

ELEVATOR CALL SYSTEM AND METHOD

TECHNICAL FIELD

This invention relates generally to an elevator call system, an elevator call method and a call
5 sensor module for implementation with an elevator.

Background

Elevator call button are typically mechanical switches which not only accumulate dirt and
bacteria but also make them difficult to clean. There will also be wear and tear of the
10 physical contacts of the call buttons through prolong usage which will affect the reliability
thereof and cause operational problems. The use of touch sensors to replace these
mechanical switches improves the situation but still requires that the surface of the buttons
to be constantly cleaned. In a world coming to grips with the COVID-19 pandemic, the fear
that the elevator call buttons have been contaminated with bacteria by other passengers have
15 led to extreme measures such as scheduling high-frequency wipe-down and disinfecting of
the call buttons as well as introducing transparent films over the call buttons which has to be
constantly changed, adding to the inconvenience. Even with such extreme measures,
passengers are stil weary and will use pointed objects such as keys to jab at the call buttons
so as to operate them. This has let to damaging or protective film and to aesthetics of the
20 surface of the call buttons and calls into question the relevance and effectiveness of current
measures taken to allay fear of use of the elevator call buttons. Therefore, there exists a
need for a method for addressing the foregoing problems.

Summary

25 In accordance with a first aspect of the invention, there is disclosed an elevator call system
for an elevator comprising an elevator controller. The elevator call system comprises a
sensor module disposed adjacent a landing door of the elevator and being in signal
communication with the elevator controller, the sensor module being operated for sending a
call request signal to the elevator controller in responses to sensing a passenger being within
30 a pre-determined distance from the sensor module, and a call indicator for providing visual

indication of the call request signal being provided to the elevator controller. The sensor module comprises an infrared reflective sensor configured for sensing the proximity of the passenger thereto.

- 5 In accordance with a second aspect of the invention, there is disclosed an elevator call method for an elevator comprising an elevator controller. The elevator call method comprises sensing proximity of a passenger to a sensor module disposed adjacent a landing door of the elevator and being in signal communication with the elevator controller, sending a call request signal to the elevator controller by the sensor module in responses to the
- 10 passenger being within a pre-determined distance from the sensor module; and providing visual indication of the call request signal being provided to the elevator controller. The sensor module comprises an infrared reflective sensor configured for sensing the proximity of the passenger thereto.
- 15 In accordance with a third aspect of the invention, there is disclosed a call sensor module for an elevator comprising an elevator controller. The call sensor module comprises an infrared reflective sensor disposed adjacent a landing door of the elevator and configured for sensing proximity of a passenger thereto, and a control circuitry coupled to the infrared reflective sensor, the control circuitry being electrically driven for enabling operating of the infrared
- 20 reflective sensor and for communicating a call request signal to the elevator controller in response to the passenger being sensed by the infrared reflective sensor and being determined to be within a pre-determined distance from the infrared reflective sensor.

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Brief Description of the Drawings

FIG. 1 shows a system diagram of use of an elevator call system comprising a sensor module according to an aspect of the invention;

5 FIG. 2 shows an illustration of a frontage of a lift landing with a controls panel implementing the elevator call system and the sensor module of FIG. 1 with existing call buttons;

FIG. 3 shows a process flow diagram of an elevator call method according to another aspect
10 of the invention for implementing the elevator call system and sensor module of FIG. 1;

FIG. 4 shows a side sectional view of a housing of the sensor module of FIG. 1;

FIG. 5 shows a front perspective view of a cover of the housing of FIG. 4 having a
15 rectangular-like shape and for housing a infrared reflective sensor, a prompt indicator and a call indicator for implementation without existing call buttons;

FIG. 6 shows a rear perspective view of the cover of FIG. 5;

20 FIG. 7 shows a front perspective view of a cover of the housing of FIG. 4 having an oval-like shape and for housing an infrared reflective sensor and a prompt indicator for implementation with existing call buttons;

FIG. 8 shows a rear perspective view of the cover of FIG. 7; and

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FIG. 9 shows a front perspective view of a backing having an oval-like shape for use the cover of FIG. 9.

Detailed Description

An exemplary embodiment of the present invention, an elevator call system 20, is described hereinafter with reference to FIG. 1 and FIG. 9. The elevator call system 20 is for use with
5 an elevator 22 having an elevator controller 24 for controlling movement and operation of one or more cabs of the elevator 22 at and between landings of an infrastructure such as a building.

Preferably, the elevator call system 20 comprises a sensor module 26, also referred to
10 hereinafter as a call sensor module 26, disposed adjacent a landing door 28 of the elevator 22 and being in signal communication with the elevator controller 24. The sensor module 26 is operable for sending a call request signal to the elevator controller 24 in responses to sensing a passenger being within a pre-determined distance from the sensor module 26. The elevator call system 20 further comprises a call indicator 34 for providing visual indication
15 of the call request signal being provided to the elevator controller 24. The sensor module 26 comprises an infrared reflective sensor 36 configured for sensing the proximity of the passenger thereto. Proximity is sensed when the passenger, for example, reaches his or her arm, hand or finger towards the sensor module 26, and consequently towards the infrared reflective sensor 36. Once, for example, the hand of the passenger is sensed to be a pre-
20 determined distance away from the sensor module 26 whether by positioning of the hand in front of the sensor module 26 or swiping, or waving, the hand over the sensor module 26 without touching the sensor module 26 or any other buttons, the sensor module 26 will send the call request signal to the elevator controller 24. This renders the elevator call system 20 and the sensor module 26 contactless in operations and as a contactless interface for use by
25 the passenger.

Preferably, the elevator call system 20 further comprises a call button 38 electrically coupled, in electrical parallel, to the sensor module 26 for further signal communication with the elevator controller 24. The call request signal being sent to the elevator controller
30 24 can also be in response to at least one of the sensor module 26 being operated and the call button 38 being one of depressed and touched. The call indicator 34 is at least one visual

indicator being integrated with one of the call button 38 and the sensor module 26. Preferably, the call indicator 34 is one of an LED (Light Emitting Diode) array, an LCD (Liquid Crystal Display) and at least one at least one light bulb for providing visual indications to the passenger.

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The elevator call system 20 further comprises a housing 40 for receiving the sensor module 26 therein. The housing 40 defining an aperture 42 wherethrough the sensor module 26 is operable for sensing proximity of a passenger. The elevator call system 20 further comprises a control circuitry 44 coupled to the infrared reflective sensor 36 and is received
10 in the housing 40. The control circuitry 44 is electrically driven for enabling operating of the infrared reflective sensor 36 and for communicating the call request signal to the elevator controller 24 in response to close proximity of a passenger to the infrared reflective sensor 36 being sensed. The housing 40 is formed from molded or printed plastic, machined metal, sheet metal or any combination thereof.

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Preferably, the housing has a conduit 46 protruding therefrom and wherethrough wired connectors between the sensor module 26 and at least one of the elevator controller 24 and the call button 38.

20 Preferably, the conduit 46 being shaped and dimensioned for being disposed through an opening 50 formed in an elevator call panel 52 for positioning the sensor module 26 to a front 54a of the elevator call panel 52 and for protruding from and for fastening at the rear 54b of the elevator call panel 52 to thereby mount the housing 40 to the elevator call panel 52. The opening 50 in the elevator call panel can be pre-existing and vacated by another
25 button, for example another call button for the elevator, which has been removed for replacement by the sensor module 26. Alternatively, the opening 50 is formed adjacent the call button 38 which has been mounted to the elevator call panel 52 so that the sensor module 26 and the call button 38 is presented next to each other for use by the passenger.

Preferably, the conduit 46 is cylindrical and externally threaded for being fastened by an internally threaded nut 56 at the rear 54b of the elevator call panel 52. The elevator call panel 52 can have at least one other call button for sending other types of request signals to the elevator controller 24 coupled thereto.

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The elevator call system 20 is implementable using an elevator call method 100 as one aspect of the invention. Specifically, the elevator call method 100 comprises a step 110 of sensing proximity of the passenger to the sensor module 26 disposed adjacent the landing door 28 of the elevator, a step 112 of sending the call request signal to the elevator controller 24 by the sensor module 26 in responses to the passenger being within the pre-determined distance from the sensor module 26, and a step 114 of providing visual indication that the call request signal has been provided to the elevator controller 24.

Alternatively or additionally, in a step 120, the call request signal is sent to the elevator controller 24 in response to at least one of the sensor module 26 being operated and the call button 38 being one of depressed and touched.

In the step 114, the visual indication can be provided by the call indicator 34 which is integrated with the sensor module 26 and hence received within the housing 40, or which is integrated with the call button 38 with the call button lighting up when the call request signal is sent from the sensor module 26 to the elevator controller 24.

Another aspect of the invention is the call sensor module 26 which comprises the infrared reflective sensor 36, and the control circuitry 44 coupled to the infrared reflective sensor 36 to be electrically driven for enabling operating of the infrared reflective sensor 36 and for communicating a call request signal to the elevator controller 24 in response to the passenger being sensed by the infrared reflective sensor 36 and being determined to be within a pre-determined distance from the infrared reflective sensor 36. The call sensor module 26 can be installed, preferably adjacent the landing door 28 of the elevator 22, and preferably on the elevator call panel 52, for being configured for sensing proximity of the

passenger thereto when the passenger approaches, waves or positions his or her over the call sensor module 26.

5 Preferably, the infrared reflective sensor 36 is functionally used to detect the presence of an object, for example the passenger of the hand/fingers of the passenger, within a specific range. The infrared reflective sensor 36 comprises an IR LED and a photosensor (phototransistor) pair. The light emitted by the IR LED is reflected by any object placed in front of the sensor and this reflection is detected by the photosensor (phototransistor). Other suitable types of photoelectric sensors meeting the aforementioned operational requirements
10 may be used in replacement of the infrared reflective sensor 36 in other implementations of the call sensor module 26.

Preferably, the housing 40 comprises a cover 70 and a backing 72. The infrared reflective sensor 36 is preferably mounted on the control circuitry 44, which in turn, is mounted on the
15 backing 72. In one implementation, the call indicator 34 may also be mounted to the control circuitry 44, specifically on the substrate on which the control circuitry 44 is formed. The cover 70 is shaped and dimensioned for substantially enveloping the control circuitry 44, the infrared reflective sensor 36, and in one implementation, the call indicator 34. The cover 70 is adapted for shape-fitting and coupling with the backing 72, removably by fastening
20 means, latches or snap-fitting, or permanently. Signal communication between the control circuitry 44 and the elevator controller 24 may be wired or wireless. Preferably, the signal communication between the control circuitry 44 and the elevator controller 24 is wired by the wired connectors extending through the conduit 46 which preferably protrudes from the backing 72. The wired connectors may be electrically coupled in parallel to the existing call
25 button 38 which in turn is in signal communication with the elevator controller 24, or directly to the elevator controller 24. The housing 40 may be implemented with just the cover 70 alone and without the backing 72. In some instances, this may be preferred with the infrared reflective sensor 26 and the control circuitry being mounted directly to the cover 70 or directly to the elevator call panel 52, over which the cover 70 is disposed.

Further, the housing 40 can define one or more of the aperture 42 to allow for passage of light between one or both of the infrared reflective sensor 36 and call indicator 34 received inside the housing 40 with the outside of the housing 40.

- 5 The sensor module 26 can further comprise a prompt indicator 74 for visually prompting the passenger to place their finger or hand near the sensor 26. The prompt indicator 74 can be an illuminatable bulb or LED to draw attention to the sensor module 26. In such an instance, the housing 40 will further comprise corresponding apertures 42 to enable the illumination of the prompt indicator 74 to be visible. The corresponding apertures 42 may
10 be shaped to be symbolic of, for example, a pointed finger in the direction of the aperture 42 for so that the passenger will be cued or prompted to position their finger or hand over the aperture 42 corresponding to the infrared reflective sensor 36.

- The housing 40 further comprises walls 76 on the inside thereof for defining compartments
15 where the prompt indicator 74, the call indicator 34 and the infrared reflective sensor 36 sits. This will keep substantially reduce blending of the illumination between the prompt indicator 74 and the call indicator 34 which may confuse the passenger, and substantially reduce interference of the illumination from the prompt indicator 74 and the call indicator 34 with the operations of the infrared reflective sensor 36.

- 20 Aspects of particular embodiments of the present disclosure address at least one aspect, problem, limitation, and/or disadvantage associated with existing elevator call stations. While features, aspects, and/or advantages associated with certain embodiments have been described in the disclosure, other embodiments may also exhibit such features, aspects,
25 and/or advantages, and not all embodiments need necessarily exhibit such features, aspects, and/or advantages to fall within the scope of the disclosure. It will be appreciated by a person of ordinary skill in the art that several of the above-disclosed structures, components, or alternatives thereof, can be desirably combined into alternative structures, components, and/or applications. In addition, various modifications, alterations, and/or improvements

may be made to various embodiments that are disclosed by a person of ordinary skill in the art within the scope of the present disclosure, which is limited only by the following claims.

Claims

1. An elevator call system for an elevator comprising an elevator controller, the elevator call system comprising:

a sensor module disposed adjacent a landing door of the elevator and being in signal communication with the elevator controller, the sensor module being operated for sending a call request signal to the elevator controller in responses to sensing a passenger being within a pre-determined distance from the sensor module; and

a call indicator for providing visual indication of the call request signal being provided to the elevator controller,

wherein the sensor module comprises an infrared reflective sensor configured for sensing the proximity of the passenger thereto.

2. The elevator call system as in claim 1, further comprising:

a call button electrically coupled in parallel to the sensor module for further signal communication with the elevator controller, the call request signal being sent to the elevator controller in response to at least one of the sensor module being operated and the call button being one of depressed and touched.

3. The elevator call system as in claim 1, the call indicator being at least one visual indicator being integrated with one of the call button and the sensor module.

4. The elevator call system as in claim 3, the call indicator being one of an LED array, an LCD and at least one at least one light bulb.

5. The elevator call system as in claim 1, further comprising:

a housing for receiving the sensor module therein, the housing defining an aperture wherethrough the sensor module is operable for sensing proximity of a passenger.

6. The elevator call system as in claim 5, the sensor module further comprising:
a control circuitry coupled to the infrared reflective sensor and received in the housing, the control circuitry being electrically driven for enabling operating of the infrared reflective sensor and for communicating the call request signal to the elevator controller in response to close proximity of a passenger to the infrared reflective sensor being sensed.
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7. The elevator call system as in claim 5, the housing having a conduit protruding therefrom and wherethrough wired connectors between the sensor module and at least one of the elevator controller and the call button.
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8. The elevator call system as in claim 7, the conduit being shaped and dimensioned for being disposed through an opening formed in an elevator call panel for positioning the sensor module to a front of the elevator call panel and for protruding from and for fastening at the rear of the elevator call panel to thereby mount the housing to the elevator call panel.
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9. The elevator call system as in claim 8, the conduit being cylindrical and externally threaded for being fastened by a nut at the rear of the elevator call panel.
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10. The elevator call system as in claim 9, the elevator call panel having at least one call button coupled thereto.
11. An elevator call method for an elevator comprising an elevator controller, the elevator call method comprising:
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sensing proximity of a passenger to a sensor module disposed adjacent a landing door of the elevator and being in signal communication with the elevator controller;

sending a call request signal to the elevator controller by the sensor module in responses to the passenger being within a pre-determined distance from the sensor module; and

providing visual indication of the call request signal being provided to the elevator controller,

wherein the sensor module comprises an infrared reflective sensor configured for sensing the proximity of the passenger thereto.

12. The elevator call method as in claim 11, a call button electrically coupled in parallel to the sensor module for further signal communication with the elevator controller, the call request signal being sent to the elevator controller in response to at least one of the sensor module being operated and the call button being one of depressed and touched.

13. The elevator call method as in claim 11, the call indicator being at least one visual indicator being integrated with one of the call button and the sensor module, wherein the call indicator being one of an LED array, an LCD and at least one at least one light bulb.

14. The elevator call method as in claim 11, the sensor module is received in a housing defining an aperture wherethrough the sensor module is operable for sensing proximity of a passenger, the housing having a conduit protruding therefrom and wherethrough wired connectors between the sensor module and at least one of the elevator controller and the call button, the conduit being shaped and dimensioned for being disposed through an opening formed in an elevator call panel for positioning the sensor module to a front of the elevator call panel and for protruding from and for fastening at the rear of the elevator call panel to thereby mount the housing to the elevator call panel, the conduit being cylindrical and externally threaded for being fastened by a nut at the rear of the elevator call panel.

15. The elevator call method as in claim 14, the sensor module further comprising:

5 a control circuitry coupled to the infrared reflective sensor and received in the housing, the control circuitry being electrically driven for enabling operating of the infrared reflective sensor and for communicating the call request signal to the elevator controller in response to close proximity of a passenger to the infrared reflective sensor being sensed.

16. A call sensor module for an elevator comprising an elevator controller, the call sensor module comprising:

10 an infrared reflective sensor disposed adjacent a landing door of the elevator and configured for sensing proximity of a passenger thereto; and

15 a control circuitry coupled to the infrared reflective sensor, the control circuitry being electrically driven for enabling operating of the infrared reflective sensor and for communicating a call request signal to the elevator controller in response to the passenger being sensed by the infrared reflective sensor and being determined to be within a pre-determined distance from the infrared reflective sensor.

17. The call sensor module as in claim 16, further comprising:

20 a housing for receiving the infrared reflective sensor therein, the housing defining an aperture wherethrough the infrared reflective sensor is operable for sensing proximity of a passenger, the housing comprising a conduit protruding therefrom and wherethrough wired connectors between the sensor module and at least one of the elevator controller and the call button, the conduit being shaped and dimensioned for being disposed through an opening formed in an elevator call panel for positioning the sensor module to a front of the elevator call panel and for protruding from and for fastening at the rear of the elevator call panel to thereby mount the housing to the elevator call panel,

25 wherein the conduit is cylindrical and externally threaded for being fastened by a nut at the rear of the elevator call panel.

18. The call sensor module as in claim 17, wherein the control circuitry is electrically couplable in parallel to a call button for further signal communication with the elevator controller, the call request signal being sent to the elevator controller in response to at least one of the sensor module being operated and the call button being one of depressed and touched.
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19. The call sensor module as in claim 16, further comprising:
a call indicator for providing visual indication of the call request signal being provided to the elevator controller.
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20. The call sensor module as in claim 19, the call indicator being one of an LED array, an LCD and at least one at least one light bulb.