

Specification
ELEVATOR SECURITY SYSTEM

Technical field

5 The present invention relates to an elevator security system comprising an authentication function that authenticates the user of the elevator.

Technical background

10 In recent years, with a view to ensuring security of high and medium rise buildings, fingerprint authentication systems have been developed wherein there are provided a fingerprint detector that detects the fingerprints of persons entering and leaving the building, a fingerprint
15 registration device that registers beforehand the fingerprint authentication information of residents resident in the building, and a fingerprint comparison device that compares the fingerprint authentication information that is already registered in the fingerprint registration device
20 with the detected fingerprint pattern that is transmitted from the fingerprint detector. If this fingerprint comparison device finds that the detected fingerprint pattern agrees with the previously registered fingerprint authentication information, the person is authenticated as
25 being a genuine resident of the building and for example the door of the lobby of the building is opened.

With increase in the number of floors and size of buildings, the authentication information relating to fingerprints i.e. fingerprint authentication information (authentication information relating to fingerprints may be referred to as fingerprint authentication information) that is registered in the fingerprint registration devices in such fingerprint authentication systems has tended to increase to enormous levels. Incidentally, there is the problem that, if fingerprint authentication information corresponding to about 100 users of a building is registered in a fingerprint registration device, the time required for this fingerprint authentication is about seven seconds.

However, if such a fingerprint authentication function is applied to an elevator system, problems arise such as that unless the authentication results are obtained in about one second at the most, users of the elevator cannot move smoothly to the target floor and inconvenience is caused to following elevator users.

Accordingly, as disclosed in for example Laid-open Japanese Patent Application No. (Tokkai Hei 11-286378), an elevator system comprising an elevator security system has been proposed having a fingerprint authentication function that enables fingerprints of elevator users to be rapidly authenticated.

In this security system, on the cage control panel in the passenger cage, in addition to the destination floor

registration buttons and the door opening/door closing buttons, there are provided a fingerprint detector and a keypad (ten key or ten keypad). In addition, in this cage control panel, there are provided a fingerprint registration
5 device that registers fingerprint authentication information of elevator users and a fingerprint comparison device that compares the fingerprint pattern detected from this fingerprint detector with the fingerprint authentication information in the fingerprint registration device.

10 The method employed in this system is that the fingerprint authentication information is divided into groups, a key word is allocated to each group, the key word is input from a keypad or from the destination floor registration buttons employed instead of a keypad, the group
15 is inferred from this keyword and a comparison is then made between the fingerprint pattern detected from the fingerprint detector and the fingerprint authentication information within the inferred group; genuine elevator users can thereby be authenticated rapidly.

20 However, in an elevator security system as described above, the problem arises that it may be somewhat difficult to adopt this system since, if a keypad is installed in the elevator hall or passenger cage, the keypad itself is large in size compared with the fingerprint detector etc, mounting
25 space may be restricted, and it may be unattractive to users from the point of view of artistic design.

Also, the operation of inputting the keyword by the keypad may be difficult for children or old persons.

As a result, if a keypad was not to be installed and if fingerprint authentication processing was to be performed at high speed, it was only possible to apply a fingerprint authentication function to small buildings with at most 20 to 30 people; this has been an obstacle to the popularization of fingerprint authentication processing.

A further problem with an elevator security system having a fingerprint authentication function is the need for a fingerprint reading action i.e. it is necessary for fingerprint authentication to be performed for each person individually. This is considerably affected by the behavior of the passengers using the elevator. For example, there is the problem that if, after a plurality of passengers have entered the passenger cage, after one of the passengers has been authenticated, another passenger is still performing the authentication operation following on from this, this other passenger may be carried past the floor to which this other passenger intends to travel whilst this authentication operation is being performed.

Also, if a security system is constructed by purchasing for example a fingerprint authentication device from a specialist manufacturer, since the output signals of the fingerprint authentication device are different for each specialist manufacturer, it is necessary to create a program

in accordance with the manufacturer in question and/or operations depending on customer requests at the elevator control panel. As security needs increase, design costs and manufacturing costs etc tend to increase.

5 Furthermore, in elevator security systems having a fingerprint authentication function, since individual authentication is possible, the number and variety of customer requests relating to operation of the elevator control panel such as for example hall non-stop release,
10 hall destination floor registration, cage non-stop release (non-stop release in the cage) and cage destination floor registration (destination floor registration in the cage) has increased and the resulting processing load on the elevator has become large, to the extent that a condition is
15 produced in which the resources for basic elevator control may be used up. For example, in a high-rise building of 24 floors, if the operation of hall destination floor registration is requested by the customer at all the floors, it is necessary to sequentially store the destination floor
20 registration information from the halls on each floor, so a storage device having a storage area that can store all these hall conditions is necessary; in this case, an area corresponding to 24 floors x 24 destination floors is necessary. Also, there is the problem that an enormous load
25 is imposed on control of the elevator in order to accurately classify and process these items of information.

The present invention was made in view of the above circumstances. Its object is to provide an elevator security system capable of easily meeting customer needs and that can be utilized with improved straight forwardness and convenience, without restriction as to age etc.

Disclosure of the invention

In a first aspect, there is provided an elevator security system for authenticating a plurality of passengers using an elevator and carrying a wireless card that stores information as to floors to be used by each passenger and authentication information, said elevator security system comprising:

(1) a fingerprint reading section that reads a fingerprint pattern of a passenger when using said elevator; and

(2) a wireless/fingerprint common control device comprising

(a) an authentication comparison section that stores fingerprint authentication information of a plurality of passengers and that, when said passenger holding said wireless card enters a prescribed distance range, prior to reading of a fingerprint pattern of said passenger in question by said fingerprint reading unit, extracts fingerprint authentication information of said passenger based upon said authentication

information, of said information stored on said wireless card, and stands by, executes a fingerprint comparison after acquiring a fingerprint pattern from said fingerprint reading section, and, if an elevator user is authenticated as genuine, transmits an information as to floors to be used by said passenger read from said wireless card;

(b) a section for conversion of information as to floors to be used, in which is stored installed floor information of said wireless/fingerprint common control device and that generates hall calling information of each floor based upon said information as to floors to be used from said authentication comparison section and said installed floor information,

(3) a hall calling information transmission section that, if said wireless/fingerprint common control device is installed in an elevator hall at an arbitrary floor, outputs as summarized hall calling information a hall calling information of each floor generated by said section for conversion of information as to floors to be used of each wireless/fingerprint common control device;

(4) an elevator interface that stores beforehand elevator floor information in accordance with circumstances of a building and that generates and outputs floor hall calling information in which a floor is altered in accordance with said elevator floor information in respect of hall calling information arriving from said hall calling information transmission section; and

(5) an elevator control panel that flashes a hall calling button of said floor in question in accordance with floor hall calling information received from said elevator interface to prompt for selection of a hall calling button by a passenger authenticated as a genuine elevator user.

In a second aspect, there is provided an elevator security system for authenticating a passenger using an elevator and carrying a wireless card that stores information as to floors to be used by said passenger in question and authentication information, said elevator security system comprising:

(1) a fingerprint reading section that reads a fingerprint pattern of said passenger when using said elevator; and

(2) a wireless/fingerprint common control device comprising

(a) an authentication comparison section that stores fingerprint authentication information of a passenger and that, when said passenger holding said wireless card enters a prescribed distance range, extracts fingerprint authentication information of said passenger based upon said authentication information, of said information stored on said wireless card, and stands by, executes a fingerprint comparison after acquiring a fingerprint pattern from said fingerprint reading section, and, if an elevator user is authenticated as genuine, transmits and information as to floors to be used by said passenger read from said wireless card;

(b) a section for conversion of information as to floors to be used, in which is stored installed floor information of said wireless/fingerprint common control device and that generates destination floor information of each floor based upon said information as to floors to be used from said authentication comparison section and said installed floor information,

(3) a destination floor information transmission section that, if a wireless/fingerprint common control device is installed in an elevator hall at an arbitrary floor, selects and outputs said destination floor information corresponding to a floor in question, based upon door opening information of a particular floor generated by said elevator control panel by detecting landing stage door opening on an arrival of said elevator at a landing stage, of said destination floor information of each floor generated by said section for conversion of information as to floors to be used, of each wireless/fingerprint common control device;

(4) an elevator interface that stores beforehand elevator floor information in accordance with circumstances of a building and that generates and outputs elevator destination floor information in which a floor is altered in accordance with said elevator floor information in respect of destination floor information arriving from said destination floor information transmission section; and

(5) an elevator control panel that performs destination floor registration based upon said elevator destination floor information received from said elevator interface.

(1) Also disclosed in example embodiments is an elevator security system for authenticating a passenger using an elevator and carrying a wireless card that stores information as to floors to be used by the passenger in question and authentication information constructed as follows. Specifically, the elevator security system comprises: a fingerprint reading section that reads the fingerprint pattern of a passenger when using the elevator; and a wireless/fingerprint common control device that stores fingerprint authentication information of a large number of passengers who use the elevator and that, when a passenger holding said wireless card enters a prescribed distance range (for example 5 cm to 70 cm is suitable), receives information as to the floors to be used and authentication information characteristic of a passenger that are stored on this wireless card and extracts fingerprint authentication information of the passenger in question from said passenger fingerprint authentication information using the

authentication retrieval information characteristic of this passenger and makes possible immediate comparison processing thereof with a fingerprint pattern that is transmitted from said fingerprint reading section.

In such a wireless card, information as to the floors to be used and authentication information characteristic of a passenger are stored as described above, but, depending on the specification, there may in addition be stored in this authentication information sex/changeover of operation mode (for example, pet - accompanied operating mode, crime prevention operating mode (to prevent women from sharing a passenger cage with persons of the opposite sex late at night) or other operating mode changeovers). However, the passenger's fingerprints themselves are not stored.

By means of a construction as described above, when a passenger holding a wireless card enters the prescribed area, the information as to the floors to be used and the authentication information characteristic of the passenger stored in the wireless card are received by the receiving antenna and transmitted to the wireless/fingerprint common control device. This wireless/fingerprint common control device extracts fingerprint authentication information of a passenger using authentication information characteristic of the passenger from the fingerprint authentication information of large number of passengers that is already registered and stands

by, so, when a fingerprint pattern is sent from the aforesaid fingerprint reading section, immediate comparison processing can be performed; thus, even though a large number of items of fingerprint authentication information are registered, high-speed fingerprint authentication can be achieved and the effect on following passengers can be reduced to the utmost.

(2) Also, in example embodiments an elevator security system for authenticating a passenger using an elevator and carrying a wireless card that stores information as to floors to be used by the passenger in question and authentication information may be constructed as follows. Specifically, the elevator security system for authenticating a passenger using an elevator and carrying a wireless card that stores information as to floors to be used by the passenger in question and authentication information comprises: a fingerprint reading section that reads the fingerprint pattern of a passenger when using the elevator; and a wireless/fingerprint common control device comprising an authentication comparison section that stores fingerprint authentication information of a large number of passengers who use the elevator and that, when a passenger holding said wireless card enters a prescribed distance range, extracts fingerprint authentication information of the passenger in question

using said authentication information, of the information stored on this wireless card, and stands by, executes a fingerprint comparison simultaneously with acquiring a fingerprint pattern from said fingerprint reading section, and, if the elevator user is authenticated as genuine, transmits the information as to the floors to be used by the passenger read from said wireless card; and a section for conversion of information as to the floors to be used, in which is stored installed floor information of this wireless/fingerprint common control device and that generates hall calling information of each floor from the information as to floors to be used from said authentication comparison section and this installed floor information. Thanks to the construction as described above, authentication of fingerprints can be achieved at high speed even though a large number of items of fingerprint authentication information are registered, and, in addition, if the user of the elevator is authenticated as a genuine user, hall calling information of each floor is generated and output. This hall calling information of each floor is obtained by logical processing of the information as to the floors to be used by the passenger whose wireless card was read and installed floor information of the wireless/fingerprint common control device. Hall calling information of each floor can therefore

be automatically generated and communicated to the elevator control panels without any restriction as to age etc.

(3) While the case has been described in which, in the case of (1) and (2) above, the wireless/fingerprint common control device described above was installed at a specified floor, furthermore, an elevator security system in example embodiments comprises:

a hall calling information transmission section that, if the wireless/fingerprint common control device is installed in an elevator hall at a floor that may be chosen at will, as a new addition to the construction of (2) described above, outputs as summarized hall calling information the hall calling information of each floor generated by the section for conversion of information as to floors to be used of each wireless/fingerprint common control device;

an elevator interface that stores beforehand elevator floor information in accordance with the circumstances of the building and that generates and outputs floor hall calling information in which the floor is altered in accordance with the elevator floor information referred to above in respect of hall calling information arriving from the hall calling information transmission section; and

an elevator control panel that flashes (blinks) a hall calling button of the floor in question in accordance with floor hall calling information received from this elevator

interface to prompt for selection of a hall calling button by a passenger authenticated as a genuine elevator user. Since floor hall calling information in which the floor is altered by taking into account elevator floor information of the building in respect of hall calling information summarizing the hall calling information of each floor is generated and transmitted to the elevator control panel, it is possible to prompt for selection of the hall calling button by a passenger who has been authenticated as a genuine elevator user by flashing (blinking) the hall calling button of the floor in question. An elevator security system can thereby be realized that is capable of application without difficulty to the needs of customers and that is not subject to restrictions regarding age etc.

(4) Also, in example embodiments, an elevator security system for authenticating a passenger using an elevator and carrying a wireless card that stores information as to floors to be used by the passenger in question and authentication information may be constructed as follows. Specifically, the elevator security system comprises: a fingerprint reading section that reads the fingerprint pattern of a passenger when using the elevator; and a wireless/fingerprint common control device comprising an authentication comparison section that stores fingerprint authentication information of a large number of

passengers who use the elevator and that, when a passenger holding said wireless card enters a prescribed distance range, extracts fingerprint authentication information of the passenger in question using the authentication retrieval information, of the information stored on this wireless card, and stands by, executes a fingerprint comparison simultaneously with acquiring a fingerprint pattern from the fingerprint reading section, and, if the elevator user is authenticated as genuine, transmits the information as to the floors to be used by the passenger read from the wireless card; and a section for conversion of information as to the floors to be used, in which is stored installed floor information of this wireless/fingerprint common control device and that generates destination floor information of each floor from the information as to floors to be used from the authentication comparison section and this installed floor information.

Thanks to the construction as described above, information as to the destination floor can be generated at each floor from the information as to the floors to be used by the passenger read from the wireless card if the elevator user is authenticated as a genuine elevator user and from the installed floor information. Also, if a wireless/fingerprint common control device is installed in an elevator hall at any desired floor,

destination floor registration can be automatically performed by adding:

5 a destination floor information transmission section that selects and outputs the destination floor information corresponding to the floor in question, based on door opening information of a particular floor generated from the elevator control panel by detecting landing stage door opening on arrival of the elevator at the landing stage, of the destination floor information of each floor generated by
10 the section for conversion of information as to the floors to be used, of each wireless/fingerprint common control device;

an elevator interface that stores beforehand elevator floor information in accordance with the circumstances of
15 the building and that generates and outputs elevator destination floor information in which the floor is altered in accordance with the elevator floor information in respect of destination floor information arriving from the destination floor information transmission section; and

20 an elevator control panel that receives elevator destination floor information from this elevator interface.

As a result, it is possible to flexibly cope with operations such as flashing of a floor hall calling button or destination floor registration by an elevator control
25 panel in accordance with (3) above, in accordance with the needs of the customer.

Brief description of the drawings

Figure 1 is a layout diagram showing an embodiment of an elevator security system according to the present invention;

5 Figure 2 is a view given in explanation of an example of operation to release hall non-stop; and

Figure 3 is a view given in explanation of an example in the case of an operation for hall destination floor registration.

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Best mode for putting the invention into effect

An embodiment of the present invention is described below with reference to the drawings.

Figure 1 is a layout diagram showing an embodiment of an
15 elevator security system according to the present invention.

This system comprises elevator halls, for example 10a to 10c corresponding to each floor, elevator floor boxes 20a to 20c installed in correspondence with the elevator halls 10a to 10c, an elevator control panel 30 connected to so as to
20 input in centralized fashion information output from a plurality of elevator floor boxes such as for example 20b and 20c via a specified single elevator floor box such as for example 20a, a passenger cage 40 and a switch box 50 for maintenance. It should be noted that the specified single
25 elevator floor box such as for example 20a, elevator control

panel 30 and passenger cage 40 etc are arranged in the ascending/descending path (elevator shaft) 60.

10a to 10c indicate respectively different floors.

Wireless cards 11a to 11c held by passengers using the
5 elevator are present in the elevator halls 10a to 10c. These wireless cards 11a to 11c are constructed to store authentication information such as information as to the floors to be used and fingerprints that is characteristic of a passenger (authentication information relating to
10 fingerprints may also be referred to as fingerprint authentication information) and to receive authentication information such as fingerprints characteristic of a passenger and information as to floors to be used, by means of receiving antennas 12a to 12c that are installed on each
15 floor. Also, fingerprint detectors 13a to 13c that read the fingerprint patterns of passengers using the elevator, and hall calling buttons 14a to 14c are installed in the elevator halls 10a to 10c. These hall calling buttons 14a to 14c are connected with the elevator control panel 30 through
20 transmission lines.

In the elevator floor boxes 20a to 20c there are provided wireless/fingerprint common control devices 21a to 21c that authenticate at high speed whether or not a passenger is a genuine elevator user by using the
25 fingerprint pattern of the passenger read by the fingerprint detectors 13a to 13c and the authentication information and

information as to floors to be used received from the
respective receiving antennas 12a to 12c and generate final
hall calling information from the information as to floors
to be used if the passenger is a genuine elevator user. Also,
5 in the elevator floor box 20b, there is provided a cascade
connection hub 22 for feeding the various items of output
information of the wireless/fingerprint common control
devices 21b, 21c to the wireless/fingerprint common control
device 21a. In addition, in the elevator floor box 21a,
10 there are provided a fingerprint registration/update
identifying section 24 and the elevator interface 23 for
feeding the various items of output information of the
wireless/fingerprint common control devices 21a to 21c to
the elevator control panel 30.

15 An elevator in-cage switch 41 is provided in the
passenger cage 40 and a keypad 51 and maintenance switches
52 to 55 are provided in the maintenance switch box 50. This
keypad 51 is releasably mounted and is for example employed
when giving instructions to transfer for example fingerprint
20 authentication information registered in for example a
wireless/fingerprint common control device 21a to another
wireless/fingerprint common control device 21b or 21c. The
maintenance switches 52 to 55 transmit a fingerprint
registration condition signal to the fingerprint
25 registration/update identifying section 24 by combined
operation of a plurality of switches.

When this fingerprint registration/update identifying section 24 identifies for example a fingerprint registration from the fingerprint registration condition signal produced by combined operation of a plurality of switches, it gives
5 notification of this to the elevator interface 23. This elevator interface 23 performs a blocking action such that the information that is output from the wireless/fingerprint common control devices 21a to 21c cannot enter the elevator control panel 30.

10 Next, operation of the system as described above will be described with reference to Figure 2.

Figure 2 is a detail view showing the construction of part of Figure 1, being in particular a view given in explanation of the flow of information (information as to
15 floors to be used). Also, it will be assumed that the operation of the elevator control panel 30 is set to hall non-stop release. Also, apart from the information as to floors to be used utilized by the passengers, the wireless cards 11a to 11c are constructed so as to be capable of
20 storing authentication information such as for example fingerprints for authentication of passengers or authentication information required for retrieval of for example authentication identification information and to be capable of receiving, by means of receiving antennas 12a to
25 12c, authentication information and information as to floors to be used stored in the wireless cards 11a to 11c when

these enter an area of a prescribed distance range. Let us assume that the information "10010" as to floors to be used is stored in the wireless card 11c shown in Figure 2. The meaning of this information "10010" as to floors to be used is that, reading in sequence from left to right, the first floor, second floor, third floor, fourth floor and fifth floor are indicated and a "1" indicates that the floor in question can be used while a "0" indicates that the floor in question cannot be used. In other words, this indicates that the passenger holding this wireless card 11c can use the first floor and the fourth floor. Furthermore, the authentication information stored in the wireless cards 11a to 11c is encoded in order to maintain security and is in a form that is not visible to the eye, so a description thereof will be omitted here.

Under the above assumptions, the case will be described where a passenger A holding the wireless card 11c that stores the information "10010" as to floors to be used arrives at the fourth floor hall, for example 10c.

When the passenger A arrives at the fourth floor hall 10c, due to operation of the elevator control panel 30, the hall calling button 14c is in the non-stop condition, so the passenger A in question cannot perform an operation of selecting the hall calling button 14c.

When, in this condition, the passenger A using the elevator approaches the wireless antenna 12c that is

installed in the hall 10c, holding the wireless card 11c,
the information as to floors to be used that is stored in
this wireless card 11c and the authentication information
characteristic of the passenger are received by the
5 reception antenna 12c wirelessly and transmitted to the
wireless/fingerprint common control device 21c. That is, the
information as to floors to be used and the authentication
information are transmitted from the wireless card 11c in a
one-to-one relationship and the wireless/fingerprint common
10 control device 21c then performs rapid fingerprint
authentication and preparation processing utilizing the
information from the wireless card 11c and processing to
generate the hall calling information at each floor using
the information as to floors to be used, if the passenger is
15 authenticated as genuine, without delay.

This wireless/fingerprint common control device 21c
authenticates whether or not a passenger A is a genuine
passenger allowed to use the elevator from the
authentication information in question, of the
20 authentication information and information as to floors to
be used, received by the receiving antenna 12c, and,
specifically, comprises an authentication information
storage section 211c that stores the fingerprint
authentication information of passengers that use the
25 elevator, such as residents of the floor in question of the
building and an authentication comparison section 212c. This

authentication comparison section 212c extracts and prepares fingerprint authentication information relating exclusively to the passenger in question, from the authentication information storage section 211c, using the authentication
5 information in the wireless card 11c received by the receiving antenna 12c, and immediately compares the fingerprint pattern of the passenger A with the fingerprint authentication information when this fingerprint pattern of the passenger A is received from the fingerprint detector
10 13c installed in the same elevator hall 10c and thereby authenticates the passenger as being a genuine elevator user or not. As the fingerprint authentication information that is stored in the authentication information storage section 211c, there is stored fingerprint information of the
15 passengers themselves that are allowed to use the elevator or, in associated fashion, fingerprint identification information and fingerprint information; the fingerprint information is extracted therefrom from the relationship between the fingerprint identification information and
20 authentication information received by the receiving antenna 12c.

The authentication comparison section 212c compares the single item of fingerprint authentication information prepared from the authentication information in the wireless
25 card 11c with the fingerprint pattern of the passenger A that is sent from the fingerprint detector 13c and, if this

fingerprint authentication information and the fingerprint pattern agree, transmits the information as to floors to be used "10010" that is read from the wireless card 11c (S1c) to the section 213c for conversion of information as to the
5 floors to be used.

To this section 213c for conversion of information as to the floors to be used there is connected a section 214c for storage of information as to installed floors, that stores information (S2c) as to the installed floors, for example
10 "00010". The meaning of this installed floors information "00010" is that, reading in sequence from left to right, the first floor, second floor, third floor, fourth floor and fifth floor are indicated and a "1" indicates that the floor in question is an installed floor. In this example, the
15 meaning is that a wireless/fingerprint common control device 21c is installed at the fourth floor.

Thereupon, the section 213c for conversion of information as to the floors to be used executes logical operation (in this case, an AND operation or logical product
20 operation) on the information S1c as to floors to be used and the information S2c as to installed floors, and generates the hall calling information S3c of each floor i.e. "00010". The meaning of this hall calling information "00010" of each floor is that, reading in sequence from left
25 to right, the first floor, second floor, third floor, fourth

floor and fifth floor are indicated and "1" is indicated at the fourth floor.

This means that the section 213c for conversion of information as to the floors to be used converts the
5 information "10010" as to floors to be used and the information "00010" as to installed floors to the hall calling information "00010" (S3c) of each floor, representing the fact that a passenger A authenticated as genuine generates a hall call from the fourth floor, and
10 transmits this to the wireless/fingerprint common control device 21a that is provided for example in the ascending/descending path (elevator shaft) 60, through a hub 22 (not shown) of the wireless/fingerprint common control device 20b. As a result, the elevator control panel 30 can
15 easily detect the fact that a fourth floor hall call has been generated, from the information as to floors to be used emitted by the wireless card 11c held by the passenger A.

Also, if the wireless/fingerprint common control device 21c were to be installed on the first floor, when
20 fingerprint authentication is performed with the passenger A carrying the same wireless card 11c, the installed floor information of the installed floor information storage section 214c would be "10000", so, as a result of the AND operation described above, the fact that a first floor hall
25 call has been generated can be detected without difficulty. Likewise, if the wireless/fingerprint common control device

21c is installed on the third floor and fingerprint authentication is performed with the passenger A carrying the same wireless card 11c, the installed floor information of the installed floor information storage section 214c is
5 now "00100", so, as a result of the logical operation (AND operation) described above, the hall calling information of each floor becomes "00000"; in other words, hall calling by the passenger A from the third floor is blocked. That is, if fingerprint authentication is performed with the passenger A
10 carrying the wireless card 11c storing the information "10010" as to floors to be used, when authentication is performed through a wireless/fingerprint common control device 21c installed on the third floor, third floor hall calling can be blocked. This is because, from the wireless
15 card 11, at least the third floor is not a floor at which the elevator can be made to stop.

The hall calling information of each floor generated by the wireless/fingerprint common control devices 21b, 21c,... as described above are for example Ethernet (Ethernet: LAN
20 (local area network) standard devised by Xerox and Dec (now part of Hewlett-Packard). Ethernet is standardized by the IEEE 802.3 committee.) signals which are sent to the wireless/fingerprint common control device 21a by using the hub 22. The plurality of hall calling information items S3a
25 to S3c of each floor are there combined to produce hall

calling information S3, which is sent to the elevator control panel 30 through the elevator interface 23.

It should be noted that the elevator interface 23 is provided with an elevator floor conversion section 231 and
5 elevator floor information storage section 232. If, depending on the location etc of installation or the building where the elevator is installed, there exists for example an intermediate floor or express zone (the passenger cage is arranged not to stop at this intermediate floor or
10 in this express zone), the method of processing input hall calling information S3 of the floor by the elevator control panel 30 may be different, so the elevator floor conversion section 231 converts the elevator floor in accordance with elevator floor information stored in the elevator floor
15 information storage section 232, thereby generating elevator floor hall calling data S4, which is transmitted to the elevator control panel 30.

This elevator control panel 30 controls the movement of the passenger cage 40 and, when it receives elevator floor
20 hall calling information S4, prompts for selection of a hall calling button 14c by a passenger A by flashing the hall calling button 14c of the applicable halls 10a to 10c (for example 10c) for the passenger, who has been authenticated as a genuine elevator user, at each floor.

25 If the passenger then selects for example the button 14c of the floor in question during flashing of the hall calling

buttons 14a to 14c, this selected hall calling button 14c is
flashed and the elevator is made answer the floor at which
the button in question was operated. It should be noted that,
if no button is selected during flashing of the hall calling
5 buttons 14a to 14c, this process is automatically cancelled.

Incidentally, as explained above, with a fingerprint
authentication device in which fingerprint detectors 13a to
13c are provided, since fingerprint authentication must be
performed for one customer at a time and the elevator
10 attempts to serve customers in the order in which they were
authenticated, problems may arise in that service to later
customers is neglected.

According, in this elevator security system, as shown in
Figure 2, there is provided a during-scanning reading
15 section 215c that generates during-scanning information S11c
on detecting that information as to floors to be used stored
in the wireless card 11c has been read at the output side of
the authentication comparison section 212c of the
wireless/fingerprint common control device 21c. This during-
20 scanning information S11c is converted to a form that is
capable being used on the Ethernet and is sent via the
elevator interface 23 of the wireless/fingerprint common
control device 21a to the elevator control panel 30, where
it performs control such that the door on the hall side does
25 not close. In this way, it is possible to ensure that a

passenger does not fail to enter the cage during fingerprint authentication.

Next, an example of performance of fingerprint registration and updating using a system according to the
5 present invention will be described.

Usually, the authentication information relating to fingerprints of residents of the building or passengers using the elevator is frequently altered, so it is necessary to be able to register and update fingerprints in a trouble-
10 free fashion. This requirement to frequently alter the authentication information relating to fingerprints arises because the fingerprints of children resident in the building in question change as they grow and because new residents move into the building.

15 Specifically, in this system, there are removeably mounted a keypad and a switch box 50 for maintenance purposes comprising maintenance switches 52 to 55. The keypad 51 is provided in removable fashion but the other switches 52 to 55 are permanently installed. The switch 52
20 has a normal terminal a and a setting terminal b; the switch 53 has a cut-off terminal c and a delete terminal d; the switch 54 has a cut-off terminal e and a registration terminal f; these switches 52 to 54 are employed for registration and updating of the fingerprints. The switch 55
25 has a normal terminal g and a special terminal h and is employed during execution of forced operation.

First of all, when a fingerprint is registered, the switch 52 is closed with the setting terminal b; the switch 54 is then closed with the registration terminal f and the fingerprint registration condition signal is transmitted to the fingerprint registration/update identifying section 24. If the fingerprint registration/update identifying section 24 identifies "fingerprint registration" from the fingerprint registration condition signal, it gives notification thereof to the elevator interface 23. This elevator interface 23 performs an action of blocking the information that is output from the wireless/fingerprint common control devices 21a to 21c from entering the elevator control panel 30 and may for example read the fingerprint of a passenger by means of a fingerprint detector 13a and register this in the authentication information storage section 211c via the authentication comparison section 212c of the wireless/fingerprint common control device 21a. Also, if used in conjunction with the wireless card, the information as to floors to be used and the authentication information may be associated by bringing the wireless card 11a up close to the receiving antenna 12a whilst the fingerprint reading described above is being performed and registering these i.e. the information as to floors to be used and the authentication information in the authentication information storage section 211c.

It should be noted that it is possible to arrange that the fingerprint authentication information registered in the authentication information storage section 211a (not shown) of the wireless/fingerprint common control device 21a may be
5 transferred to and stored in authentication information storage sections 211b, 211c of the other wireless/fingerprint common control devices 21b, 21c through the hub 22 by utilizing the Ethernet, so that elevator users can use other floors without having to register separately
10 at each floor.

After registration of the fingerprint authentication information, the switch 52 is separated from the setting terminal b and moved to the normal terminal a and the switch 54 is separated from the registration terminal f and moved
15 to the cut-off terminal e, thereby completing fingerprint registration.

As mentioned above, in the maintenance switch box 50, there is provided a switch 55 having a normal terminal a and a special terminal h and, within the passenger cage 40,
20 there is provided an elevator in-cage switch 41 having a normal terminal j and special terminal k. The purpose of these switches 55 and 41 is as follows. If the fingerprint authentication device should be broken, basically the elevator would not operate, but, if the manager needs to
25 operate the elevator regardless, the elevator can be set in normal operating mode by the manager disconnecting the

switches 55 and 41 from the special terminals h, k and connecting them with the normal terminals g, j. That is, the elevator can be made to operate in normal fashion neglecting the fingerprint authentication function.

5 Figure 3 is a view given in explanation of another embodiment of an elevator security system according to the present invention.

Whereas Figure 2 described above described an example of hall non-stop release by an operation at the elevator control panel 30, in Figure 3, that describes this
10 embodiment, an example of hall destination floor registration is described. The overall layout of the system is substantially the same as in the case of Figure 1, so for details the reader is referred to the description of Figure
15 1.

The particular difference in the case of this system lies in the different construction or processing in regard to some parts of the wireless/fingerprint common control
20 devices 21a to 21c. Specifically, whereas, in the case of the sections 213a to 213c (213a and 213b are not shown) for conversion of information as to floors to be used of the wireless/fingerprint common control devices 21a to 21c, logical operation processing such as for example an AND
25 operation was performed on the information "10010" S1c as to floors to be used that was output from the authentication

comparison section, such as for example 212c, and the information "00010" S2c as to installed floors of the installed floors information storage section 214c, in this embodiment, information "11101" S5c obtained by inversion
5 processing by the inversion processing section 216 C of the installed floors information "00010" S2c is extracted, this inverted information "11101" and the information as to floors to be used "10010" are subjected to logical operation processing (such as for example an AND operation" and
10 destination floor information for each of the floors "10000" S6c is thereby generated.

This destination floor information for each of the floors S6c is transmitted to the wireless/fingerprint common control device 21a through the hub 22 of the
15 wireless/fingerprint common control device 21b. This wireless/fingerprint common control device 21a collects the destination floor information S6a to S6c for each of the floors from the wireless/fingerprint common control devices 21a to 21c on each floor.

20 In the case of the hall non-stop release shown in Figure 2, this was summarized as a single item of hall calling information S4, but, in the case of the destination floor registration in this embodiment, it is necessary to have information regarding each of the floors, so this
25 information is transmitted to the elevator interface 23 with a prescribed timing in the form of individual items of

information for each floor, rather than being converted to a single summarized item of information.

A signal of this prescribed timing is generated by the elevator control panel 30. Specifically, when the door of the passenger cage 40 is opened on arrival of the passenger cage 40 at a given floor, the landing stage door of the floor in question is opened, so, on detecting this opening of the landing stage door, the elevator control panel 30 transmits the door opening information S21a to S21c of the floor in question and transmits a timing signal to the wireless/fingerprint common control device 21a through the elevator interface 23.

Consequently, the wireless/fingerprint common control device 21a, using the door opening information such as for example S21c of the given floor that arrives from the elevator control panel 30, outputs destination floor information S6c corresponding to the floor in question and transmits this to the elevator interface 23.

At this elevator interface 23, there are provided an elevator floor conversion section 231 and elevator floor information storage section 232; since, in this elevator floor information storage section 232, the method of processing of the floors at the elevator control panel 30 is different if there exists for example an intermediate floor or express zone, depending on the building or location of

installation etc, the elevator floor information is stored so as to be capable of coping with such service.

Accordingly, the elevator floor conversion section 231 of the elevator interface 23 converts input destination
5 floor information S6c to elevator destination floor information S22 based on the elevator floor information of the elevator floor information storage section 232 before transmitting it to the elevator control panel 30. This
elevator control panel 30 can perform destination floor
10 registration on door opening and so can register the destination desired by the passenger after entering the elevator hall.

Consequently, with the embodiment described above, authentication information relating to a passenger's
15 fingerprints is selected from the authentication information stored in the wireless card prior to reading of the fingerprint and the system stands by for the arrival of the fingerprint pattern of the passenger in question, so it is possible to authenticate whether a passenger is a genuine
20 elevator user at the instant when the fingerprint pattern of the passenger has been read. Thus, authentication processing can be executed in a short time irrespective of the number of passengers whose fingerprints are to be authenticated and irrespective of the age etc of the elevator users.

25 Also, since the fingerprint authentication information of the passengers is selected from outside irrespective of

processing performed by the elevator control panel 30, the processing load of the elevator control panel 30 can be considerably reduced and, in addition, by unifying the form of the elevator hall calling information and elevator
5 destination floor information, several operations at the elevator control panel are standardized, so that it is possible to cope in a flexible manner with for example combination of operations, in accordance with the needs of customers.

10 While fingerprint authentication in the elevator hall was described in the above embodiment, it should be noted that this could easily be generalized to authentication of fingerprints within the passenger cage, by adopting the construction of the first floor. Also, although in the above
15 embodiments, examples were described of from one to a few floors, the invention could of course be applied to high-rise buildings by for example increasing the number of wireless/fingerprint common control devices in accordance with the increase in number of floors.

20 Apart from this, the present invention is not restricted to the above embodiments and could be put into practice in various modified ways without departing from its gist.

Also, the embodiments may be put into practice in combination as far as possible and, if this is done,
25 beneficial effects may be obtained by the combinations. Furthermore, the above embodiments include various

superordinate and subordinate inventions and various inventions can be extracted by suitable combination of a plurality of disclosed structural elements. For example, if an invention is extracted by omitting some structural
5 elements from the overall structural features described in the means for solving the problem, the portions which have thus been omitted can be suitably supplemented by common technical knowledge in order to implement this invention which has thus been extracted.

10

Field of industrial application

The present invention makes it possible to perform authentication processing in a short time irrespective of the number of passengers whose fingerprints are to be
15 authenticated and irrespective of the age of the elevator users.

Also, according to the present invention, the processing load of the elevator can be considerably reduced and, in addition, by unifying the form of the elevator hall calling
20 information and elevator destination floor information, several operations at the elevator control panel are standardized, so that it is possible to cope in a flexible manner with for example combination of operations, in accordance with the needs of customers.

WHAT is claimed is:

1. An elevator security system for authenticating a plurality of passengers using an elevator and carrying a wireless card that stores information as to floors to be used by each passenger and authentication information, said elevator security system comprising:

(1) a fingerprint reading section that reads a fingerprint pattern of a passenger when using said elevator; and

(2) a wireless/fingerprint common control device comprising

(a) an authentication comparison section that stores fingerprint authentication information of a plurality of passengers and that, when said passenger holding said wireless card enters a prescribed distance range, prior to reading of a fingerprint pattern of said passenger in question by said fingerprint reading unit, extracts fingerprint authentication information of said passenger based upon said authentication information, of said information stored on said wireless card, and stands by, executes a fingerprint comparison after acquiring a fingerprint pattern from said fingerprint reading section, and, if an elevator user is authenticated as genuine, transmits an information as to floors to be used by said passenger read from said wireless card;

(b) a section for conversion of information as to floors to be used, in which is stored installed floor information of said wireless/fingerprint common control device and that generates hall calling information of each floor based upon said information as to floors to be used from said authentication comparison section and said installed floor information,

(3) a hall calling information transmission section that, if said wireless/fingerprint common control device is installed in an elevator hall at an arbitrary floor, outputs as summarized hall calling information a hall calling information of each floor generated by said section for conversion of information as to floors to be used of each wireless/fingerprint common control device;

(4) an elevator interface that stores beforehand elevator floor information in accordance with circumstances of a building and that generates and outputs floor hall calling information in which a floor is altered in accordance with said elevator floor information in respect of hall calling information arriving from said hall calling information transmission section; and

(5) an elevator control panel that flashes a hall calling button of said floor in question in accordance with floor hall calling information received from said elevator interface to prompt for selection of a hall calling button by a passenger authenticated as a genuine elevator user.

2. An elevator security system for authenticating a passenger using an elevator and carrying a wireless card that stores information as to floors to be used by said passenger in question and authentication information, said elevator security system comprising:

(1) a fingerprint reading section that reads a fingerprint pattern of said passenger when using said elevator; and

(2) a wireless/fingerprint common control device comprising

(a) an authentication comparison section that stores fingerprint authentication information of a passenger and that, when said passenger holding said wireless card enters a prescribed distance range, extracts fingerprint authentication information of said passenger based upon said authentication information, of said information stored on said wireless card, and stands by, executes a fingerprint comparison after acquiring a fingerprint pattern from said fingerprint reading section, and, if an elevator user is authenticated as genuine, transmits and information as to floors to be used by said passenger read from said wireless card;

(b) a section for conversion of information as to floors to be used, in which is stored installed floor information of said wireless/fingerprint common control device and that generates destination floor information of each floor based upon said information as to floors to be used from said authentication comparison section and said installed floor information,

(3) a destination floor information transmission section that, if a wireless/fingerprint common control device is installed in an elevator hall at an arbitrary floor, selects and outputs said destination floor information corresponding to a floor in question, based upon door opening information of a particular floor generated by said elevator control panel by detecting landing stage door opening on an arrival of said elevator at a landing stage, of said destination floor information of each floor generated by said section for conversion of information as to floors to be used, of each wireless/fingerprint common control device;

(4) an elevator interface that stores beforehand elevator floor information in accordance with circumstances of a building and that generates and outputs elevator destination floor information in which a floor is altered in accordance with said elevator floor information in respect of destination floor information arriving from said destination floor information transmission section; and

(5) an elevator control panel that performs destination floor registration based upon said elevator destination floor information received from said elevator interface.

3. The elevator security system according to claim 1 or claim 2,

wherein said wireless/fingerprint common control device comprises

a scanning information section that, when information as to floors to be used and authentication information characteristic of a passenger that are stored in said wireless card are received if a passenger holding said wireless card enters a prescribed distance range, reads and outputs said information as to floors to be used as scanning information; and

a door opening control section that accepts said scanning information output from said scanning information section and outputs door opening control information by said elevator control panel to avoid failure of a passenger to enter said elevator during fingerprint authentication while said scanning information is being received.

4. The elevator security system according to claim 1 or claim 2, further comprising

a maintenance switch for setting up a signal for

fingerprint registration in said elevator interface and connected by Ethernet with a wireless/fingerprint common control device installed in an elevator hall of each floor, wherein when a fingerprint is registered from said fingerprint reading section of a given floor, sets up said signal for fingerprint registration in said elevator interface from said maintenance switch and then saves said fingerprint pattern of said passenger read by said fingerprint reading section as fingerprint authentication information in said wireless/fingerprint common control device installed at said given floor, allows utilization thereof by said passenger without separate registration at each floor by transferring to, and saving said fingerprint authentication information in said wireless/fingerprint common control devices installed in other floors, using said Ethernet.