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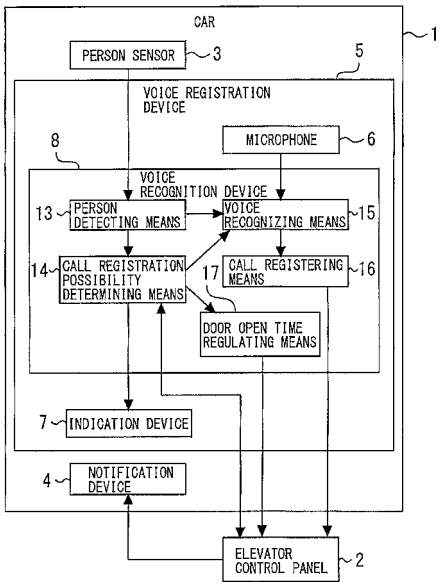
(54) ELEVATOR CALL REGISTRATION DEVICE

(57) In a call registration device which can be used to make call registration by voice when an elevator door is open, the door is prevented from being closed before a passenger makes call registration by voice. The call registration device comprises a microphone provided in a car to input voice, a person detector provided in the car to detect a passenger, and call registering means for registering a call based on a voice signal inputted through the microphone when the person detector detects the presence of a passenger during the time when an elevator door is open. When a call can be registered by the call registering means, door open time is regulated properly based on the elevator boarding load.

Fig. 1



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Description

Technical Field

[0001] The present invention relates to an elevator call registration device that can be used for a passenger to make call registration by voice in an elevator car.

Background Art

[0002] Elevators are used by a variety of passengers such as wheelchair users, aged persons, and persons carrying many pieces of luggage by both hands. Therefore, some passengers feel it difficult or inconvenient to perform button operation for registering a call.

[0003] Patent Literatures 1 to 4 propose call registration devices that can be used to make elevator call registration by voice.

For example, in the call registration device described in Patent Literature 1, call registration can be made by voice only when it is detected that a person stands in front of a microphone, and thereby erroneous call registration (erroneous recognition of voice) is prevented from being made by conversations among waiting passengers in a hall, surrounding noises, and the like. Also, as a means for preventing erroneous call registration, the installation of a plurality of microphones for inputting voice is described in Patent Literature 2, and the voice recognition made by a plurality of processing methods is described in Patent Literature 3.

[0004] Patent Literatures 1 to 3 disclose techniques capable of being also applied to the call registration device installed in an elevator hall. On the other hand, a unique technique that is not applied to a call registration device in a hall is sometimes applied to a call registration device installed in an elevator car. For example, in the call registration device described in Patent Literature 4, call registration can be made by voice only when the elevator door is open, and thereby erroneous call registration is prevented from being made by conversations among passengers during the time when the car is running and surrounding noises.

Citation List

Patent Literature

[0005]

Patent Literature 1: Japanese Patent No. 2557939
Patent Literature 2: Japanese Patent Laid-Open No. 3-284589
Patent Literature 3: Japanese Patent No. 3082618
Patent Literature 4: Japanese Patent Laid-Open No. 2002-128404

Summary of Invention

Technical Problem

[0006] In the call registration device described in Patent Literature 4, the time period for which call registration can be made by voice is limited to a short time period after a passenger has gotten in the car. Therefore, for example, in the case where the car is crowded, sometimes, the door is closed before the passenger moves to a place in front of a microphone, so that the voice call registering function cannot be fulfilled sufficiently. Such an event is liable to occur when a passenger who requires much time for the movement into the car or has difficulty in quickly moving in the car, such as a wheelchair user, an aged person, or a person carrying many pieces of luggage by both hands, gets in the car.

[0007] In the case where the door is closed before call registration is made by voice, for example, the passenger carrying many pieces of luggage by both hands must perform the operation of a car call button and the like after having put down the luggage once onto the floor in the car. Therefore, the effect of providing the voice call registering function is lost significantly.

[0008] The present invention has been made to solve the above-described problems, and accordingly an object thereof is to provide an elevator call registration device which can be used to make call registration by voice when an elevator door is open and can prevent the door from being closed before a passenger makes call registration by voice.

Solution to Problem

[0009] An elevator call registration device of the invention is a device which comprises a microphone provided in an elevator car to input voice, a person detector provided in the car to detect a passenger, call registering means for registering a call based on a voice signal inputted through the microphone when the person detector detects the presence of a passenger during the time when an elevator door is open, and door open time regulating means for regulating door open time based on an elevator boarding load when a call can be registered by the call registering means.

Advantageous Effect of Invention

[0010] According to the present invention, in a call registration device capable of being used to make call registration by voice when an elevator door is open, the door can be prevented from being closed before a passenger makes call registration by voice.

Brief Description of Drawings

[0011]

Figure 1 is a block diagram showing an elevator call registration device in a first embodiment according to the present invention.
Figure 2 is an exemplary view showing the state in an elevator car provided with the call registration device shown in Figure 1.
Figure 3 is a flowchart showing the operation of the elevator call registration device in the first embodiment according to the present invention.
Figure 4 is a block diagram showing the main part of an elevator call registration device in a second embodiment according to the present invention.
Figure 5 is a flowchart showing the operation of the elevator call registration device in the second embodiment according to present invention.
Figure 6 is a block diagram showing an elevator call registration device in a third embodiment according to the present invention.
Figure 7 is a flowchart showing the operation of the elevator call registration device in the third embodiment according to the present invention.

Description of Embodiments

[0012] The present invention will be described in more detail with reference to the accompanying drawings. In the drawings, the same reference signs are applied to the same or equivalent elements, and the duplicated explanation thereof is simplified or omitted.

First embodiment

[0013] Figure 1 is a block diagram showing an elevator call registration device in a first embodiment according to the present invention, and Figure 2 is an exemplary view showing the state in an elevator car provided with the call registration device shown in Figure 1.

[0014] In Figures 1 and 2, reference sign 1 denotes a car moving up and down in an elevator shaft, and 2 denotes a control panel for carrying out operation control of the whole of elevator including the running control of the car 1. The car 1 is provided with a person sensor (person detector) 3, a notification device 4, and a voice registration device 5.

[0015] The person sensor 3 has a function of detecting a passenger who is present in a predetermined detection range. Specifically, the person sensor 3 is provided to detect a passenger who is to be a user of the voice registration device 5, and for example, the detection range is set so as to cross the entrance of the car 1 (refer to Figure 2). In the example shown in Figure 2, a plurality of person sensors 3 are provided on a vertical frame forming the entrance of the car 1, whereby the detection ranges are arranged on the upper and lower sides to prevent a failure to detect a passenger. By adopting this configuration, the presence of a passenger is detected reliably by at least any one person sensor 3 when the passenger passes through the entrance of the car 1.

[0016] The notification device 4 has a function of notifying the passenger in the car 1 about predetermined information. This notification device 4 is composed of, for example, a speaker that provides voice guidance for the passenger in the car 1.

[0017] The voice registration device 5 is provided in the car 1 for the passenger in the car 1 to make call registration

by voice. The essential portion of the voice registration device 5 is composed of, for example, a microphone (voice inputting device) 6, an indication device 7, and a voice recognition device 8.

[0018] The microphone 6 is provided in the car 1 for use as voice input. That is, a passenger who desires to register a call by voice inputs voice information about his/her destination floor and the like through the microphone 6. The indication device 7 has a function of indicating, to passengers in the car 1, that the voice registration device 5 can be used, that is, that call registration can be made by voice. The indication device 7 is composed of, for example, an LED display.

[0019] In the example shown in Figure 2, the microphone 6 and the indication device 7 are disposed on an operating panel 9 in the car 1. The operating panel 9 is provided with, besides the notification device 4, a door opening button 10, a door closing button 11, and car call buttons 12.

[0020] The voice recognition device 8 constitutes the essential portion of the present invention, and has a function of making call registration based on the voice information inputted through the microphone 6, and a function of preventing the elevator door from being closed before the passenger who gets in the car 1 makes call registration by voice. Specifically, the essential portion of the voice recognition device 8 is composed of a person detecting means 13, a call registration possibility determining means 14, a voice recognizing means 15, a call registering means 16, and a door open time regulating means 17.

[0021] The person detecting means 13 receives a detection signal sent from the person sensor 3 to detect the presence or absence of a passenger who is to be a user of the voice registration device 5.

[0022] The call registration possibility determining means 14 has a function of determining whether or not a call can be registered by voice. That is, even if a passenger inputs his/her voice through the microphone 6 when it has been determined by the call registration possibility determining means 14 that call registration by voice is impossible, the call registration is not made. Into this call registration possibility determining means 14, the detection result of the presence or absence of passenger is inputted from the person detecting means 13, and the data on the operation condition of elevator is inputted from the control panel 2. The data inputted from the control panel 2 includes various pieces of information such as an elevator door opening/closing state and an elevator boarding load. Based on these pieces of inputted information, the call registration possibility determining means 14 determines that the voice call registration is possible during the time until the elevator door is closed, for example, when the person sensor 3 detects the presence of a passenger during the time when the elevator door is open.

[0023] The voice recognizing means 15 performs the voice recognizing function of the voice registration device 5. The voice recognizing function performed by the voice recognizing means 15 may be of any system as far as it can be determined whether or not the voice uttered to the microphone 6 by the passenger is a voice for requiring the call registration. For example, the voice recognizing means 15 determines whether or not a voice signal that coincides with the already registered voice signal under predetermined conditions is present among the voice signals inputted through the microphone 6, and if the coinciding voice signal is present, the voice recognizing means 15 identifies the destination floor corresponding to the registered voice signal as the destination floor of the passenger. Such a technique is also applied to a car navigation system and the like.

[0024] The call registering means 16 has a function of registering a call based on the determination result of the call registration possibility determining means 14 and the processing result of the voice recognizing means 15. That is, if the voice recognizing means 15 identifies the destination floor of the passenger based on the voice signal inputted through the microphone 6 during the time when it is determined by the call registration possibility determining means 14 that voice call registration is possible, the call registering means 16 gives the instruction corresponding to the identification result to the control panel 2, and registers the call of the passenger.

[0025] The above-described function of the call registering means 16 can be realized easily by turning the switch of the microphone 6 ON or by making the voice recognizing function of the voice recognizing means 15 effective, for example, only when it is determined by the call registration possibility determining means 14 that the registration is possible. Also, the configuration may be made such that the determination as to whether or not it is the time when the call registration is possible is made by the call registering means 16, and thereby the voice input from the microphone 6 and the voice recognizing function of the voice recognizing means 15 are always set effective.

[0026] The door open time regulating means 17 has a function of regulating door open time properly based on the elevator boarding load when the passenger can register a call by voice through the voice registration device 5, that is, when call registration can be made by the call registering means 16. For example, if it is determined by the call registration possibility determining means 14 that the voice call registration is possible, based on the elevator boarding load, the door open time regulating means 17 calculates presumed time during which the voice registration device 5 is used by the passenger, and gives a door open (prolong) instruction corresponding to the calculation result to the control panel 2. Table 1 below gives one example of a method for regulating the door open time in this embodiment.

[0027]

[Table 1]

	Boarding load (boarded weight/boardable weight × 100)			
	0-10%	11-30%	31-50%	51%ormore
Door open regulation time	+0 sec	+10 sec	+20 sec	+30 sec

[0028] The door open time regulating means 17 obtains the elevator boarding load from the control panel 2, for example, via the call registration possibility determining means 14. The elevator boarding load is calculated, for example, based on the number of users of the voice registration device 5, that is, the number of passengers who are presumed to make call registration by voice. In the example given in Table 1, the presumed number of passengers is calculated from the boarded weight of the car 1 (the whole or the increment) detected by a predetermined weighing device. That is, the elevator boarding load is determined by dividing the boarded weight of the car 1 detected by the weighing device by the boardable weight of the car 1. Based on the obtained elevator boarding load, the door open time regulating means 17 regulates the door open time, for example, so that the door open time is longer (prolonged) with the increase in the elevator boarding load. Table 1 gives, as one example, the case where the door open time is prolonged stepwise with the increase in the elevator boarding load.

[0029] Each of the means 13 to 17 provided in the voice recognition device 8 is configured by, for example, software on a microcomputer.

[0030] Next, referring to Figure 3 as well, the operation of a call registration device having the above-described configuration is explained specifically. Figure 3, which is a flowchart showing the operation of the elevator call registration device in the first embodiment according to the present invention, shows a specific process flow of the voice registration device 5.

[0031] In the voice registration device 5, the call registration possibility determining means 14 obtains the data on the operation condition of elevator from the control panel 2 (S101). The data obtained at this time includes various pieces of information such as the door opening/closing state of the car 1, the call registration state, and the elevator boarding load. Also, in voice registration device 5, the person detecting means 13 obtains the data on the state of user of the voice registration device 5 from the person sensor 3 (S102).

[0032] After various pieces of information have been obtained in S101 and S102, the voice registration device 5 determines, by using the call registration possibility determining means 14, whether or not the state is such that a call can be registered by voice (S 103). If all conditions such that, for example, the car 1 is in the state of door open, the operation condition is such that call registration can be made in the car 1, and the person sensor 3 detects the presence of passenger are met, the call registration possibility determining means 14 determines that the voice registration device 5 is in the usable state, that is, the voice call registration can be made (Yes in S103).

[0033] If it is determined in S 103 that the voice registration device 5 is usable, the voice registration device 5 turns the switches of the indication device 7 and the microphone 6 ON (S104). Thereby, for example, as shown in Figure 2, the LED of the indication device 7 is lighted up, a sign of "usable" or the like is displayed, and the passenger in the car 1 is notified that the voice call registration can be made. Also, a voice can be inputted through the microphone 6.

[0034] Further, when a voice can be inputted through the microphone 6 in S104, the voice recognizing means 15 starts voice recognition process (S105). If the voice recognizing means 15 recognizes a predetermined floor as the destination floor of passenger (Yes in S106), the call registering means 16 gives an instruction corresponding to the recognition result of the voice recognizing means 15 to the control panel 2, and makes call registration (S107).

[0035] If it is determined in S103 that the voice registration device 5 is usable, the voice registration device 5 calculates, by using the door open time regulating means 17, a door open time regulation value for regulating the door open time (S108). For example, in the case where the table shown in Table 1 has been prepared in advance in the voice registration device 5, when the elevator boarding load becomes 11%, the door open time regulating means 17 sends a door open (prolong) instruction for prolonging the door open time to 10 seconds to the control panel 2 (S109). Also, when the boarding onto the car 1 continues still thereafter, and the boarding load reaches 31%, the door open time regulating means 17 sends a door open instruction for prolonging the door open time to 20 seconds (for further prolonging the door open time by 10 seconds) to the control panel 2.

[0036] Table 1 provides one example of the table prepared to calculate the door open time regulation value. The door open time regulation value is configured so as to be settable optionally according to the elevator installation state and the like.

[0037] After sending the door open instruction in S109, the voice registration device 5 returns to the process in S 101, and repeats the above-described processes until it is determined in S 103 that the voice call registration cannot be made.

[0038] When the time to which the door open regulation time regulated by the door open time regulating means 17 is also added has elapsed after the elevator door has been opened in a predetermined hall, the elevator starts door closing

motion at that hall. When the elevator door is closed, the conditions for using the voice registration device 5 come to be not met, and determination of No is made in S 103 by the call registration possibility determining means 14.

[0039] If it is determined by the call registration possibility determining means 14 that the voice call registration cannot be made, the voice registration device 5 turns the switches of the indication device 7 and the microphone 6 OFF (S110). Thereby, the LED indication of the indication device 7 is put out, and the passenger in the car 1 is notified that the service time of the voice registration device 5 has expired. When the voice input from the microphone 6 is stopped, the voice recognizing means 15 finishes the voice recognition process (S111). Thereby, erroneous call registration is prevented from being made by conversations among passengers, surrounding noises, and the like after the door has been closed (including after the car 1 has started to run).

[0040] After the voice recognition process has been finished in S111, the voice registration device 5 returns to S 101, and performs processes in S 101 to S 103. If it is determined again in S 103 that the voice registration device 5 can be used, the voice registration device 5 turns the switches of the indication device 7 and the microphone 6 ON, and performs the processes in S105 and the following steps.

[0041] According to the first embodiment of the present invention, when the car 1 stops at a hall and the door is opened, the door open time at that hall is regulated properly according to the elevator boarding load. Therefore, the time during which the voice registration device 5 can be used is also prolonged properly according to the elevator boarding load, so that the passenger can reliably make voice call registration before the door closing motion is started.

[0042] In this embodiment, explanation has been given of the case where the number of users of the voice registration device 5 (the elevator boarding load) is calculated based on the boarded weight in the car 1. However, this embodiment merely shows one example, and the number of users may be calculated by any other method. For example, the configuration may be made such that a camera is installed in the car 1, the number of passengers (the whole number of passengers or the number of newly boarding passengers) is determined from the in-car image taken by the camera, and the number of users of the voice registration device 5 (the elevator boarding load) is calculated based on the determination result.

Second embodiment

[0043] In the first embodiment, when the voice registration device 5 becomes in the usable state, the door open time is prolonged appropriately according to the elevator boarding load, whereby the door is prevented from being closed before the passenger makes voice call registration. However, in the configuration shown in the first embodiment, in the case where the call registration is made smoothly, that is, in the case where the call registration is made successively and the door open time need not be prolonged, there is a fear that the door open time is prolonged wastefully by the above-described regulating function performed by the door open time regulating means 17.

[0044] Figure 4, which is a block diagram showing the main part of an elevator call registration device in a second embodiment according to the present invention, shows a specific configuration for solving the above-described problem. The voice registration device 5 in accordance with this embodiment includes a door open time correcting means 18 in addition to the above-described means 13 to 17 in the voice recognition device 8. Like the means 13 to 17, the door open time correcting means 18 is also configured by, for example, software on a microcomputer.

[0045] The door open time correcting means 18 has a function of correcting the door open time according to the service results of the voice registration device 5 when the passenger can make voice call registration through the voice registration device 5. For example, if it is determined by the call registration possibility determining means 14 that the voice call registration can be made, the door open time correcting means 18 corrects the output of the door open time regulating means 17 based on the call registration results of the call registering means 16, and sends a door open (prolong) instruction corresponding to the correction result to the control panel 2.

Table 2 below gives one example of a method for correcting the door open time in this embodiment.

[0046]

[Table 2]

	Voice registration call coefficient
Door open regulation time	-5 sec/call

[0047] The door open time correcting means 18 obtains call registration results (the number of calls having been registered by the call registering means 16) from the call registering means 16, for example, via the door open time regulating means 17. Then, the door open time correcting means 18 corrects the door open time based on the obtained call registration results, for example, so that the door open time is shortened with the increase in the number of calls registered by the call registering means 16. Table 2 gives, as one example, the case where the door open time is

shortened by 5 seconds each time one call is registered by the call registering means 16.

[0048] Other configurations including the configurations other than the voice registration device 5 are the same as those of the first embodiment.

[0049] Next, referring to Figure 5 as well, the operation of a call registration device having the above-described configuration is explained specifically. Figure 5, which is a flowchart showing the operation of the elevator call registration device in the second embodiment according to present invention, shows a specific process flow of the voice registration device 5 in accordance with this embodiment. Figure 5 corresponds to the motion in S108 of Figure 3. That is, other motions (motions before and after the motion in Figure 5) are the same as the motions in S101 to S107 and S 109 to S111 in Figure 3.

[0050] If it is determined by the call registration possibility determining means 14 that the voice call registration can be made (corresponding to Yes in S103 of Figure 3), the voice registration device 5 calculates a door open time regulation value by using the door open time regulating means 17 (S201). Then, the door open time regulating means 17 sends the calculated door open time regulation value to the door open time correcting means 18.

[0051] In the door open time correcting means 18, when the door open time regulation value is received from the door open time regulating means 17, first, a door open time correction value for correcting this door open time regulation value is calculated (S202). Specifically, in the case where the table shown in Table 2 has been prepared in advance in the voice registration device 5, the door open time correcting means 18 obtains the door open time correction value by multiplying the number of calls registered by the call registering means 16 by the voice registration call coefficient. For example, in the case where two calls have been registered by the call registering means 16 during the time when the door is open, the door open time correcting means 18 obtains -10 seconds as the door open time correction value.

[0052] Table 2 provides one example of the table prepared to calculate the door open time correction value. The door open time correction value is configured so as to be settable optionally according to the elevator installation state and the like.

[0053] Next, the door open time correcting means 18 corrects, by using the calculated door open time correction value, the door open time regulation value received from the door open time regulating means 17 (S203). Specifically, the door open time correcting means 18 makes the correction by subtracting the door open time correction value calculated in S202 from the door open time regulation value received from the door open time regulating means 17. For example, in the case where -10 seconds is calculated as the door open time correction value, if the door open time regulation value received from the door open time regulating means 17 is 20 seconds, the door open time correcting means 18 calculates the value (10 seconds) obtained by subtracting 10 seconds from 20 seconds as the door open time regulation value after correction.

[0054] After the door open time regulation value has been corrected, the door open time correcting means 18 determines whether or not the corrected door open time regulation value is smaller than zero (S204). If the corrected door open time regulation value is smaller than zero, the door open time correcting means 18 corrects this value to zero again (S205), and finishes the process. If the corrected door open time regulation value is zero or larger (No in S204), the door open time correcting means 18 sends a door open (prolong) instruction based on the door open time regulation value obtained by the process in S203 to the control panel 2 to prolong the door open time in accordance with that value (corresponding to S109 of Figure 3).

[0055] According to the second embodiment of the present invention, the door open time can be corrected appropriately in real time according to the call registration state that changes after the elevator door has been opened, so that the door open time can be prevented reliably from being prolonged wastefully by the regulating function of the door open time regulating means 17. In the case where the voice recognition device 8 is provided with the door open time correcting means 18, for example, if it is determined by the call registration possibility determining means 14 that the voice call registration cannot be made (corresponding to No in S 103 of Figure 3), the call registration results of the call registering means 16 has only to be reset (to zero).

Third embodiment

[0056] Figure 6 is a block diagram showing an elevator call registration device in a third embodiment according to the present invention. As shown in Figure 6, in the third embodiment, a camera (preferential person detection device) 19 is newly connected to the control panel 2 of elevator, and a preferential passenger determining means 20 is newly provided in the voice recognition device 8. Like the means 13 to 17 (18), the preferential passenger determining means 20 is also configured by, for example, software on a microcomputer.

[0057] The camera 19 is installed in the car 1 to take an image of the interior of the car 1. The image information taken by the camera 19 is sent to the voice registration device 5 via the control panel 2.

[0058] The preferential passenger determining means 20 has a function of determining a predetermined preferential passenger based on the image information taken by the camera 19. The preferential passenger is defined as a passenger whose movement into the car 1 or in the car 1 is easily restricted and who is presumed to require time longer than usual

in call registration motion. For example, wheelchair users, aged persons, persons carrying many pieces of luggage by both hands and the like are included in the preferential passengers. After the number of preferential passengers have been determined by the preferential passenger determining means 20, the door open time regulating means 17 calculates the door open time regulation value based on the determination result, and sends a door open (prolong) instruction corresponding to the calculation result to the control panel 2. The function of determining the preferential passenger may be provided in the device on the camera 19 side (the preferential person detection device).
Tables 3 and 4 each give one example of a method for regulating the door open time in this embodiment.

[0059]

[Table 3]

	Basic time	Maximum door open time
Door open regulation time	10 sec	60 sec

[0060]

[Table 4]

	Time for one luggage-carrying person	Time for one wheelchair user	Time for one aged person
Door open regulation time	3 sec/person	7 sec/person	5 sec/person

[0061] The preferential passenger determining means 20 determines the preferential passenger by predetermined kinds: for example, a wheelchair user, an aged person, and a person carrying luggage by both hands (luggage-carrying person). Based on the number of preferential passengers of each kind determined by the preferential passenger determining means 20, the door open time regulating means 17 calculates the door open time regulation value, and regulates the door open time. Table 4 gives, as one example, the case where different prolongation time is applied to each kind of preferential passengers.

[0062] Other configurations including the configurations other than the voice registration device 5 are the same as those of the first or second embodiment.

[0063] Next, referring to Figure 7 as well, the operation of a call registration device having the above-described configuration is explained specifically. Figure 7, which is a flowchart showing the operation of the elevator call registration device in the third embodiment according to the present invention, shows a specific process flow of the voice registration device 5 in accordance with this embodiment. Figure 7 corresponds to the motion in S 108 of Figure 3. That is, other motions (motions before and after the motion in Figure 7) are the same as the motions in S101 to S 107 and S 109 to S111 in Figure 3.

[0064] If it is determined by the call registration possibility determining means 14 that the voice call registration can be made (corresponding to Yes in S 103 of Figure 3), the voice registration device 5 determines a preferential passenger based on the image information sent from the camera 19, and calculates the door open time regulation value. Specifically, in the case where the tables shown in Tables 3 and 4 have been prepared in advance in the voice registration device 5, the preferential passenger determining means 20 determines the number of wheelchair users, aged persons, and luggage-carrying persons, respectively, based on the image information sent from the camera 19. The above-described determining function of the preferential passenger determining means 20 can be realized, for example, by distinguishing a luggage-carrying person and a wheelchair user by the size and shape of a moving object, and an aged person by employing the general image processing technique such as age determination using face recognition.

[0065] When receiving the detection result of the preferential passenger determining means 20, first, the door open time regulating means 17 calculates luggage-carrying passenger time by multiplying the number of luggage-carrying persons determined by the preferential passenger determining means 20 by predetermined time for one luggage-carrying person (S301). Likewise, the door open time regulating means 17 calculates wheelchair-using passenger time by multiplying the number of wheelchair users determined by the preferential passenger determining means 20 by predetermined time for one wheelchair user (S302), and calculates aged passenger time by multiplying the number of aged persons determined by the preferential passenger determining means 20 by predetermined time for one aged person (S303). Then, the door open time regulating means 17 calculates preferential passenger time by summing up the times calculated in S301 to S303 (S304).

[0066] For example, if it is determined by the preferential passenger determining means 20 that the number of luggage-carrying persons is one, the number of wheelchair users is two, and the number of aged persons is three, the door open time regulating means 17 makes calculation such that the luggage-carrying passenger time is $1 \times 3 = 3$ seconds,

the wheelchair-using passenger time is 2 × 7 = 14 seconds, and the aged passenger time is 3 × 5 = 15 seconds. Then, the door open time regulating means 17 sums up these times to make calculation such that the preferential passenger time is 3 + 14 + 15 = 32 seconds.

[0067] After the preferential passenger time has been calculated in S304, the door open time regulating means 17 obtains the door open time regulation value by adding the calculated preferential passenger time to the basic time preset for ordinary person (S305). For example, if the preferential passenger time is calculated to be 32 seconds in S304, the door open time regulating means 17 calculates the door open time regulation value to be 10 + 32 = 42 seconds.

[0068] After the door open time regulation value has been calculated in S305, the door open time regulating means 17 determines whether or not the calculated door open time regulation value is the maximum door open time or larger (S306). If the door open time regulation value calculated in S305 is the maximum door open time or larger, the door open time regulating means 17 causes the regulation value to agree with the maximum door open time (S307), and finishes the process. If the door open time regulation value calculated in S305 is smaller than the maximum door open time (No in S306), the door open time regulating means 17 sends a door open (prolong) instruction based on the door open time regulation value obtained by the process in S305 to the control panel 2 to regulate the door open time by using that regulation value (corresponding to S109 of Figure 3). For example, in the case where the door open time regulation value is calculated to be 42 seconds in S305, since this regulation value is smaller than the maximum door open time (60 seconds), the door open time regulating means 17 sends a door open instruction for making the door open time regulation value 42 seconds to the control panel 2.

[0069] Tables 3 and 4 each provide one example of the table prepared to calculate the door open time correction value. The door open time correction value is configured so as to be settable optionally according to the elevator installation state and the like.

[0070] According to the third embodiment of the present invention, even if many of the elevator passengers are passengers of specific kind, the door open time can be regulated properly at the hall. Therefore, the time for which the voice registration device 5 is usable is also prolonged properly according the kind of passenger, so that the passenger can reliably make voice call registration before the door closing motion is started.
Besides, this embodiment achieves the same effect as that of the first or second embodiment.

Industrial Applicability

[0071] The elevator call registration device of the present invention can be applied to an elevator in which a passenger can make call registration by voice in an elevator car.

Reference Signs List

[0072]

1	car
2	control panel
3	person sensor
4	notification device
5	voice registration device
6	microphone
7	indication device
8	voice recognition device
9	operating panel
10	door opening button
11	door closing button
12	car call button
13	person detecting means
14	call registration possibility determining means
15	voice recognizing means
16	call registering means
17	door open time regulating means
18	door open time correcting means
19	camera
20	preferential passenger determining means

Claims

1. An elevator call registration device comprising:

   a microphone provided in an elevator car to input voice;
   a person detector provided in the car to detect a passenger;
   call registering means for registering a call based on a voice signal inputted through the microphone when the person detector detects the presence of a passenger during the time when an elevator door is open; and
   door open time regulating means for regulating door open time based on an elevator boarding load when a call can be registered by the call registering means.

2. The elevator call registration device according to claim 1, wherein the door open time regulating means regulates the door open time so that the door open time is prolonged with the increase in an elevator boarding load.

3. The elevator call registration device according to claim 1 or 2, wherein the elevator boarding load is calculated based on the number of passengers who are presumed to make call registration by voice.

4. The elevator call registration device according to claim 3, wherein the number of passengers who are presumed to make call registration by voice is calculated from the boarded weight of the car detected by a predetermined weighing device or from an in-car image taken by a predetermined camera.

5. The elevator call registration device according to any one of claims 1 to 4, further comprising:

   door open time correcting means for correcting the door open time based on the call registration results of the call registering means when a call can be registered by the call registering means.

6. The elevator call registration device according to claim 5, wherein the door open time correcting means corrects the door open time so that the door open time is shortened with the increase in the number of calls registered by the call registering means.

7. The elevator call registration device according to any one of claims 1 to 6, comprising:

   a camera for taking an image of the interior of the car; and
   preferential passenger determining means for determining a predetermined preferential passenger who is presumed to require much time for the motion for call registration based on image information taken by the camera, wherein
   the door open time regulating means regulates the door open time based on the number of preferential passengers determined by the preferential passenger determining means.

8. The elevator call registration device according to claim 7, wherein
   the preferential passenger determining means determines the preferential passenger by predetermined kinds; and
   the door open time regulating means regulates the door open time based on the number of preferential passengers of each kind determined by the preferential passenger determining means.

Fig. 1

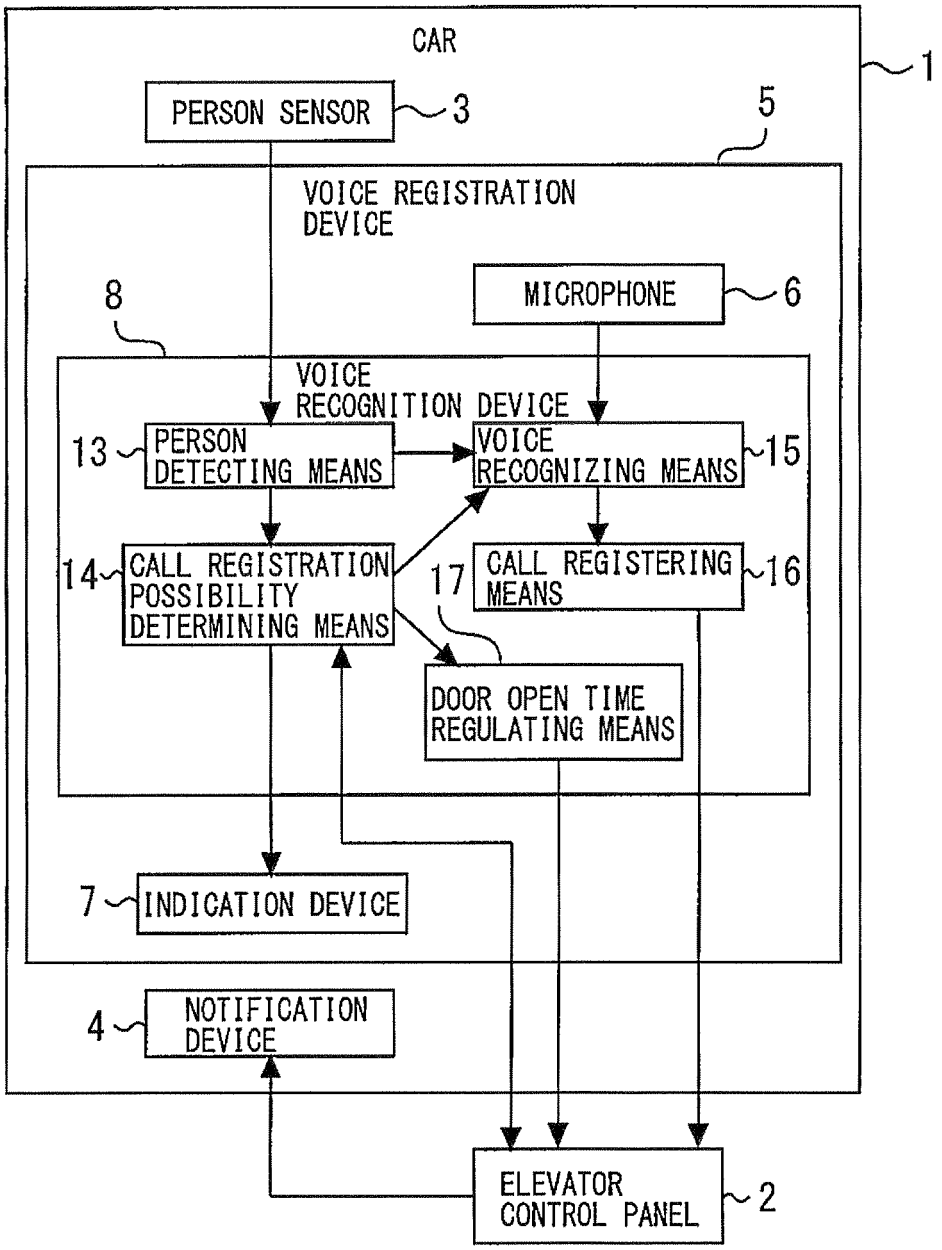

CAR
1
PERSON SENSOR
3
5
VOICE REGISTRATION DEVICE
MICROPHONE
6
8
VOICE RECOGNITION DEVICE
13
PERSON DETECTING MEANS
VOICE RECOGNIZING MEANS
15
14
CALL REGISTRATION POSSIBILITY DETERMINING MEANS
17
CALL REGISTERING MEANS
16
DOOR OPEN TIME REGULATING MEANS
7
INDICATION DEVICE
4
NOTIFICATION DEVICE
ELEVATOR CONTROL PANEL
2

Fig. 2

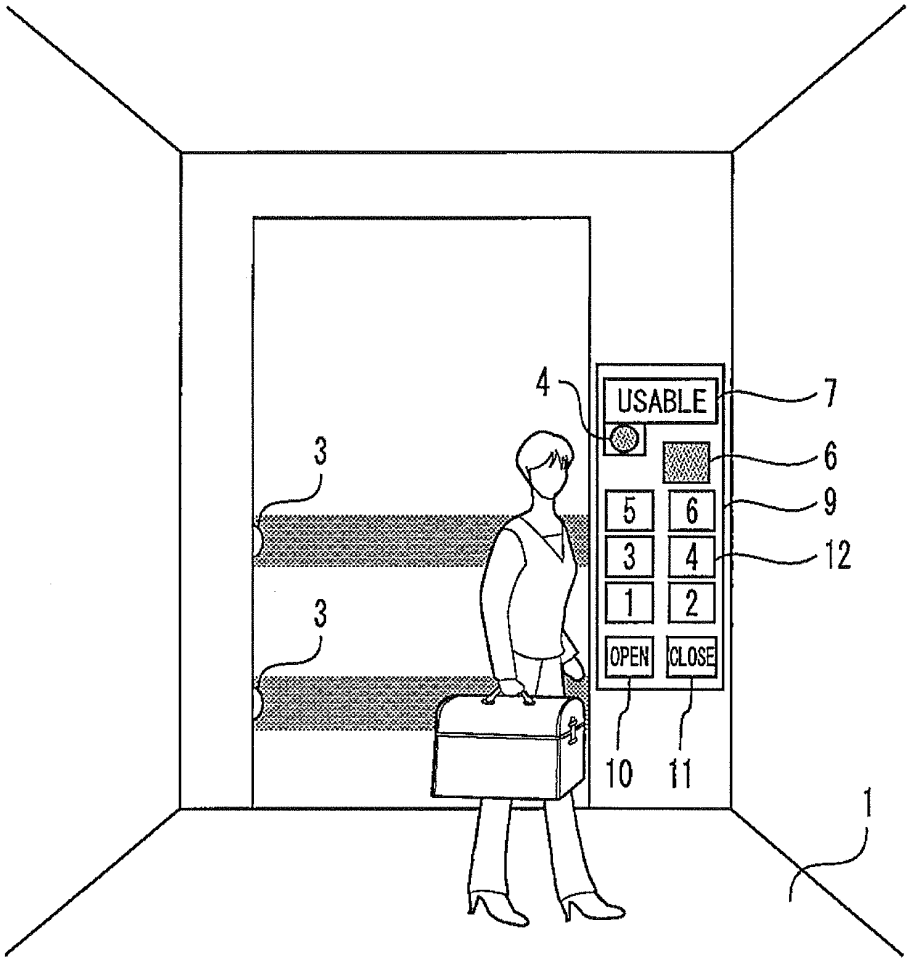


Fig. 3

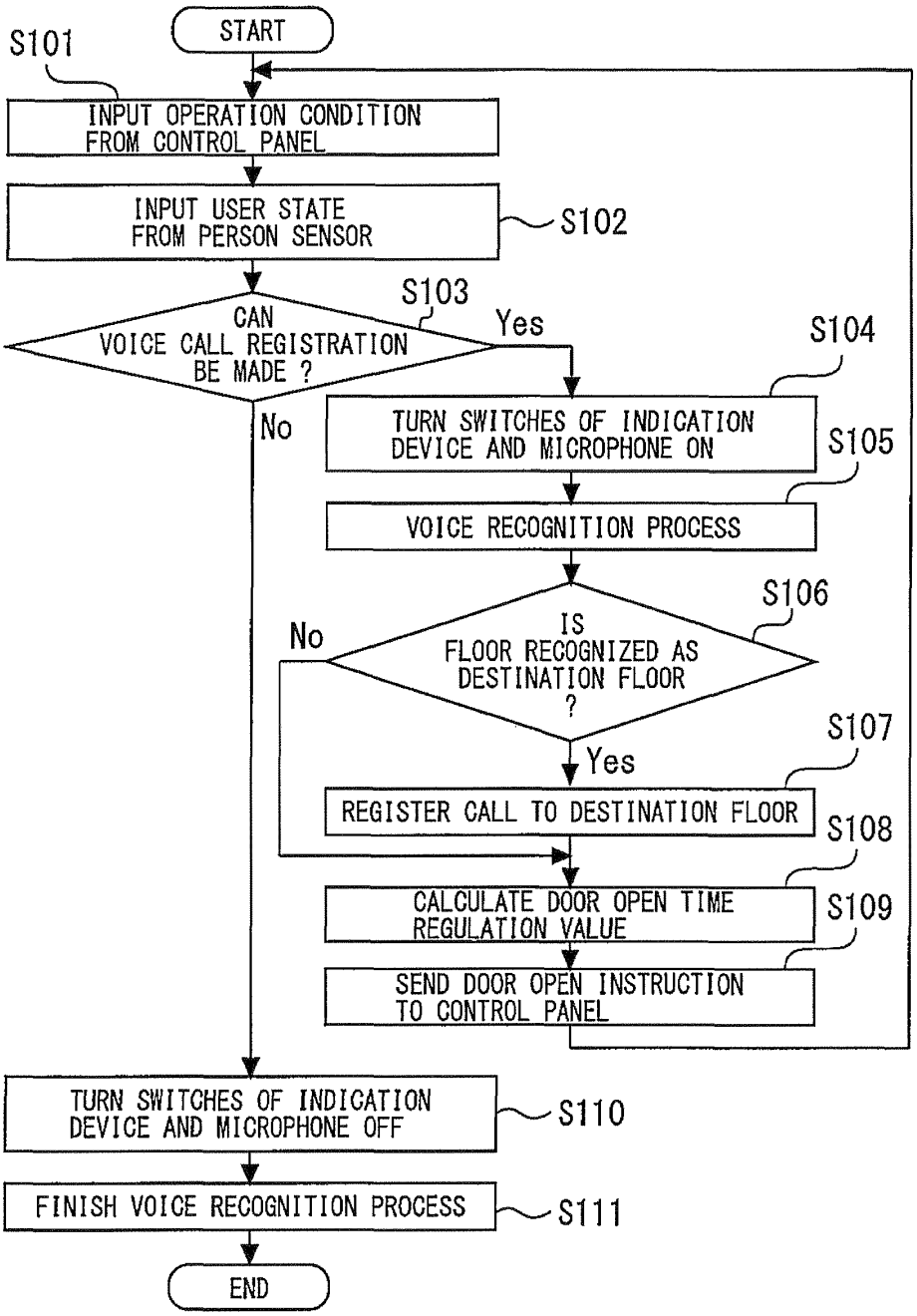

START
S101
INPUT OPERATION CONDITION FROM CONTROL PANEL
INPUT USER STATE FROM PERSON SENSOR
S102
S103
CAN VOICE CALL REGISTRATION BE MADE ?
Yes
No
S104
TURN SWITCHES OF INDICATION DEVICE AND MICROPHONE ON
S105
VOICE RECOGNITION PROCESS
S106
IS FLOOR RECOGNIZED AS DESTINATION FLOOR ?
No
Yes
S107
REGISTER CALL TO DESTINATION FLOOR
S108
CALCULATE DOOR OPEN TIME REGULATION VALUE
S109
SEND DOOR OPEN INSTRUCTION TO CONTROL PANEL
TURN SWITCHES OF INDICATION DEVICE AND MICROPHONE OFF
S110
FINISH VOICE RECOGNITION PROCESS
S111
END

Fig. 4

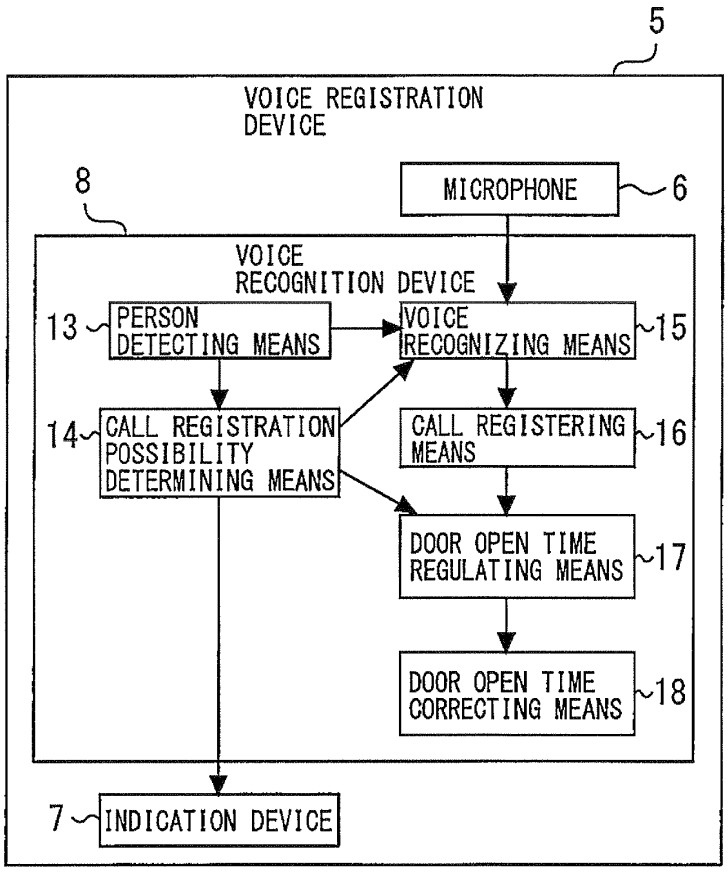

5
VOICE REGISTRATION DEVICE
8
MICROPHONE
6
VOICE RECOGNITION DEVICE
13
PERSON DETECTING MEANS
VOICE RECOGNIZING MEANS
15
14
CALL REGISTRATION POSSIBILITY DETERMINING MEANS
CALL REGISTERING MEANS
16
DOOR OPEN TIME REGULATING MEANS
17
DOOR OPEN TIME CORRECTING MEANS
18
7
INDICATION DEVICE

Fig. 5

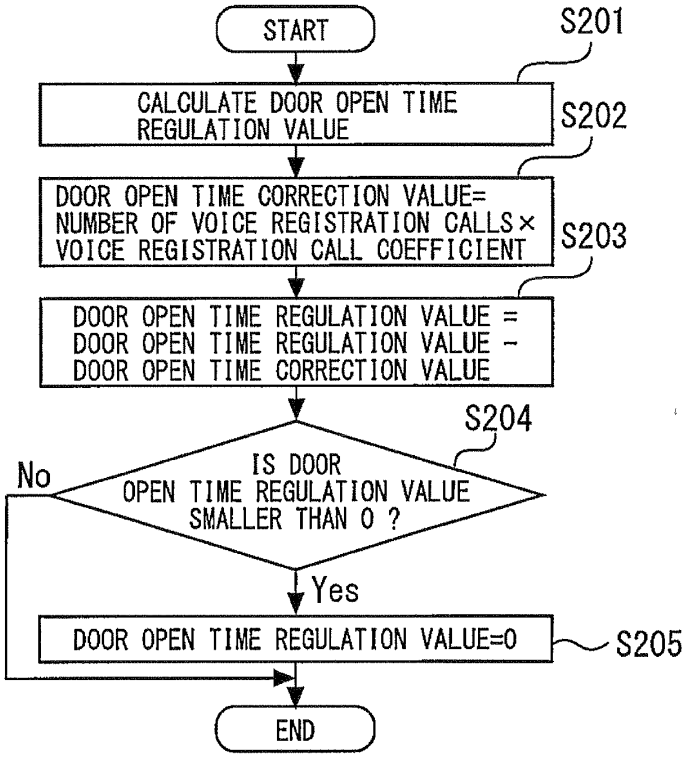

START
S201
CALCULATE DOOR OPEN TIME REGULATION VALUE
S202
DOOR OPEN TIME CORRECTION VALUE= NUMBER OF VOICE REGISTRATION CALLS × VOICE REGISTRATION CALL COEFFICIENT
S203
DOOR OPEN TIME REGULATION VALUE = DOOR OPEN TIME REGULATION VALUE - DOOR OPEN TIME CORRECTION VALUE
S204
IS DOOR OPEN TIME REGULATION VALUE SMALLER THAN 0 ?
No
Yes
DOOR OPEN TIME REGULATION VALUE=0
S205
END

Fig. 6

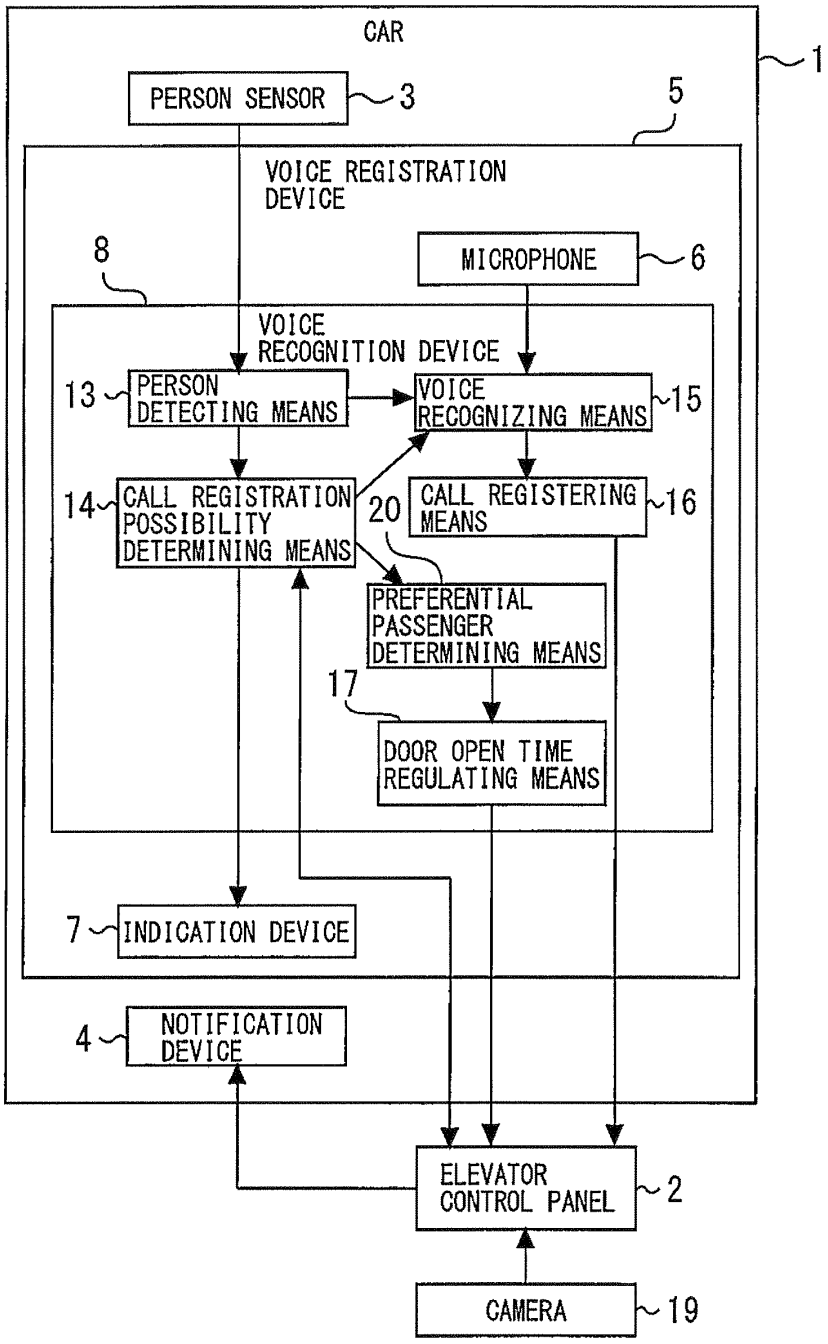
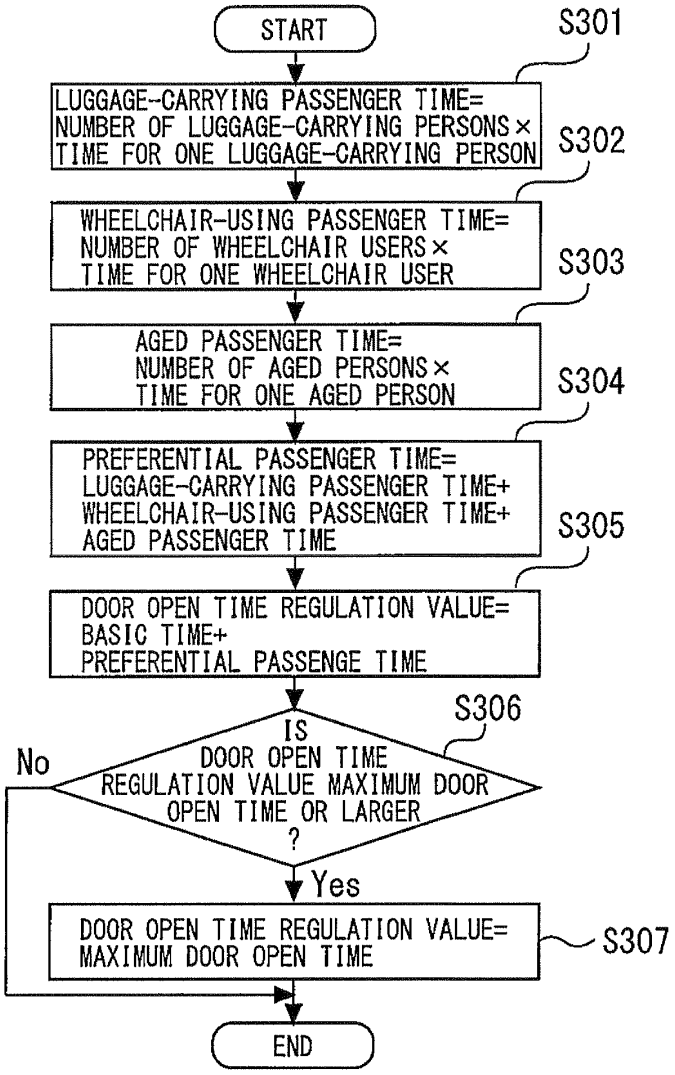

CAR
1
PERSON SENSOR
3
5
VOICE REGISTRATION DEVICE
8
MICROPHONE
6
VOICE RECOGNITION DEVICE
13
PERSON DETECTING MEANS
VOICE RECOGNIZING MEANS
15
14
CALL REGISTRATION POSSIBILITY DETERMINING MEANS
20
CALL REGISTERING MEANS
16
PREFERENTIAL PASSENGER DETERMINING MEANS
17
DOOR OPEN TIME REGULATING MEANS
7
INDICATION DEVICE
4
NOTIFICATION DEVICE
ELEVATOR CONTROL PANEL
2
CAMERA
19

Fig. 7


START
S301
LUGGAGE-CARRYING PASSENGER TIME= NUMBER OF LUGGAGE-CARRYING PERSONS × TIME FOR ONE LUGGAGE-CARRYING PERSON
S302
WHEELCHAIR-USING PASSENGER TIME= NUMBER OF WHEELCHAIR USERS × TIME FOR ONE WHEELCHAIR USER
S303
AGED PASSENGER TIME= NUMBER OF AGED PERSONS × TIME FOR ONE AGED PERSON
S304
PREFERENTIAL PASSENGER TIME= LUGGAGE-CARRYING PASSENGER TIME+ WHEELCHAIR-USING PASSENGER TIME+ AGED PASSENGER TIME
S305
DOOR OPEN TIME REGULATION VALUE= BASIC TIME+ PREFERENTIAL PASSENGE TIME
S306
IS DOOR OPEN TIME REGULATION VALUE MAXIMUM DOOR OPEN TIME OR LARGER ?
No
Yes
DOOR OPEN TIME REGULATION VALUE= MAXIMUM DOOR OPEN TIME
S307
END

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2010/056998

A. CLASSIFICATION OF SUBJECT MATTER
B66B1/14(2006.01)i, *B66B3/00*(2006.01)i, *B66B13/14*(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B66B1/14, B66B3/00, B66B13/14

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2010
Kokai Jitsuyo Shinan Koho 1971-2010 Toroku Jitsuyo Shinan Koho 1994-2010

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 62-36284 A (Mitsubishi Electric Corp.), 17 February 1987 (17.02.1987), entire text; all drawings (Family: none)	1-8
A	JP 2557939 B2 (Toshiba Corp.), 27 November 1996 (27.11.1996), entire text; all drawings & JP 1-247378 A	1-8
A	JP 3-31175 A (Toshiba Corp.), 08 February 1991 (08.02.1991), entire text; all drawings (Family: none)	1-8

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
15 July, 2010 (15.07.10)	27 July, 2010 (27.07.10)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2010/056998

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 61-2685 A (Toshiba Corp.), 08 January 1986 (08.01.1986), entire text; all drawings (Family: none)	2
A	JP 54-132947 A (Mitsubishi Electric Corp.), 16 October 1979 (16.10.1979), entire text; all drawings (Family: none)	1-2
A	JP 57-145780 A (Mitsubishi Electric Corp.), 08 September 1982 (08.09.1982), entire text; all drawings (Family: none)	4-6
A	JP 2006-160447 A (Hitachi, Ltd.), 22 June 2006 (22.06.2006), entire text; all drawings (Family: none)	5
A	JP 2008-156028 A (Toshiba Elevator and Building Systems Corp.), 10 July 2008 (10.07.2008), entire text; all drawings (Family: none)	7
A	JP 2010-58859 A (Mitsubishi Electric Corp.), 18 March 2010 (18.03.2010), entire text; all drawings (Family: none)	3,7-8

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2557939 B **[0005]**
- JP 3284589 A **[0005]**
- JP 3082618 B **[0005]**
- JP 2002128404 A **[0005]**