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(54) Title: LIGHT CONTROL SYSTEM WITH ARTIFICIAL INTELLIGENCE

(57) Abstract: According to an embodiment, a light control system 100 with artificial intelligence is disclosed. The light control system 100 may include a light fixture 102. The light fixture 102 may include a light source 104 to emit light, a sensor 106 to detect at least one object in an area illuminated by the light source 104 and an image capturing device 108 to capture the image of the area where at least one object is detected. Whenever at least one or more object is detected, the sensor 106 may determine one or more parameters associated with each of the object. The image captured by the image capturing device 108 may be processed to determine one or more material characteristics of each of the object. Once the material characteristics and the parameters associated with each of the object is identified, the processor 110 may control the illumination of the light respectively.

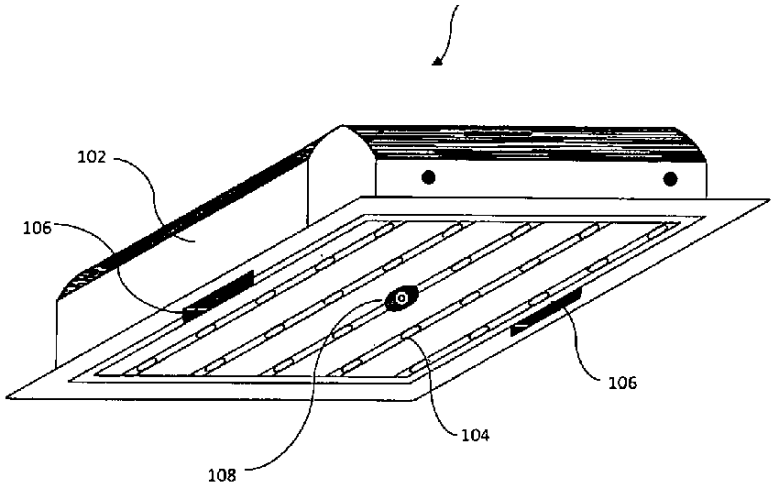
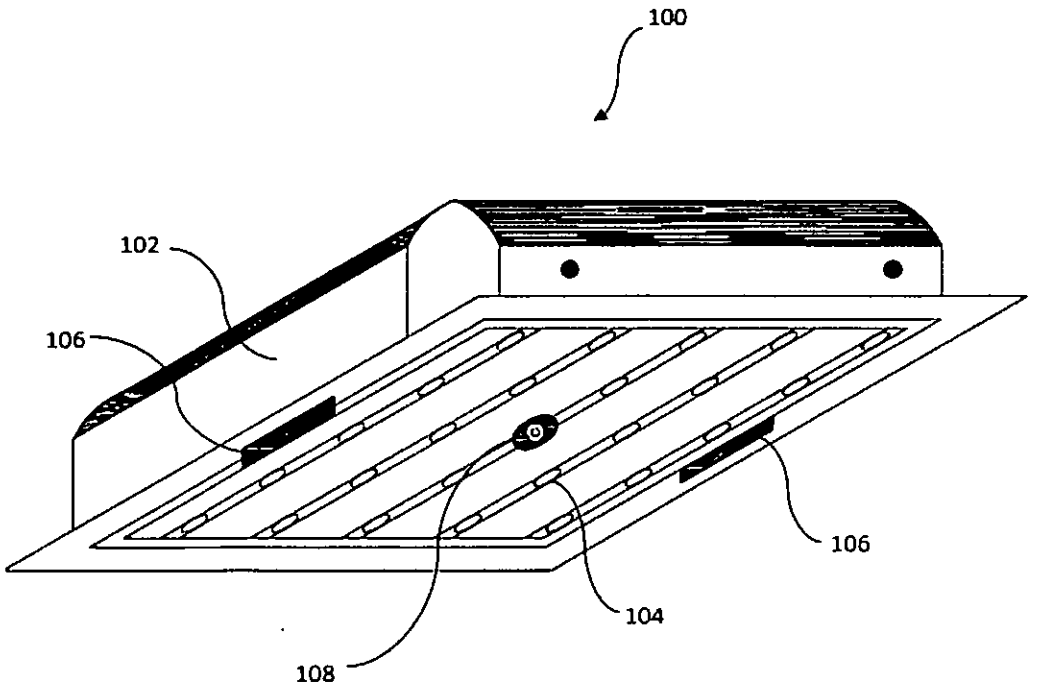


Figure 1

ABSTRACT

Light control system with artificial intelligence

According to an embodiment, a light control system 100 with artificial intelligence is disclosed. The light control system 100 may include a light fixture 102. The light fixture 102 may include a light source 104 to emit light, a sensor 106 to detect at least one object in an area illuminated by the light source 104 and an image capturing device 108 to capture the image of the area where at least one object is detected. Whenever at least one or more object is detected, the sensor 106 may determine one or more parameters associated with each of the object. The image captured by the image capturing device 108 may be processed to determine one or more material characteristics of each of the object. Once the material characteristics and the parameters associated with each of the object is identified, the processor 110 may control the illumination of the light respectively.



We claim:

1. A light control system 100 with artificial intelligence having a light fixture 102, the light fixture 102 comprising:

a light source 104;

a sensor 106 to detect at least one object in an area illuminated by the light source 104 and determine one or more predefined parameters associated with each of the object;

an image capturing device 108 for capturing an image of the area where the object is detected, wherein the captured image is processed to determine one or more material characteristics of each of the detected object; and

a processor 110 configured to control the illumination of the area based on the material characteristics and one or more predefined parameters of each of the detected object.

2. The light control system 100 with artificial intelligence as claimed in claim 1, wherein the light source 104 is an LED.

3. The light control system 100 with artificial intelligence as claimed in claim 1, wherein the image capturing device 108 is a fish eye camera with an autofocus feature.

4. The light control system 100 with artificial intelligence as claimed in claim 1, wherein the sensor 106 is a laser distance sensor.

5. The light control system 100 with artificial intelligence as claimed in claim 1, wherein the one or more parameters include size of the object or shape of the object or location of the object or distance of the object from the light fixture 102.

6. The light control system 100 with artificial intelligence as claimed in claim 1, wherein the light control system 100 with artificial intelligence further includes a storage unit 112 having a repository of plurality of material characteristics.

7. The light control system 100 with artificial intelligence as claimed in claim 1, wherein the material characteristics of the object in the captured image is compared with the plurality of material characteristics stored in the storage unit 112.

8. The light control system 100 with artificial intelligence as claimed in claim 1, wherein the material characteristics of the object include material of the object or absorption properties of the object or reflection properties of the object or refraction properties of the object or transmission properties of the object.

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FIELD OF INVENTION

The invention generally relates to a field of light control and more particularly to controlling light through artificial intelligence.

BACKGROUND

A conventional lighting fixture includes a light source such as a bulb; tube light, LED etc. that may be operated through an electric switch. A user may turn the light on or off as required. At several occurrences, the user may turn on the light and may forget to turn the light off. This leads to a wastage of electricity and may also lead to higher electricity bill. In certain places like a warehouse that includes multiple racks and products, a large amount of light energy is wasted due to lack of focused and targeted lighting. In the recent years, the lighting system has undergone many technological improvements. The improvements in the lighting system has made attempt in saving electricity successful to quite an extent. As the smart technologies are developing, the demand for increased intelligence of smart terminal devices in a smart home environment is also increasing. How to integrate resources, enhance applications of smart lights, and make home smart device simple and well integrated has recently become the development focus of smart technologies.

Some of the known solutions that addresses lighting control and management includes US patent no. 9,215,781. The US9,215,781 describes an outdoor lighting and intelligent sensor technology in cooperation with video analytics processing to selectively illuminate outdoor spaces and to identify and evaluate events in a scene monitored by a video camera. Another

solution, U.S. Pat. No. 6,151,529 describes an intelligent lighting control system for indoor lights based upon analysis of data from simple motion sensors. Another solution, U.S. Pat. No. 6,114,816 describes a lighting system that controls gas discharge lamps, dimming them automatically according to slow changes sensed in the immediate environment such as time of day and ambient light level. The conventional lighting control systems do not usually take the material characteristics of the objects into consideration and therefore may often provide inaccurate illumination in an area.

Hence there is a need for an improved system for lighting control and management.

SUMMARY OF THE INVENTION

According to an exemplary embodiment of the invention, a light control system with artificial intelligence is disclosed. The light control system with artificial intelligence may include a light fixture. The light fixture may have a light source to emit light, a sensor to detect at least one object in an area illuminated by the light from the light source and an image capturing device to capture an image of the area where the object is detected. The light control system may be configured such that whenever at least one or more object is detected, the sensor may determine one or more predefined parameters associated with each of the object. The image captured by the image capturing device may be processed to determine one or more material characteristics of each of the object. Once the material characteristics of each of the object and the predefined parameters associated with each of the object may be identified, the processor may control the illumination of the light respectively.

BRIEF DESCRIPTION OF DRAWINGS

Other objects, features, and advantages of the invention will be apparent from the following description when read with reference to the accompanying drawings. In the drawings, wherein like reference numerals denote corresponding parts throughout the several views:

Figure 1 illustrates an isometric view of a light control system with artificial intelligence according to an exemplary embodiment of the invention.

Figure 2 illustrates a block diagram of a light control system with artificial intelligence according to an exemplary embodiment of the invention.

DETAILED DESCRIPTION OF DRAWINGS

The following description with reference to the accompanying drawings is provided to assist in a comprehensive understanding of exemplary embodiments. It includes various specific details to assist in that understanding but these are to be regarded as merely exemplary. Accordingly, those of ordinary skill in the art will recognize that various changes and modifications of the embodiments described herein can be made without departing from the scope and spirit of the invention. In addition, descriptions of well-known functions and constructions are omitted for clarity and conciseness.

Figure 1 illustrates an isometric view of a light control system 100 with artificial intelligence according to an exemplary embodiment of the invention. The light control system 100 with artificial intelligence may include a light fixture 102. The light fixture 102 may have any

suitable shape and size. According to an embodiment, the light fixture 102 may be substantially cuboidal or cylindrical in shape. The shape and size of the light fixture may vary depending on the several factors such as, but not limited to, area to be illuminated, intensity of illumination, feasibility of fixing the light fixture 102 in the area etc. One of the faces of the light fixture 102 may include a transparent or a translucent surface. The transparent or translucent surface may enable the light to pass through the surface. The other surfaces of the light fixture 102 may be formed of an opaque body. The opaque body of the light fixture 102 may be constructed from material or a combination of materials that may include, but are not limited to, one or more of metal, alloy, plastic and any other suitable material known in the art. The opaque body of the light fixture 102 may protect the components enclosed within the light fixture. According to an embodiment, the light fixture 102 may include a reflective surface on an interior part of the light fixture 102. The reflective surface may be utilized to control the illumination in the area. The light fixture 102 may be further provided with a provision for mounting the light fixture 102 on a surface or pole as required. The provision for mounting the light fixture 102 may include arrangements such as screw-bolt arrangement, clamp arrangement, eyebolt arrangement or other suitable methods known in the art.

The light fixture 102 may include a light source 104 enclosed within the light fixture 102. The light source 104 may emit light in an area. According to an embodiment, the light source 104 may be an LED. The light fixture 102 may include a plurality of LEDs within the light fixture 102. The LEDs for example may be employed in any form such as but not limited to a strip, bulb, tube etc. It will be apparent to a person skilled in the art that the LEDs are not limited to the above examples and other suitable implementations known in the art may also be employed. The working of LEDs may be controlled based on the illumination requirement in the area.

The light fixture 102 may include a sensor 106 to detect at least one object in an area illuminated by the light source 104. The sensor 106 may detect the objects present in the area being illuminated by a light fixture 102. According to an embodiment, the sensor 106 may be provided on the light fixture 102. According to another embodiment, the sensor 106 may be provided in proximity to the light fixture 102. The position of the sensor 106 on light fixture 102 or in proximity to light fixture 102 may be established based on the accuracy to detect the objects within the illuminated area. According to an embodiment, the sensor 106 may be a laser distance sensor. The sensor 106 may be configured to determine one or more predefined parameters associated with each of the object. The predefined parameters may include size of the object or shape of the object or distance of the object from the light fixture 102 or location of the object in the illuminated area. The sensor 106 may determine the predefined parameters associated with each of the object and send the predefined parameters to a processor 110.

The light fixture 102 may further include an image capturing device 108. According to an embodiment, the image capturing device 108 may be a camera. According to an embodiment, the camera may be a fish eye camera with an autofocus feature. It will be apparent to a person skilled in the art that the type of camera may vary depending to the requirement and other suitable cameras known in the art may also be employed. Once the sensor 106 detects an object in the area illuminated by the light fixture 102, the image capturing device 108 may receive a signal to take an image of the area where the object is detected. By way of an example, if the sensor 106 detects multiple objects in the area illuminated by the light fixture 102, the sensor 106 determines the parameters of each of the object and the image capturing device 108 captures one or more images of the area with the detected objects. For more clarity of the detected object, the image capturing device 108 may be configured to capture the specific object in the illuminated area. The image capturing device 108 and the sensor 106 may cover

the same area where the light from the light source 104 falls. The image captured by the image capturing device 108 may be processed to determine one or more material characteristics of each of the object. The material characteristics of the object may include material of the object such as but not limited to steel, copper, wood, plastic, ceramic, aluminium, glass etc. The material characteristics of the object may further include properties of the object such as but not limited to absorption properties, reflection properties, refraction properties, transmission properties etc. By way of an example, if the area illuminated by the light source 108 includes a wooden rack and a steel drum, the sensor 106 may identify the predefined parameters of the wooden rack and the steel drum, and the image capturing device 108 may capture the area with the wooden rack and the steel drum. The captured image on being processed may enable the light control system 100 to determine the material characteristics of the wooden rack and the steel drum,

Figure 2 illustrates a block diagram of a light control system 100 with artificial intelligence according to an exemplary embodiment of the invention. The light control system 100 with artificial intelligence may include a storage unit 112. The storage unit 112 may be in any form such as, but not limited to a hard drive, USB storage device, compact disc etc. According to an embodiment, the storage unit 112 may be arranged in the light fixture 102. According to another embodiment, the storage unit 112 may be arranged outside the light fixture 102. The storage unit 112 may have a repository of plurality of material characteristics. The material characteristics of each of the object in the image captured by the image capturing device 108 may be analysed with the plurality of material characteristics in the storage unit 112. The analysis of the image captured by the image capturing device 108 may identify the material characteristics of the object. According to an embodiment, the storage unit 112 may be configured to update any new material characteristics periodically from the internet. The light

control system 100 with artificial intelligence may comprise of a processor 110. According to an embodiment, the processor 110 may be arranged in the light fixture 102. According to another embodiment, the processor 110 may be arranged outside the light fixture 102. The processor 110 may be programmed to control the illumination of light emitted from the light source 104. The processor 110 may perform calculations and evaluations of the required illumination in the area based on the information of the predefined parameters associated with each of the object and the material characteristics of each of the object. The processor 110 may perform calculations and evaluations to obtain the desired illumination in the area and based on the results, the processor 110 may control the illumination of the area. The automatic control of illumination in the area may optimize power consumption and may provide adequate lighting in the area.

It is understood that the above description is intended to be illustrative, and not restrictive. It is intended to cover all alternatives, modifications and equivalents as may be included within the spirit and scope of the invention as defined in the appended claims. Many other embodiments will be apparent to those of skill in the art upon reviewing the above description. The scope of the invention should, therefore, be determined with reference to the appended claims, along with the full scope of equivalents to which such claims are entitled. In the appended claims, the terms "including" and "in which" are used as the plain-English equivalents of the respective terms "comprising" and "wherein," respectively.

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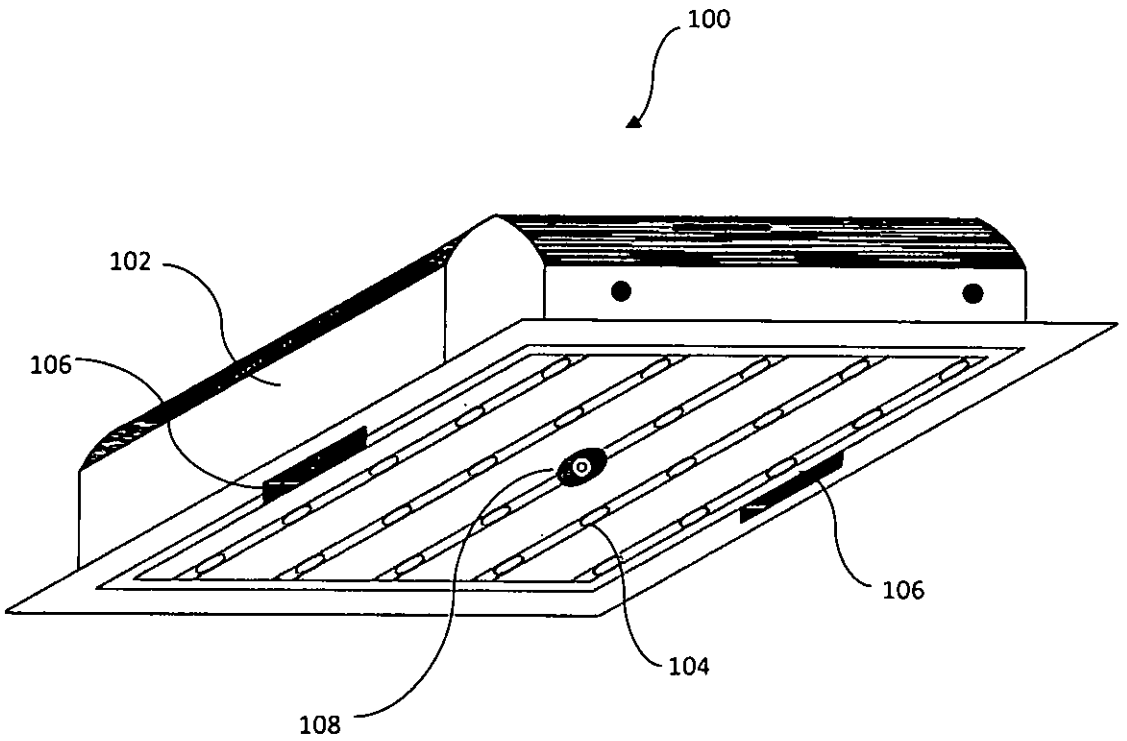

Figure 1

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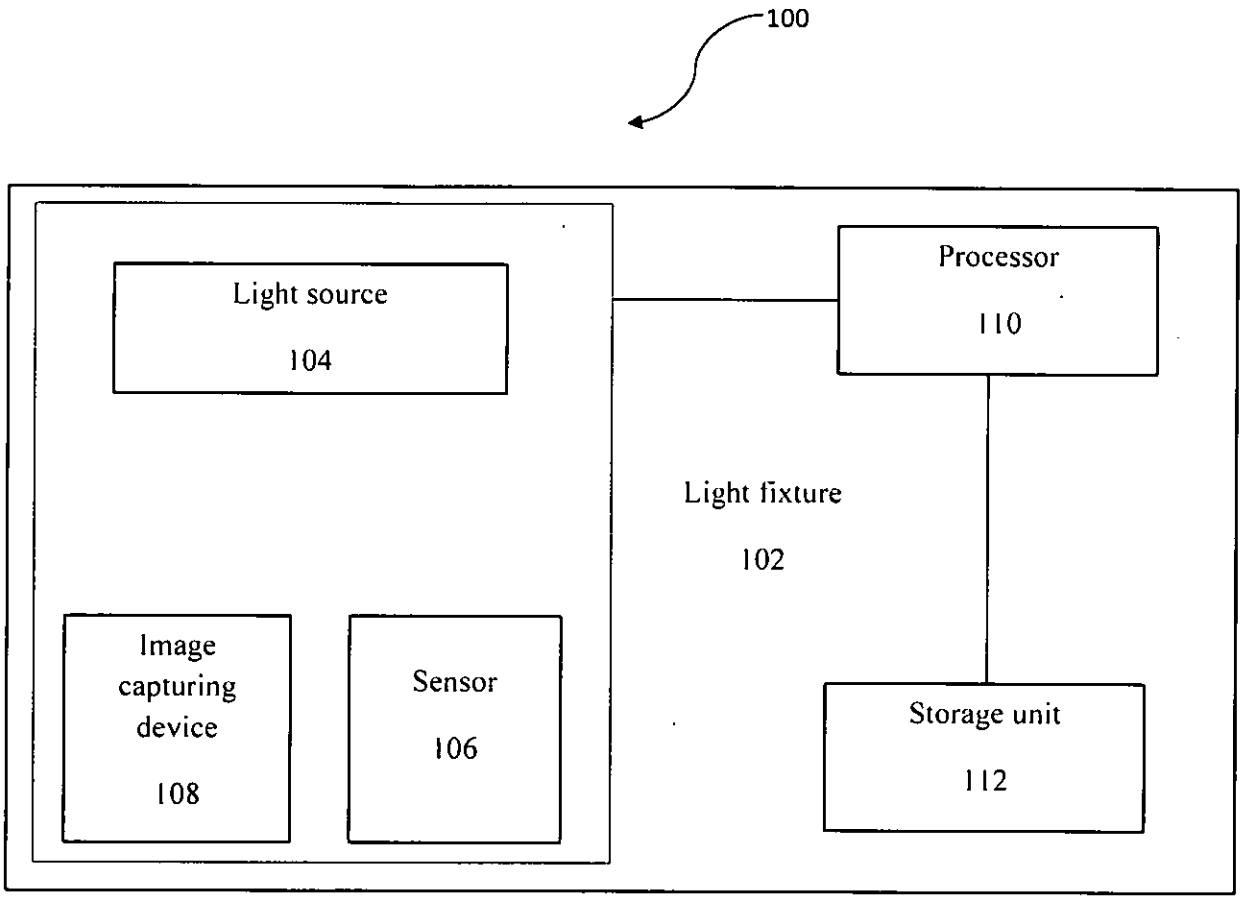

Figure 2

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