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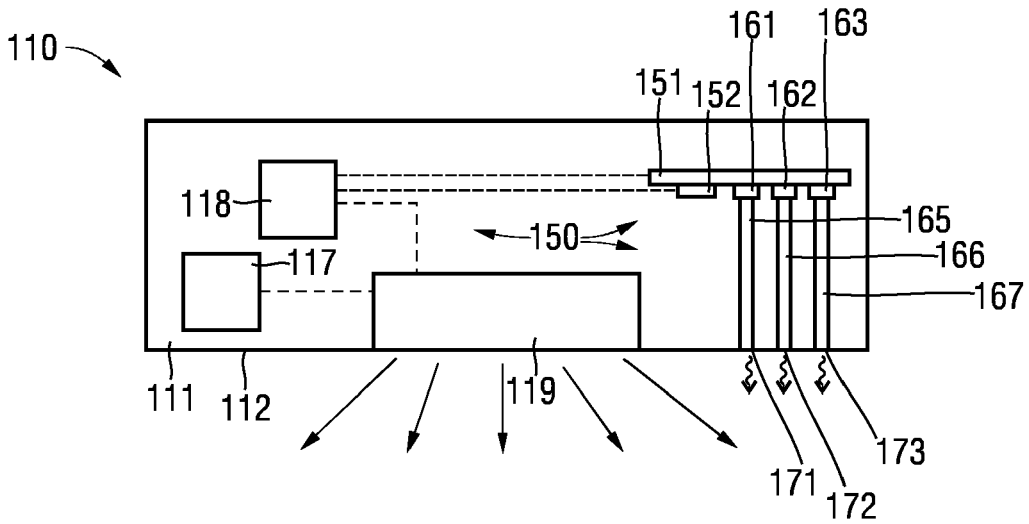
(54) **STATUS INDICATION FOR EMERGENCY LIGHTING EQUIPMENT**

(57) The disclosure pertains to techniques of advanced status indication of one or more operational statuses of an emergency lighting equipment, e.g., an emergency light module.

FIG. 1



EP 4 489 525 A1

Description

TECHNICAL FIELD

[0001] Various examples of the disclosure generally pertain to hardware and software techniques of providing a status indication for emergency lighting equipment such as an emergency luminaire.

BACKGROUND

[0002] Emergency luminaires, or emergency lights, are battery-backed lighting devices that are automatically activated in emergency situations, e.g., when a building experiences a power outage. They are standard in new commercial and high occupancy residential buildings and are crucial for safety during power failures. These systems typically employ a status Light Emitting Diode (LED) to indicate whether the battery is being charged.

[0003] The status LED can be designed to alert maintenance personnel to any operational issues with the luminaire, such as a failure in the charging circuit or a depleted battery. However, the status LED is often limited to a few signaling options, like on/off or color changes, which can restrict the level of detail provided about the system's status. Here, typically only one indicator is employed, e.g., a single colour or one flash rate etc.

SUMMARY

[0004] The current signaling system using a status LED in emergency luminaires has been found to be insufficient in providing comprehensive information about the system's status. This is because the LED's signaling options are typically limited and may not adequately represent the range of potential operational states or fault modes that the emergency luminaire could experience. Consequently, maintenance personnel may not be fully informed about the luminaire's status, potentially leading to longer down-times, inefficient maintenance, and potentially unsafe situations in the event of a power outage.

[0005] According to the disclosure, advanced techniques of indicating the operational status of an emergency lighting equipment are provided. The disclosed techniques can provide a more comprehensive range of status signals to represent the various operational states such as specific fault modes of the emergency lighting equipment, e.g., an emergency luminaire, a light module of the emergency luminaire, a battery of the emergency luminaire, etc.

[0006] A system for indicating an operational status of an emergency lighting equipment is disclosed.

[0007] For instance, the emergency lighting equipment can be an emergency luminaire, a light module thereof, a driver of the light module, or a battery for an emergency luminaire. The emergency lighting equipment could be a communication network communicatively coupling multiple emergency lighting luminaires.

[0008] The system includes a circuit board. For instance, a printed circuit board or a flexible circuit board.

[0009] The system includes multiple light emitters arranged on the circuit board. The multiple light emitters can be active regions of light emitting diodes. The light emitters can be single-color or multi-colour light emitters, e.g., red-green-blue light emitters.

[0010] The system also includes multiple light guides. The light guides are fixed relative to the circuit board. For instance, the light guides can be attached to the circuit board, e.g., clamped or glued. The light guides can be optical blocks made from glass or transparent plastics. They can have a refraction index that is higher than the refraction index of air. Total reflexion can be used to guide the light within the multiple light guides towards the respective emitter surfaces.

[0011] The multiple light guides can be separated from each other. Also, a combined system of light guides may be used.

[0012] Each of the multiple light guides is arranged to guide light emitted by a respective one or more of the multiple light emitters towards a respective emitter surface. The emitter surfaces are configured to radiate the light towards a surrounding of the system. The emitter surfaces can be structured to emit the light. For instance, holographic optical elements can be provided on the emitter surfaces, to form a respective hologram. Fresnel lenses can be used.

[0013] A control circuitry is included in the system. The control circuitry can be implemented by an integrated circuit, e.g., a microprocessor. The control circuitry is configured to obtain the operational status of the emergency lighting equipment. The control circuitry is further configured to control each of the multiple light emitters depending on the operational status of the emergency lighting equipment.

[0014] Some operational statuses of an emergency luminaire are summarized below.

TAB. 1: Example operational statuses of an emergency luminaire.

Operational status	Description
Standby	The emergency luminaire is not illuminated, but is actively monitoring for an emergency event, e.g., failure of the main power source. It is ready to switch on if the main power source fails. Normally, in standby mode, a stable green LED is shown in Europe and UK to indicate the battery is charging and is ready.
Active	The emergency luminaire is illuminated responsive to an emergency event. I.e., a light module of the emergency luminaire is switched on. The indicator LED can be switched off, to save power.
Testing	The emergency luminaire is illuminated responsive to a test trigger (rather than an emergency event).
Fault	They can be various root causes for a fault state such as light failure, battery issues, discharged battery, fault of a communi cation interface used to detect whether a power failure is present. It would also be possible that the operational status pertains to the particular type of the fault of the emergency lighting equipment, i.e., discriminates between different root causes of the fault state.

[0015] Operational statuses can also be defined for other emergency lighting equipment, e.g., subcomponents of an emergency luminaire.

[0016] For an emergency battery the modes could be: charging; charged; discharged; end-of-life; overheating; state of charge level; state of health level; etc. to give just a few examples.

[0017] For the light module of an emergency luminaire operational statuses can include emitter failure, power interface failure, normal operation, overtemperature, etc.

[0018] For a communication network the operational statuses could be: operational; out-of-coverage; congestion; etc.

[0019] Another emergency lighting equipment would be a control circuitry, e.g., a central or local control circuitry. Such control circuitry can be used for controlling, e.g., a light module or the battery for powering the emergency luminaire. The control circuitry can also experience certain operational statuses, e.g., normal operation, fault, read/write fault, over-temperature, etc. to give just a few examples.

[0020] By such a design of the system, multiple effects can be achieved. Firstly, a flexible footprint of the emitter surfaces can be provided. In particular, the emitter surfaces can be flexibly arranged relative to the light emitters; thereby, distinct patterns of the emitter surfaces that are easy to recognize and comprehensible can be formed. Secondly, by providing multiple light emitters and multiple light guides that are controlled by the control circuitry depending on the operational status a finer distinction between different operational status can be achieved. For instance, continuous values can be indicated, or a larger number of operational statuses can be indicated.

[0021] In some scenarios, the operational status can take non-binary values, e.g., continuous values or semi-continuous values. I.e., the operational status does not pertain to a binary set of values, e.g., battery fully charged or not fully charged, or test mode on or test mode off, or fault condition detected or fault condition not present, etc. Rather, the operational status takes a multitude of values in a continuous or semi-continuous space, e.g., certain state of charge levels of the battery from 0% to 100%, state of health of the battery between 0% and 100% etc. In such scenarios, it would be possible that the control circuitry is configured to determine at least one of a count of the multiple light emitters to be activated or a brightness level of the one or more multiple light emitters depending on the respective value within a predefined continuous range.

[0022] The brightness level, as a general rule, cannot only be used to indicate a value within a predefined continuous the range. Alternatively or additionally, the brightness level could also be adjusted depending on the status of the emergency luminaire (cf. TAB. 1). For instance, a difference status can be used in standby and active operational statuses.

[0023] In other words, it would be possible that a larger count of light emitters is activated for larger values (or vice versa). Alternatively or additionally a higher brightness level may be chosen for larger values (or vice versa). Thereby, beyond the mere presence of a certain event, it is possible to provide information regarding the particular value of the operational status to a user.

[0024] As a general rule, there are various options for obtaining the operational status. For instance, the control circuitry can be configured to receive a status message via a communication interface from the emergency lighting equipment. The status message can then be indicative of the operational status.

[0025] This would enable simple retrofitting of the system into a housing of an emergency luminaire; it can then receive status reports based on a predefined communication protocol. Standardized communication protocols can enable interoperability with a wide range of different types of emergency lighting equipment.

[0026] In other examples, the control circuitry can include one or more detection circuits or sensors to measure or

otherwise determine the operational status.

[0027] According to some scenarios, the control circuitry can be configured, to obtain, via a user interface, configuration data. The configuration data maps each of the multiple predefined operational statuses to a respective lighting configuration of each of the multiple light emitters. Accordingly, the mapping between operational status and light configuration can be user configurable. Thus, depending on the particular deployment scenario, more critical or relevant operational statuses can be prioritized over other, less important operational status, for indication. Because more degrees of freedom for indication are available, such prioritization, however, may be less strict as in reference implementations where only a single indication is available. More generally, the lighting configuration can be adjusted depending on certain regional requirements.

[0028] Various user interfaces are conceivable. In one scenario, the user interface can be implemented by a wireless communication interface. For instance, a neo-field communication interface can be used. A user device can be used to program the control circuitry with certain configuration data.

[0029] The system can optionally include a power interface. The power interface is configured to obtain a supply signal to drive the multiple light emitters from an external source. The external source can be a battery. The external source could also be an AC power supply. The system can be piggybacked onto an emergency battery for powering an emergency luminaire. It would also be possible to provision a dedicated battery, different from the emergency battery that powers the emergency luminaire lighting when it is in active status, cf. TAB. 1.

[0030] The power interface may be configured to receive a DC voltage. The power interface may also be configured to provide a conversion between an AC voltage and a DC voltage. The power interface may be configured to switch between multiple power sources, e.g., between a power grid and in case of failure of the power grid a battery.

[0031] The system can accommodate for light guides having various shapes. For instance, the light guides can have a linear shape. It would be possible that the light guides have circular shapes and are concentrically arranged. Multiple emitter surfaces can form a 2-D or 3-D pattern. For instance, the multiple emitter surfaces can jointly form a lateral surface of a cone.

[0032] Such techniques are based on the finding that it is generally advisable to implement the light emitter surfaces in a characteristic shape or pattern, as outlined above. This enables users to the immediate the detect and interpret the signal operational status which is particularly important in emergency situations.

[0033] Also, by using 2-D or even 3-D patterns, and intuitive suggestion of a severity of a particular operational status that is indicated can be provided. For instance, if a 2-D pattern is only partially lighted, a user intuitively understands that the operational status is less severe than if a 2-D pattern is fully lighted. For instance, if a 3-D pattern is formed of by the light emitting surfaces, illumination of the most exposed peak areas of the 3-D pattern intuitively suggests a severe operational status being present.

[0034] According to various examples, the system can include a communication interface that is configured to receive sensor data of a sensor that observes an environmental condition of the surrounding. The control circuitry is configured to control each of the multiple light emitters depending on the sensor data.

[0035] Thereby, additional information can be conveyed via the lighting configuration of the multiple light emitters beyond the operational status of the emergency lighting equipment.

[0036] For instance, the sensor data could be indicative of an ambient brightness level in the surrounding. The control circuitry can then be configured to control a brightness level of each of the multiple light emitters that is activated depending on the operational status based on the ambient brightness level. For instance, if a certain light emitter is to be activated given a certain operational status, then its brightness level can be determined based on the ambient brightness level.

[0037] Other examples of observables that could be indicated by such sensor data is include: heat/fire; water/flooding; particles/smoke; gas such as CO or CO2, etc.

[0038] An emergency luminaire includes a housing and a light module arranged inside the housing. The light module includes one or more light emitting regions that face towards a surrounding of the luminaire for providing an emergency illumination of the surrounding of the luminaire. The luminaire also includes the system as disclosed above. The system is arranged inside the housing so that the emitter surfaces of the multiple light guides based towards the surrounding of the luminaire. In other words, the emitter surfaces could be arranged in certain recesses or openings in the housing so that they protrude from the housing and face towards the outside of the luminaire.

[0039] The system may be retrofitted into the housing. I.e., the system may be an accessory that is retrofitted to a luminaire. It can then interface with an emergency driver of the luminaire.

[0040] A method of operating a control circuitry is disclosed. The control circuitry is configured to control each of multiple light emitters. The method includes obtaining an operational status of an emergency lighting equipment. The method further includes controlling each of the multiple light emitters depending on the operational status of the emergency lighting equipment. The method may further include obtaining sensor data of a sensor that observes an environmental condition of the surrounding and controlling each of the multiple light emitters further depending on the sensor data.

[0041] It is to be understood that the features mentioned above and those yet to be explained below may be used not only in the respective combinations indicated, but also in other combinations or in isolation without departing from the scope of

the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0042]

FIG. 1 schematically illustrates a system including an emergency lighting luminaire, an emergency lighting battery, and a system for indicating an operational status of the emergency lighting luminaire according to various examples.

FIG. 2 schematically illustrates the system for indicating the operational status of the emergency lighting luminaire according to various examples.

FIG. 3 schematically illustrates an integration of the system for indicating the operational status into a housing of the emergency lighting luminaire according to various examples.

FIG. 4 schematically illustrates indication of continuous values of an operational status by selectively activating light emitters according to various examples.

FIG. 5 schematically illustrates different modes of operating light emitters according to various examples.

FIG. 6 is a flowchart of a method according to various examples.

DETAILED DESCRIPTION

[0043] Some examples of the present disclosure generally provide for a plurality of circuits or other electrical devices. All references to the circuits and other electrical devices and the functionality provided by each are not intended to be limited to encompassing only what is illustrated and described herein. While particular labels may be assigned to the various circuits or other electrical devices disclosed, such labels are not intended to limit the scope of operation for the circuits and the other electrical devices. Such circuits and other electrical devices may be combined with each other and/or separated in any manner based on the particular type of electrical implementation that is desired. It is recognized that any circuit or other electrical device disclosed herein may include any number of microcontrollers, a graphics processor unit (GPU), integrated circuits, memory devices (e.g., FLASH, random access memory (RAM), read only memory (ROM), electrically programmable read only memory (EPROM), electrically erasable programmable read only memory (EEPROM), or other suitable variants thereof), and software which co-act with one another to perform operation(s) disclosed herein. In addition, any one or more of the electrical devices may be configured to execute a program code that is embodied in a non-transitory computer readable medium programmed to perform any number of the functions as disclosed.

[0044] In the following, embodiments of the invention will be described in detail with reference to the accompanying drawings. It is to be understood that the following description of embodiments is not to be taken in a limiting sense. The scope of the invention is not intended to be limited by the embodiments described hereinafter or by the drawings, which are taken to be illustrative only.

[0045] The drawings are to be regarded as being schematic representations and elements illustrated in the drawings are not necessarily shown to scale. Rather, the various elements are represented such that their function and general purpose become apparent to a person skilled in the art. Any connection or coupling between functional blocks, devices, components, or other physical or functional units shown in the drawings or described herein may also be implemented by an indirect connection or coupling. A coupling between components may also be established over a wireless connection. Functional blocks may be implemented in hardware, firmware, software, or a combination thereof.

[0046] FIG. 1 schematically illustrates a system 150. The system 150 includes a circuit board 151 onto which multiple light emitters 161, 162, 163 are mounted. The system 150 also includes light guides 165, 166,167 that are fixed relative to the circuit board 151. Each of the light guides 165, 166, 167 is arranged to guide light that is emitted by the light emitters 161, 162, 163 towards a respective emitter surface 171, 172, 173. The emitter surfaces 171, 172, 173 are configured to radiate the light towards a surrounding of the system 150.

[0047] Also provided is a control circuitry 118. The control circuitry 118 obtains an operational status of an emergency lighting equipment, in the illustrated case an emergency light module 119. Based on this operational status, the control circuitry 118 controls each of the multiple light emitters 161, 162, 163.

[0048] The system 150 and the emergency light module 119 are part of a system 110 (the system 110 including the various components is sometimes referred to as emergency luminaire). Also illustrated is a battery 117 for powering the emergency light module 119. The battery 117 is also part of the system 150.

[0049] In some scenarios, the control circuitry 118 may alternatively or additionally to the operational status of the

emergency light module 119 obtain an operational status of the battery 117 for controlling the light emitters 161, 162, 163.

[0050] Also illustrated is a sensor 152; the sensor 152 is attached to the circuit board 151 and coupled to the control circuitry 118. The sensor 152 provides sensor data that is indicative of an ambient brightness level in the surrounding of the system 110. The control circuitry 118 is also configured to control a brightness level of the multiple light emitters 161, 162, 163 depending on the ambient brightness level.

[0051] Other observables could be monitored by the sensor 152 and/or further sensors. External sensors could be used, separate from the system 150 or even the system 110.

[0052] In the illustrated example, the control circuitry 118 is also configured to control the emergency light module 119. In other examples, it would be possible that distinct control circuitries are provided for controlling the emergency light module 119 and the light emitters 161, 162, 163 respectively. The control circuitry 118 or another control circuitry for controlling the light emitters 161, 162, 163 could be attached to the PCB 151.

[0053] Next, an example implementation of a system 150 is illustrated in FIG. 2 in connection with the system 250. The system 250 includes a printed circuit board 251, e.g., having a diameter of 1-2 cm. LEDs 261-264 are mounted to the PCB 251 together with a control circuitry, e.g., microcontroller, to drive the LEDs 261-264 (the microcontroller is not illustrated in FIG. 2). It is not required in all scenarios that the control circuitry is attached to the PCB 251. For instance, the PCB may be interconnected to a control circuitry of an emergency luminaire. Then, an application driver can be used directly to drive the LEDs 261-264. A driving interface can be provided implementing a communication protocol supported by the application driver to signal the required output of the LEDs 261-264.

[0054] In the scenario illustrated in FIG. 2, circular light emitting surfaces 271-274 are implemented. They are all concentrically arranged (FIG. 2, bottom illustrates a respective top view). However, such a circular shape of the light guides is only one option. Beyond the stacked implementation forming the lateral surface of a cone, other implementations would be possible, e.g., linear shapes.

[0055] The multiple light emitters, as a general rule, can provide light of different colours. For instance, in a scenario of FIG. 2, the light emitter 261 can provide a yellow colour, the light emitter 262 can provide a red colour, the light emitter 263 can provide a yellow colour and the light emitter 264 can provide a green colour. However, each of the light emitters 261-264 could also be implemented as an RGB light source, thereby providing the option for varying colour and increasing the flexibility to serve multiple deployment scenarios that may require different colours.

[0056] The light emitters, as a general rule, can be driven to blink or provide continuous light.

[0057] As a further general rule, the light emitters can be controlled to change their brightness level. For this pulse width modulation or scaling a driver current can be used. For instance, different brightness levels can be used depending on whether an emergency luminaire is switched on or switched off (cf. FIG. 1). Also, a light sensor can be used to detect the ambient brightness used to detect the ambient brightness and adjust the brightness level depending on the ambient brightness level.

[0058] The system 250 of FIG. 2 can be easily retrofitted into a housing of an emergency luminaire. A respective scenario is illustrated in FIG. 3, for the system 210. The light module 219 is shown, as well as the housing 211. Integrated into the housing 211 is the conical structure 270 formed by the multiple light emitting surfaces 271-274. Such retrofitting can be by clipping or magnetic attachment. An aperture can be provided in the housing 211 to accommodate for the light emitting surfaces 271-274.

[0059] FIG. 4 illustrates how the lighting configuration or specifically the activation/deactivation of multiple light emitters can change depending on the operational status taking different non-binary values. For instance, in FIG. 4, left a lighting configuration for the state of charge of a battery powering an emergency luminaire falling below 25% state of charge is illustrated. The state of charge then gradually increases towards 100%. Also, a combination of multiple fault conditions can be indicated, as illustrated in FIG. 5. Here, the light emitter 261 is operated in a blinking mode 291; while the light emitter 263 is operated in a continuous mode 292. Thus, multiple fault conditions - e.g., battery fault + light module fault - can be provided in a superimposed manner.

[0060] FIG. 6 is a flowchart of a method according to various examples. The method of FIG. 6 can be executed by a control circuitry such as the control circuitry 118 of the system 110 discussed in connection with FIG. 1. The method of FIG. 6 can be executed by a control circuitry upon loading and executing program code. The method of FIG. 6 pertains to controlling multiple light emitters of a system for indicating an operational status of an emergency lighting equipment. The method of FIG. 6 can be used to operate any of the systems 150, 250 as discussed above.

[0061] At box 3005 it is optionally possible to obtain configuration data. The configuration data can configure the lighting configurations of the multiple light emitters. For instance, the configuration data can include a mapping of each of multiple predefined operation statuses to a respective lighting configuration of each of the multiple lighting emitters. A respective user configuration may be obtained via a communication interface, specifically a user interface. For instance, a near-field communication (NFC) communication interface can be used. Data can be downloaded from a respective application driver. For instance, one of multiple country-specific lighting configurations may be activated or provisioned.

[0062] At box 3010, it is optionally possible to obtain sensor data. The sensor data can be indicative of one or more observables of a surrounding of the system, specifically of the emergency lighting equipment. For instance, a brightness

level, an air quality, a concentration of a gas, dust particle concentration, temperature, humidity etc. can be indicated. Such sensor data may be obtained from a locally integrated sensor and/or from an external sensor. Sensors can be mounted onto respective mounting positions of the PCB.

[0063] At box 3015, an operational status of the emergency lighting equipment is obtained. For instance, respective information may be provided in analogue or digital format. For instance, a control message may be obtained (i.e., received, decoded, and processed) via a communication interface. In scenarios in which the control circuitry also controls the emergency lighting equipment, such operational status may be internally available.

[0064] Then, at box 3020, the light sources are controlled depending on the operation status of box 3015 and, where available, depending on the sensor data obtained above 3010. The user configuration obtained optionally at box 3005 can be taken into account.

[0065] Summarizing, a unique indication system for indicating an operational status of an emergency lighting equipment has been disclosed. The exterior of an emergency lighting equipment does not need to be altered significantly; rather, a small recess to accommodate for multiple light emitter surfaces is sufficient. A PCB including multiple light emitters, e.g., RGB LEDs, can be internally housed. The light emitters are optically coupled with a multi-segment light guide. Various shapes and forms of the light guides and light emitting surfaces thereof have been disclosed. Such LED indication can offer more information to a user. For instance, battery charge status, battery health status, multiple faults or test event progress can be indicated in parallel. Fault information can be provided as well.

[0066] It is possible to control the multiple light emitters via an application controller. Also, an on-board microcontroller integrated on the PCB can be used. A communication protocol can be defined for indicating the operational status.

[0067] Colour and flash rates are selectable, e.g., in a user configuration. Thereby, country or region-specific adaptation is possible.

[0068] Such systems can be retrofitted into emergency lighting equipment. It also can be pre-integrated by the manufacturer.

[0069] Techniques of implementing an NFC interface/antenna have been disclosed. Thereby, a user configuration of the lighting configuration, e.g., colour or identification modes, are possible. Additional information can be downloaded to a user device.

[0070] The light sensor can define the brightness according to the different use cases such as maintained or non-maintained mode.

[0071] Beyond such sensor data also other sensor data can be used. Examples include, smoke detection, carbon monoxide detection, carbon dioxide detection, noise detection, etc..

[0072] Although the invention has been shown and described with respect to certain preferred embodiments, equivalents and modifications will occur to others skilled in the art upon the reading and understanding of the specification. The present invention includes all such equivalents and modifications and is limited only by the scope of the appended claims.

Claims

1. A system (150, 250) for indicating an operational status of an emergency lighting equipment (117, 118, 119), the system (150, 250) comprising:

- a circuit board (151, 251),
- multiple light emitters (161, 162, 163, 261, 262, 263, 264) arranged on the circuit board (151, 251), and
- multiple light guides (165, 166, 167, 265, 266, 267, 268) fixed relative to the circuit board (151, 251), each of the multiple light guides (165, 166, 167, 265, 266, 267, 268) being arranged to guide light emitted by respective one or more of the multiple light emitters (161, 162, 163, 261, 262, 263, 264) towards a respective emitter surface (171, 172, 173, 271, 272, 273, 274) configured to radiate the light towards a surrounding of the system (150, 250), and
- a control circuitry (118) configured to obtain the operational status of the emergency lighting equipment (117, 118, 119),

wherein the control circuitry (118) is further configured to control each of the multiple light emitters (161, 162, 163, 261, 262, 263, 264) depending on the operational status of the emergency lighting equipment (117, 118, 119).

2. The system (150, 250) of claim 1,
wherein the operational status of the emergency lighting equipment (117, 118, 119) is associated with at least one of a battery state-of-charge level of an emergency lighting supply battery, a test mode of the emergency lighting equipment (117, 118, 119) being activated, presence of a fault condition of the emergency lighting equipment (117, 118, 119), a type of a fault condition of the emergency lighting equipment (117, 118, 119) being present, a standby mode being activated.

3. The system (150, 250) of claim 1 or 2,

wherein the operational status takes non-binary values,
wherein the control circuitry (118) is configured to determine at least one of a count of the multiple light emitters (161, 162, 163, 261, 262, 263, 264) to be activated or a brightness level of one or more of the multiple light emitters (161, 162, 163, 261, 262, 263, 264) depending on the non-binary values.

4. The system (150, 250) of any one of the preceding claims,
wherein the control circuitry (118) is configured to receive a status message via a communication interface from the emergency lighting equipment (117, 118, 119), the status message being indicative of the operational status.

5. The system (150, 250) of any one of the preceding claims, further comprising:
wherein the control circuitry (118) is configured to obtain, via a user interface, configuration data, the configuration data mapping each of multiple predefined operational status to a respective lighting configuration of each of the multiple light emitters (161, 162, 163, 261, 262, 263, 264).

6. The system (150, 250) of any one of the preceding claims, further comprising:

- a power interface configured to obtain a supply signal to drive the multiple light emitters (161, 162, 163, 261, 262, 263, 264) from an external source.

7. The system (150, 250) of any one of the preceding claims,

wherein the light guides (165, 166, 167, 265, 266, 267, 268) have a linear shape, or
wherein the light guides (165, 166, 167, 265, 266, 267, 268) have circular shapes and are concentrically arranged.

8. The system (150, 250) of any one of the preceding claims,
wherein the multiple emitter surfaces (171, 172, 173, 271, 272, 273, 274) form a two-dimensional or three-dimensional pattern.

9. The system (150, 250) of any one of the preceding claims,
wherein the multiple emitter surfaces (171, 172, 173, 271, 272, 273, 274) jointly form a lateral surface of a cone.

10. The system (150, 250) of any one of the preceding claims, further comprising:

- a communication interface configured to receive sensor data of a sensor observing an environmental condition of the surrounding,

wherein the control circuitry (118) is further configured to control each of the multiple light emitters (161, 162, 163, 261, 262, 263, 264) depending on the sensor data.

11. The system (150, 250) of claim 10,

wherein the sensor data is indicative of an ambient brightness level in the surrounding,
wherein the control circuitry (118) is further configured to control a brightness level of each of the multiple light emitters (161, 162, 163, 261, 262, 263, 264) that is activated depending on the operational status based on the ambient brightness level.

12. A luminaire system (110, 210), comprising:

- a housing (112),
- a light module (119, 219) arranged inside the housing and comprising one or more light emitting regions facing towards a surrounding of the luminaire system (110, 210) for providing an emergency illumination of the surrounding of the luminaire system (110, 210), and
- the system (150, 250) of any one of the preceding claims,

wherein the system is (150, 250) arranged inside the housing (112) so that the emitter surfaces (171, 172, 173, 271, 272, 273, 274) of the multiple light guides (165, 166, 167, 265, 266, 267, 268) face towards the surrounding of the

luminaire system (110, 210).

13. A method of operating a control circuitry (118) configured to control each of multiple light emitters (161, 162, 163, 261, 262, 263, 264),

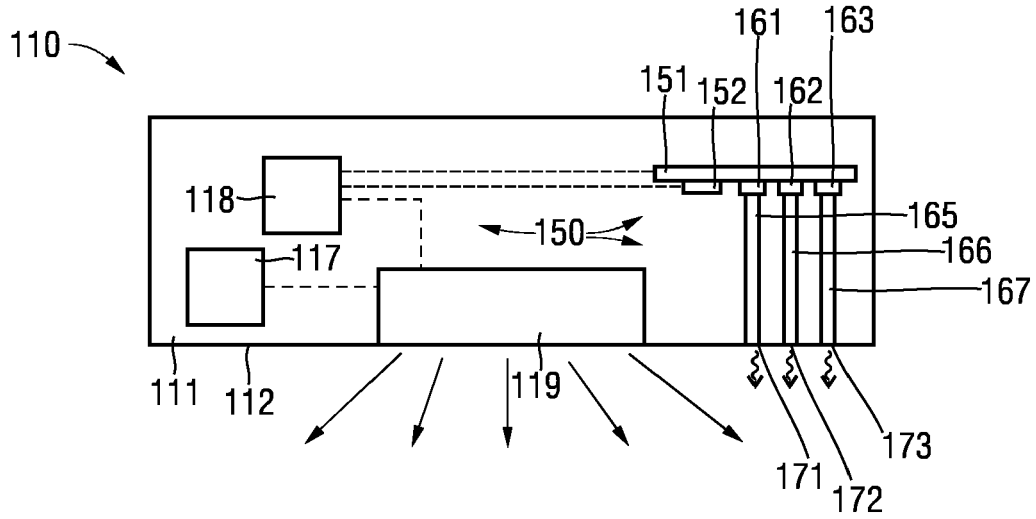
- obtaining an operational status of an emergency lighting equipment (117, 118, 119), and
- controlling each of the multiple light emitters (161, 162, 163, 261, 262, 263, 264) depending on the operational status of the emergency lighting equipment (117, 118, 119).

14. The method of claim 13, further comprising:

- obtaining sensor data of a sensor of a sensor observing an environmental condition of a surrounding of the emergency lighting equipment,
- controlling each of the multiple light emitters (161, 162, 163, 261, 262, 263, 264) further depending on the sensor data.

15. The method of claim 13 or 14,
wherein the control circuitry (118) is the control circuitry of the system of claim 1.

FIG. 1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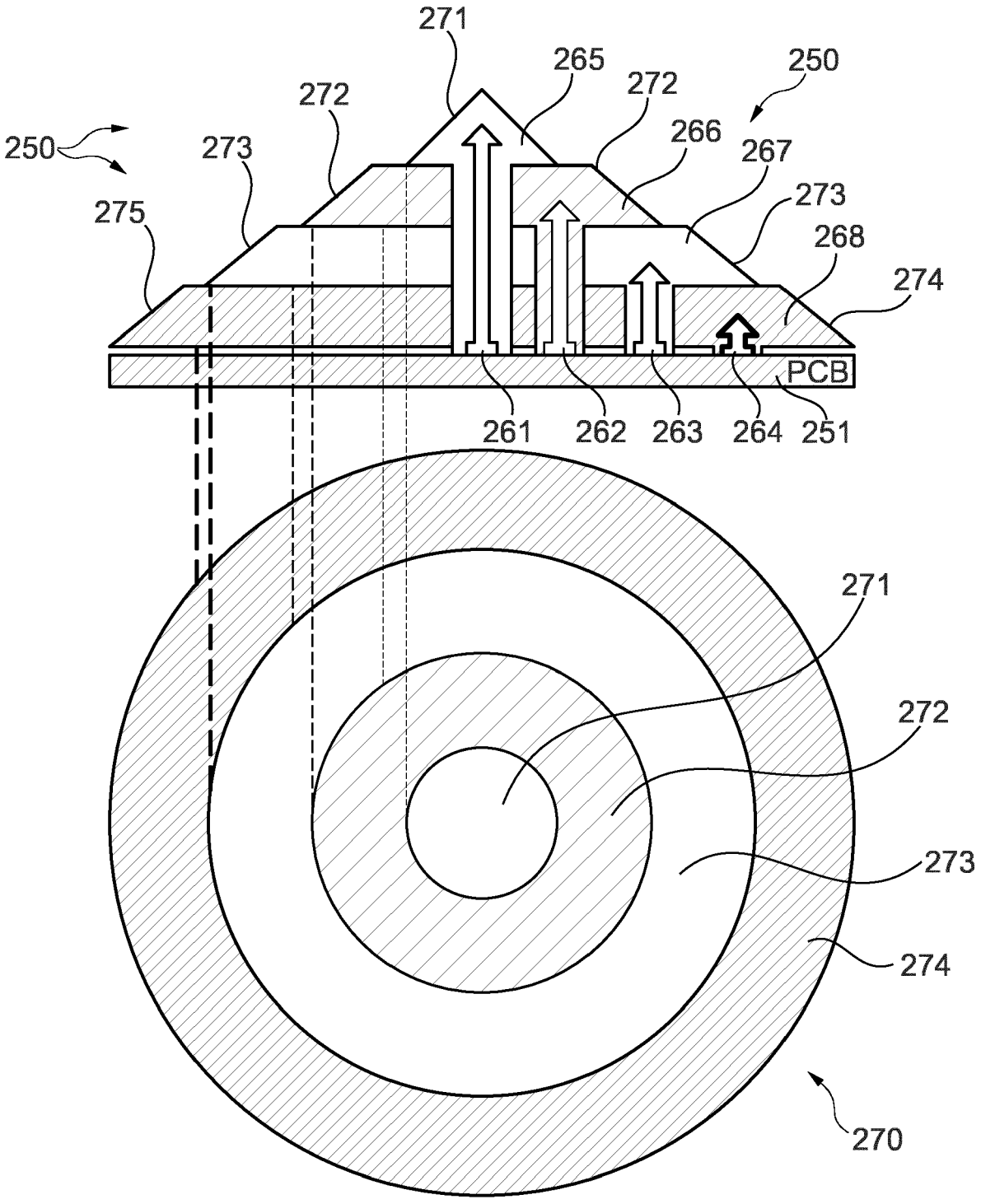
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PCB
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Fig. 2

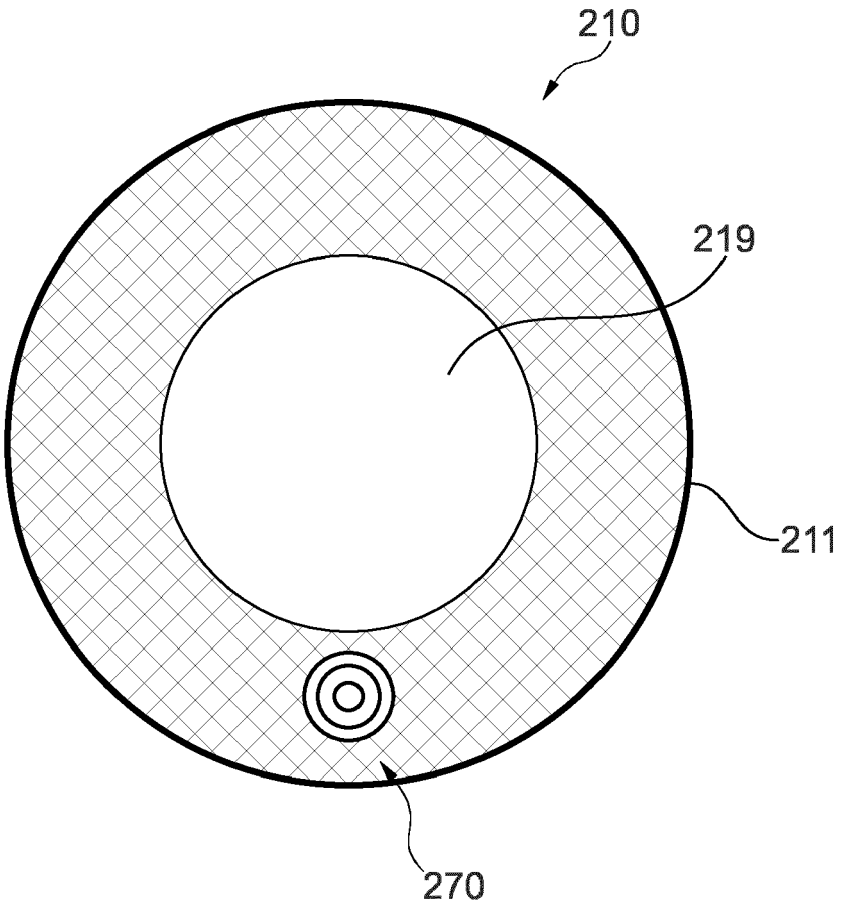
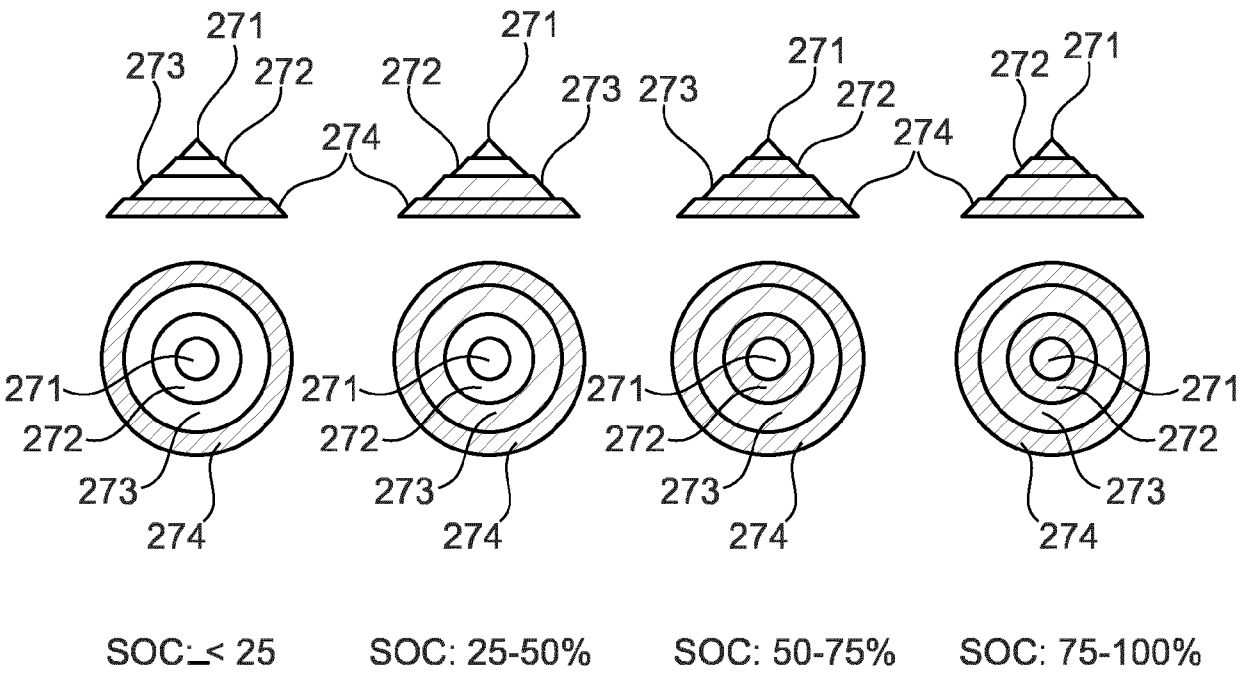


Fig. 3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SOC: ≤ 25
SOC: 25-50%
SOC: 50-75%
SOC: 75-100%

Fig. 4

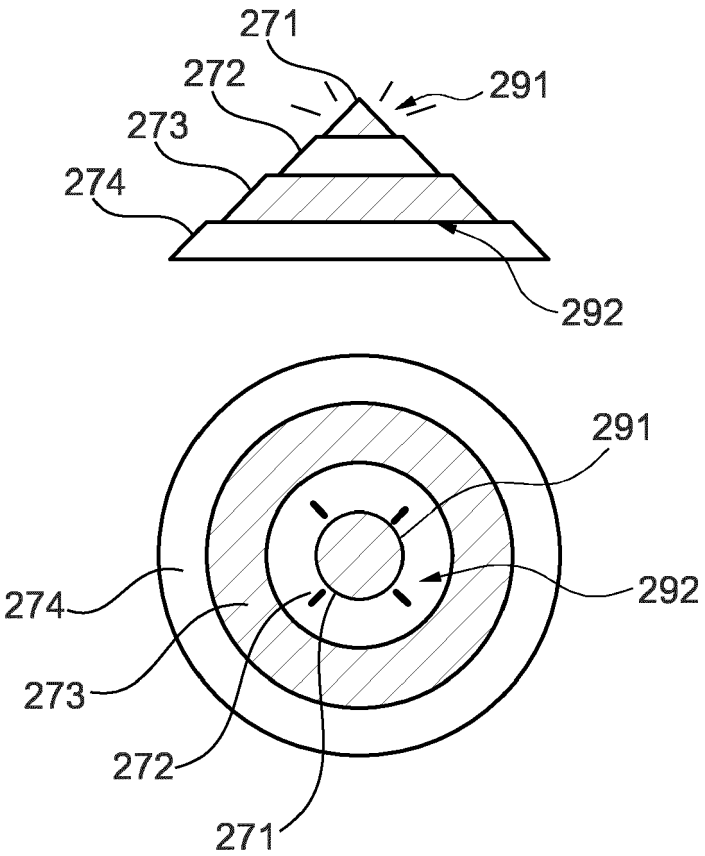
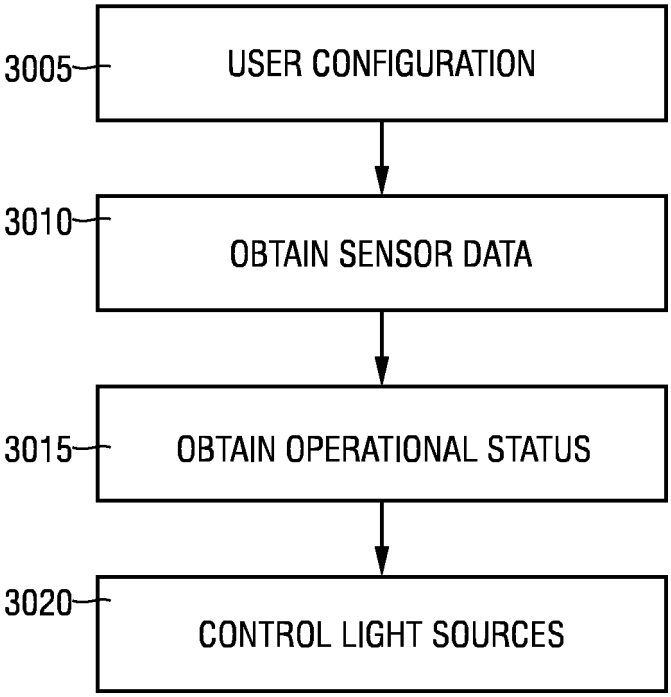


Fig. 5

FIG. 6


3005
USER CONFIGURATION
3010
OBTAIN SENSOR DATA
3015
OBTAIN OPERATIONAL STATUS
3020
CONTROL LIGHT SOURCES

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EUROPEAN SEARCH REPORT

Application Number
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DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 2 798 267 B1 (IDEAL IND LIGHTING LLC [US]) 19 October 2022 (2022-10-19) * claim 1; figures * * paragraphs [0022], [0045], [0100], [0122], [0128], [0131] - [0134] *	1-15	INV. H05B47/17
X	US 2023/022976 A1 (TRIDONIC GMBH & CO KG) 26 January 2023 (2023-01-26) * claims 2,8,14 * * paragraphs [0021] - [0023], [0070] - [0075] *	1-15	
X	EP 4 161 216 A1 (TRIDONIC GMBH & CO KG [AT]) 5 April 2023 (2023-04-05) * the whole document *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC) H05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	25 November 2023	Maicas, Jesús

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25-11-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2798267 B1	19-10-2022	CN 104081119 A	01-10-2014
		CN 104220809 A	17-12-2014
		CN 104838727 A	12-08-2015
		EP 2792216 A2	22-10-2014
		EP 2798267 A1	05-11-2014
		KR 20140102267 A	21-08-2014
		KR 20140102268 A	21-08-2014
		US 2013127362 A1	23-05-2013
		US 2013147351 A1	13-06-2013
		US 2013147376 A1	13-06-2013
		WO 2013090275 A2	20-06-2013
		WO 2013090277 A1	20-06-2013
		WO 2013090281 A1	20-06-2013
US 2023022976 A1	26-01-2023	CN 114946275 A	26-08-2022
		EP 4066599 A1	05-10-2022
		GB 2591148 A	21-07-2021
		US 2023022976 A1	26-01-2023
		WO 2021144329 A1	22-07-2021
EP 4161216 A1	05-04-2023	EP 4161216 A1	05-04-2023
		WO 2023057201 A1	13-04-2023

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