

TITLE OF THE INVENTION

ELEVATOR REMOTE MONITORING SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001]

The present invention relates to a remote monitoring system for an elevator.

2. Description of the Related Art

[0002]

In a conventional elevator security device, the following configuration is known. Specifically, occurrence of rampage movement of a passenger is detected from a camera image of a security camera device in an elevator car, an operation of an elevator is automatically controlled according to the rampage situation of the passenger, and the camera image is recorded in association with detection information of the rampage movement of the passenger.

[0003]

For example, in JP 2007-31017 A, the following configuration is devised. Specifically, when a rampage situation of the passenger is detected by a camera that is installed in an elevator car and captures a passenger in the car, an image monitoring device that detects a rampage

situation of the passenger from the recorded image captured by the camera, and a recorder device that is notified of a detection result and changes the recording density of the recorded image to a high density when the image monitoring device detects the rampage situation of the passenger, the rampage situation of the passenger is notified to a security company or an owner depending on the degree of the situation of the rampage detection of the passenger.

SUMMARY OF THE INVENTION

[0005]

According to JP 2007-31017 A described above, the notification destination of the detection of the rampage movement of the passenger is only the security company or the owner of a building in which the elevator with the rampage detected is installed. A suspicious person (passenger who has performed the rampage movement) may escape to a building in the neighborhood and move using an elevator installed in the building in the neighborhood. For this reason, for an owner of the building in the neighborhood, there is a possibility that the suspicious person who has caused the rampage movement in another building and another passenger will ride on the elevator in the own building at the same time, and the owner may feel that the security measures of the own building are not

sufficient.

[0006]

An object of the present invention is to improve the crime prevention property of a building.

[0007]

In order to achieve the above object, an elevator remote monitoring system according to the present invention includes an alert receiving unit and a direct operation setting unit. The alert receiving unit receives an alert which means that rampage movement of a passenger has been detected from an image captured by a camera installed in a car of a first elevator from a first management system that is installed in a first building including the first elevator and manages the first elevator. The direct operation setting unit transmits a switching command, which is a command to switch to a direct operation, to a second management system that manages a second elevator of a second building located at a position defined as being located in a neighborhood of a position of the first building when the alert is received.

[0008]

According to the present invention, the crime prevention property of the building can be improved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009]

Fig. 1 is a diagram showing a configuration of an elevator remotely monitored by a monitoring center device, which is an example of an elevator remote monitoring system, according to an embodiment of the present invention;

Fig. 2 is a diagram showing a configuration of an entire system including the monitoring center device;

Fig. 3 is a diagram showing an example of a status management screen of a building B;

Fig. 4 is a flowchart showing processing of switching to a direct operation; and

Fig. 5 is a flowchart showing processing of returning to a normal operation.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0010]

In the following description, a "communication interface device" may be one or more communication interface devices. The one or more communication interface devices may be one or more similar types of communication interface devices or two or more different types of communication interface devices.

[0011]

Further, in the following description, a "memory"

may be one or more memory devices which are an example of one or more storage devices, and may typically be a main storage device. At least one memory device in the memory may be a volatile memory device or a non-volatile memory device.

[0012]

Further, in the following description, a "permanent storage device" may be one or more permanent storage devices which are an example of one or more storage devices. The permanent storage device may typically be a non-volatile storage device (for example, an auxiliary storage device), and specifically, may be, for example, an HDD (Hard Disk Drive) or an SSD (Solid State Drive).

[0013]

Further, in the following description, a "storage device" may be at least a memory of the memory and a permanent storage device.

[0014]

Further, in the following description, a "processor" may be one or more processor devices. At least one processor device may typically be a microprocessor device such as a CPU (Central Processing Unit), but may be another type of processor device such as a GPU (Graphics Processing Unit). At least one processor device may be a processor device in a broad sense such as a circuit which is an

aggregate of gate arrays by a hardware description language that performs a part or all of processing (for example, FPGA (Field-Programmable Gate Array), CPLD (Complex Programmable Logic Device), or ASIC (Application Specific Integrated Circuit)).

[0015]

Further, in the following description, the function may be described by the expression of a "yyy unit", but the function may be realized by executing one or more computer programs by a processor, may be realized by one or more hardware circuits (for example, FPGA or ASIC), or may be realized by a combination thereof. When the function is realized by executing the program by the processor, the specified processing is appropriately performed using a storage device and/or an interface device, so that the function may be at least a part of the processor.

Processing described with the function as the subject may be processing performed by a processor or a device having the processor. The program may be installed from a program source. The program source may be, for example, a program distribution computer or a computer-readable recording medium (for example, a non-temporary recording medium).

The description of each function is an example, and a plurality of functions may be combined into one function, or one function may be divided into a plurality of

functions.

[0016]

Further, in the following description, a common code among reference codes may be used when the same type of elements are not distinguished, and a reference code may be used when the same type of elements are distinguished.

[0017]

An elevator remote monitoring system according to an embodiment of the present invention will be described in detail below with reference to the drawings.

[0018]

Fig. 1 is a diagram showing a configuration of an elevator remotely monitored by a monitoring center device, which is an example of the elevator remote monitoring system, according to the embodiment of the present invention.

[0019]

For example, the elevator mainly includes a hoistway 1, a car 5 on which an elevator user rides, a counterweight 4, a motor 3 installed at an optional position, a main rope 2 that is wound around the motor 3, to which the car 5 and the counterweight 4 are suspended, an elevator control device 7 that controls an elevator operation, an elevator monitoring device 8 that monitors the elevator, a control panel 6 that houses the elevator control device 7 and the

elevator monitoring device 8, and a communication device 9 that communicates with a monitoring center device 11 via a communication line 10.

[0020]

The elevator monitoring device 8 includes an elevator monitoring unit 20 that monitors the elevator, an operation data receiving unit 21 that receives operation data of the elevator, and an operation method switching unit 22 that switches an operation method of the elevator.

[0021]

According to the example shown in Fig. 1, there are first to fourth floors. The hoistway 1 is for four floors. A landing door 12 is installed at a landing on each of the first to fourth floors. By reversing the motor 3 in the forward and reverse directions, the car 5 is driven up and down. The car 5 stops at a landing level 14 indicating the stop position of each floor according to the destination floor, and a car door 15 and the landing door 12 on the landed floor open. The up and down drive of the car 5 is performed by registering the destination floor with a car call button 16 in the car 5 or by calling the car 5 with a landing call button 13 provided at the landing on each floor. In addition, an image monitoring device 17 capable of detecting rampage movement of a passenger (for example, a camera in the car 5 and a device that analyzes an image

captured by the camera) is installed in the car 5. The image monitoring device 17 communicates with the elevator monitoring device 8 by a communication line (not shown). The "passenger" refers to an elevator user in the car 5.

[0022]

In the present embodiment, there are a "normal operation" and a "direct operation" as the operation method of the elevator.

[0023]

The "normal operation" is an operation method in which the car 5 stops both on the destination floor registered by a car calling and on the destination floor registered by a landing call.

[0024]

The "direct operation" is a driving method for the purpose of preventing another passenger from riding on the same car at the same time, and is an operation method that does not respond to a landing call and goes directly to the destination floor while driving with a car call. Specifically, the direct operation is an operation method that satisfies the following (a) and (b).

(a) If there is a passenger (in other words, if there is a destination floor registered by a car call), the car 5 does not stop on the destination floor registered by a landing call, but the car 5 stops only on the destination

floor registered by the car call.

(b) If there is no passenger (in other words, if there is no destination floor registered by a car call), the car 5 stops on the destination floor registered by a landing call.

[0025]

Fig. 2 is a diagram showing a configuration of an entire system including the monitoring center device 11. In the example shown in Fig. 2, there are a building A (building 18A) and a building B (building 18B) as an example of a plurality of buildings having a plurality of elevators. The reference code of the element in the building A ends with "A", and the reference code of the element in the building B ends with "B". Further, in the present embodiment, it is assumed that an owner of the building A has subscribed to an option contract for rampage detection, and an owner of the building B is trying out the option contract for rampage detection. The "option contract for rampage detection" is one of option contracts of a maintenance contract for an elevator, and is a contract to use a service that switches the operation method to the direct operation when rampage movement is detected in the building 18 with the consent of the owner of the building 18 (or automatically without the consent of the owner).

[0026]

An example of the outline of the present embodiment is as follows. When an image monitoring device 17A of the building A detects rampage movement of a passenger from an image captured by a camera installed in a car of an elevator of the building 18A, the rampage detection is notified. An elevator monitoring device 8A receives the notification, generates an alert, and transmits the alert to the monitoring center device 11. The monitoring center device 11 includes an operation data collection unit 26, an alert receiving unit 25, an average waiting time calculation unit 33, an implementation period calculation unit 27, a status notification unit 29, and a direct operation setting unit 28. The operation data collection unit 26 collects, as operation data, registration number information indicating the number of registrations of landing calls during an operation (typically during a normal operation) of the car and waiting time information indicating a waiting time from creation (registration) of a landing call to arrival of the car to a destination floor of the landing call, from the monitoring device 8 of each building 18. The alert receiving unit 25 receives the alert of the rampage detection from the elevator monitoring device 8A. For example, the alert receiving unit 25 identifies the building A from the received alert,

identifies the building B as a building in the neighborhood of the building A, and notifies the average waiting time calculation unit 33 and the status notification unit 29 that the alert has been received from the building A, and the building in the neighborhood of the building A is the building B. The average waiting time calculation unit 33 calculates the average waiting time from the creation of the landing call to the arrival of the car for each operation method (each of the normal operation and the direct operation) from the operation data collected for the building B. The implementation period calculation unit 27 compares the average waiting time for the direct operation and a determination threshold value, and calculates the implementation period of the direct operation. When the direct operation setting unit 28 receives rampage detection of the building A, the direct operation setting unit 28 provides a notification of the appearance of a suspicious person and a proposal for switching the operation method of the elevator to the direct operation during the period calculated by the implementation period calculation unit 27 to an owner of the building B in the neighborhood of the building A in addition to (or instead of) an owner of the building A. When the direct operation setting unit 28 receives the consent from the owner of the building B to switch to the direct operation, the direct operation

setting unit 28 transmits a command to switch to the direct operation to an elevator monitoring device 8B of the building B.

[0027]

According to this outline, the monitoring center device 11 notifies the owner of the building B in the neighborhood as well as the owner of the building A of the rampage detection in the building A, so that the owner of the building B in the neighborhood as well as the owner of the building A can know the appearance of a suspicious person. In addition, by switching the operation method of the elevator of the building B to the direct operation for a certain period of time, the user can use the elevator in the building B with peace of mind even in a situation where a suspicious person appears in the neighborhood. In addition, by notifying the owner of the building B of the average waiting times from the creation of the landing call at the time of the normal operation and at the time of the direct operation, the owner of the building B can confirm the effect on the operation efficiency caused by setting the direct operation.

[0028]

Fig. 2 will be described in detail below.

[0029]

Each building 18 is provided with the image

monitoring device 17, the elevator control device 7, the elevator monitoring device 8, and the communication device 9 (an example of the communication interface device).

Hereinafter, one building 18 will be taken as an example.

[0030]

The image monitoring device 17 includes a rampage detection unit 19. A rampage detection unit 19A constantly analyzes images captured by the camera installed in the car 5 of the building 18. When the rampage detection unit 19 detects rampage movement of a passenger, the rampage detection unit 19 transmits a notification of the rampage detection to the elevator monitoring device 8.

[0031]

The elevator monitoring device 8 includes the elevator monitoring unit 20, the operation data receiving unit 21, and the operation method switching unit 22. When the elevator monitoring unit 20 receives the notification of the rampage detection, the elevator monitoring unit 20 generates an alert of the rampage detection and transmits the alert of the rampage detection to the alert receiving unit 25 of the monitoring center device 11 via the communication device 9. Each time the operation data receiving unit 21 receives the operation data, the operation data receiving unit 21 stores the received operation data in, for example, a storage device in the

elevator monitoring device 8. The operation method switching unit 22 sets the elevator control unit 23 of the elevator control device 7 to switch the operation method to the direct operation when the command to switch to the direct operation is received.

[0032]

The elevator control device 7 includes the elevator control unit 23 and an operation data transmission unit 24. The elevator control unit 23 controls the operation of the elevator. For example, the elevator control unit 23 switches the operation method to the direct operation in response to the setting for switching to the direct operation. The operation data transmission unit 24 periodically transmits, as the operation data of the elevator, the registration number information of the landing call during driving and the waiting time information from the creation of the landing call to the arrival of the car 5 to the operation data receiving unit 21 in the elevator monitoring device 8. In addition to the registration number information of the landing call and the waiting time information for each landing call, other types of information may be adopted as operation data.

[0033]

The monitoring center device 11 is a device that remotely monitors the elevators in the buildings A and B.

The monitoring center device 11 may be a physical device including a communication interface device 301, a storage device 302, and a processor 303 connected to them, or may be a logical device that is realized on the physical device (for example, a cloud platform). For example, when one or more programs in the storage device 302 are executed by the processor 303, the alert receiving unit 25, the operation data collection unit 26, the implementation period calculation unit 27, the direct operation setting unit 28, the status notification unit 29, and the average waiting time calculation unit 33 are realized in the monitoring center device 11.

[0034]

It is possible to communicate with the communication device 9 of each building 18 and a smartphone (an example of an information processing terminal of a right holder) of the owner of each building 18 (an example of a predetermined right holder regarding the building 18) via the communication interface device 301.

[0035]

The storage device 302 stores management information 315 regarding remote monitoring of the elevator. The management information 315 may include, for example, for each building 18, a building ID, a building name, an operation data group (collection time and collected

operation data), a building position information (for example, latitude/longitude data of the building 18 or address of the building 18), and owner information of the building 18 (for example, owner's name, contact information (for example, email address or ID of an application as the status display unit 31), and the status of the subscription to the option contract for rampage detection (for example, subscribed, during trial, not subscribed without subscribing or trying, etc.).

[0036]

The operation data collection unit 26 periodically collects the operation data stored by the operation data receiving unit 21 via the communication device 9, and stores the collected operation data in, for example, the storage device 302. The collected operation data is used for calculation by the average waiting time calculation unit 33.

[0037]

When the alert receiving unit 25 receives the alert of the rampage detection of the passenger, the status notification unit 29 provides a notification of the appearance of a suspicious person and a proposal for switching the operation method of the elevator of the building B to the direct operation to a smartphone 32 owned by the owner of the building B in the neighborhood of the

building A in addition to a smartphone (not shown) owned by the owner of the building A where the rampage has been detected. In addition, the status notification unit 29 provides information on the number of rampage detections detected within a certain period of time for the elevator maintained by an elevator maintenance company for the building B, and guidance on subscribing to the option contract for rampage detection. The owner of the building B knows that a suspicious person has appeared in the neighborhood of the building B and can switch the operation method to the direct operation. Further, the owner of the building B can decide whether or not to switch to the direct operation by comparing the average waiting time at the time of the normal operation and the predicted average waiting time at the time of the direct operation. In addition, the owner of the building B can consider subscribing to the option contract for rampage detection based on the number of rampage detections detected within a certain period of time for the elevator maintained by an elevator maintenance company for the building B or other information. In addition, the owner of the building B can subscribe according to the provided guidance when he/she decides to subscribe to the option contract for rampage detection.

[0038]

The average waiting time calculation unit 33 calculates the average waiting time in the normal operation (the average of the waiting times from the creation of the landing call to the arrival of the car 5) based on the waiting time information for each landing call in the collected operation data. Further, the average waiting time calculation unit 33 calculates the predicted average waiting time (the average of the waiting times from the creation of the landing call to the arrival of the car 5) in a certain time after the operation method is switched to the direct operation based on the registration number information of the landing call during the normal operation in the collected operation data in addition to the waiting time information for each landing call. In addition, the average waiting time calculation unit 33 calculates an actual average waiting time, which is an actual value of the average waiting time in the direct operation, based on the waiting time information for each landing call in the operation data (that is, the operation data during the direct operation) collected after the operation method is switched to the direct operation.

[0039]

The implementation period calculation unit 27 compares the predicted average waiting time calculated by the average waiting time calculation unit 33 and a

predetermined determination threshold value, and calculates the implementation period of the direct operation. For example, the "certain time after the operation method is switched to the direct operation" is defined as a "time T" (for example, 2 hours). When the predicted average waiting time is equal to or larger than the determination threshold value, the implementation period calculation unit 27 sets the implementation period of the direct operation to a relatively short period (for example, about 30 minutes to 1 hour) determined based on the time T. On the other hand, when the predicted average waiting time is smaller than the determination threshold value, the implementation period calculation unit 27 sets the implementation period of the direct operation to a relatively long period (for example, about 1 hour to 2 hours) determined based on the time T.

[0040]

When the direct operation setting unit 28 receives an answer indicating the consent to switch the operation method to the direct operation, the direct operation setting unit 28 transmits a command to switch the operation method to the direct operation to the operation method switching unit 22 of the elevator monitoring device 8.

[0041]

The smartphone 32 includes a communication device 30 (an example of the communication interface device) and the

status display unit 31. The status display unit 31 may be realized by executing a program (for example, an application program) by a processor in the smartphone 32. The status display unit 31 receives information from the status notification unit 29 of the monitoring center device 11 via the communication device 30, and displays a status management screen based on the received information. The status display unit 31 receives an answer as to whether or not to consent to switch the operation method, and notifies the direct operation setting unit 28 of the answer.

[0042]

Fig. 3 is a diagram showing an example of the status management screen displayed by the status display unit 31.

[0043]

A status management screen 350 is an example of a user interface, and is, for example, a GUI (Graphical User Interface). According to the example shown in Fig. 3, the status management screen 350 displays waiting time information 351, operation switching information 352, rampage detection status information 353, and guidance information 354. At least part of these pieces of information 351 to 354 need not be displayed on one screen or at the same time, but may be displayed on a plurality of screens or at different timings.

[0044]

The waiting time information 351 includes, for example, a waiting time graph 361. The waiting time graph 361 represents the average waiting time in the normal operation and the predicted average waiting time in the direct operation. When the actual average waiting time is calculated based on the operation data after the operation method is switched to the direct operation, the information indicating the actual average waiting time is transmitted from the status notification unit 29 to the status display unit 31, and the actual average waiting time is displayed in the waiting time graph 361.

[0045]

The operation switching information 352 is information indicating the notification of the appearance of a suspicious person, the proposal for switching to the direct operation, and the implementation period of the direct operation. The operation switching information 352 includes a "set" button 362 and a "not set" button 363. Pressing the "set" button 362 is an example of consenting to switch to the direct operation. Pressing the "not set" button 363 is an example of refusing to switch to the direct operation.

[0046]

The rampage detection status information 353 is information indicating the total number of rampage

detections (for example, "15 cases") obtained in a predetermined period (for example, this month) for the elevator maintained by the elevator maintenance company for the building B, the number of rampage detections (for example, "4 cases") obtained in the predetermined period for the neighborhood of the building B, and the breakdown thereof (for example, the number of rampage detections for each of the area to which building B belongs and the surrounding area). The rampage detection status information 353 may include information indicating a position indicating a location where rampage detection occurs in the surrounding area of the building B. When the position is displayed on a map, a method may be adopted in which the position is displayed using a figure that indicates a range so that the building cannot be identified in consideration of privacy.

[0047]

The guidance information 354 is information indicating guidance on subscribing to the option contract for rampage detection. When a "subscribe" button 365 is pressed, for example, a screen for applying to subscribe to the option contract for rampage detection is displayed.

[0048]

Next, an example of processing performed in the present embodiment will be described with reference to

Figs. 4 and 5.

[0049]

First, processing of switching to the direct operation will be described with reference to Fig. 4.

[0050]

In S101, the operation data collection unit 26 periodically collects operation data (the registration number information of the landing call during the normal operation and the waiting time information for each landing call) stored by an operation data receiving unit 21B.

[0051]

In S102, when the rampage detection unit 19A detects the rampage movement of the passenger from the captured image in the elevator car 5 installed in the building A (S102: YES), the rampage detection unit 19A notifies the elevator monitoring unit 20A of the rampage detection. In S103, the elevator monitoring unit 20A generates an alert of the rampage detection, and transmits the alert of the rampage detection to the alert receiving unit 25 via a communication device 9A. When the rampage detection unit 19A does not detect the rampage movement of the passenger (S102: NO), the processing returns to the stage before S101 (that is, waiting for the collection of operation data).

[0052]

In S104, the average waiting time calculation unit

33 calculates the average waiting time in the normal operation and also calculates a predicted average waiting time P after the operation method is switched to the direct operation based on the collected operation data (for example, the operation data within the past predetermined time after the alert is received).

[0053]

In S105, the implementation period calculation unit 27 determines whether or not the predicted average waiting time P is equal to or larger than a determination threshold value Th. When the result of the determination is true (S105: YES), the implementation period calculation unit 27 sets the implementation period of the direct operation to a relatively short period (for example, 30 minutes to 1 hour). On the other hand, when the result of the determination is false (S105: NO), the implementation period calculation unit 27 sets the implementation period of the direct operation to a relatively long period (for example, 1 hour to 2 hours). For example, when the predicted average waiting time P is 60 seconds and the determination threshold value Th is 70 seconds, even if the operation method is switched to the direct operation, there is little effect on the decrease in operation efficiency, and hence the implementation time of the direct operation is set to a relatively long period.

[0054]

In S108, the status notification unit 29 transmits, to the status display unit 31 of the smartphone 32 owned by the owner of the building B located in the neighborhood of the building A where the rampage has been detected, a notification of the appearance of a suspicious person, a notification of the implementation period of the direct operation, a proposal for switching to the direct operation, information indicating the average waiting time for each operation method, a notification of the number of rampage detections obtained this month in the elevator maintained by the elevator maintenance company for the building B, and information including guidance on subscribing to the option contract for rampage detection.

[0055]

In S109, the status display unit 31 displays, to the display of the smartphone 32, the status management screen 350 shown in Fig. 3 (that is, the screen displaying the notification of the appearance of a suspicious person, the proposal for switching to the direct operation, the implementation period of the direct operation, the average waiting time for each operation method, the guidance on subscribing to the option contract for rampage detection, and the like) based on the information from the status notification unit 29. The owner of the building B can

optionally subscribe to the option contract for rampage detection by operating the smartphone 32.

[0056]

In S110, when the direct operation setting unit 28 receives an answer from the status display unit 31 that the owner of the building B has consented to switch to the direct operation (S110: YES), in S111, the direct operation setting unit 28 transmits a command to switch to the direct operation to an operation method switching unit 22B via a communication device 9B. In response to the command, the operation method switching unit 22B instructs an elevator control unit 23B to switch the operation method of the elevator from the normal operation to the direct operation, and the elevator control unit 23B switches the operation method from the normal operation to the direct operation in response to the instruction. When the direct operation setting unit 28 receives an answer indicating that the building owner of the building B refuses to switch to the direct operation (S110: NO), the processing returns to the stage before S101.

[0057]

Next, processing of returning to the normal operation will be described with reference to Fig. 5.

[0058]

In S201, when the implementation period of the

direct operation elapses after the operation method is switched to the direct operation (S201: YES), in S202, the direct operation setting unit 28 transmits a command to switch to the normal operation to the operation method switching unit 22 via the communication device 9B. In response to the command, the operation method switching unit 22 instructs the elevator control unit 23B to switch the operation method of the elevator from the direct operation to the normal operation, and the elevator control unit 23B switches the operation method from the direct operation to the normal operation in response to the instruction. In addition, for the return to the normal operation, another method, for example, a method of returning without a command from the monitoring center device 11 may be adopted. Specifically, for example, the command to switch to the direct operation may include information indicating the implementation period of the direct operation, and the operation method switching unit 22B may detect that the implementation period of the direct operation has elapsed after the operation method is switched to the direct operation, and automatically instruct the elevator control unit 23B to switch the operation method from the direct operation to the normal operation.

[0059]

In S203, the operation data collection unit 26 collects the operation data (for example, the waiting time information for each landing call obtained from the start to the end of the direct operation) stored by the operation data receiving unit 21B.

[0060]

In S204, the average waiting time calculation unit 33 calculates the actual average waiting time for the direct operation based on the operation data collected in S203. The status notification unit 29 transmits information including information indicating the calculated actual average waiting time to the status display unit 31.

[0061]

In S205, the status display unit 31 displays the average waiting time for the normal operation and the actual average waiting time for the direct operation on the display of the smartphone 32 based on the information from the status notification unit 29. The owner of the building B can compare the operation efficiency in the direct operation and the operation efficiency in the normal operation.

[0062]

As described above, according to the present embodiment, the owner of the building B in the neighborhood of the building A where the rampage has been detected knows

the appearance of a suspicious person and consents to switch to the direct operation, so that the user of the building B can use the elevator with peace of mind even in a situation where a suspicious person appears in the neighborhood. In addition, the owner of the building B can determine whether or not to consent to switch to the direct operation while confirming the effect on the operation efficiency caused by setting the direct operation. In addition, the owner of the building B can consider subscribing to the optional contract for rampage detection based on the number of rampage detections for the elevator maintained by the elevator maintenance company for the building B.

[0063]

The above-described embodiment can be summarized as follows, for example.

[0064]

The monitoring center device 11 (an example of the elevator remote monitoring system) includes the alert receiving unit 25 and the direct operation setting unit 28. The alert receiving unit 25 receives the alert which means that the rampage movement of the passenger has been detected from the image captured by the camera installed in the car of the elevator of the building A (an example of a first elevator of a first building) from a management

system A (for example, a system including the elevator control device 7A and the elevator monitoring device 8A) that is installed in the building A and manages the elevator. The "management" of the elevator may include at least one of monitoring and control of the elevator. When the alert is received, the direct operation setting unit 28 transmits a switching command, which is a command to switch to the direct operation, to a management system B (for example, a system including the elevator control device 7B and the elevator monitoring device 8B) that manages the elevator of the building B in the neighborhood of the building A. As a result, the crime prevention property of the building B can be improved.

[0065]

The "neighborhood of the building A" is a position defined as being located in the neighborhood of the position of the building A. As the "position defined as being located in the neighborhood of the position of the building A", for example, any position on a circle with a radius of Xm centered on the position of the building A (for example, latitude/longitude or address) or a position in the area to which the position of the building A belongs can be adopted. Which building is located at the position defined as being located in the neighborhood of the position of the building A may be determined by the fact

that the alert is issued from the building A and at least part of the above-mentioned management information 315 (for example, information indicating the position of each building). The identification of the building B in the neighborhood of the building A may be performed by at least one of the alert receiving unit 25, the average waiting time calculation unit 33, and the status notification unit 29, or may be performed by an independent function of the monitoring center device 11 which is not shown in Fig. 2 (for example, a corresponding building identification unit (not shown) that identifies the building B located at the position defined as being located in the neighborhood of the position of the building A). Further, the "area" may be, for example, a range corresponding to the upper predetermined part of the address.

[0066]

Further, the command transmitted to the management system B in response to the alert may be the stop of the elevator (for example, the stop of the car to the nearest floor) instead of the command to switch to the direct operation, but by adopting the switching to the direct operation, it can be expected that improvement in the crime prevention property and reduction of decrease in the operation efficiency can be achieved at the same time.

[0067]

The monitoring center device 11 may further include the status notification unit 29. When the alert of the rampage detection of the building A is received, the status notification unit 29 may output a notification of the appearance of a suspicious person and a proposal for switching the operation method of the elevator of the building B to direct operation to the owner of the building B. The direct operation setting unit 28 may transmit a command to switch to the direct operation to the management system B in response to receiving the consent from the owner of the building B to switch to the direct operation. As a result, the switch to the direct operation can be performed with the consent of the owner of the building B.

[0068]

The owner of the building B is an example of a predetermined right holder regarding the building B. As such a right holder, for example, a security company may be employed instead of or in addition to the owner.

[0069]

The monitoring center device 11 may further include the operation data collection unit 26, the average waiting time calculation unit 33, and the implementation period calculation unit 27. The operation data collection unit 26 may collect the operation data of the elevator of the building B. The average waiting time calculation unit 33

may calculate the predicted average waiting time for a certain time after the operation method of the elevator of the building B is switched to the direct operation based on the collected operation data. The implementation period calculation unit 27 may calculate a period according to a length of the predicted average waiting time as the implementation period of the direct operation of the elevator of the building B. The implementation period of the direct operation of the elevator of the building B may be the implementation period calculated above. As a result, the implementation period of the direct operation is set to a period according to the predicted average waiting time, so that it can be expected that the period in which the operation efficiency is lowered is optimized while the crime prevention property is improved. For example, when the predicted average waiting time is equal to or larger than the threshold value, it is considered that the number of users is relatively large, that is, the crime prevention property is relatively high. In such a case, a relatively short period may be set to the implementation period of the direct operation. For example, when the predicted average waiting time is smaller than the threshold value, it is considered that the number of users is relatively small, that is, the crime prevention property is relatively low. In such a case, a relatively

long period may be set to the implementation period of the direct operation.

[0070]

In addition, the implementation period calculation unit may calculate a period according to a time zone to which the time of the alert of the rampage detection of the building A belongs instead of or in addition to the predicted average waiting time as the implementation period of the direct operation of the elevator of the building B. For example, if the time zone to which the time of the alert of the rampage detection of the building A belongs is a time zone X (for example, 9:00 am to 9:00 pm) defined as having a relatively large number of users, a relatively short period may be set to the implementation period of the direct operation. On the other hand, if the time zone to which the time of the alert of the rampage detection of the building A belongs is other than the time zone X, a relatively long period may be set to the implementation period of the direct operation.

[0071]

The status notification unit 29 may provide, to the owner of the building B, a notification of the number of rampage detections that occur in the past certain period in the neighborhood of the building B (an example of a predetermined range based on the position of the building

B) and guidance on adding the option contract for rampage detection to the maintenance contract for an elevator of the building B. As a result, the owner of the building B can consider subscribing to the option contract for rampage detection based on the situation of the rampage detection in the neighborhood of the building B.

[0072]

Although one embodiment has been described above, this is an example for explaining the present invention, and is not intended to limit the scope of the present invention to this embodiment. The present invention can also be practiced in various other forms.

What is claimed is:

1. An elevator remote monitoring system comprising:
an alert receiving unit that receives an alert which means that rampage movement of a passenger has been detected from an image captured by a camera installed in a car of a first elevator from a first management system that is installed in a first building including the first elevator and manages the first elevator;

a direct operation setting unit that transmits a switching command, which is a command to switch to a direct operation, to a second management system that manages a second elevator of a second building located at a position defined as being located in a neighborhood of a position of the first building when the alert is received;

an operation data collection unit that collects operation data of the second elevator;

an average waiting time calculation unit that calculates a predicted average waiting time for a certain time after an operation method of the second elevator is switched to the direct operation based on the collected operation data; and

an implementation period calculation unit that calculates a period according to a length of the predicted average waiting time as an implementation period of the

direct operation of the second elevator,

wherein the average waiting time is an average of waiting times from creation of a landing call to arrival of the car of the first elevator at a landing, and

the implementation period of the direct operation of the second elevator is the calculated implementation period.

2. An elevator remote monitoring system comprising:

an alert receiving unit that receives an alert which means that rampage movement of a passenger has been detected from an image captured by a camera installed in a car of a first elevator from a first management system that is installed in a first building including the first elevator and manages the first elevator;

a direct operation setting unit that transmits a switching command, which is a command to switch to a direct operation, to a second management system that manages a second elevator of a second building located at a position defined as being located in a neighborhood of a position of the first building when the alert is received;

an implementation period calculation unit that calculates a period according to a time zone to which a time of the alert belongs as an implementation period of the direct operation of the second elevator,

wherein the implementation period of the direct

operation of the second elevator is the calculated implementation period.

3. The elevator remote monitoring system according to claim 1 or claim 2, further comprising a status notification unit which provides, to a predetermined right holder regarding the second building, a notification of the number of rampage detections that occur in a past certain period in a predetermined range based on a position of the second building and guidance on adding an option contract for rampage detection to a maintenance contract for the second elevator.

4. The elevator remote monitoring system according to claim 1 or claim 2, further comprising a status notification unit that output a notification of appearance of a suspicious person and a proposal for switching an operation method of the second elevator to the direct operation to a predetermined right holder regarding the second building when the alert is received,

wherein the direct operation setting unit transmits the switching command to the second management system in response to receiving consent to switch to the direct operation from the right holder.

5. An elevator remote monitoring system comprising:
an alert receiving unit that receives an alert which means that rampage movement of a passenger has been

detected from an image captured by a camera installed in a car of a first elevator from a first management system that is installed in a first building including the first elevator and manages the first elevator;

a direct operation setting unit that transmits a switching command, which is a command to switch to a direct operation, to a second management system that manages a second elevator of a second building located at a position defined as being located in a neighborhood of a position of the first building when the alert is received;

a status notification unit that output a notification of appearance of a suspicious person and a proposal for switching an operation method of the second elevator to the direct operation to a predetermined right holder regarding the second building when the alert is received, wherein the direct operation setting unit transmits the switching command to the second management system in response to receiving consent to switch to the direct operation from the right holder;

an operation data collection unit that collects operation data of the second elevator;

an average waiting time calculation unit that calculates an average waiting time when the operation method of the second elevator is in a normal operation and a predicted average waiting time for a certain time after

the operation method of the second elevator is switched to the direct operation based on the collected operation data; and

an implementation period calculation unit that calculates a period according to a length of the predicted average waiting time as an implementation period of the direct operation of the second elevator,

wherein the average waiting time is an average of waiting times from creation of a landing call to arrival of the car of the first elevator at a landing,

the implementation period of the direct operation of the second elevator is the calculated implementation period, and

the status notification unit provides, to the predetermined right holder regarding the second building, the calculated average waiting time and the predicted average waiting time, a notification of the number of rampage detections that occur in a past certain period in a predetermined range based on a position of the second building, and guidance on adding an option contract for rampage detection to a maintenance contract for the second elevator, in addition to the notification of appearance of a suspicious person and the proposal for switching the operation method of the second elevator to the direct operation.