ESCAPE GUIDANCE APPARATUS

An escape guidance apparatus comprising a wall mountable unit comprising a housing having visual display means actuable to provide visually perceptible information, for example regarding the occurrence of an emergency, such as a fire, and/or the direction of an escape route, and audible warning means actuable to provide audibly perceptible information, control means being provided for actuating the audible warning means and/or the visual display means to provide predetermined or pre-programmed information in response to a predetermined control input.
Escape Guidance Apparatus

This invention relates to apparatus for guiding a person to an emergency exit during evacuation of a building, for example in the event of a fire.

It is known to provide signage to direct persons to appropriate emergency exits during evacuation of a building, for example due to a fire. Such signs are typically placed above a doorway and typically comprise an illuminated housing having a transparent or partially transparent front panel incorporating indicia to indicate that the exit is suitable for use in an emergency evacuation or to indicate the direction of the nearest usable exit.

However, such known signage possesses a number of disadvantages. Firstly, the sign may be obscured by smoke, particularly when the sign is located above a doorway. Secondly, known signs provides only a visual indication of the escape route and are thus of limited benefit to sight impaired or blind individuals. The present invention also addresses a problem with existing audible fire alarms, which are of limited benefit to hearing impaired individuals.

According to the present invention there is provided an escape guidance apparatus comprising a wall mountable unit comprising a housing having visual display means actuable to provide visually perceptible information, for example regarding the occurrence of an emergency, such as a fire, and/or the direction of an escape route, and audible warning means actuable to provide audibly perceptible information, control means being provided for actuating the audible warning means and/or the visual display means to provide predetermined or pre-programmed information in response to a predetermined control input.

In one embodiment, the apparatus includes proximity detection means for detecting the proximity of a person with respect to the unit, the control means actuating the audible warning means and/or the visual display means to provide predetermined or pre-programmed information in response to a signal from the proximity detection means indicating the proximity of a person relative to the unit.

Preferably the proximity detection means is adapted to detect the direction of movement of a person relative to the unit, the control means actuating the audible warning means and/or the visual display means in response to a signal from the proximity detection means, for example to warn the person that they are heading the wrong way if the proximity sensors indicate that a person is moving away from the exit.

The apparatus may include a receiver for detecting activation of a fire alarm. The receiver may detect the sound emitted by a nearby fire alarm sounder, whereby the control means actuates the audible warning means and/or the visual display means of the unit when activation of a fire alarm is detected. The apparatus can be programmed to detect the particular frequency and volume of the alarm sounder to avoid false alarms. Therefore the apparatus can be configured to operate in
conjunction with an existing fire alarm system without requiring modification of, or direct connection to, the fire alarm and without any electronic or mechanical interference with the fire alarm system. The receiver may be provided within the housing or may be located remote from the housing. Where the receiver is located remote from the housing, the receiver may communicate with the control means by wireless communication means.

Preferably the housing contains an internal power supply, such as batteries, such that the apparatus can operate without requiring an external supply of power. The internal power supply may be connectable to a mains supply using a transformer to enable recharging of the internal power supply.

In one embodiment, the apparatus includes means for wirelessly activating a warning device, such as a tactile warning device, worn by or associated with a person, for example a deaf person.

In one embodiment, the apparatus includes a smoke detector or other fire detection means, the control means actuating the audible warning means and/or the visual display means in response to a signal from the fire detection means. The control means may include wireless communication means communicating with a remote location for alerting a person at said remote location in the event of activation of the fire detection means. The unit associated with the triggered fire detection means may be programmed to emit an audible alert.

Preferably the control means is programmable to enable selection of a desired visual and/or audible message or warning in response to a predetermined control input.

The visually and/or audible perceptible information provided by the apparatus may comprise an image or message indicating the direction of the nearest emergency exit or preferred exit route or a warning that a particular exit route should not be used, and/or provide a warning of the proximity of a nearby hazard, such as a stairway or trip hazard. The control means may be programmable to provide audible warnings triggered by the proximity sensors to warn of the presence of a nearby hazard independently of the emergency escape route guidance functionality of the system. The audible warning may indicate whether an adjacent stairway ascends or descends for the benefit of visually impaired persons.

The proximity sensors may comprise passive infrared sensors (PIR sensors) that can measure infrared light radiating from objects in its field of view. Apparent motion is detected when an infrared source with one temperature, such as a human, passes in front of an infrared source with another temperature, such as a wall.

The visually perceptible information may comprise a flashing or moving image. The visual display means may comprise an array of light emitting diodes.
Preferably the housing is mounted at a low level compared to prior art signage, such as approximately 1 metre from the floor, to reduce the risk of the unit becoming obscured by smoke in the event of a fire.

The housing may incorporate tactile information means, for example for indicating the direction of the nearest emergency exit. Such tactile information means may comprise a textured surface having a different feel depending upon the direction in which a person's hand is moved across the surface.

The housing may include light sensor means and an illumination means, the control means selectively controlling operation of the illumination means to provide emergency lighting when the light sensor indicates low light conditions.

The apparatus may comprise a plurality of units, each having a control means, each unit including wireless communication means whereby each unit may provide information and/or control signals to affect the operation of adjacent units. Thus, activation of one unit due to detection of the operation of a nearby fire alarm sounder can transit a control signal to adjacent units, which in turn may cascade the control signal to further units to activate all of said plurality of units.

The individual units may communicate by radio frequency signals.

The units may each be provided with individual identifier so a particular unit, for example a unit triggered by a smoke detector, can be identified by other units or by a central control station. Units may be grouped into zones, for example corresponding to floors or regions of a building. Because the units are linked, one unit may be programmed and such programming or information may be subsequently cascaded to other units in turn.

All of said plurality of units may communicate with a central control station from which the units may be monitored and controlled wirelessly. Such central control station may be provided with a graphical user interface, which may identify the status and location of each unit.

According to a further aspect of the present invention, there is provided a provided an escape guidance apparatus comprising a plurality of guidance devices, each device comprising a wall mountable housing having visual display means actuable to provide visually perceptible information regarding the direction of an escape route, and audible warning means actuable to provide audibly perceptible information, each device including proximity detection means for detecting the proximity of a person with respect to the housing, control means being provided for actuating the audible warning means and/or the visual display means in response to a signal from the proximity detection means indicating the proximity of a person relative to the housing, each device including wireless communication means whereby adjacent devices may communicate with each other, each device being associated with a smoke detector or other fire detection means, whereby, upon detection of the presence of a fire by one device, a signal is transmitted to adjacent devices whereby the control
means of each device is configured to actuate the visual display means and/or audible warning means to guide persons to the nearest usable emergency exit away said one device that has detected a fire.

5 Therefore the present invention provides an improved escape guidance apparatus that can be easily installed without requiring any wiring or modification to the existing fire alarm system to work in conjunction with the existing fire alarm system without any invasion of the existing system.

The apparatus can be stand alone, operating from an internal power supply, or can be set up for mains power operation for recharging and/or supplementing the internal power supply.

The apparatus can be associated with fire detection means, such as sensitive smoke detectors, to provide a pre-alert functionality with remote alert of suspected problems via a remote interface.

15 The remote interface may also be adapted to permit programming of the apparatus for desired functionality and to tailor the apparatus to suit the particular position of each unit.

The apparatus may provide sequential flashing images, such as directional arrows, to provide greater directionality of the visual display and may also provide complimentary audible commands and information to assist the visually impaired. Audible commands can also provide warning of adjacent hazards, such as stairs. The provision of proximity and motion detection means, such as PIR sensors, enables the apparatus to provide specific warnings and instructions, which may be audibly perceptible, to a person that may be specific to adjacent structures or hazards and/or specific to the direction of motion of the person, such as away from or towards a fire or other hazard.

25 The apparatus can provide illumination of walkways in the event of power failure.

The apparatus can activate pillows/wrist bands to warn hearing impaired persons of a fire or other evacuation situation.

30 An escape guidance system in accordance with an embodiment of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which :-

Figure 1 is a perspective view of a wall mountable unit of an escape guidance system according to an embodiment of the present invention;

Figure 1a is a sectional view through the wall unit of Figure 1;

Figure 2 is an exploded view of the wall unit of Figure 1; and

Figure 3 is a perspective view of the back plate of the wall unit of Figure 1.

40 An escape guidance system in accordance with an embodiment of the present invention comprises a plurality of wall mountable units 10 which can be mounted on a wall at a low level compared to prior
art signage, such as approximately 1 metre from the floor, to reduce the risk of the unit becoming obscured by smoke in the event of a fire.

Each unit 10 comprises a housing 12 having an illuminated display 14 capable of directing a person to an escape route. The display 14 shows a representation of a running person and an arrow 15 pointing towards an escape route. Preferably the display 14 is capable of being illuminated in a green colour to indicate a safe escape route, as is conventional in escape guidance signage. As shown in Figure 1a, the arrow pattern 15 is embossed into the cover 16 of the display 14 and the cover may be otherwise textured to enable it to be interpreted by touch for the assistance of sign impaired persons.

LEDs 18 are located beneath the translucent cover 16 for illuminating the display 14.

Each unit 10 also includes a sounder for providing an audible warning to a person adjacent the unit 10, for example to provide a warning of the occurrence of an emergency, such as a fire, and/or the direction of an escape route.

Each unit 10 includes a programmable controller, located within the housing 12 of the unit 10, for controlling the operation of the unit 10, and in particular the illumination of the LEDs 18 of the display 14 and the operation of the sounder.

Each unit includes a proximity sensor 20, for example a passive infrared sensor, capable of detecting the proximity of a person to the unit 10. The controller may be programmed to determine the direction of movement of a person with respect to the unit 10 from the signal from the proximity sensor 20. The controller may be programmed to activate the display 14 and/or the sounder to warn a person that they are heading the wrong way if it is determined that they are heading away from a safe exit. Preferably the controller is programmed to provide audible commands via the sounder to assist visually impaired persons. Such audible commands can advise the direction to a safe exit and/or can provide warnings of adjacent hazards, such as a stairway. Such commands may be activated in response to the proximity sensor at times other than during an emergency to provide guidance to the visually impaired.

Each unit 10 includes a microphone connected to the controller whereby the controller can "hear" the activation of a fire alarm from the sound emitted by a nearby fire alarm sounder, whereupon the controller can enter a full alert status and activate the display 14 and sounder to guide persons to a safe exit. Thus the system can be installed in conjunction with an existing fire alarm system without any invasion of the existing fire alarm system.

Alternatively, or additionally, each unit 10 may be associated with a smoke detector or similar fire detection device for activating the unit 10, as will be described below in more detail.
Each unit includes a wireless communication device whereby adjacent units can communicate with each other. Thus activation of one unit 10 to a full alert status by the detection of the operation of a nearby fire alarm sounder can transmit a control signal to adjacent units, which in turn may cascade the control signal further to activate all of the units 10 in the system to their full alert status. The controllers of adjacent units 10 may be programmed such that at least some of the LEDs 18 of the display devices 14 of a numbers of units, in particular those behind the arrows 15 thereof, may be activated to flash in sequence to provide greater directionality. The LEDs 18 of each unit 10 may be programmed to illuminate in an animated sequence to provide greater directionality to the information displayed thereby.

A central control device may be provided for controlling the operation of all of the wall mounted units 10 in the system. Each unit 10 may be provided with a unique identifier so that the control device can identify and/or individually control each unit 10. The control device may be provided with a graphical interface to display the status and location of each unit 10 and to enable control of each unit 10. Units 10 may be controlled in groups corresponding to specific zones or regions within a building, such as particular floors within the building. The central control device may comprise a portable, hand held device for remotely controlling the escape guidance apparatus. Instructions from the control device may be received by a unit 10 adjacent the control device and relayed to all of the other units 10 in sequence.

The housing 12 of each unit 10 incorporates batteries 22 for powering the unit 10. The batteries are preferably rechargeable batteries and each unit may be provided with a charger connected to a mains power to maintain the batteries in a charged state. Thus each unit 10 can operate even if the power supply to the building is interrupted. Additionally, or alternatively, solar panels may be provided for charging the batteries.

Each unit 10 also includes a light sensor 24 for sensing ambient light conditions around the unit 10, whereby the controller of the unit 10 may be programmed to illuminate the display 14 to provide lighting in low light conditions. A row of LEDs 26 may be mounted in a lower face of the housing 12 to provide a downlighting effect to serve as emergency lighting when activated by a signal from the light sensor 24.

Each unit 10 may include a transmitter for activating vibrating pillows or wristbands to assist hearing impaired persons.

The operation of the smoke detector may activate a pre-alert state of the apparatus wherein the unit 10 triggered by the smoke detector may send a signal to the control device, which signal may be relayed by several intervening units, whereby the control device may be programmed to provide an alert that the unit in question has been triggered to enable staff to investigate the issue, thus reducing the risk of full activation of the system in a false alarm. A portion of the display 14 of the triggered unit 10 may be illuminated to assist identification of the unit 10 and/or the unit 10 may...
"beep" to assist identification. A full alert and activation of the units 10 in a full escape guidance capability may be triggered, and the main fire alarm system may be activated, should the alert from the smoke detector provide to be a fire. Alternatively the unit 10 triggered to a pre-alert status may be reset if the alert turns out to be a false alarm. The units 10 are also programmed to go to a full alert status should one of the units 10 detect the activation of the main fire alarm system by detecting the sound from the adjacent fire alarm sounder.

The escape guidance system according to the present invention can be installed in a building to operate alongside an existing fire alarm system without requiring any mechanical or electronic interface with the existing fire alarm system.

At all times the system may provide low intensity emergency lighting when background light falls below a threshold. In the event of an alert from the main fire-alarm system the arrow of each unit 10 should illuminate in an animated sequence (pulsing from base to point) to enhance its message of directionality. Also in the event of such an alert the "running man" symbol should flash in a manner prescribed by prevailing legislation for providing visual fire alerts to deaf users. Also in the event of such an alert each unit 10 may provide verbal warnings and instructions to assist users whose vision is impaired by reason of either blindness or smoke. In the event of a main fire alert the proximity sensors may detect the approach of one or more users to a unit 10 and the sounder of the unit 10 may be activated to inform them to "carry on straight" or "wrong direction turn around" and other messages as appropriate. Units 10 that are positioned at the top or bottom of staircases may be programmed to provide verbal alerts at all times irrespective of the status of the main fire alarm. The proximity sensors may have a built-in function to check if the sign is being obscured in any way so that the system manager can be alerted to clear the obstruction.

The invention is not limited to the embodiment(s) described herein but can be amended or modified without departing from the scope of the present invention.
1. An escape guidance apparatus comprising a wall mountable unit comprising a housing having visual display means actuable to provide visually perceptible information, for example regarding the occurrence of an emergency, such as a fire, and/or the direction of an escape route, and audible warning means actuable to provide audibly perceptible information, control means being provided for actuating the audible warning means and/or the visual display means to provide predetermined or pre-programmed information in response to a signal from the fire detection means.

2. An apparatus as claimed in claim 1, further comprising proximity detection means for detecting the proximity of a person with respect to the unit, the control means actuating the audible warning means and/or the visual display means to provide predetermined or pre-programmed information in response to a signal from the proximity detection means indicating the proximity of a person relative to the unit.

3. An apparatus as claimed in claim 2, wherein the proximity detection means is adapted to detect the direction of movement of a person relative to the unit, the control means actuating the audible warning means and/or the visual display means in response to a signal from the proximity detection means, for example to warn the person that they are heading the wrong way if the proximity sensors indicate that a person is moving away from the exit.

4. An apparatus as claimed in any preceding claim, wherein the apparatus includes a receiver for detecting activation of a fire alarm.

5. An apparatus as claimed in claim 4, wherein the receiver detects the sound emitted by a nearby fire alarm sounder, whereby the control means actuates the audible warning means and/or the visual display means of the unit when activation of a fire alarm is detected.

6. An apparatus as claimed in claim 5, wherein the apparatus is programmed to detect the particular frequency and volume of said alarm sounder to avoid false alarms.

7. An apparatus as claimed in any preceding claim, further comprising means for wirelessly activating a warning device, such as a tactile warning device, worn by or associated with a person, for example a deaf person.

8. An apparatus as claimed in any preceding claim, further comprising a smoke detector or other fire detection means, the control means actuating the audible warning means and/or the visual display means in response to a signal from the fire detection means.
9 An apparatus as claimed in claim 8, wherein the control means includes wireless communication means communicating with a remote location for alerting a person at said remote location in the event of activation of the fire detection means.

5 10 An apparatus as claimed in claim 8 or claim 9, wherein the unit associated with the triggered fire detection means is adapted to emit an audible alert.

11 An apparatus as claimed in claim 10, wherein the control means is programmable to enable selection of a desired visual and/or audible message or warning in response to a predetermined control input.

12 An apparatus as claimed in any preceding claim, wherein the visually and/or audible perceptible information provided by the apparatus comprises an image or message indicating the direction of the nearest emergency exit or preferred exit route or a warning that a particular exit route should not be used, and/or provide a warning of the proximity of a nearby hazard, such as a stairway or trip hazard.

13 An apparatus as claimed in claim 12, wherein the control means is programmable to provide audible warnings triggered by the proximity sensors to warn of the presence of a nearby hazard independently of the emergency escape route guidance functionality of the system.

14 An apparatus as claimed in any preceding claim, wherein the housing incorporates tactile information means, for example for indicating the direction of the nearest emergency exit.

15 An apparatus as claimed in claim 14, wherein said tactile information means comprises a textured surface having a different feel depending upon the direction in which a person's hand is moved across the surface.

16 An apparatus as claimed in any preceding claim, wherein the housing includes light sensor means and an illumination means, the control means selectively controlling operation of the illumination means to provide emergency lighting when the light sensor indicates low light conditions.

17 An apparatus as claimed in any preceding claim, wherein the apparatus comprise a plurality of units, each having a control means, each unit including wireless communication means whereby each unit may provide information and/or control signals to affect the operation of adjacent units.

18 An apparatus as claimed in claim 17, wherein the individual units communicate by radio frequency signals.
19. An apparatus as claimed in claim 17 or claim 18, wherein each unit is provided with an
individual identifier whereby any particular unit can be identified by other units or by a central control
station.

5 20. An apparatus as claimed in any of claims 17 to 19, wherein said units are grouped into
zones, for example corresponding to floors or regions of a building.

21. An apparatus as claimed in any of claims 17 to 20, wherein all of said plurality of units
communicate with a central control station from which the units may be monitored and controlled
wirelessly.

22. An apparatus as claimed in claim 20, wherein said central control station is provided with a
graphical user interface, which may identify the status and location of each unit.

15 23. An escape guidance apparatus comprising a plurality of guidance devices, each device
comprising a wall mountable housing having visual display means actuable to provide visually
perceptible information regarding the direction of an escape route, and audible warning means
actuable to provide audibly perceptible information, each device including proximity detection means
for detecting the proximity of a person with respect to the housing, control means being provided for
actuating the audible warning means and/or the visual display means in response to a signal from
the proximity detection means indicating the proximity of a person relative to the housing, each
device including wireless communication means whereby adjacent devices may communicate with
each other, each device being associated with a smoke detector or other fire detection means,
whereby, upon detection of the presence of a fire by one device, a signal is transmitted to adjacent
devices whereby the control means of each device is configured to actuate the visual display means
and/or audible warning means to guide persons to the nearest usable emergency exit away said one
device that has detected a fire.

24. An escape guidance apparatus as claimed in claim 23, further comprising fire detection
means to provide a pre-alert functionality with remote alert of suspected problems via a remote
interface.

25. An escape guidance apparatus as claimed in claim 24, wherein the remote interface is
adapted to permit programming of the apparatus for desired functionality and/or to tailor the
apparatus to suit the particular position of each unit.
**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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<td>WO 2005/122102 Al (PATTERSON KIERAN [GB]) 22 December 2005 (2005-12-22)</td>
<td>1-6, 8-13, 16-25</td>
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<td>Y</td>
<td>* abstract page 6, line 19 - page 11, line 10 page 14, line 16 - line 26 page 6, line 20 - line 27 figures</td>
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Further documents are listed in the continuation of Box C

See patent family annex

* Special categories of cited documents
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