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Use of Tailgate Detection Systems on Escalators

Background Information

An escalator is essentially a moving staircase that is used to transport pedestrian traffic from one level of a facility to another while requiring a minimum amount of work by the passengers.

Many of the escalators installed in transportation facilities, as well as government and commercial facilities, are used to convey people from a secure area of the facility to a non-secure portion of the facility. Supervision of the escalator is required to ensure that unauthorized persons do not attempt to gain access to the secure areas by going the wrong way.

Problem Description

Escalators continue to be installed in locations that require security processes be modified or added to preclude unauthorized individuals from entering the secured areas. The logic for using escalators is that they allow large volumes of pedestrian traffic to move between levels in a safe and speedy manner. This is especially true in facilities such as airports where there are typically numerous levels available to passengers, yet one way motion is essential for security purposes.

In an airport such as Chicago O'Hare the common areas of the airport are divided into areas that define function as well as various levels of security protection. As an example, the lower level of the airport is used for baggage claim, immigrations and customs, and ground transportation staging. The upper level is used for airline offices, ticketing, security screening, and aircraft boarding. Intermingled within these common areas are a number of restricted or secure areas. Passengers that have arrived from the aircraft on the upper level must get to their baggage on the lower level. The easiest way to move these people between the floors is through the use of escalators.

The major problem that presents itself in this scenario is passengers that have just arrived or are waiting to board have been screened and are held in the *sterile* area. This is the area of an airport where all entrance to this space must be strictly controlled to prevent the introduction of dangerous goods or weapons. This seems simple enough until we look at the escalators that leave the sterile area and carry arriving passengers to the unsecured baggage claim area on the lower level. There is suddenly a conflict between

NEWTON SECURITY INC.
443 SW 41ST STREET, RENTON, WA 98055 USA
TEL: (425) 251-9494 FAX: (425) 251-6236
www.newtonsecurityinc.com

the need to secure an area and the need to efficiently move people within a facility. The escalator in of itself has no way to protect against persons going the wrong way, therefore, security personnel must be assigned to constantly monitor the flow of pedestrian traffic either leaving or entering onto the escalator to insure compliance with security requirements.

This exact scenario exists at Atlanta-Hartsfield International Airport and on November 16, 2001 an individual sprinted past security officers and disappeared into the crowd. This action required that the busiest airport in the United States be closed for four hours and caused flights across the nation to be disrupted, resulting in millions of dollars in financial loss for the airline industry.

Solution

The addition of a T-DAR® (Tailgate Detection and Alarm Recording) system to an escalator system will directly and immediately solve the problem of undetected entry during normal operation. The system will alarm both locally and remotely, as well as document the event via digital video recording. This information is then communicated to a central control center for processing. T-DAR is additionally capable of monitoring for thrown objects to preclude the introduction of contraband into a sterile area.

A Direction Violation alarm occurs when the system has detected a tailgate violation. It is annunciated locally with a horn/siren and flashing light, and remotely with an alarm contact output and event video loop replay. A Thrown Object alarm occurs when the system detects a thrown object moving in the unauthorized direction of travel. Thrown Object alarms are annunciated locally with a verbal message, and remotely with an alarm contact output and event video loop replay. Each event video replay has the time/date, location, and type of alarm displayed in the lower left corner of the designated screen.

The patent-pending T-DAR system for doors, mantraps and other portals also utilizes 3 Dimensional Stereo Machine Vision analysis to evaluate each access cycle to guarantee that only one person passes through the portal for each valid access card presented. The system is able to discriminate between carried items, carts, luggage, and so-forth, allowing the unimpeded access of authorized persons carrying out day-to-day tasks. The system consists of the following components: a stereo-optic camera head for overhead image capture, a Pentium processor/controller for system processes, and an annunciator box for local audible and visual notification of alarm events. The system is interfaced with the existing access control system for the purpose of gathering access and door position information, and for communicating alarms. Additionally, an event camera is connected to the system to allow the capture of alarm event information for review by authorities when responding to alarms.

Summary

This document has shown the need for implementation of T-DAR® (Tailgate Detection and Alarm Recording) for escalator systems. With the application of 3 Dimensional Stereo machine vision technology, it is now possible to accurately detect and document security violations as they occur.

Additionally, the T-DAR product is well suited for virtually any application requiring tailgate/piggybacking detection. The product is being deployed in both commercial/corporate environments, as well as in government and military applications.

For questions on this application note, or for more information on T-DAR and other machine vision-based security solutions, please contact the author via e-mail at dwoody@newtonsecurityinc.com