Progress in Recording Entrance/Exit Imaging "Visual Surveillance Systems" "Flapper Gate"

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Abstract

Enforcement of the Personal Information Protection Law has quickly stimulated activities aimed at security enhancement. The NEC Networks & Systems Integration Corporation is developing an integrated system to connect the existing "entrance/exit magament" system with the "tresspassing surveillance" and "image surveillance" systems. Its aim is to implement a system that can record entrances and exits together with images enabling the identification of actual persons. This paper introduces an outline of the flapper gates and image surveillance system that were exhibited at the last iEXPO2005.

1. Introduction

Enforcement of the Personal Information Protection Law has quickly stimulated activities that are aimed at security enhancement . Those businesses awarded ISMS and P status have also been increasing rapidly and by the end of 2005 (Source: Japan Information Processing Development Corporation website), have respectively reached circa 1270 (about twice the previous year) and circa 2900 (about three times the previous year). However, according to a survey undertaken by a private organization, more than half of Japanese businesses, particularly the small and medium sized businesses, do not apply any security measures at all. Based on these trends, the NEC Net-

works & System Integration Corporation began a study into system integration by combining existing technologies such as the "entrance/exit management," "tresspassing surveillance" and "image surveillance" in order to implement a visual entrance/exit record system that is capable of identifying persons entering or exciting a facility as shown in **Fig. 1**.

At the last iEXPO2005, we exhibited the "NEC Security Zone," a visual surveillance and flapper gate systems and offered an experience tour to visitors, in which they could confirm their own images passing through the flapper gates. They could also experience the effects of physical and IT security linkages such as an interlocking with the security systems of other group companies by using IC cards as the common means of authetication. This paper is intended to outline the two systems that we exhibited on that occasion.

2. Visual Surveillance System

Usually we perform system integration by selecting those visual surveillance systems that are considered to be suitable for the customers' requirements. In the following sections, we will describe the Argus BOX that we exhibited in iEXPO2005.

(1) Outline

The Argus BOX is an all-in-one type visual surveillance system that incorporates in a compact cabinet all of the functions for the monitoring, control and recording of the images that are captured by the surveillance cameras. It is an extendible visual surveillance system equipped with an I/O controller as well as various sensors for recording image events by inputting signals from the flapper gates and the entrance/exit
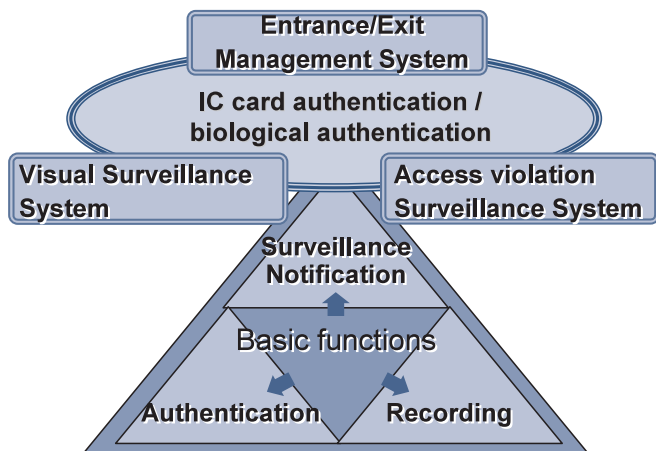

Fig. 1 Concept of Physical Security Solution.

Standard web camera (w/ built-in MPEG4 chip)
• Pan/tilt: Available
• Zooming: Not available
• Minimum subject illumination: 1 lux

Wireless LAN camera (w/ built-in MPEG4 chip)
• Pan/tilt: Available
• Zooming: Not available
• With built-in IEEE802.11G wireless LAN
• Minimum subject illumination: 1 lux

High-sensitivity zoom camera (w/ built-in MPEG4 chip)
• Pan/tilt: Available
• Zooming: Max. 100X
• Day/Night function
• Minimum subject illumination: 0.05 lux

Darkview web camera (w/ built-in MPEG4 chip)
• Pan/tilt: Not available
• Zooming: Not available
• Built-in IR system
• Minimum subject illumination: 0 lux

Fig. 2 Camera Lineup.

management system.

(2) Main Functions

The main cabinet incorporates the UniArgus surveillance control software that has the following main functions.

1) Monitoring, control and recording of surveillance images.
2) Search and reproduction of recorded images.
3) Moving object detection.
4) Event recording based on interlocking with sensors.
5) Mail notification in case of an event.

(3) Product Lineup

The Argus BOX lineup consists of the following seven products that can be categorized into three types according to their small to large scale applications.

1) Analog camera/network camera combined type (Entry/Middle/Enterprise)

Three products are available according to the number of connected cameras. When a customer already owns existing analog cameras, it is possible to use them in the new system while also adding network cameras.

2) Network camera-only type (NET8/NET16/NET32)

This type is for the exclusive use of network cameras and three products are also available according to the number of connected cameras.

3) Centralized surveillance type (Station)

This type is used for the centralized surveillance and recording of cameras installed in multiple points. It is also capable of connecting the ArgusBOXes described in 1) and 2) above for the centralized surveillance of the entire system. The main system uses an Express server to enable high-performance, flexible system configuration that covers storage expansion and backup using RAID configuration.

(4) Features

1) Recording capacity according to customer requirements

The ArgusBOX incorporates a 240G- to 400G-byte HDD as standard. The recording capacity can be expanded without limitation by connecting additional storage as required.

2) Interlocking with sensors and entrance/exit systems

Various signals can be connected to the I/O controller for use in event surveillance control for triggering recording.

3) Centralized surveillance in a broad-area network

Centralized surveillance and recording remote locations becomes possible by building a broad-area network via the Internet.

4) Analog camera/ network camera mixed image display

Video signals of different formats from two kinds of cameras can be displayed simultaneously on a single screen for surveillance purposes.

(5) Compatibility with Various Cameras Including the Exclusive High-Compression Network Camera

See **Fig. 2**, "Camera Lineup" together with the following text.

The network camera designed for use with the ArgusBOX incorporates a MPEG4 codec chip for converting the images captured with the cameras into the MPEG4 compression format. This enables communication of highly compressed data, so that the transmission capacity can be reduced as well as the recording capacity of the destination.

The ArgusBOX accepts connections of different models of network cameras from the camera manufacturers so that a setup matching the installation environment is enabled.

The analog camera-compatible ArgusBOX can accept signals from any analog camera as NTSC video signals, regardless of the camera model.

(6) Highly Reliable Entrance/Exit Imaging Records

1) Interlocking of entrance/exit management systems and visual surveillance system

The core of the physical security system is the entrance/exit management system that is interlocked with an authentication

Photo 1 The flapper gate image captured in the iEXPO hall.

system. The traditional entrance/exit management systems performs authentication based on the individual ID data that has been registered in the IC card, etc. in advance, and record the entrance/exit information in a log. The log presupposes that the person who makes entrance or exit based on authentication is the owner of the IC card, etc. but in reality it cannot confirm that it is actually that person using the card. If a person uses a lost card or two persons attempt to make an entrance by "piggybacking," the log cannot record the data correctly.

When this system is interlocked with the ArgusBOX and the entrance and exit images are recorded, it is possible to confirm if the person is the real person. **Photo 1** shows an image captured in the iEXPO hall based on interlocking with the flapper gate. We actually asked the visitors to confirm their own images passing the flapper gates.

2) Retroactive recording and sensor interlocking

The Argus BOX has a retroactive recording function. This is triggered by event information such as the opening or closing of a door and the image is recorded for a total period of 2 minutes 30 seconds beginning with a maximum of 30 seconds before the occurrence of the event. This function makes it possible to identify the authentication situations and the behaviors of persons making entrance and exit.

Similarly, recording can also be triggered by interlocking with sensors such as breaking glass sensors and human sensors. In these cases, too, the image before and after the sensor detection can be recorded for use in the verification of each event.

(7) Future Perspectives of Visual Surveillance Systems

A large-scale surveillance system connecting multiple points is accompanied with the problem of line cost for obtaining high-resolution images. In the future, in order to reduce line and storage costs we intend to introduce systems that will provide compatibility with more advanced image compression technologies.

3. Flapper Gate

(1) Outline

The flapper gate (hereinafter referred to as "the gate") is a two-way gate allowing both entrance and exit, which is installed in order to pass to and from an area that requires sure identification. It also records the persons passing it, which is usually controlled by an entrance/exit management system that is installed at the same time as the gates. The persons passing the gates are usually identified by a non-contact type IC card but another method based on a request by the customer can also be used. The advantages of NEC's gates compared to ordinary gate products include a design that assumes outdoor installation and the provision of a system for collecting IC cards in card holders.

(2) The Aims of Gate Installation

We are recently receiving active inquiries about this gate product, and increasing numbers of those showing interest aim to use such gates as well as conventional entrances to facilities where security is important.

In order to ensure the security of entire premises or a building the methods of applications that are requested are as follows:

1) To permit persons to line up and pass each gate one by one

This process can collect individual passage data and thus prevent "piggybacking" by which means a person may pass a gate illegally together with an illegal person.

At the same time the system also has the psychological effect of deterring tresspass by persons attempting illegal entry.

2) Management systems to manage personnel movements by interlocking with other information systems

The records of ID codes and actual entrance/exit times can be applied to duty management, flow line tracing and the identification of the number of persons actually on the premises. This process will result in economic benefits for the organization.

3) To reduce the security guard load at the entrances

As the system can clearly distinguish in advance between those who are permitted entrance and visitors, etc., the security personnel don't have to examine the ID cards of everyone passing the gate, so the work load of the security personnel can be reduced.

(3) Types of Gates

The gates are available in the following two types. Both types include a side unit that supports a flapper and a central

Photo 2 Image of hyper-door type gate.

unit that has flappers on both sides. These two types can be combined to assure the required number of passages.

1) Flap type gate

This is the standard type. The main body length is either 1,000mm or 1,500mm and can be selected according to the installation space.

The standard passage width is 550mm but a 900mm width is also available for the passage of wheelchairs.

2) Hyper-door type (**Photo 2**)

A door of this type has a height of 1,500mm, so that vaulting over it or tresspass by short people including children can be prevented. It slides instead of revolving and it is made of clear tempered glass that features a similar strength to a standard resin door. The passage width is 600mm.

(4) Features

1) Outdoor installation capability

This type of gate was originally developed for use as a ticket gate for lifts at skiing grounds and about 250 units have already been delivered for this purpose. Such gates with outdoor installation capabilities comply with the outdoor dust/water prevention specification (IP55:International Protection Standard).

2) Results achieved in Japan's state-of-the-art entrance/exit management systems

About 60 gates are in 24-hour service in the entrance/exit management systems at the NEC Head Office and other divisional offices since starting operation in October 2004.

3) Free installation

The gates are usually installed by fixing the base of the main body directly to the floor. However, when they are installed in an existing office where work to the floor surface is not per-

mitted, they can also be installed by the "passage plate method." With this method, 30mm high passage plates are installed in the passage areas and the gate main bodies are fixed to them. This method enables a relatively open installation layout.

4) IC card collection mechanism

A function for collecting the IC cards, each of which are accommodated in a card holder can be added optionally. Collecting the IC cards automatically when visitors exit the premises, makes it possible to prevent the IC cards from being lost or carried away.

(5) Safety Measures

The gate has the following three safety measures for preventing people from getting caught in the doors. In addition, a safety mechanism for preventing the catching of hands and fingers is also provided for the main body and doors. The gate functions primarily to prevent entry by illegal persons but its safety-first design is able to limit its tresspass prevention measures to an acceptible range.

1) Compliance with the human catching prevention standard

In Japan, the safety standard for preventing automated doors from catching people is planned to be enacted soon. However, the gate design already complies with the existing prEN12650-1 and prEN12650-2 EU safety regulations that define the requirements and test/inspection methods for construction equipment categorized as "automatically closing pedestrian doors". These regulations contain the requirements for preventing accidents with any kind of automatically closing pedestrian door, including sliding doors, swinging doors and revolving doors. They define that the potential force of mobile parts of the doors, etc. should be below 75 Newtons in case of trouble being caused by the failure of a safety device or control. Our gate is also designed so that the catching force is within specified limits even when all of the safety device functions are removed or the system status is not controllable.

2) Catching prevention by using sensors

The main body incorporates multiple sensors, which prevent catching by restricting the opening and closing of the door based on the relationship between the position of the person passing the door and the moving parts of the door.

3) Gate operation setting in case of an emergency

When a fire or power failure is detected the doors are set free so as not to obstruct the emergency evacuation of people.

(6) Future Perspectives for Gates

The primary future issue is still the enhancement of the individual identification capability. The present system assumes that persons passing the gates are real persons who are registered in the IC cards. However, future systems will be required to improve interlocking between the gates and the

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entrance/exit and image management systems so that person identification is more rapid and assured and a rapid detection of malicious tresspassers is enabled.

4. Conclusion -Future Developments-

Following the recent trend for financial institutions to run 24 hours a day, increases in the number of unattended shops and the spread of cellular phones, crimes associated with such systems are becoming more diversified and complicated than ever. We believe that a suitably effective means for preventing these crimes and of damage due to them is via an effective utilization of image security. At the NEC Networks & System Integration Corporation, a team specializing in physical security is analyzing the various risks that result from such crimes and are developing activities for the embodiment of suitable countermeasures. We believe that this strategy will enable our customers to be supported by more advanced physical security solutions.

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