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(54) **METHOD AND SYSTEM FOR DETECTING PERSON TRAPPED BY ELEVATOR CAR**

(57) A method and system for detecting a person trapped by an elevator car. The method comprises: configuring an elevator controller (1) of an elevator to collect state parameters of an elevator car (3) in real time; configuring a digital transmission unit (2) of the elevator to continuously acquire the state parameters from the elevator controller and continuously store the state parameters; when the elevator is in a non-power-off state, the digital transmission unit detecting, according to a logical combination of the acquired state parameters, whether the elevator car is in a state of there being a person trapped therein; and when the elevator is in a power-off state, the digital transmission unit detecting, according to a logical combination of state parameters that are acquired one second before the elevator is powered off, whether the elevator car is in a state of there being a person trapped therein. In the method, whether there is a passenger in an elevator car is determined by using an internal message from an elevator controller, so that it is not necessary to mount an additional sensor even if the elevator is powered off, and the costs can be reduced.

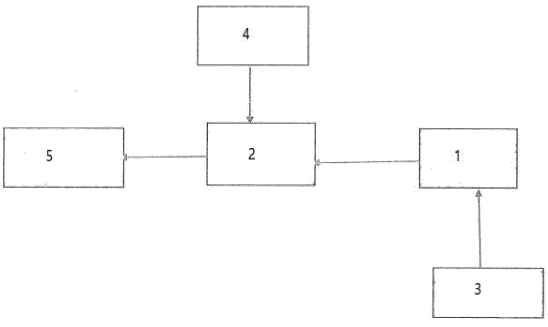

Fig. 2

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Description

TECHNICAL FIELD

[0001] The present disclosure relates to a detection method and detection system for detecting people trapped in an elevator car.

BACKGROUND

[0002] In today's urbanization, elevators are used more and more frequently and are more and more closed. However, when the building is out of power, sometimes passengers are stranded in the elevator car (that is, trapped in the elevator), which will bring passengers a direct bad experience. Because this is a safety-related issue, passengers are very sensitive to it, and the government also requires to detect passenger detention when the building is out of power. This brings a challenge to elevator manufacturers, that is, how to detect passenger detention in time when the elevator controller stops running and loses communication when power is cut off. Of course, it is also a challenge for elevator manufacturers to detect passenger detention in time without power failure.

[0003] In order to solve the above problems, the solution in the existing art is to add sensors (such as infrared sensors, cameras, etc.) in the elevator car to detect whether there are people in the elevator. Although adding this kind of sensor can actively obtain the detection signal of whether there is anyone in the elevator car, it also has the following disadvantages:

1) It affects the safety of the elevator, and it is needed to add new sensors to the existing elevator, which may affect the existing stable electrical circuit and make the installation complicated.
2) Sensors with high cost and high precision are expensive and difficult to popularize.

[0004] Therefore, it is needed to improve the existing solution for detecting people trapped in the elevator.

SUMMARY

[0005] In order to solve one or more defects in the existing art, an aspect according to the present disclosure provides a detection method for detecting people trapped in an elevator car, the detection method includes: setting an elevator controller of an elevator to acquire state parameters of an elevator car in real time; setting a digital transmission unit of the elevator to continuously acquire the state parameters from the elevator controller and continuously store the state parameters.

when the elevator is in a non-power-off state, the digital transmission unit detects whether the elevator car is in a people-trapped state according to a logical combination of the state parameters as acquired.
when the elevator is in a power-off state, the digital transmission unit detects whether the elevator car is in a people-trapped state according to a logical combination of the state parameters as acquired before power-off.

[0006] For example, the digital transmission unit detects whether the elevator car is in a people-trapped state according to a logical combination of the state parameters as acquired one second before power-off.

[0007] According to the above aspect of the present disclosure, setting a power management device of the elevator to detect whether the elevator is in a power-off state or a non-power-off state and to supply power to the digital transmission unit.

when the elevator is in a non-power-off state, the digital transmission unit will receive a first signal sent by the power management device.
when the elevator is in the power-off state, the digital transmission unit will receive a second signal sent by the power management device.

[0008] According to the above aspects of the present disclosure, the state parameters include a real-time load of the elevator car and a real-time state of a door of the elevator car.
when the elevator is in a power-off state, if the digital transmission unit judges that the real-time load of the elevator car is greater than an empty car load of the elevator car and judges that the real-time state of the door of the elevator car is in a closed state, the digital transmission unit sends out a people-trapped signal.

[0009] According to the above aspects of the present disclosure, the state parameters also include a number of unfinished internal call from inside of the elevator car.
when the elevator is in a power-off state, if the digital transmission unit judges that the real-time load of the elevator car is greater than the empty car load of the elevator car, judges that the real-time state of the door of the elevator car is in a closed state and judges that the unfinished internal call exists, the digital transmission unit sends out a people-trapped signal.

[0010] According to the above aspects of the present disclosure, when the elevator is in a power-off state, the digital transmission unit sends the second signal, the real-time load of the elevator car, the real-time state of the door of the elevator car, the number of unfinished internal call and the people-trapped signal to a remote server.

[0011] According to the above aspects of the present disclosure, the state parameters include a real-time load of the elevator car, a real-time state of a door of the elevator car and a number of unfinished internal call from inside of the elevator car;
when the elevator is in a non-power-off state, if the digital transmission unit judges that the real-time load of the elevator car is greater than the empty car load of the

elevator car, judges that the real-time state of the door of the elevator car is in a closed state, and judges that the unfinished internal call exists, the digital transmission unit sends out a people-trapped signal.

[0012] According to the above aspects of the present disclosure, when the elevator is in a non-power-off state, the digital transmission unit sends the first signal, the real-time load of the elevator car, the real-time state of the door of the elevator car, the number of unfinished internal call and the people-trapped signal to a remote server.

[0013] Another aspect according to the present disclosure provides a detection system for detecting people trapped in an elevator car, the detection system includes an elevator controller and a digital transmission unit; the elevator controller acquires state parameters of an elevator car in real time; the digital transmission unit continuously acquires the state parameters from the elevator controller and continuously stores the state parameters.

when the elevator is in a non-power-off state, the digital transmission unit detects whether the elevator car is in a people-trapped state according to a logical combination of the state parameters as acquired.

when the elevator is in a power-off state, the digital transmission unit detects whether the elevator car is in a people-trapped state according to a logical combination of the state parameters as acquired before power-off.

[0014] For example, the digital transmission unit detects whether the elevator car is in a people-trapped state according to a logical combination of the state parameters as acquired one second before power-off.

[0015] According to the above aspects of the present disclosure, the detection system also includes a power management device.

[0016] The power management device is used for detecting whether the elevator is in a power-off state or not and supplying power to the digital transmission unit.

when the elevator is in a non-power-off state, the digital transmission unit will receive a first signal sent by the power management device.

when the elevator is in the power-off state, the digital transmission unit will receive a second signal sent by the power management device.

[0017] According to the above another aspect of the present disclosure, the state parameters include a real-time load of the elevator car and a real-time state of a door of the elevator car.

when the elevator is in a power-off state, if the digital transmission unit judges that the real-time load of the elevator car is greater than an empty car load of the elevator car and judges that the real-time state of the door of the elevator car is in a closed state, the digital transmission unit sends out a people-trapped signal.

[0018] According to the above another aspect of the present disclosure, the state parameters also includes a number of unfinished internal call from inside of the elevator car.

when the elevator is in a power-off state, if the digital transmission unit judges that the real-time load of the elevator car is greater than the empty car load of the elevator car, judges that the real-time state of the door of the elevator car is in a closed state and judges that the unfinished internal call exists, the digital transmission unit sends out a people-trapped signal.

[0019] According to the above another aspect of the present disclosure, when the elevator is in a power-off state, the digital transmission unit sends the second signal, the real-time load of the elevator car, the real-time state of the door of the elevator car, the number of unfinished internal call and the people-trapped signal to a remote server.

[0020] According to the above another aspect of the present disclosure, the state parameters include a real-time load of the elevator car, a real-time state of a door of the elevator car and a number of unfinished internal call from inside of the elevator car;

when the elevator is in a non-power-off state, if the digital transmission unit judges that the real-time load of the elevator car is greater than an empty car load of the elevator car, judges that the real-time state of the door of the elevator car is in a closed state, and judges that the unfinished internal call exists, the digital transmission unit sends out a people-trapped signal.

[0021] According to the above another aspect of the present disclosure, when the elevator is in a non-power-off state, the digital transmission unit sends the first signal, the real-time load of the elevator car, the real-time state of the door of the elevator car, the number of unfinished internal call and the people-trapped signal to a remote server.

[0022] The technical solution of the present disclosure solves two problems of detecting people trapped in the elevator car when the elevator is powered off:

a) The method according to the present disclosure can still work if no additional sensors are installed in the elevator car and if there is no interaction between passengers and the outside world (without a mobile phone).

b) According to the technical solution of the present disclosure, continuous monitoring can be provided at the back end, and once people are trapped during power failure, a people-trapped signal is automatically sent to the remote server and a maintenance technician is notified.

[0023] Compared with the technical solution in the existing art, the technical solution according to the present disclosure has the following technical advantages: judging whether there are passengers in the elevator car in an intelligent way by using the internal message of the

elevator controller, even in the case of power failure, all controller data will be lost, and no additional sensors need to be installed, which can meet the intention of reducing costs. The remote monitoring function is added to the system. Once the trapped person is confirmed, the alarm will be sent to the remote technicians.

[0024] So far, in order that the detailed description of the disclosure herein can be better understood and the contribution of the disclosure to the prior art can be better realized, the disclosure has outlined the contents of the disclosure quite broadly. Likewise, those skilled in the art will recognize that the concept on which this disclosure is based can be easily used as a basis for designing other structures, methods and systems for carrying out the several purposes of this disclosure.

BRIEF DESCRIPTION OF DRAWINGS

[0025] Those skilled in the art will have a better understanding of the present disclosure through the following drawings, and the advantages of the present disclosure can be more clearly reflected. The drawings described here are only for illustrative purposes of selected embodiments, not all possible implementations, and are not intended to limit the scope of the present disclosure.

Fig. 1 shows a detection method for detecting people trapped in an elevator car according to the present disclosure;

Fig. 2 shows a detection system for detecting people trapped in an elevator car according to the present disclosure.

DETAILED DESCRIPTION

[0026] Hereinafter, specific embodiments according to the present disclosure will be described in detail with reference to the accompanying drawings.

[0027] As illustrated by Fig. 1 and Fig. 2, according to an embodiment of the present disclosure, a detection method for detecting people trapped in an elevator car is proposed, the detection method includes: setting an elevator controller 1 of an elevator to acquire state parameters of an elevator car 3 in real time; setting a digital transmission unit 2 of the elevator to continuously acquire the state parameters from the elevator controller 1 and continuously store the state parameters.

[0028] When the elevator is in a non-power-off state, the digital transmission unit 2 detects whether the elevator car 3 is in a people-trapped state according to a logical combination of the state parameters as acquired.

[0029] When the elevator is in a power-off state, the digital transmission unit 2 detects whether the elevator car 3 is in a people-trapped state according to a logical combination of the state parameters as acquired before power-off. For example, the digital transmission unit 2 detects whether the elevator car 3 is in a people-trapped state according to the logical combination of the state parameters as acquired one second before power-off.

[0030] According to the above embodiment of the present disclosure, a power management device 4 of the elevator is configured to detect whether the elevator is in a power-off state or a non-power-off state and to supply power to the digital transmission unit 2.

[0031] When the elevator is in the non-power-off state, the digital transmission unit 2 will receive a first signal sent by the power management device 4.

[0032] When the elevator is in the power-off state, the digital transmission unit 2 will receive a second signal sent by the power management device 4.

[0033] According to the above embodiments of the present disclosure, the state parameters include a real-time load of the elevator car 3 and a real-time state of a door of the elevator car 3.

[0034] When the elevator is in a power-off state, if the digital transmission unit 2 judges that the real-time load of the elevator car 3 is greater than an empty car load of the elevator car 3 and judges that the real-time state of the door of the elevator car 3 is in a closed state, the digital transmission unit 2 sends out a people-trapped signal.

[0035] According to the above-mentioned embodiments of the present disclosure, the state parameters also include a number of unfinished internal call from the inside of the elevator car 3.

[0036] When the elevator is in a power-off state, if the digital transmission unit 2 judges that the real-time load of the elevator car 3 is greater than the empty car load of the elevator car 3, judges that the real-time state of the door of the elevator car 3 is in a closed state and judges that the unfinished internal call exist, the digital transmission unit 2 sends out a people-trapped signal.

[0037] According to the above-mentioned embodiments of the present disclosure, when the elevator is in the power-off state, the digital transmission unit 2 transmits the second signal, the real-time load of the elevator car 3, the real-time state of the door of the elevator car 3, the number of unfinished internal call and the people-trapped signal to the remote server 5.

[0038] According to the above embodiments of the present disclosure, the state parameters include the real-time load of the elevator car 3, the real-time state of the door of the elevator car 3, and the number of unfinished internal call from the inside of the elevator car 3.

[0039] When the elevator is in the non-power-off state, if the digital transmission unit 2 judges that the real-time load of the elevator car 3 is greater than the empty load of the elevator car 3, judges that the real-time state of the door of the elevator car 3 is in the closed state, and judges the unfinished internal call exists, the digital transmission unit 2 sends out a people-trapped signal.

[0040] According to the above-mentioned embodiments of the present disclosure, when the elevator is in the non-power-off state, the digital transmission unit 2 transmits the first signal, the real-time load of the elevator car 3, the real-time state of the door of the elevator car

3, the number of unfinished internal call and the people-trapped signal to the remote server 5.

[0041] In the flowchart shown in Fig. 1, the digital transmission unit 2 of the elevator is configured to continuously acquire and store the real-time load of the elevator car 3 and the real-time state of the door of the elevator car 3 from the elevator controller 1, for example, every second, and calculate the empty car load of the elevator car 3 and the number of unfinished internal call from the inside of the elevator car 3.

[0042] If the digital transmission unit 2 judges that there is no fault code, the digital transmission unit 2 of the elevator continuously acquires and stores the real-time load of the elevator car 3 and the real-time state of the door of the elevator car 3 from the elevator controller 1, and calculates the empty car load of the elevator car 3 and the number of unfinished internal call from the inside of the elevator car 3.

[0043] If the digital transmission unit 2 judges that there is a fault code (such as control failure), the digital transmission unit 2 continues to judge whether the elevator is in a power-off state.

[0044] When it is judged that the elevator is in a power-off state, if the digital transmission unit 2 judges that the real-time load of the elevator car 3 before power-off is greater than the empty car load of the elevator car 3, judges that the real-time state of the door of the elevator car 3 is in a closed state, and judges that the unfinished internal call exists, the digital transmission unit 2 sends out a people-trapped signal due to power-off.

[0045] When it is judged that the elevator is in a non-power-off state, if the digital transmission unit 2 judges that the real-time load of the elevator car 3 is greater than the empty car load of the elevator car 3, judges that the real-time state of the door of the elevator car 3 is in a closed state, and judges that the unfinished internal call exists, the digital transmission unit 2 sends out a people-trapped signal due to the control failure.

[0046] As illustrated by Fig. 2, according to another embodiment of the present disclosure, a detection system for detecting people trapped in an elevator car is proposed, the detection system includes an elevator controller 1 and a digital transmission unit 2. The elevator controller 1 acquires state parameters of the elevator car 3 in real time.

[0047] The digital transmission unit 2 continuously acquires the state parameters from the elevator controller 1 and continuously stores the state parameters.

[0048] When the elevator is in a non-power-off state, the digital transmission unit 2 detects whether the elevator car 3 is in a people-trapped state according to a logical combination of the state parameters as acquired.

[0049] When the elevator is in a power-off state, the digital transmission unit 2 detects whether the elevator car 3 is in a people-trapped state according to the logical combination of the state parameters as acquired before power-off. For example, the digital transmission unit 2 detects whether the elevator car 3 is in a people-trapped state according to the logical combination of the state parameters as acquired one second before power-off.

[0050] According to another embodiment of the present disclosure, the detection system further includes a power management device 4.

[0051] The power management device 4 is used for detecting whether the elevator is in a power-off state or not and supplying power to the digital transmission unit 2.

[0052] The elevator controller 1, the digital transmission unit 2 and the power management device 4 are arranged in an elevator machine room (not shown).

[0053] When the elevator is in the non-power-off state, the digital transmission unit 2 will receive the first signal sent by the power management device 4.

[0054] When the elevator is in the power-off state, the digital transmission unit 2 will receive the second signal sent by the power management device 4.

[0055] According to another embodiment of the present disclosure, the state parameters include the real-time load of the elevator car 3 and the real-time state of the door of the elevator car 3.

[0056] When the elevator is in a power-off state, if the digital transmission unit 2 judges that the real-time load of the elevator car 3 is greater than the empty car load of the elevator car 3 and judges that the real-time state of the door of the elevator car 3 is in a closed state, the digital transmission unit 2 sends out a people-trapped signal.

[0057] According to the above-mentioned another embodiment of the present disclosure, the state parameters also include the number of unfinished internal call from the inside of the elevator car 3 (for example, the passenger presses the emergency call button in the elevator car, etc.).

[0058] When the elevator is in a power-off state, if the digital transmission unit 2 judges that the real-time load of the elevator car 3 is greater than the empty car load of the elevator car 3, judges that the real-time state of the door of the elevator car 3 is in a closed state and judges that the unfinished internal call exists, the digital transmission unit 2 sends out a people-trapped signal.

[0059] According to another embodiment of the present disclosure, when the elevator is in a power-off state, the digital transmission unit 2 transmits the second signal, the real-time load of the elevator car 3, the real-time state of the door of the elevator car 3, the number of unfinished internal call and the people-trapped signal to the remote server 5.

[0060] According to the above another embodiment of the present disclosure, the state parameters include the real-time load of the elevator car 3, the real-time state of the door of the elevator car 3, and the number of unfinished internal call from the inside of the elevator car 3.

[0061] When the elevator is in the non-power-off state, if the digital transmission unit 2 judges that the real-time load of the elevator car 3 is greater than the empty load of the elevator car 3, judges that the real-time state of the door of the elevator car 3 is in the closed state, and

judges that the unfinished internal call exists, the digital transmission unit 2 sends out a people-trapped signal.

[0062] According to another embodiment of the present disclosure, when the elevator is in a non-power-off state, the digital transmission unit 2 transmits the first signal, the real-time load of the elevator car 3, the real-time state of the door of the elevator car 3, the number of unfinished internal call and the people-trapped signal to the remote server 5.

[0063] The foregoing disclosure provides illustration and description, but is not intended to be exhaustive or to limit the embodiments to the precise forms as disclosed. Modifications and variations are possible in light of the above disclosure, or may be acquired from practice of the embodiments.

[0064] Even if specific combinations of features are recited in the claims and/or disclosed in the description, these combinations are not intended to limit the disclosure of various embodiments. In fact, many of these features can be combined in ways not specifically recited in the claims and/or not specifically disclosed in the description. Although each dependent claim listed below may directly depend on only one claim, the disclosure of various embodiments includes each dependent claim in combination with every other claim in the claim set.

[0065] Unless explicitly stated, any element, action or instruction used herein should not be interpreted as critical or essential. In addition, as used herein, the articles "a" and "an" are intended to include one or more items and can be used interchangeably with "one or more". Furthermore, as used herein, the term "the" is intended to include one or more items cited in conjunction with the term "the" and may be used interchangeably with "one or more". Furthermore, as used herein, the term "set" is intended to include one or more items (e.g., related items, unrelated items, combinations of related and unrelated items, etc.) and may be used interchangeably with "one or more". If only one item is intended, use the phrase "only one item" or similar language. In addition, as used herein, the term "comprising" or "including" and its variants and the like are intended to be open-ended terms. Furthermore, the phrase "based on" is intended to mean "at least partially based on" unless explicitly stated otherwise. In addition, as used herein, the term "or" when used in series is intended to be inclusive and can be used interchangeably with "and/or" unless otherwise specified (for example, if used in combination with "or" or only one of them).

Claims

1. A detection method for detecting people trapped in an elevator car, which is **characterized in that**, comprising:

   setting an elevator controller of an elevator to acquire state parameters of an elevator car in real time;

   setting a digital transmission unit of the elevator to continuously acquire the state parameters from the elevator controller and continuously store the state parameters;

   when the elevator is in a non-power-off state, the digital transmission unit detects whether the elevator car is in a people-trapped state according to a logical combination of the state parameters as acquired;

   when the elevator is in a power-off state, the digital transmission unit detects whether the elevator car is in a people-trapped state according to a logical combination of the state parameters as acquired before power-off.

2. The detection method according to claim 1, wherein, when the elevator is in a power-off state, the digital transmission unit detects whether the elevator car is in a people-trapped state according to a logical combination of the state parameters as acquired one second before power-off.

3. The detection method according to claim 2, wherein,

   setting a power management device of the elevator to detect whether the elevator is in a power-off state or a non-power-off state and to supply power to the digital transmission unit;

   when the elevator is in a non-power-off state, the digital transmission unit will receive a first signal sent by the power management device;

   when the elevator is in the power-off state, the digital transmission unit will receive a second signal sent by the power management device.

4. The detection method according to claim 3, wherein,

   the state parameters comprise a real-time load of the elevator car and a real-time state of a door of the elevator car;

   when the elevator is in a power-off state, if the digital transmission unit judges that the real-time load of the elevator car is greater than an empty car load of the elevator car and judges that the real-time state of the door of the elevator car is in a closed state, the digital transmission unit sends out a people-trapped signal.

5. The detection method according to claim 4, wherein,

   the state parameters also comprise a number of unfinished internal call from inside of the elevator car;

   when the elevator is in a power-off state, if the digital transmission unit judges that the real-time load of the elevator car is greater than the empty car load of the elevator car, judges that the real-

time state of the door of the elevator car is in a closed state and judges that the unfinished internal call exists, the digital transmission unit sends out a people-trapped signal.

6. The detection method according to claim 5, wherein, when the elevator is in a power-off state, the digital transmission unit sends the second signal, the real-time load of the elevator car, the real-time state of the door of the elevator car, the number of unfinished internal call and the people-trapped signal to a remote server.

7. The detection method according to claim 3, wherein,

the state parameters comprise a real-time load of the elevator car, a real-time state of a door of the elevator car and a number of unfinished internal call from inside of the elevator car;
when the elevator is in a non-power-off state, if the digital transmission unit judges that the real-time load of the elevator car is greater than the empty car load of the elevator car, judges that the real-time state of the door of the elevator car is in a closed state, and judges that the unfinished internal call exists, the digital transmission unit sends out a people-trapped signal.

8. The detection method according to claim 7, wherein, when the elevator is in a non-power-off state, the digital transmission unit sends the first signal, the real-time load of the elevator car, the real-time state of the door of the elevator car, the number of unfinished internal call and the people-trapped signal to a remote server.

9. A detection system for detecting people trapped in an elevator car, which is **characterized in that**,

the detection system comprises an elevator controller and a digital transmission unit;
the elevator controller acquires state parameters of an elevator car in real time;
the digital transmission unit continuously acquires the state parameters from the elevator controller and continuously stores the state parameters;
when the elevator is in a non-power-off state, the digital transmission unit detects whether the elevator car is in a people-trapped state according to a logical combination of the state parameters as acquired;
when the elevator is in a power-off state, the digital transmission unit detects whether the elevator car is in a people-trapped state according to a logical combination of the state parameters as acquired before power-off.

10. The detection system according to claim 9, wherein, when the elevator is in a power-off state, the digital transmission unit detects whether the elevator car is in a people-trapped state according to a logical combination of the state parameters as acquired one second before power-off.

11. The detection system according to claim 10, wherein,

the detection system also comprises a power management device;
the power management device is used for detecting whether the elevator is in a power-off state or not and supplying power to the digital transmission unit;
when the elevator is in a non-power-off state, the digital transmission unit will receive a first signal sent by the power management device;
when the elevator is in the power-off state, the digital transmission unit will receive a second signal sent by the power management device.

12. The detection system according to claim 11, wherein,

the state parameters comprise a real-time load of the elevator car and a real-time state of a door of the elevator car;
when the elevator is in a power-off state, if the digital transmission unit judges that the real-time load of the elevator car is greater than an empty car load of the elevator car and judges that the real-time state of the door of the elevator car is in a closed state, the digital transmission unit sends out a people-trapped signal.

13. The detection system according to claim 12, wherein,

the state parameters also comprises a number of unfinished internal call from inside of the elevator car;
when the elevator is in a power-off state, if the digital transmission unit judges that the real-time load of the elevator car is greater than the empty car load of the elevator car, judges that the real-time state of the door of the elevator car is in a closed state and judges that the unfinished internal call exists, the digital transmission unit sends out a people-trapped signal.

14. The detection system according to claim 13, wherein,
when the elevator is in a power-off state, the digital transmission unit sends the second signal, the real-time load of the elevator car, the real-time state of the door of the elevator car, the number of unfinished

internal call and the people-trapped signal to a remote server.

15. The detection system according to claim 11, wherein,

the state parameters comprise a real-time load of the elevator car, a real-time state of a door of the elevator car and a number of unfinished internal call from inside of the elevator car;
when the elevator is in a non-power-off state, if the digital transmission unit judges that the real-time load of the elevator car is greater than an empty car load of the elevator car, judges that the real-time state of the door of the elevator car is in a closed state, and judges that the unfinished internal call exists, the digital transmission unit sends out a people-trapped signal.

16. The detection system according to claim 15, wherein,
when the elevator is in a non-power-off state, the digital transmission unit sends the first signal, the real-time load of the elevator car, the real-time state of the door of the elevator car, the number of unfinished internal call and the people-trapped signal to a remote server.

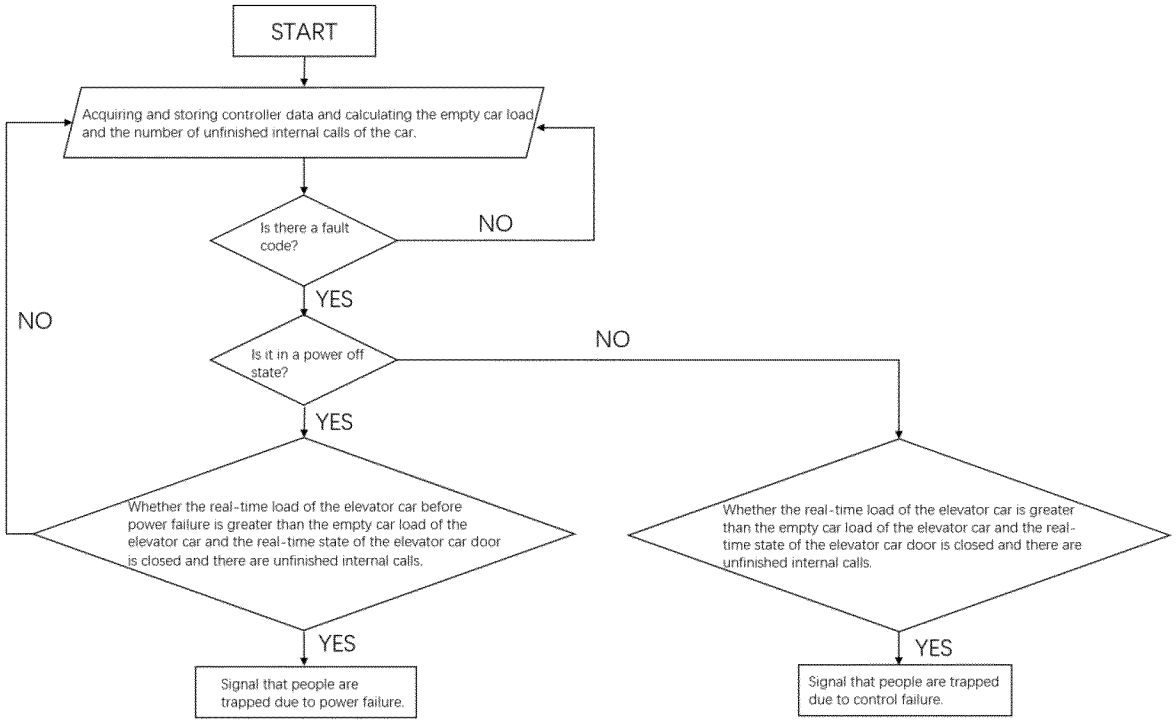
START
Acquiring and storing controller data and calculating the empty car load and the number of unfinished internal calls of the car.
Is there a fault code?
NO
YES
NO
Is it in a power off state?
NO
YES
Whether the real-time load of the elevator car before power failure is greater than the empty car load of the elevator car and the real-time state of the elevator car door is closed and there are unfinished internal calls.
Whether the real-time load of the elevator car is greater than the empty car load of the elevator car and the real-time state of the elevator car door is closed and there are unfinished internal calls.
YES
YES
Signal that people are trapped due to power failure.
Signal that people are trapped due to control failure.

Fig. 1

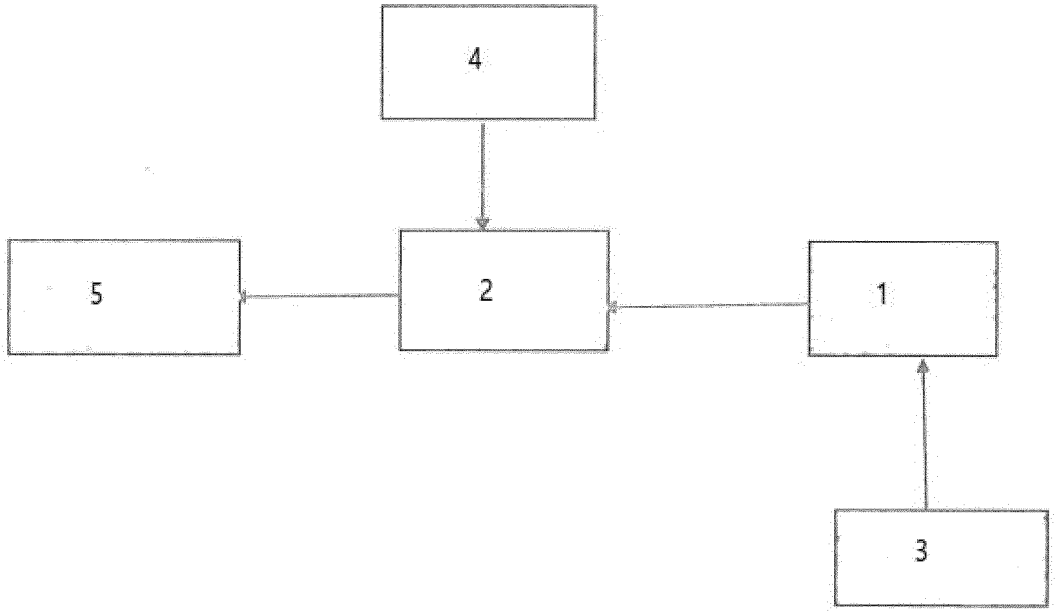
4
5
2
1
3

Fig. 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2021/115318

A. CLASSIFICATION OF SUBJECT MATTER

B66B 5/02(2006.01)i; B66B 3/00(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)

B66B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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

CNTXT, WPABS, DWPI, CJFD: 电梯, 困人, 断电, 停电, 检测, 负荷, 呼叫; elevator, shut, close, stop, power, detect, load, call

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 104803251 A (SHANGHAI STEP ELECTRIC CORP.) 29 July 2015 (2015-07-29) see description, paragraphs 8-72, and figures 1-6	1-16
A	CN 110697529 A (HITACHI BUILDING TECHNOLOGY (GUANGZHOU) CO., LTD.) 17 January 2020 (2020-01-17) see entire document	1-16
A	CN 111071892 A (SHENZHEN TECHNOLOGY UNIVERSITY) 28 April 2020 (2020-04-28) see entire document	1-16
A	CN 104071668 A (GUANGXI SPECIAL EQUIPMENT SUPERVISION INSPECTION INSTITUTE) 01 October 2014 (2014-10-01) see entire document	1-16
A	CN 102145840 A (NINGBO QINZHOU OULING ELEVATOR COMPONENTS CO., LTD.) 10 August 2011 (2011-08-10) see entire document	1-16
A	CN 101462663 A (HITACHI LTD. et al.) 24 June 2009 (2009-06-24) see entire document	1-16
A	JP 2000143110 A (HITACHI BUILDING SYSTEMS CO., LTD.) 23 May 2000 (2000-05-23) see entire document	1-16

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"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
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
09 May 2022	**27 May 2022**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088, China** Facsimile No. **(86-10)62019451**	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2021/115318

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 104803251 A	29 July 2015	None	
CN 110697529 A	17 January 2020	None	
CN 111071892 A	28 April 2020	None	
CN 104071668 A	01 October 2014	None	
CN 102145840 A	10 August 2011	None	
CN 101462663 A	24 June 2009	JP 2009149413 A	09 July 2009
JP 2000143110 A	23 May 2000	None	

Form PCT/ISA/210 (patent family annex) (January 2015)