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CASE HISTORY

PSA Italy - Genova Pra’ Terminal

Artificial intelligence for port security

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Adopting the best technologies to meet the increasingly stringent safety and security requirements is one of the missions of PSA Genova Pra’, the most important container terminal in the Port of Genoa and the Upper Tyrhenian Sea, equipped with some of the most modern and efficient facilities in the entire Mediterranean Sea. For this reason, PSA Genova Pra’ has chosen Aitek for the development of video applications for the security of the terminal: a consolidated technological partnership that has crossed the prestigious milestone of twenty years and that has allowed PSA Genova Pra’ to equip itself with cutting-edge systems with few equals in the world.

The first collaboration dates back to 2003, when Aitek implemented a video security solution where video streams from analogue cameras were converted to digital using a video server specially developed by Aitek, a state-of-the-art solution at the time.

Over the years, the system has been progressively expanded with the installation of high-resolution IP cameras and upgraded with the wide range of software products from Aitek’s AiVu video security platform.

The advent of smart technologies is transforming port terminals into places of innovation equipped with state-of-the-art systems whose deployment improve safety, operational efficiency and productivity.

The automation of many operations and transit procedures at the access gates, the advanced video monitoring through artificial intelligence and the data digitalization are just some of the many innovations that are redefining the harbour logistics.

In terms of security, the main challenge is the need to protect large areas and complex infrastructures using systems capable of automatically detecting potentially dangerous situations in real time, in order to support the work of security personnel and reduce intervention times in case of critical events.

Aitek and PSA Italy, a successful technology partnership

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An innovative approach to port security

Today, the system manages more than 150 cameras positioned at the focal points of the terminal to ensure video monitoring of docks, perimeter areas, access gates, railway yards, operating yards, buildings and parking areas, even at night and in poor visibility conditions. The entire management of the system is entrusted to Aitek’s AiVu-VMS video management software, capable of offering a complete response to any security requirement. All video streams from the cameras are managed through a single interface and sent to the video decoders for displaying the images on the monitors and video walls of the PSA Genova Pra control room.

However, relying solely on the human eye to monitor a large number of cameras is impossible. Therefore, as in all new-generation security applications, artificial intelligence is the ideal solution.

To achieve a higher level of efficiency, the video surveillance system has been integrated with a set of video analytics algorithms developed by Aitek, which process the images from the cameras to automatically detect potential security threats to people, goods and infrastructure in real time.

The greatest innovation involved the use of video analytics algorithms based on deep learning, the image processing technique that allows algorithms to ‘learn’ directly from experience, without being constrained by pre-defined mathematical models. In particular, deep learning is based on the training of very sophisticated neural networks to achieve very high reliability in the analysis of images and footages in any shooting conditions, even in case of camera shake due to wind. As the name suggests, neural networks are designed to mimic our brains, although on a much smaller scale. In fact, much like the human being, the neural network improves its performance as the events from which it learns increase over time, correcting any processing errors or adapting to new situations.
Automatic, real-time event detection

The use of these sophisticated AI techniques provides significant support to the control room operators of PSA Genova Pra'. A monitor on the video wall is dedicated to displaying images from the alarmed cameras. Each time a new event occurs, the operators' attention is drawn by visual and sound signals that highlight the frame in which the alarm-related images are displayed. In addition, the system automatically starts tracking the subjects and automatically zooms in to show every detail. Operators can therefore see not only the live footage from the camera involved in the event, but also a close-up image (crop) of the situation.

The live stream from the camera in alarm is displayed on the monitor, while a special frame (Picture-in-Picture) shows the zoom detail of the person detected by the neural network trained to recognize the human silhouette: the zoom automatically adapts to follow the subject's movements within the frame with maximum precision.

But what are the events detected by video analytics algorithms? Here are some examples. Speaking of safety, the solution developed by Aitek is able to detect and track people inside dangerous areas (e.g. near cranes or operating vehicles); or track people walking along the railway tracks or crossing the lanes of the road gate, with the risk of accidents.

Related to terminal security are events such as the detection of people entering from the perimeter areas or the railway gate (when this is open to allow the transit of convoys), or unauthorised access of people from the road gate lanes, especially during the closing hours.

Aitek and PSA Genova Pra': together towards the future

The continuous attention to technological developments and the effective cooperation relationship established between the IT departments of the two companies are the keys of the success of the video security project that Aitek has developed for the PSA Genova Pra' terminal: a constantly evolving solution that has achieved the highest standards of quality, efficiency and reliability.
Intrusion detection

1 - Real-time detection of people walking near the tracks while a train is passing.

2 - Real-time detection of a person attempting to enter the terminal during gate closing time.

People detection and tracking

3 - The Picture-in-Picture feature for tracking people detected within the frame.

4 - A display in the control room is dedicated to displaying the video streams associated with the alarms generated by the video analytics algorithms.
The entire video surveillance component is managed by Aitek’s AiVu software platform: the AiVu-VMS video management system, the clients for managing the decoders and the videowall, the monitors for displaying the alarms generated by the artificial intelligence algorithms.