



TELEGRA

SMART TRAFFIC MANAGEMENT

Integrating Video Surveillance ITS

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Introduction

Video surveillance (Closed Circuit Television – CCTV) is a mandatory system in all intelligent traffic control systems. Even though today's highways are equipped with a variety of high-tech sensors that superbly depict current traffic situations at any given time, a picture from a live video feed is, after all, worth a thousand words.

CCTV System consists of several parts. Cameras alongside highways and tunnels, and monitors or video-walls inside the command center are the fundamental parts of the system. The CCTV System is more complex the more cameras are used. Part of the complexity is the function to show feeds from any camera on any monitors or video-wall. Another part of the CCTV System is a Camera Remote Control System (CRCS), which enables the user to zoom in, zoom out or rotate cameras. Camera manipulation is feasible through a specialized keyboard and joystick at the command center.

Often times there are more cameras on the road than monitors available at the command center. In those situations an operator needs assistance of Video Detection System (VDS) to keep checking the entire traffic area uninterrupted.

Video Detection System (VDS) has the capability to analyze video snapshots and detect possible irregularities or critical situation in traffic flow. Most common VDS analysis algorithms are vehicle detection, vehicle driving the wrong way, speed and size of the vehicle, stopped vehicle, smoke, fire, etc.

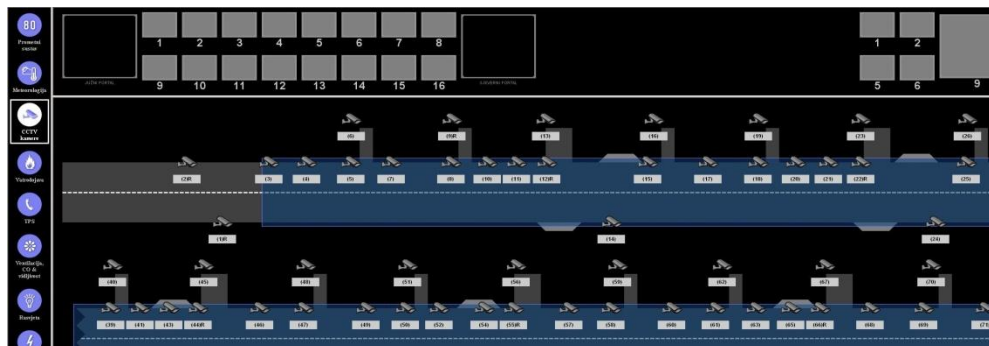
Integrating the VDS with CRCS could be of great assistance to the operator. VDS points out the camera feed where the alarm came from, and the operator can switch the feeds to the appropriate monitors, focusing all of the attention to only the alarmed area out of hundreds of live camera feeds.

The question is – is that enough? Does this integration mentioned above give us enough data to act promptly and keep the roads safe enough? Most of the operators will answer no to that question. The complaint is most of the cameras show similar environment with not enough characteristic details to recognize on which kilometer of the highway the accident happened at. Telegraf's **topXview** offers the technological solution to that problem as well.

Operating the Video System

Operating Video System is easy because it is integrated, together with all other implemented systems, in one graphical user interface (GUI). Just like for other systems, GUI follows easy-to-use, intuitive way to navigate through Video System eliminating confusion, elaborate operator procedures, search for the correct system keyboard, etc.

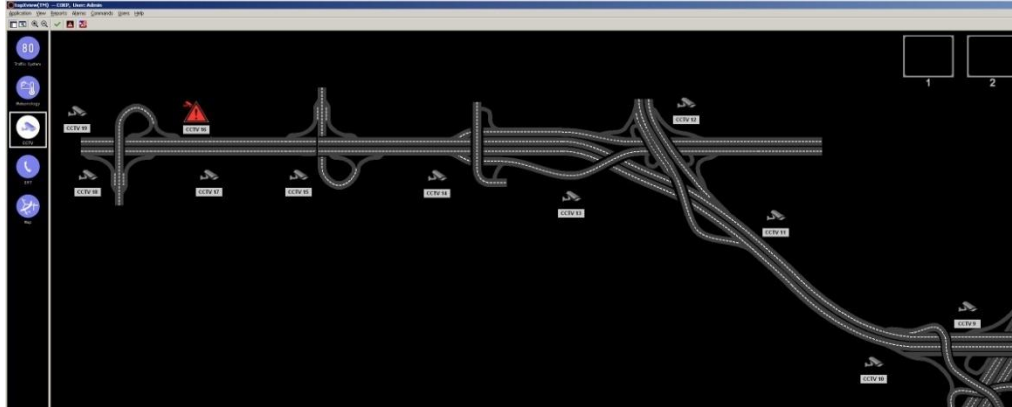
Centralized control allows the operator to select desired camera feed on GUI. The position of the camera on GUI is arranged precisely to reflect its actual location on the road (Figure 1). It is also possible to show different video-wall feed layouts.



Picture 1 CCTV integration in topXview tm program system

Integrating the AID System

Integrating the Automatic Incident Detection (AID) System in Central Operating System gives room to implement automatic procedures, and allows the operator to quickly become aware of the precise accident location (Figure 2). It is of great help and importance for an operator to be able to locate the alarm/accident and, at the same time, see the video feed from the camera at that very location.



Picture 2 Integration of AID system in topXview tm program system

When integrating AID system in Central Operating System, it is important to know that AID is not totally reliable. One should not rely solely on data from AID before employing completely automatic procedures. To circumvent the drawback of AID, it is of great importance the system interacts with the operator (Figure 3 = diagram 1)

AID detects smoke inside the tunnel and triggers the alarm. This starts the automatic procedure for closing the tunnel in case of fire. However, the reliability of this alarm is too small to allow such an immense action. The following steps should precede the tunnel closing algorithm

- after receiving the alarm show the video feed from the camera detecting the smoke
- automatic procedure must offer the operator to confirm or cancel the alarm
- based on operators decision, the automatic procedure is started, or the system returns to normal operation mode

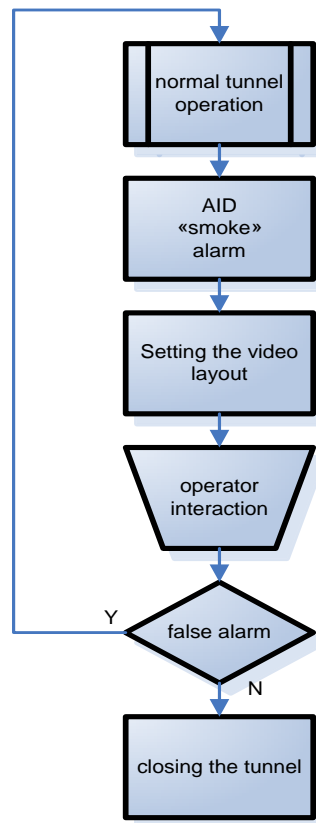


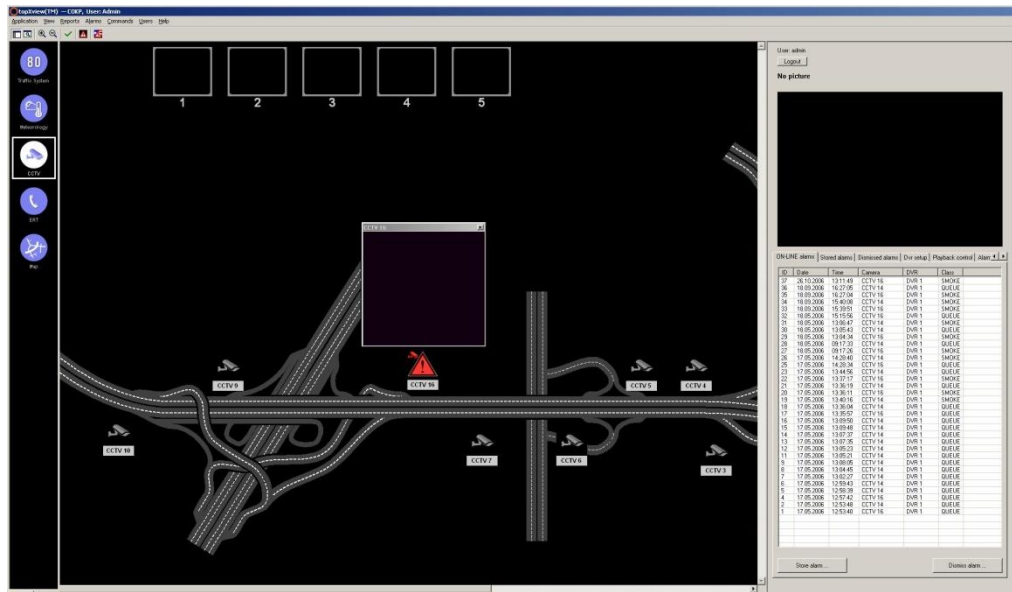
Diagram 1 Reaction of automatic process on AID alarm

The steps described above will ensure the shortest response time, the simplest interaction and no traffic interruption in case of a false alarm. The fire alarm response time described above is even shorter (by a few minutes) than the response time of a completely automated reaction received from the fire alarm station/fire department.

Ergonomic Integration

Showing video feed on Central Operating System GUI has a great advantage. The operators focus is drawn directly to the segment of the road the video feed is coming from and can immediately see what kind of traffic control equipment is available at that location. It is important to point out that the number of simultaneous video feeds is limited by the computer processor speed and graphical capabilities.

Integrating video feed with Central Operating System GUI is another convenience which will enable the operator to quickly localize traffic irregularity and take action in the shortest amount of time.



Picture 3 Ergonomic integration of CCTV in topXview tm program system

Conclusion

Today almost all Operating Centers are equipped with some kind of video surveillance. That is especially true for those Operating Centers that control traffic. Even though unavoidable, video feed can not control traffic, it only helps the operator make a decision. The real traffic control is made up of many manual, semi-automatic and automatic procedures the operator has to navigate through. Integrating Video System with central Operating System makes the operators navigation and traffic supervision easier, decision-making more rational, and response time much shorter, making the road safer.