

[Document Name] Description

[Title of Invention] SECURITY DEVICE, SECURITY SYSTEM,
AND SECURITY MODE SETTING METHOD

[Technical Field]

[0001]

The present invention relates to a security device capable of setting an inspection mode in addition to a security set mode and a security release mode, a security system including the security device, and a security mode setting method in the security device.

[Background Art]

[0002]

Security devices have conventionally been known which monitor abnormality of facilities that are security objects with various sensors installed in the facilities. Such security devices can generally set a mode (security set mode (armed mode)) for monitoring a security object and sending a report to a remote monitor center when abnormality is detected and a mode (security release mode (disarmed mode)) for cancelling monitoring of the security object. For example, when a user or users are present in a security object such as in the daytime, the security release mode is set. When the security object is unmanned such as in the nighttime, the security set

mode is set. In some of these security devices, routine patrols of the security object, inspection of equipment such as sensors installed in the security object, and inspection of abnormality generated in the security object are performed by security persons such as guards.

[0003]

Patent Literature 1 discloses a security device configured to read a patrol card carried by a security person to set a mode (inspection mode) for the security person to inspect the security object (see, for example, paragraph 0033). The inspection mode indicates the security person is inspecting the security object. When abnormality is detected in this mode, the security device updates an internal abnormality history without sending a report to the center.

[0004]

In the security device of Patent Literature 1, when the patrol card carried by the security person is read, the security set mode or the security release mode can be set in addition to the inspection mode. Accordingly, the security person sets the inspection mode when inspecting the security object, and once the inspection is finished, the security person sets the security set mode or the security release mode, before leaving the security object.

[Citation List]

[Patent Literature]

[0005]

[Patent Literature 1]

Japanese Patent Laid-Open No. 2008-140019

[Summary of Invention]

[Technical Problem]

[0006]

However, it is essentially undesirable that security persons (such as guards) who are outsider for a security object can freely cancel the security of the security object (can set the security release mode). For example, assume the case where a security person comes to a security object and sets the security release mode while no user is present in the security object. In this case, even though the security object is unmanned (no user is present), the security object is left unguarded (left in the state where abnormal circumstances, such as invasion of the security object, cannot be detected) after the security person leaves the security object.

[0007]

Embodiments of the present invention seek to provide a security device that can appropriately limit shifting to an essentially undesirable operational mode.

[Solution to Problem]

[0008]

One aspect of the present invention is a security device capable of setting a security set mode for sending a report upon reception of a detection signal from a security sensor provided in a security object, and a security release mode for sending no report upon reception of the detection signal from the security sensor. The security device includes: a storage unit having users registered in advance as a registered user, the users being privileged to perform operational input of the security device; a checking unit configured to check whether or not a user who performs operational input of the security device is the registered user registered in the storage unit; and a mode setting unit configured to set an operational mode to the security release mode or the security set mode in response to the operational input by the checked user, wherein the registered users include a security person of the security object, and when the user who performs the operational input is the security person, the mode setting unit sets the operational mode to the inspection mode indicating the security person is inspecting in response to the operational input by the security person, and when the operational input is performed by the security person while the inspection mode is set, the mode setting unit limits the operational modes shiftable

from the inspection mode in accordance with the operational mode set before the inspection mode is set.
[0008a]

Another aspect of the present invention provides a security system, comprising:

a security device capable of setting a security set mode for sending a report upon reception of a detection signal from a security sensor provided in a security object and a security release mode for sending no report upon reception of the detection signal from the security sensor; and

a center device configured to communicate with the security device, wherein

the security device comprises:

a storage unit having users registered in advance as a registered user, the users being privileged to perform operational input of the security device;

a checking unit configured to check whether or not a user who performs operational input of the security device is the registered user registered in the storage unit; and

a mode setting unit configured to set an operational mode to the security release mode or the security set mode in response to the operational input by the checked user,

the registered users include a security person of the security object, and

when the user who performs the operational input is the security person, the mode setting unit sets the operational mode to an inspection mode indicating the security person is inspecting in response to the operational input of the security person, and

when an inspection end signal is received from the center device while the inspection mode is set, the mode setting unit limits the operational modes shiftable from the inspection mode in accordance with the operational mode set before setting the inspection mode.

[0008b]

Another aspect of the present invention provides a security system, comprising:

a security device capable of setting a security set mode for sending a report upon reception of a detection signal from a security sensor provided in a security object and a security release mode for sending no report upon reception of the detection signal from the security sensor; and

a center device configured to communicate with the security device, wherein

the security device comprises:

a storage unit having users registered in advance as a registered user, the users being privileged to perform operational input of the security device;

a checking unit configured to check whether or not a user who performs operational input of the security device is the registered user registered in the storage unit; and

a mode setting unit configured to set an operational mode to the security release mode or the security set mode in response to the operational input by the checked user, and

when an inspection start signal is received from the center device, the mode setting unit sets the operation mode to an inspection mode indicating a security person of the security object is inspecting, and

when an inspection end signal is received from the center device while the inspection mode is set, the mode setting unit limits the operational modes shiftable from the inspection mode in accordance with the operational mode set before setting the inspection mode.

[0008c]

Another aspect of the present invention provides a security mode setting method in a security device capable of setting a security set mode for sending a report upon reception of a detection signal from a security sensor provided in a security object, and a security release mode for sending no report upon reception of the detection signal from the security sensor, the method comprising:

registering users privileged to perform operational input of the security device as a registered user in advance;

checking whether or not a user who performs operational input of the security device is the registered user;

setting an operational mode to the security release mode or the security set mode in response to the operational input by the checked user;

when the user who performs the operational input is a security person of the security object, setting the operational mode to an inspection mode indicating the security person is inspecting in response to the operational input by the security person; and

when the operational input is performed by the security person while the inspection mode is set, limiting the operational modes shiftable from the inspection mode in accordance with the operational mode set before the inspection mode is set.

[0009]

As described in the following, the present invention includes other aspects. Therefore, disclosure of the present invention is intended to provide part of the aspects of the present invention and is not intended to limit the scope of the invention disclosed and claimed herein.

[Brief Description of Drawings]

[0010]

[Figure 1] Figure 1 is a block diagram illustrating a security device in an embodiment of the present invention.

[Figure 2] Figure 2 is a transition diagram of operational modes in the embodiment of the present invention.

[Figure 3] Figure 3 is a flow chart of operation (basic operation) of the security device in the embodiment of the present invention.

[Figure 4] Figure 4 is a flow chart of setting the operational modes of the security device in the embodiment of the present invention.

[Figure 5] Figure 5 is a flow chart of setting the operational modes of the security device in the embodiment of the present invention.

[Figure 6] Figure 6 is a flow chart of setting the operational modes of the security device in a first modified example.

[Figure 7] Figure 7 is a flow chart of setting the operational modes of the security device in a second modified example.

[Figure 8] Figure 8 is a transition diagram of the operational modes in a third modified example.

[Figure 9] Figure 9 is a transition diagram of the operational modes in a fourth modified example.

[Description of Embodiment]

[0011]

Hereinafter, the present invention will be described in detail. However, the detailed description and accompanying drawings below are not intended to limit the invention.

[0012]

A security device of the present invention is capable of setting a security set mode for sending a report upon reception of a detection signal from a security sensor provided in a security object, and a security release mode for sending no report upon reception of the detection signal from the security sensor. The security device includes: a storage unit having users registered in advance as a registered user, the users being privileged to perform operational input

of the security device; a checking unit configured to check whether or not a user who performs operational input of the security device is the registered user registered in the storage unit; and a mode setting unit configured to set an operational mode to the security release mode or the security set mode in response to the operational input by the checked user, wherein the registered users include a security person of the security object, and when the user who performs the operational input is the security person, the mode setting unit sets the operational mode to the inspection mode indicating the security person is inspecting in response to the operational input by the security person, and when the operational input is performed by the security person while the inspection mode is set, the mode setting unit limits the operational modes shiftable from the inspection mode in accordance with the operational mode set before the inspection mode is set.

[0013]

The security device can set not only the security set mode (mode for sending a report upon reception of a detection signal input from a security sensor provided in the security object) and the security release mode (mode for sending no report when the detection signal is input), but also the inspection mode (mode indicating the security person is inspecting). When the operational input is performed by the security person while the

security device is set in the inspection mode, the operational modes shiftable from the inspection mode are limited in accordance with the operational mode set before the inspection mode is set. For example, in such a case as the security object is unmanned (no user is present), it is essentially undesirable to shift the operational mode from the inspection mode to the security release mode. According to the present invention, it becomes possible to appropriately limit shifting to the essentially undesirable operational mode in accordance with the operational mode set before the inspection mode.

[0014]

Moreover, in the security device of the present invention, when the operational mode set before setting the inspection mode is the security set mode, the mode setting unit may prohibit shifting from the inspection mode to the security release mode.

[0015]

When the operational mode set before setting the inspection mode is the security set mode, such as the case where the security object is unmanned (no user is present), it is highly probable that shifting from the inspection mode to the security release mode is undesirable. Therefore, in such a case, shifting from the inspection mode to the security release mode is prohibited. This makes it possible to prevent the security object from being unguarded (from being in such

a situation that abnormal circumstances, such as invasion, cannot be detected regardless of the security object being unmanned).

[0016]

Moreover, in the security device of the present invention, when the operational mode set before setting the inspection mode is the security release mode, the mode setting unit may permit shifting from the inspection mode to the security release mode.

[0017]

When the operational mode set before setting the inspection mode is the security release mode, such as in the case where the security object is manned (any user is present), it is highly probable that shifting from the inspection mode to the security release mode causes no problem. Therefore, in such a case, shifting from the inspection mode to the security release mode is permitted.

[0018]

The security device of the present invention may further include an exit detection unit configured to detect exit of the user from the security object, wherein when the operational mode set before setting the inspection mode is the security release mode and the exit of the user is detected during the inspection mode, the mode setting unit may prohibit shifting from the inspection mode to the security release mode.

[0019]

In the case where the exit of the user is detected during the inspection mode, i.e., the security object becomes unmanned from the manned state, it is highly probable that shifting from the inspection mode to the security release mode is undesirable even though the operational mode set before setting the inspection mode is the security release mode. Therefore, in such a case, the shift from the inspection mode to the security release mode is prohibited.

[0020]

The security device of the present invention may further include an entry detection unit configured to detect entry of the user to the security object, wherein when the operational mode set before setting the inspection mode is the security set mode and the entry of the user is detected during the inspection mode, the mode setting unit may permit shifting from the inspection mode to the security release mode.

[0021]

In the case where the entry of the user is detected during the inspection mode, i.e., the security object become manned from the unmanned state, it is highly probable that shifting from the inspection mode to the security release mode causes no problem even though the operational mode set before setting the inspection mode is the security set mode. Therefore, in such a case,

shifting from the inspection mode to the security release mode is permitted.

[0022]

A security system of the present invention includes: a security device capable of setting a security set mode for sending a report upon reception of a detection signal from a security sensor provided in a security object, and a security release mode for sending no report upon reception of the detection signal from the security sensor; and a center device configured to communicate with the security device, wherein the security device includes: a storage unit having users registered in advance as a registered user, the users being privileged to perform operational input of the security device; a checking unit configured to check whether or not a user who performs operational input of the security device is the registered user registered in the storage unit; and a mode setting unit configured to set an operational mode to the security release mode or the security set mode in response to the operational input by the checked user, the registered users include a security person of the security object, and when the user who performs the operational input is the security person, the mode setting unit sets the operational mode to the inspection mode indicating the security person is inspecting in response to the operational input by the security person, and when an inspection end signal is received from the

center device while the inspection mode is set, the mode setting unit limits the operational modes shiftable from the inspection mode in accordance with the operational mode set before setting the inspection mode.

[0023]

In the security system, when an inspection end signal is received from the center device while the security device is set in the inspection mode, the operational modes shiftable from the inspection mode are limited in accordance with the operational mode set before the inspection mode is set. For example, in such a case as the security object is unmanned (no user is present), it is essentially undesirable to shift the operational mode from the inspection mode to the security release mode as described before. Also according to the present invention, it becomes possible to appropriately limit shifting to the essentially undesirable operational mode in accordance with the operational mode set before the inspection mode.

[0024]

A security system of the present invention includes: a security device capable of setting a security set mode for sending a report upon reception of a detection signal from a security sensor provided in a security object, and a security release mode for sending no report upon reception of the detection signal from the security sensor; and a center device configured to communicate

with the security device, wherein the security device includes: a storage unit having users registered in advance as a registered user, the users being privileged to perform operational input of the security device; a checking unit configured to check whether or not a user who performs operational input of the security device is the registered user registered in the storage unit; and a mode setting unit configured to set an operational mode to the security release mode or the security set mode in response to the operational input by the checked user, wherein when an inspection start signal is received from the center device, the mode setting unit sets the operation mode to an inspection mode indicating a security person of the security object is inspecting, and when an inspection end signal is received from the center device while the inspection mode is set, the mode setting unit limits the operational modes shiftable from the inspection mode in accordance with the operational mode set before setting the inspection mode.

[0025]

In this security system, when the security device receives an inspection start signal from the center device, the inspection mode is set. When an inspection end signal is received from the center device while the security device is set in the inspection mode, the operational modes shiftable from the inspection mode are limited in accordance with the operational mode set

before the inspection mode is set. For example, in such a case as the security object is unmanned (no user is present), it is essentially undesirable to shift the operational mode from the inspection mode to the security release mode as described before. Also according to the present invention, it becomes possible to appropriately limit shifting to the essentially undesirable operational mode in accordance with the operational mode set before the inspection mode.

[0026]

A security mode setting method of the present invention is a security mode setting method in a security device capable of setting a security set mode for sending a report upon reception of a detection signal from a security sensor provided in a security object, and a security release mode for sending no report upon reception of the detection signal from the security sensor, the method including: registering users privileged to perform operational input of the security device as registered users in advance; checking whether or not a user who performs operational input of the security device is the registered user; setting an operational mode to the security release mode or the security set mode in response to the operational input by the checked user; when the user who performs the operational input is a security person of the security object, setting the operational mode to an inspection

mode indicating the security person is inspecting in response to the operational input by the security person; and when the operational input is performed by the security person while the inspection mode is set, limiting the operational modes shiftable from the inspection mode in accordance with the operational mode set before the inspection mode is set.

[0027]

According to the security mode setting method, as in the case of the security device or the security system described before, it becomes possible to appropriately limit shifting to the essentially undesirable operational mode in accordance with the operational mode set before the inspection mode.

[0028]

Hereinafter, the security device in the embodiment of the present invention will be described with reference to the drawings. In the present embodiment, the security device for use in security systems for facilities and/or residences and in other applications will be illustrated.

[0029]

(Embodiment)

A description will be given of the configuration of the security device in the embodiment of the present invention with reference to the drawings. Figure 1 illustrates the configuration of the security system of the present embodiment. As illustrated in Figure 1, a

security system 1 includes a security device 2 installed in a security object, such as facilities and residences, and a center device 4 configured to communicate with the security device 2 through a network 3 (such as public networks and the Internet network). It is to be noted that in the example of Figure 1, only one security object and one security device 2 are illustrated for the purpose of illustration. However, the number of the security objects and the security devices 2 is not limited thereto. That is, a plurality of (two or more) security objects and security devices 2 may be provided.

[0030]

As illustrated in Figure 1, the security device 2 is connected to security sensors 5. The security sensors 5 include indoor-installed sensors installed inside a security object building, and outdoor-installed sensors installed outside the security object building, such as in gardens. Examples of the indoor-installed sensors include those detecting opening of windows and/or doors, and those detecting mobile objects inside the room. Examples of the outdoor-installed sensors include those detecting mobile objects. The security sensors 5 each transmit a detection signal including their own identification information to the security device 2 upon detection of abnormality. The security sensors 5 and the security device 2 communicate with each other in a wired or wireless manner.

[0031]

When abnormality occurrence is reported from the security device 2 to the center device 4 of a monitor center, the center device 4 informs control staffs and the like of the abnormality occurrence. Then, the monitor center instructs a security person P "to cope with the situation." The security person P copes with the abnormality (such as intrusion by suspicious persons and occurrence of fire) that occurred in the facility or the residence, while communicating and cooperating with the monitor center.

[0032]

Here, the configuration of the security device 2 will be described in detail. As illustrated in Figure 1, the security device 2 includes an operation unit 10, a communication unit 11, a display unit 12, an input output unit 13, a storage unit 14, and a control unit 15.

[0033]

The operation unit 10 includes a key input unit 16 operated to set operational modes (such as a security release mode and a security set mode which are described later) of the security device 2, and a reading unit 17 for reading authentication information of a user U. The operation unit 10 permits operational input after the authentication information is read and a user U is checked. The operation unit 10 may be configured as a

touch panel which is provided in a liquid crystal display monitor of the display unit 12.

[0034]

As the reading unit 17 that reads authentication information (identification (ID) information) of the user U, the following devices may suitably be provided: a tag reader that reads radio signals from radio frequency identification (RFID) tags; a card reader that reads card information of integrated circuit (IC) cards and/or magnetic cards; and an organism information acquisition means that reads biometrics information such as fingerprints and face images. In this case, registered authentication information corresponding to input authentication information is stored in the storage unit 14.

[0035]

The communication unit 11 includes a function to communicate with the center device 4. The communication unit 11 is a communication interface for connecting between the security device 2 and the center device 4. As described above, the security device 2 and the center device 4 are connected through public networks or the Internet network used serving as the network 3.

[0036]

The display unit 12 includes a function of outputting operation guide and the like to the user U. The display unit 12 may be configured by a liquid crystal

display, a pilot lamp, a speaker, and the like. The display unit 12 is disposed in the vicinity of the operation unit 10, or disposed integrally with the operation unit 10. The display unit 12 displays operation guide and/or menus. The operation guide and the like may be provided by a voice from a speaker.

[0037]

The input output unit 13 includes a function as an interface connected to peripheral equipment such as the security sensors 5. The input output unit 13 is connected to: the security sensors 5 such as magnet sensors that detect opening and closing of the doors, and infrared sensors that detect a human body with infrared light; disaster prevention sensors such as smoke detectors and heat detectors; and emergency buttons to be operated by users, which are disposed at proper places inside and outside the building, which are areas to be monitored in the security object. The input output unit 13 is a communication interface that receives detection signals from various sensors. The various sensors have unique identification (ID) numbers allocated thereto, the ID numbers being included in the detection signals.

[0038]

The storage unit 14 stores information, including sensor information (such as identification numbers of the sensors), registered authentication information, an operational mode history, and an abnormality history.

The storage unit 14 also stores programs for operating the control unit 15 as the security device 2, sensor information including the ID numbers of various sensors associated with types and installation positions of the sensors, registered identification information for authenticating the users who operate the security device 2, the operational mode history, and the abnormality history.

[0039]

The registered authentication information is registered in advance as the authentication information of the users. The users include security persons P, such as guards in addition to general users U. The registered authentication information also includes information for identifying whether or not a user is a security person. Examples of the information for identifying whether or not a user is a security person include flag information. The storage unit 14 stores, as the operational mode history, mode set time, information on the user who set the operation mode, and information on the set operational mode, whenever the operation mode is set. The abnormality history is a history of detection signals received from the security sensors 5 when the security set mode and the inspection mode are set. The abnormality history includes the identification information of the security sensors 5 and receipt time information.

[0040]

The control unit 15 has a function of performing various control operations of the security device 2. As illustrated in Figure 1, the control unit 15 includes a checking unit 18, a mode setting unit 19, an abnormality determination unit 20, and a manned/unmanned determination unit 21.

[0041]

The checking unit 18 determines whether or not a user who performs operational input of the operation unit 10 is a preregistered user. For this determination, the checking unit 18 checks whether the ID information of the user acquired from the operation unit 10 is matched with the information registered in advance in the registered authentication information in the storage unit 14. If the ID information is matched, the user is authenticated to have an operation privilege (user privilege) as a proper user, and therefore the operational mode of the security device 2 can be shifted in response to the operational input performed through the operation unit 10. When passwords are set, it is checked whether or not a password acquired from the operation unit 10 is matched with a password stored in the storage unit 14, and only when the passwords are matched, the shift of the operational mode is permitted.

[0042]

The checking unit 18 also determines whether or not the user is a security person. When the user is determined to be a security person, the user is authenticated to have an operation privilege (a security person privilege), and therefore the operational mode of the security device 2 can be shifted in response to the operational input performed through the operation unit 10.

[0043]

The mode setting unit 19 sets the operational mode of the security device 2 in response to the operation of the user who was determined to clear the checking in the checking unit 18. At least three operational modes, a security set mode, a security release mode, and an inspection mode, can be set as the operational modes of the security device 2

[0044]

Here, the security set mode (armed mode) is the mode to determine that abnormality is detected in the security object upon reception of a detection signal input from one of the security sensors 5 and to report the abnormality to the center device 4. The security release mode (disarmed mode) is the mode to determine that abnormality is not detected in the security object upon reception of the detection signal input from one of the security sensors 5 and to send no report. It is to be noted that the detection signals caused by fire sensors and emergency buttons are monitored on the regular basis

and abnormality relating thereto is reported even during the security set mode or the security release mode. For example, the user operates the operation unit 10 to set the security set mode when leaving the security object, and operates the operation unit 10 to set the security release mode when entering the security object.

Furthermore, the inspection mode is the mode indicating the security person is inspecting in such occasions where abnormality occurs in the security object or the security object requires inspection. When the inspection mode is set, the security device 2 stores detection signals input from the security sensors 5 as an abnormality history in the storage unit 14. Since the security person may come close to the security sensors 5 during the inspection mode, abnormality is not reported to the center device 4 even when any detection signal is input from the security sensors 5. It is to be noted that the reception of detection signals may be reported to the center device 4 not as abnormality but as sensor detection information at the time of the inspection mode. Input of detection signals from the security sensors 5 may also be reported to a mobile terminal possessed by the security person.

[0045]

In addition to the above-stated operational modes, various operational modes may be set by users as necessary. Examples of the operational modes include: a person-in-room security set mode equivalent to the

security set mode, in which security monitoring is not applied to the inside of the security object so as to enable a person or persons in a room to act as they like, but is applied only to the outer circumference of the security object; and a partial security set mode equivalent to the security set mode, in which security monitoring is partially applied to a specific block of the security object only.

[0046]

When the user is authenticated by the checking unit 18, the mode setting unit 19 accepts setting of the operational modes. When the user is not a security person, setting of the security set mode or the security release mode is permitted. When the user is a security person, setting of the inspection mode is permitted. Furthermore, when the inspection mode is currently set, the settable operational modes are changed depending on the situation. More specifically, when the operational mode before the security person sets the inspection mode is the security release mode, the security person is permitted to shift the operational mode from the inspection mode to the security release mode and to the security set mode. When the operational mode before the security person sets the inspection mode is the security set mode, the security person is prohibited to shift the operational mode from the inspection mode to the security

release mode. In this case, shifting to the security set mode is permitted.

[0047]

For example, the operational mode, which is unsettable (prohibited) when the users including the security person perform operational input, is removed from a displayed operation menu of the operation unit 10 so as to prevent the unsettable mode from being specified, or if the operational input that specifies the unsettable operational mode should be performed, the operational input specified is rejected by the mode setting unit 19 and an error message is displayed.

[0048]

Thus, setting of the security release mode as a subsequent operational mode is permitted or prohibited in accordance with the situation where the inspection mode was set. This makes it possible to prevent the security person from erroneously setting the security release mode even though the users of the security object are absent and so the security object is unmanned.

[0049]

Upon reception of a detection signal from one of the sensors, the abnormality determination unit 20 compares information in the received detection signal with the current mode and the sensor information in the storage unit 14 to determine the presence of abnormality. The abnormality determination unit 20 determines abnormality

when the detection signal is received from any one of various sensors while the security set mode is set. The abnormality determination unit 20 also determines abnormality when the detection signal is received from either the fire sensors or the emergency buttons while the security release mode or the inspection mode is set. Upon determination of abnormality, the abnormality determination unit 20 transmits an abnormal signal indicative of the abnormality to the center device 4 from the communication unit 11. The abnormal signal includes the identification number of the security device 2, the ID number of a sensor that detected abnormality, the type of the sensor, and installation position information of the sensor.

[0050]

The manned/unmanned determination unit 21 determines whether or not any user other than the security person is present in the security object (whether the security object is manned or unmanned). When exit operation is performed on the operation unit 10 by a user U (user) other than the security person, the manned/unmanned determination unit 21 determines that users other than the security person have left the security object (the security object is unmanned). When entry operation is performed on the operation unit 10 by a user U (user) other than the security person, the manned/unmanned determination unit 21 determines that the user other than

the security person is present in the security object (the security object is manned). Among the users, at least the person who first enters the security object performs the entry operation on the operation unit 10 and the person who lastly leaves the security object performs the exit operation on the operation unit 10 to register the manned and unmanned state in the security device 2.

[0051]

If an entry/exit management system is provided in the security object, the manned/unmanned determination unit 21 may determine whether or not any user is present inside the security object based on the information on the entry and exit of users detected by the entry/exit management system. Or the manned/unmanned determination unit 21 may wirelessly communicate with RFID tags possessed by the users and recognizes that the RFID tags are present in the space of the security object to determine whether or not any user is present in the security object. Or the manned/unmanned determination unit 21 may determine the presence of users based on the images of cameras disposed in the security object.

[0052]

A description will be given of the operation of the security device 2 configured as described before with reference to the drawings.

[0053]

Here, transition of the operational modes of the security device 2 will be first described with reference to Figure 2. As illustrated in Figure 2, when a user or users U other than the security person are present in the security object (when the security object is manned) for example, the operational mode is set to the security release mode. Then, the security person P comes to the security object for inspection or other purposes, and operates the operation unit 10. Accordingly, the operational mode shifts from the security release mode to the inspection mode (arrow A). When the security person P operates the operation unit 10 after the end of inspection or other operations, the operational mode shifts from the inspection mode to the security release mode (arrow B). In this case, since the operational mode set before the inspection mode is the security release mode, shifting from the inspection mode to the security release mode is permitted. Shifting from the inspection mode to the security set mode is also permitted in this case.

[0054]

Contrary to this, when the user or users U other than the security person are not present in the security object (when the security object is unmanned), the operational mode is set to the security set mode. Then, the security person P comes to the security object for inspection or other purposes, and operates the operation

unit 10. Accordingly, the operational mode shifts from the security set mode to the inspection mode (arrow C). When the security person P operates the operation unit 10 after the end of inspection or other operations, the operational mode shifts from the inspection mode to the security set mode (arrow D). In this case, since the operational mode set before the inspection mode is the security set mode, shifting from the inspection mode to the security release mode is prohibited.

[0055]

Assume the case where the security person P comes to the security object for inspection and other purposes, and operates the operation unit 10 in the state where a user U other than the security person is present in the security object (the security object is manned) and the operational mode is set to the security release mode. In this case, if the user U leaves the security object (if the security object is unmanned) (the arrow E) after the operational mode is shifted from the security release mode to the inspection mode (arrow A), shifting from the inspection mode to the security release mode is prohibited. In this case, after the inspection or other operations are ended, the operational mode is shifted from the inspection mode to the security set mode by operation of the security person P (arrow D).

[0056]

Assume the case where the security person P comes to the security object for inspection and other purposes and operates the operation unit 10 in the state where a user or users U other than the security person are absent in the security object (the security object is unmanned) and the security mode is set to the security set mode. In this case, if the user or users U enter the security object (if the security object is manned) (arrow F) after the operational mode is shifted from the security set mode to the inspection mode (arrow C), shifting from the inspection mode to the security release mode is permitted. In this case, after the inspection or other operations are ended, the operational mode is shifted from the inspection mode to the security release mode by operation of the security person P (arrow B). Shifting from the inspection mode to the security set mode may also be permitted in this case.

[0057]

Now, the flow of the basic operation of the security device 2 is described with reference to Figure 3. This processing is repeatedly executed by the control unit 15 of the security device 2. As illustrated in Figure 3, the manned/unmanned determination unit 21 in the security device 2 performs determination processing that determines whether or not any user other than the security person is present in the security object (the security object is manned or unmanned) (S1). The

security device 2 also performs determination processing that determines whether or not abnormality (such as intrusion by suspicious persons) is generated in the security object based on a detection signal from one of the security sensors 5 (S2). The security device 2 then performs processing, such as accepting operational input from the user (a general user U and/or a security person P), and setting the operational mode (S3).

[0058]

Here, the processing of accepting operational input and setting the operational mode in step S3 of Figure 3 will be described in detail with reference to the flow charts of Figures 4 and 5. As illustrated in Figure 4, when a user performs operational input, the user who performed the operational input is checked first (S10). When the user who performed the operational input is the security person P (S11), it is determined whether or not the current operational mode is the inspection mode (S12). As described with reference to Figure 2, at the time when the security person P comes to the security object (at the time before the operational input is performed), the operational mode is set to the security release mode (in a manned case) or the security set mode (in an unmanned case), and is not set to the inspection mode (No in S12). In this case, the mode setting unit 19 enables the inspection mode to be set (S13). When the security person P performs a mode setting input (S14), the input

operational mode is set (S15) and information on the set operational mode is stored as an operational mode history (S16).

[0059]

Thus, the security person P sets the inspection mode, and performs inspection of the security object or other operations. When the security person P performs operational input after the end of the inspection or other operations, the user check is first performed (S10) to determine that the user who performed the operational input is the security person P (S11). In this case, since the current operational mode is the inspection mode (Yes in S12), it is determined whether or not the operational mode before the inspection mode is the security release mode (S17). If the operational mode before the inspection mode is the security release mode, the security release mode and the security set mode are enabled to be set (S18). On the contrary, if the operational mode before the inspection mode is not the security release mode, the security set mode is enabled to be set (S19). In this case, the security release mode is disabled from setting (setting is prohibited). When the security person P performs a mode setting input (S14), the input operational mode is set (S15) and the set operational mode is stored as an operational mode history (S16).

[0060]

When the result of checking the user who performed the operational input (S10) indicates that the user who performed the operational input is not the security person P (but a general user U) (S11), it is determined whether or not the current operational mode is the security release mode (S20) as illustrated in Figure 5. When the current operational mode is the security release mode, the security set mode is enabled to be set (S21). When the user U performs a mode setting input (S22), the input operational mode is set (S23) and the set operational mode is stored as an operational mode history (S24).

[0061]

On the contrary, if the current operational mode is not the security release mode, it is determined whether or not the current operational mode is the security set mode (S25). If the current operational mode is the security release mode, the security release mode is enabled to be set (S26). When the user U performs a mode setting input (S22), the input operational mode is set (S23) and the set operational mode is stored as an operational mode history (S24). When the current operational mode is neither the security release mode nor the security set mode (No in S25), i.e., when the current operational mode is the inspection mode, setting of the operational mode by the user U is prohibited.

[0062]

Thus, in the present embodiment, when the operational input is performed by the security person P while the security device 2 is set in the inspection mode, the operational modes shiftable from the inspection mode are limited in accordance with the operational mode set before the inspection mode is set. For example, in such a case as the security object is unmanned (any user U is absent), it is essentially undesirable to shift the operational mode from the inspection mode to the security release mode. According to the security device 2 of the present embodiment, it becomes possible to appropriately limit shifting to the essentially undesirable operational mode in accordance with the operational mode set before the inspection mode.

[0063]

More specifically, when the operational mode set before setting the inspection mode is the security set mode, such as in the case where the security object is unmanned (any user U is absent), it is highly probable that shifting from the inspection mode to the security release mode is undesirable. Therefore, in such a case, shifting from the inspection mode to the security release mode is prohibited. This makes it possible to prevent the security object from being unguarded (from being in such a situation that abnormal circumstances, such as invasion, cannot be detected even though the security object is unmanned).

[0064]

Contrary to this, if the operational mode set before setting the inspection mode is the security release mode, such as in the case where the security object is manned (the user or users U are present), it is highly probable that shifting from the inspection mode to the security release mode causes no problem. Therefore, in such a case, shifting from the inspection mode to the security release mode is permitted.

[0065]

Although the embodiment of the present invention has been described in the foregoing with illustration, the scope of the present invention is not limited thereto. Modifications and alterations may occur depending on purposes without departing from the scope of the appended claims.

[0066]

(First Modified Example)

In a first modified example, when the manned/unmanned determination unit 21 determines that the security object is unmanned during the inspection mode, the mode setting unit 19 may prohibit the security person from shifting the operational mode from the inspection mode to the security release mode and to the security set mode, even though the operational mode before the security person sets the inspection mode is the security release mode. Figure 6 illustrates operation of such a

modified example, in which the processes similar to those in Figure 4 are designated by similar reference signs to omit the description thereof.

[0067]

In this case, as illustrated in Figure 6, when the operational mode set before the inspection mode is determined to be the security release mode (S17), it is then determined whether or not the security object is shifted from the manned state to the unmanned state during the inspection mode (S30). If the security object stays in the manned state during the inspection mode, the security release mode and the security set mode are enabled to be set (S18). On the contrary, if the security object is shifted from the manned state to the unmanned state during the inspection mode, the security set mode is enabled to be set (S19).

[0068]

In the case where the exit of the user is detected during the inspection mode, i.e., the security object becomes unmanned from the manned state, it is highly probable that shifting from the inspection mode to the security release mode is undesirable even though the operational mode set before setting the inspection mode is the security release mode. Therefore, in such a case, shifting from the inspection mode to the security release mode is prohibited.

[0069]

Accordingly, where the existence or non-existence of users is changed during inspection, such as in the case where the inspection work takes a longer time after the inspection mode is set, setting the subsequent operation mode to the security release mode is permitted or prohibited depending on the situation. This makes it possible to prevent the security person from erroneously setting the security release mode even though the users of the security object are absent and the security object is unmanned.

[0070]

(Second Modified Example)

In a second modified example, when the manned/unmanned determination unit 21 determines that the security object is manned during the inspection mode, the mode setting unit 19 may permit shifting from the inspection mode to the security release mode on condition that both a user U other than the security person and the security person P input their ID information into the operation unit 10 (for example, two persons continuously perform the input operation within a predetermined period of time), even though the operational mode before the security person sets the inspection mode is the security set mode. Figure 7 illustrates operation of such a modified example, in which the processes similar to those in Figure 4 are designated by similar reference signs to omit the description thereof.

[0071]

In this case, as illustrated in Figure 7, when it is determined that the operational mode set before the inspection mode is not the security release mode, i.e., the operational mode set before the inspection mode is the security set mode (S17), it is then determined whether or not the security object is shifted from the unmanned state to the manned state during the inspection mode (S40). If the security object stays in the unmanned state during the inspection mode, the security set mode is enabled to be set (S19). On the contrary, when the security object is shifted from the manned state to the unmanned state during the inspection mode, the security release mode and the security set mode are enabled to be set on condition that both the user U and the security person P input their ID information into the operation unit 10 (S18).

[0072]

In the case where the entry of a user is detected during the inspection mode, i.e., the security object becomes manned from the unmanned state, it is highly probable that shifting from the inspection mode to the security release mode causes no problem even though the operational mode set before setting the inspection mode is the security set mode. Therefore, in such a case, shifting from the inspection mode to the security release mode is permitted.

[0073]

In the case where the security object was on alert (in the security set mode) before the inspection mode is set, a user U other than the security person and the security person P input their ID information into the operation unit 10. This enables the user to recognize that the security object is shifted to a non-alert mode (security release mode).

[0074]

(Third Modified Example)

In a third modified example, a security person P may set the inspection mode, and the monitor center may end the inspection mode. That is, while the security person P on site sets the inspection mode, the inspection mode may be ended by a command transmitted to the security device 2 from the center device 4 of the monitor center. For example, after the inspection of the security object is ended, the security person P on site requests command transmission from the monitor center through the application of a telephone or a mobile terminal, so that an inspection end signal is transmitted from the center. In that case, the inspection end signal may include a mode shift command for shifting the operational mode to the security set mode or the security release mode. In this modified example, the operation flow is similar to that in the above-stated embodiment except for the point that a mode shift input at the end of the inspection mode

is performed not by the security person P but by a signal transmitted from the center device 4 of the monitor center.

[0075]

For example, as illustrated in Figure 8, when a user or users U other than the security person are present in the security object (when the security object is manned), the operational mode is set to the security release mode. Then, the security person P comes to the security object for inspection or other purposes, and operates the operation unit 10. Accordingly, the operational mode shifts from the security release mode to the inspection mode (arrow A). If an inspection end signal is received from the monitor center after the end of the inspection or other operations, the operational mode shifts from the inspection mode to the security release mode (arrow b).

[0076]

Moreover, when a user or users U other than the security person are absent in the security object (when the security object is unmanned), the operational mode is set to the security set mode. Then, the security person P comes to the security object for inspection or other purposes, and operates the operation unit 10. Accordingly, the operational mode shifts from the security set mode to the inspection mode (arrow C). When an inspection end signal is received from the monitor center after the end of the inspection and other

operations, the operational mode shifts from the inspection mode to the security set mode (arrow d).

[0077]

(Fourth Modified Example)

In a fourth modified example, the monitor center may set the inspection mode, and the monitor center may also end the inspection mode. That is, the inspection mode may be set and ended not by the security person on site but by a command transmitted to the security device 2 from the center device 4 of the monitor center. For example, at the start or end of the inspection of the security object, the security person on site requests command transmission from the monitor center through the application of the telephone or the mobile terminal, so that an inspection start signal or an inspection end signal is transmitted from the monitor center. In that case, the inspection start signal may include a mode shift command for shifting the operational mode to the inspection mode, and the inspection end signal may include a mode shift command for shifting the operational mode to the security set mode or the security release mode. In this modified example, the operation flow is similar to that in the above-stated embodiment except for the point that an input for shifting to the inspection mode and an input for shifting the mode at the end of the inspection mode are performed not by the security person

P but by a signal transmitted from the center device 4 of the monitor center.

[0078]

For example, as illustrated in Figure 9, when a user or users U other than the security person are present in the security object (when the security object is manned), the operational mode is set to the security release mode. If an inspection start signal is received from the monitor center when the security person P comes to the security object for inspection and other purposes, the operational mode shifts from the security release mode to the inspection mode (arrow a). If an inspection end signal is received from the monitor center after the end of the inspection or other operations, the operational mode shifts from the inspection mode to the security release mode (arrow b).

[0079]

Moreover, when a user or users U other than the security person are not present in the security object (when the security object is unmanned), the operational mode is set to the security set mode. If an inspection start signal is received from the monitor center when the security person P comes to the security object for inspection and other purposes, the operational mode shifts from the security set mode to the inspection mode (arrow c). If an inspection end signal is received from the monitor center after the end of the inspection and

other operations, the operational mode shifts from the inspection mode to the security set mode (arrow d).

[0080]

Although the preferable embodiment of the present invention conceivable at the present moment has been described in the foregoing, it should be understood that various alterations are possible for the embodiment disclosed, and unless departing from the spirit and scope of the present invention, such alterations are intended to be embraced in the scope of the appended claims.

[Industrial Applicability]

[0081]

As described in the foregoing, the security device according to the present invention has the effect of being able to appropriately limit shifting to an essentially undesirable operational mode, and is usefully applicable to the security systems for facilities and/or residences.

[Reference Signs List]

[0082]

- 1 Security system
- 2 Security device
- 3 Network
- 4 Center device
- 5 Security sensor

- 10 Operation unit
- 11 Communication unit
- 12 Display unit
- 13 Input output unit
- 14 Storage unit
- 15 Control unit
- 16 Key input unit
- 17 Reading unit
- 18 Checking unit
- 19 Mode setting unit
- 20 Abnormality determination unit
- 21 Manned/unmanned determination unit
- U General user (user)
- P Security person (guard)

[Document Name] Claims

[Claim 1]

A security device capable of setting a security set mode for sending a report upon reception of a detection signal from a security sensor provided in a security object, and a security release mode for sending no report upon reception of the detection signal from the security sensor, the security device comprising:

a storage unit having users registered in advance as a registered user, the users being privileged to perform operational input of the security device;

a checking unit configured to check whether or not a user who performs operational input of the security device is the registered user registered in the storage unit; and

a mode setting unit configured to set an operational mode to the security release mode or the security set mode in response to the operational input by the checked user, wherein

the registered users include a security person of the security object, and

when the user who performs the operational input is the security person, the mode setting unit sets the operational mode to the inspection mode indicating the security person is inspecting in response to the operational input by the security person, and

when the operational input is performed by the security person while the inspection mode is set, the mode setting unit limits the operational modes shiftable from the inspection mode in accordance with the operational mode set before the inspection mode is set.

[Claim 2]

The security device according to claim 1, wherein when the operational mode set before setting the inspection mode is the security set mode, the mode setting unit prohibits shifting from the inspection mode to the security release mode.

[Claim 3]

The security device according to claim 1 or 2, wherein

when the operational mode set before setting the inspection mode is the security release mode, the mode setting unit permits shifting from the inspection mode to the security release mode.

[Claim 4]

The security device according to claim 3, further comprising

an exit detection unit configured to detect exit of the user from the security object, wherein

when the operational mode set before setting the inspection mode is the security release mode and the exit of the user is detected during the inspection mode, the mode setting unit prohibits shifting from the inspection mode to the security release mode.

[Claim 5]

The security device according to any one of claims 2 to 4, further comprising

an entry detection unit configured to detect entry of the user to the security object, wherein

when the operational mode set before setting the inspection mode is the security set mode and the entry of the user is detected during the inspection mode, the mode setting unit permits shifting from the inspection mode to the security release mode.

[Claim 6]

A security system, comprising:

a security device capable of setting a security set mode for sending a report upon reception of a detection signal from a security sensor provided in a security object and a security release mode for sending no report upon reception of the detection signal from the security sensor; and

a center device configured to communicate with the security device, wherein

the security device comprises:

a storage unit having users registered in advance as a registered user, the users being privileged to perform operational input of the security device;

a checking unit configured to check whether or not a user who performs operational input of the security device is the registered user registered in the storage unit; and

a mode setting unit configured to set an operational mode to the security release mode or the security set mode in response to the operational input by the checked user,

the registered users include a security person of the security object, and

when the user who performs the operational input is the security person, the mode setting unit sets the operational mode to an inspection mode indicating the security person is inspecting in response to the operational input of the security person, and

when an inspection end signal is received from the center device while the inspection mode is set, the mode setting unit limits the operational modes shiftable from the inspection mode in accordance with the operational mode set before setting the inspection mode.

[Claim 7]

A security system, comprising:

a security device capable of setting a security set mode for sending a report upon reception of a detection signal from a security sensor provided in a security object and a security release mode for sending no report upon reception of the detection signal from the security sensor; and

a center device configured to communicate with the security device, wherein

the security device comprises:

a storage unit having users registered in advance as a registered user, the users being privileged to perform operational input of the security device;

a checking unit configured to check whether or not a user who performs operational input of the security device is the registered user registered in the storage unit; and

a mode setting unit configured to set an operational mode to the security release mode or the security set mode in response to the operational input by the checked user, and

when an inspection start signal is received from the center device, the mode setting unit sets the operation mode to an inspection mode indicating a security person of the security object is inspecting, and

when an inspection end signal is received from the center device while the inspection mode is set, the mode setting unit limits the operational modes shiftable from the inspection mode in accordance with the operational mode set before setting the inspection mode.

[Claim 8]

A security mode setting method in a security device capable of setting a security set mode for sending a report upon reception of a detection signal from a security sensor provided in a security object, and a security release mode for sending no report upon reception of the detection signal from the security sensor, the method comprising:

registering users privileged to perform operational input of the security device as a registered user in advance;

checking whether or not a user who performs operational input of the security device is the registered user;

setting an operational mode to the security release mode or the security set mode in response to the operational input by the checked user;

when the user who performs the operational input is a security person of the security object, setting the operational mode to an inspection mode indicating the security person is inspecting in response to the operational input by the security person; and

when the operational input is performed by the security person while the inspection mode is set, limiting the operational modes shiftable from the inspection mode in accordance with the operational mode set before the inspection mode is set.