advances in computer vision technology that are now implemented for everyday use (advanced driver assistance systems, for example),



(Left) **Telegra's X-AID system detects vehicles quickly and reliably**

traditional AVID is facing harsh criticism due to its low detection reliability (about 75% in a real-life situation) and high percentage of false alarms.

The reason for such a high false alarm rate is the picture analysis technology used to detect traffic disturbances in most AVID systems. The picture analysis is based on algorithms that are more than 15 years old and was adapted to the processing power of computers and microprocessors that were available at the time, when the foundations of AVID were being laid out.

Because of these limitations, Telegra, as a system integrator, realized it can't fulfill clients' expectations for AVID reliability. Examining the weaknesses of traditional AVID, Telegra set its own criteria and goals for computer vision research and development. The company wanted to find and evaluate the most successful algorithms and technologies applicable to AVID systems. Based on its research, it defined several key components of a new, modern AVID system: vehicle and pedestrian detection, a tracker that tracks the detected object's movement through space, and an incident classifier that is based on object tracking.

### A sophisticated approach

All of the above-mentioned components use artificial intelligence (AI) algorithms. AVID based on those concepts, already in its first iteration, provides more precision

(90% fewer missed alarms), and a notably reduced number of false alarms (over 25% fewer false alarms). But most importantly, this kind of AVID is not technologically limited, and allows for continuous improvement and development. It should be pointed out that this detection concept doesn't have the limitations of a traditional AVID systems. Also, this modern concept surpasses traditional AVID systems and solves traditional issues. For example, it can quickly detect vehicles driving in the wrong direction in bidirectional traffic (traditionally vehicles would have to drive 60m in the wrong direction in order to be detected). It provides reliable pedestrian detection that is not limited by distance and there are no limits for pedestrian detection in slow traffic. Also, the detection of pedestrians, slow vehicles and traffic jams does not depend on whether the road is straight or not (with traditional systems, the road has to be straight, without slopes).

The performance of the new system is not affected by variations in illumination, nor is it impacted by camera movements or shaking. Furthermore, moving shadows (which are created by the sun or car lights) do not affect precision and do not cause false alarms.

Using the modern computer vision technologies in Telegra's X-AID system, the negative limitations of traditional AVID systems are substantially reduced or completely avoided. ■