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Murakami

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(54) **ILLUMINATION SYSTEM, ILLUMINATION SETTING METHOD, AND RECORDING MEDIUM**

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H04W 4/06 (2009.01)
(Continued)

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CPC ***H05B 37/0272*** (2013.01); ***H04B 17/318*** (2015.01); ***H04L 41/0866*** (2013.01); *G06F 3/0488* (2013.01)

(58) **Field of Classification Search**
CPC . H05B 37/0272; H05B 37/02; H04L 41/0866; H04L 12/24; H04B 17/318; G06F 3/0488; H04W 52/34; H04W 4/06; H04W 4/00; H04W 16/28; H04W 76/02; H04W 4/04
See application file for complete search history.

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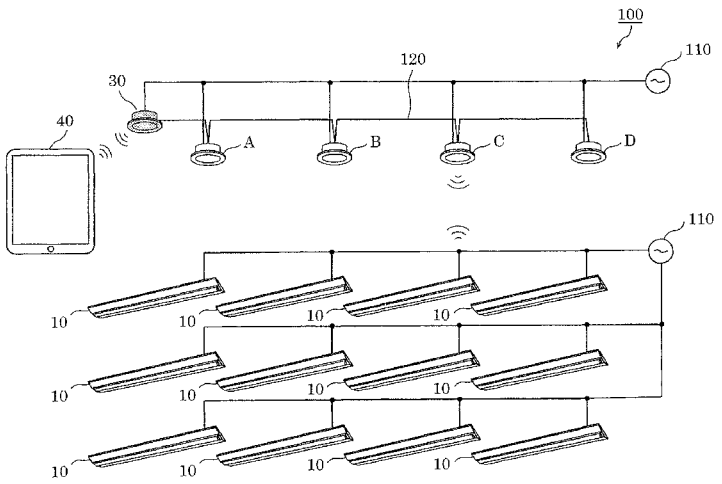
(57) **ABSTRACT**

An illumination system includes a plurality of lighting fixtures, a plurality of slave devices, and an information communication terminal. Each of the plurality of slave devices includes: first wireless communication circuitry configured to receive, from each of the plurality of lighting fixtures, a signal including a MAC address of the lighting fixture, and to measure a received signal strength indication (RSSI) of the signal received; and a first controller that causes the first wireless communication circuitry to transmit the MAC address and RSSI information indicating the RSSI measured. The information communication terminal includes a second controller that makes associations between positions and MAC addresses of the plurality of lighting fixtures based on the RSSI information and position information stored in a storage.

17 Claims, 11 Drawing Sheets



(51) **Int. Cl.**

H04W 52/34	(2009.01)
H04L 12/24	(2006.01)
H04B 17/318	(2015.01)
G06F 3/0488	(2013.01)

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FIG. 1

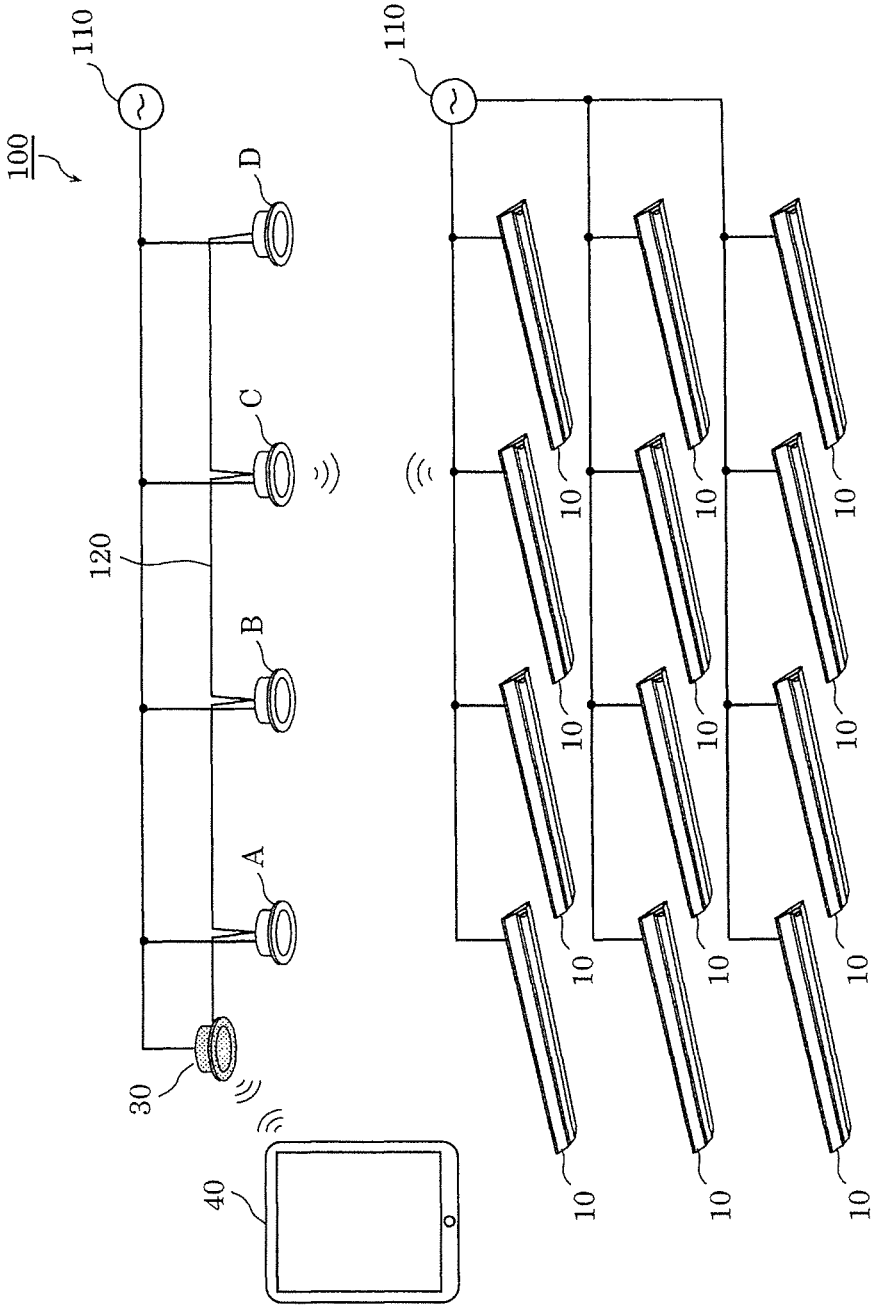


FIG. 2

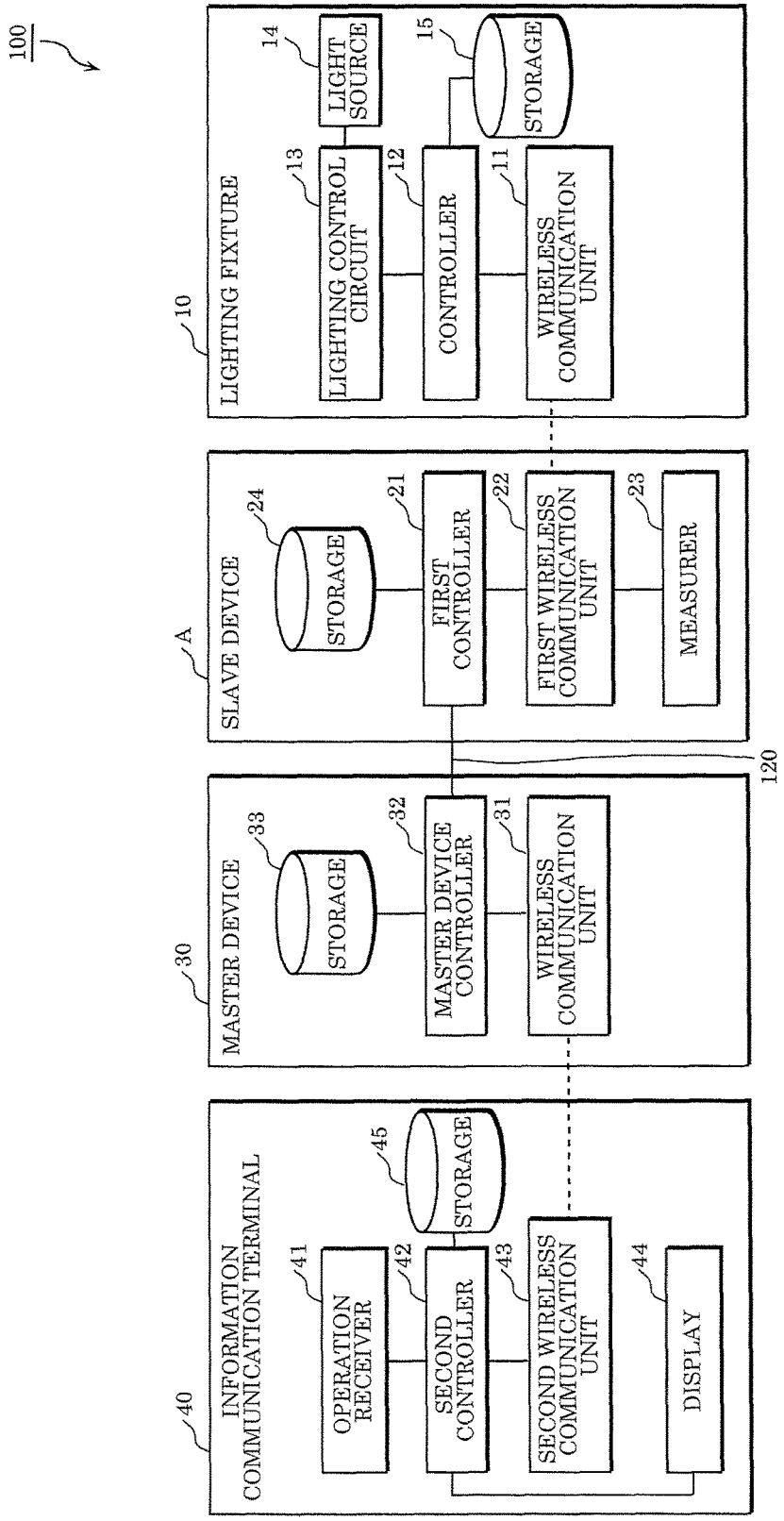

100
10
LIGHTING FIXTURE
14
LIGHT SOURCE
15
STORAGE
13
LIGHTING CONTROL CIRCUIT
12
CONTROLLER
11
WIRELESS COMMUNICATION UNIT
A
SLAVE DEVICE
24
STORAGE
21
FIRST CONTROLLER
22
FIRST WIRELESS COMMUNICATION UNIT
23
MEASURER
120
30
MASTER DEVICE
33
STORAGE
32
MASTER DEVICE CONTROLLER
31
WIRELESS COMMUNICATION UNIT
40
INFORMATION COMMUNICATION TERMINAL
45
STORAGE
41
OPERATION RECEIVER
42
SECOND CONTROLLER
43
SECOND WIRELESS COMMUNICATION UNIT
44
DISPLAY

FIG. 3

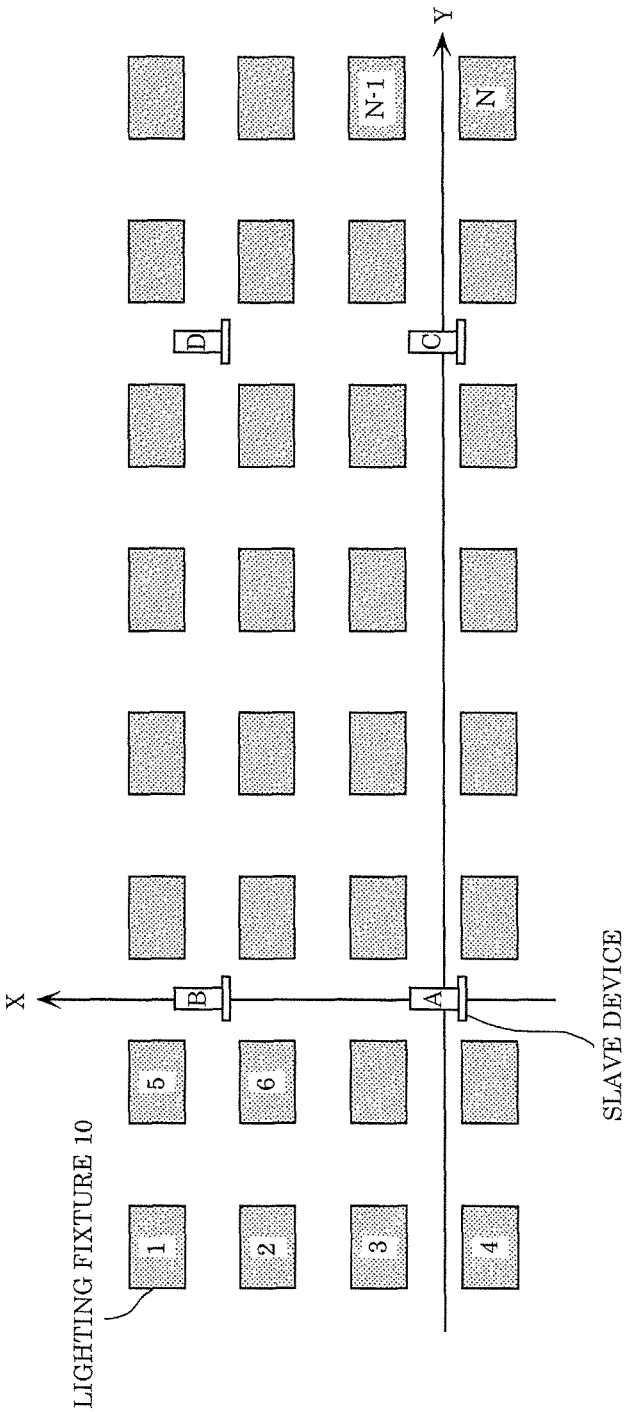


FIG. 4

NUMBER	COORDINATES		DISTANCE FROM EACH SLAVE DEVICE			
TEMPORARY ADDRESS	X	Y	La	Lb	Lc	Ld
SLAVE DEVICE A	0.0	0.0	–	4.0	8.0	8.9
SLAVE DEVICE B	0.0	4.0	4.0	–	8.9	8.0
SLAVE DEVICE C	8.0	0.0	8.0	8.9	–	4.0
SLAVE DEVICE D	8.0	4.0	8.9	8.9	8.0	–
LIGHTING FIXTURE 1	-3.0	5.0	5.8	3.2	12.1	11.0
LIGHTING FIXTURE 2	-3.0	3.0	4.2	3.2	11.4	11.0
LIGHTING FIXTURE 3	-3.0	1.0	3.2	4.2	11.0	11.4
LIGHTING FIXTURE 4	-3.0	-1.0	3.2	5.8	11.0	12.1
•	•	•	•	•	•	•
•	•	•	•	•	•	•
•	•	•	•	•	•	•
LIGHTING FIXTURE N−1	11.0	1.0	11.0	11.4	3.2	4.2
LIGHTING FIXTURE N	11.0	-1.0	11.0	12.1	3.2	5.8

FIG. 5

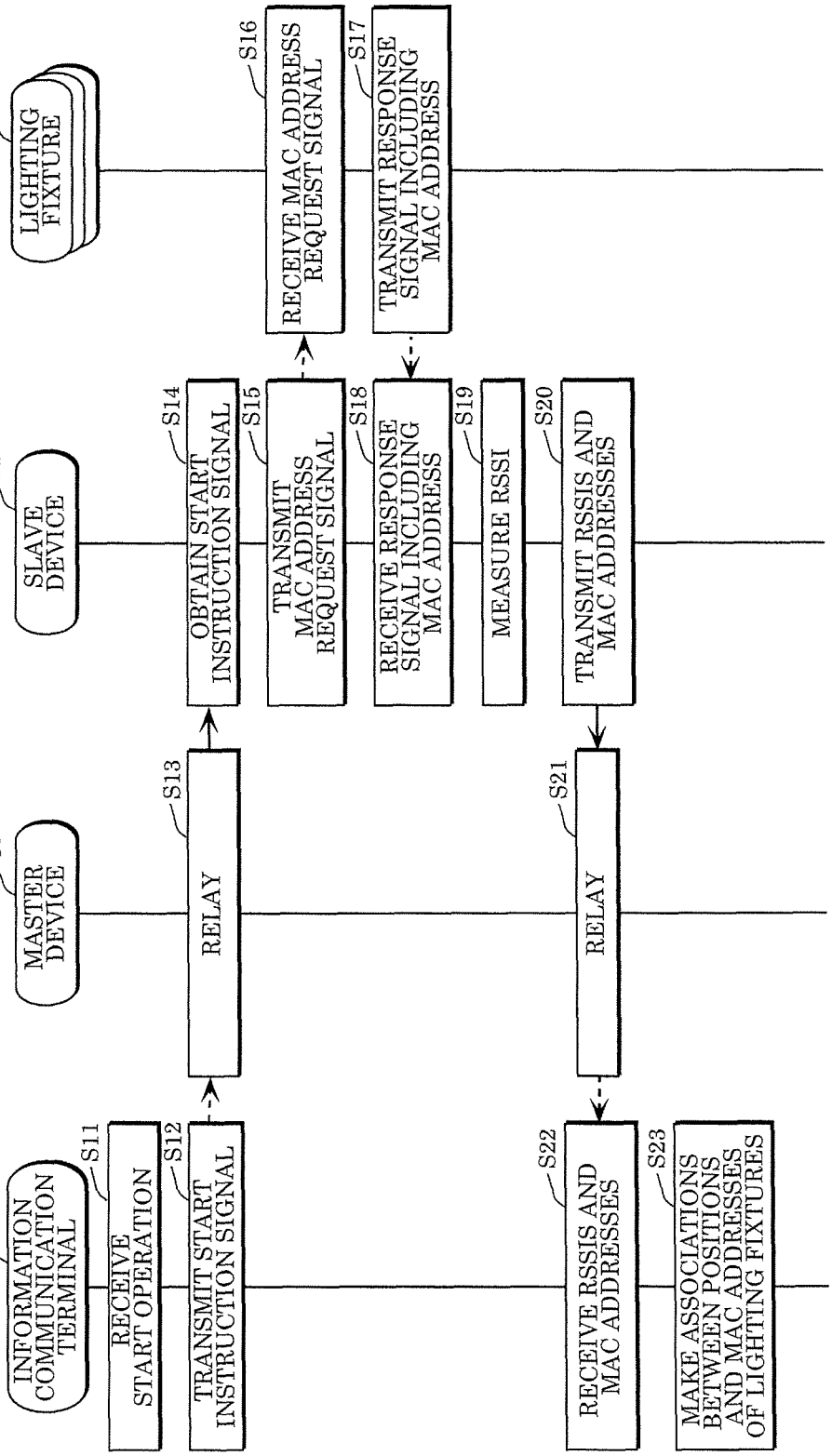

40
INFORMATION COMMUNICATION TERMINAL
30
MASTER DEVICE
A
SLAVE DEVICE
10
LIGHTING FIXTURE
S11
RECEIVE START OPERATION
S12
TRANSMIT START INSTRUCTION SIGNAL
S13
RELAY
S14
OBTAIN START INSTRUCTION SIGNAL
S15
TRANSMIT MAC ADDRESS REQUEST SIGNAL
S16
RECEIVE MAC ADDRESS REQUEST SIGNAL
S17
TRANSMIT RESPONSE SIGNAL INCLUDING MAC ADDRESS
S18
RECEIVE RESPONSE SIGNAL INCLUDING MAC ADDRESS
S19
MEASURE RSSI
S20
TRANSMIT RSSIS AND MAC ADDRESSES
S21
RELAY
S22
RECEIVE RSSIS AND MAC ADDRESSES
S23
MAKE ASSOCIATIONS BETWEEN POSITIONS AND MAC ADDRESSES OF LIGHTING FIXTURES

FIG. 6

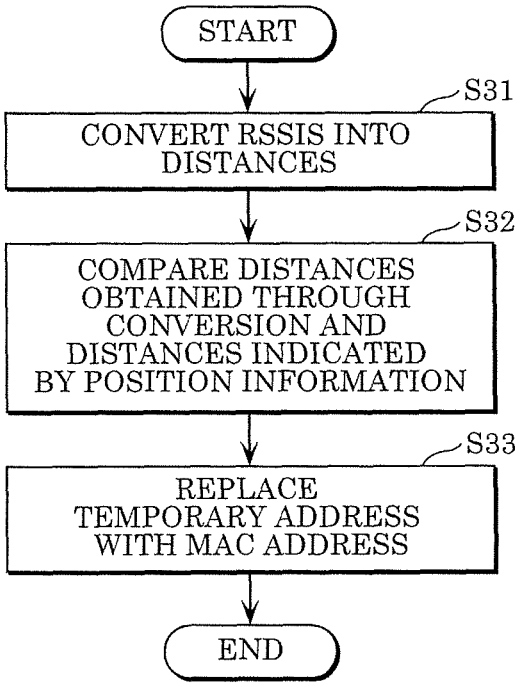

START
S31
CONVERT RSSIS INTO DISTANCES
S32
COMPARE DISTANCES OBTAINED THROUGH CONVERSION AND DISTANCES INDICATED BY POSITION INFORMATION
S33
REPLACE TEMPORARY ADDRESS WITH MAC ADDRESS
END

FIG. 7

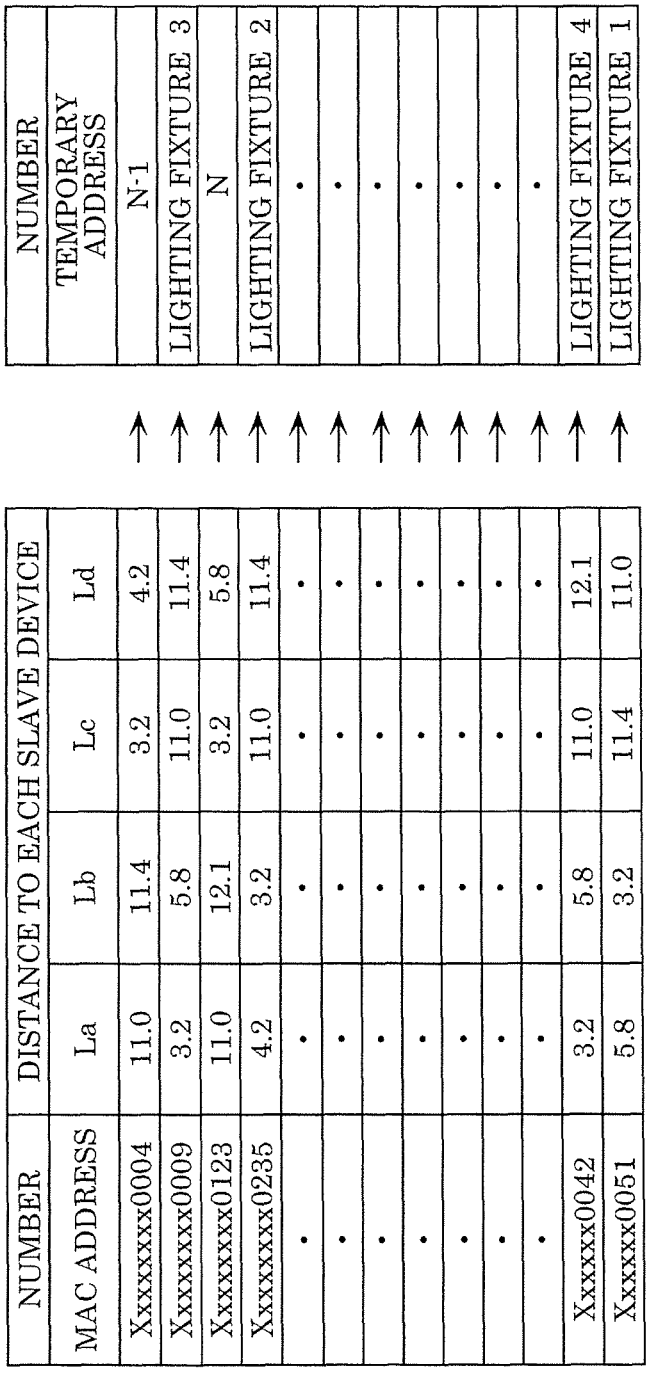

NUMBER
TEMPORARY ADDRESS
N-1
LIGHTING FIXTURE 3
N
LIGHTING FIXTURE 2
LIGHTING FIXTURE 4
LIGHTING FIXTURE 1
NUMBER
DISTANCE TO EACH SLAVE DEVICE
MAC ADDRESS
La
Lb
Lc
Ld
Xxxxxxx0004 11.0 11.4 3.2 4.2
Xxxxxxx0009 3.2 5.8 11.0 11.4
Xxxxxxx0123 11.0 12.1 3.2 5.8
Xxxxxxx0235 4.2 3.2 11.0 11.4
Xxxxx0042 3.2 5.8 11.0 12.1
Xxxxx0051 5.8 3.2 11.4 11.0

FIG. 8

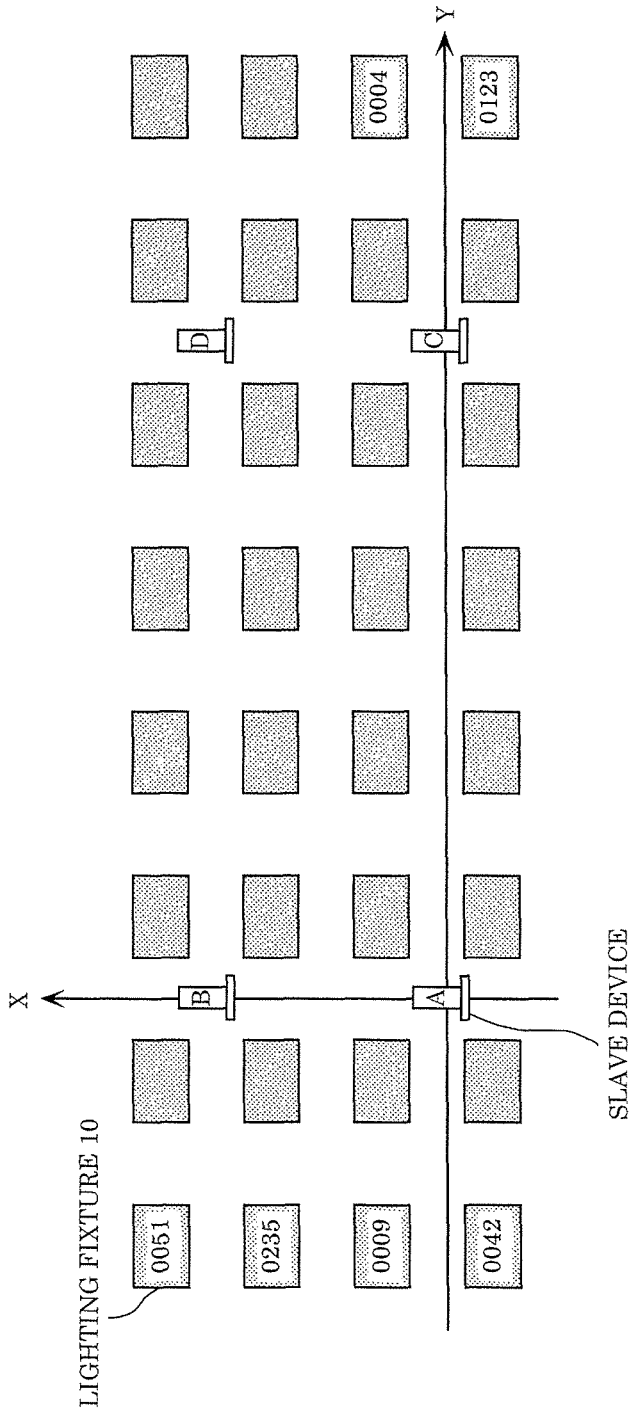

Y
X
A
B
C
D
0004
0123
0051
0235
0009
0042
LIGHTING FIXTURE 10
SLAVE DEVICE

FIG. 9

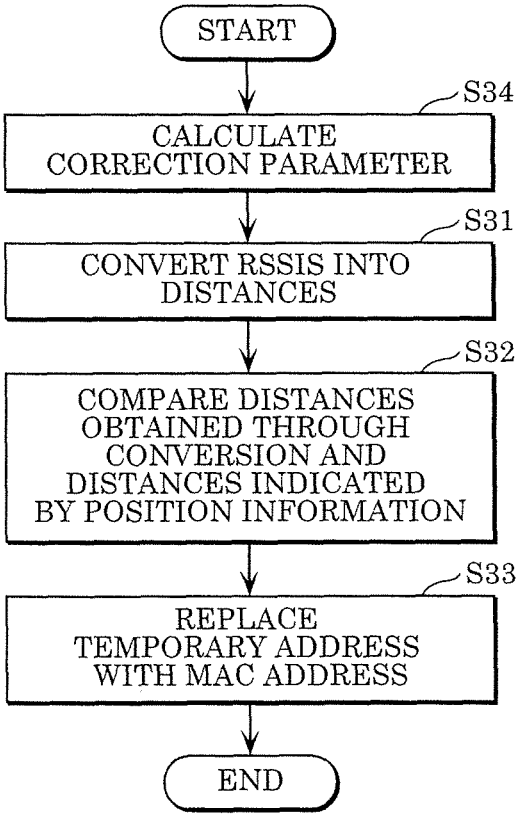

START
S34
CALCULATE CORRECTION PARAMETER
S31
CONVERT RSSIS INTO DISTANCES
S32
COMPARE DISTANCES OBTAINED THROUGH CONVERSION AND DISTANCES INDICATED BY POSITION INFORMATION
S33
REPLACE TEMPORARY ADDRESS WITH MAC ADDRESS
END

FIG. 10

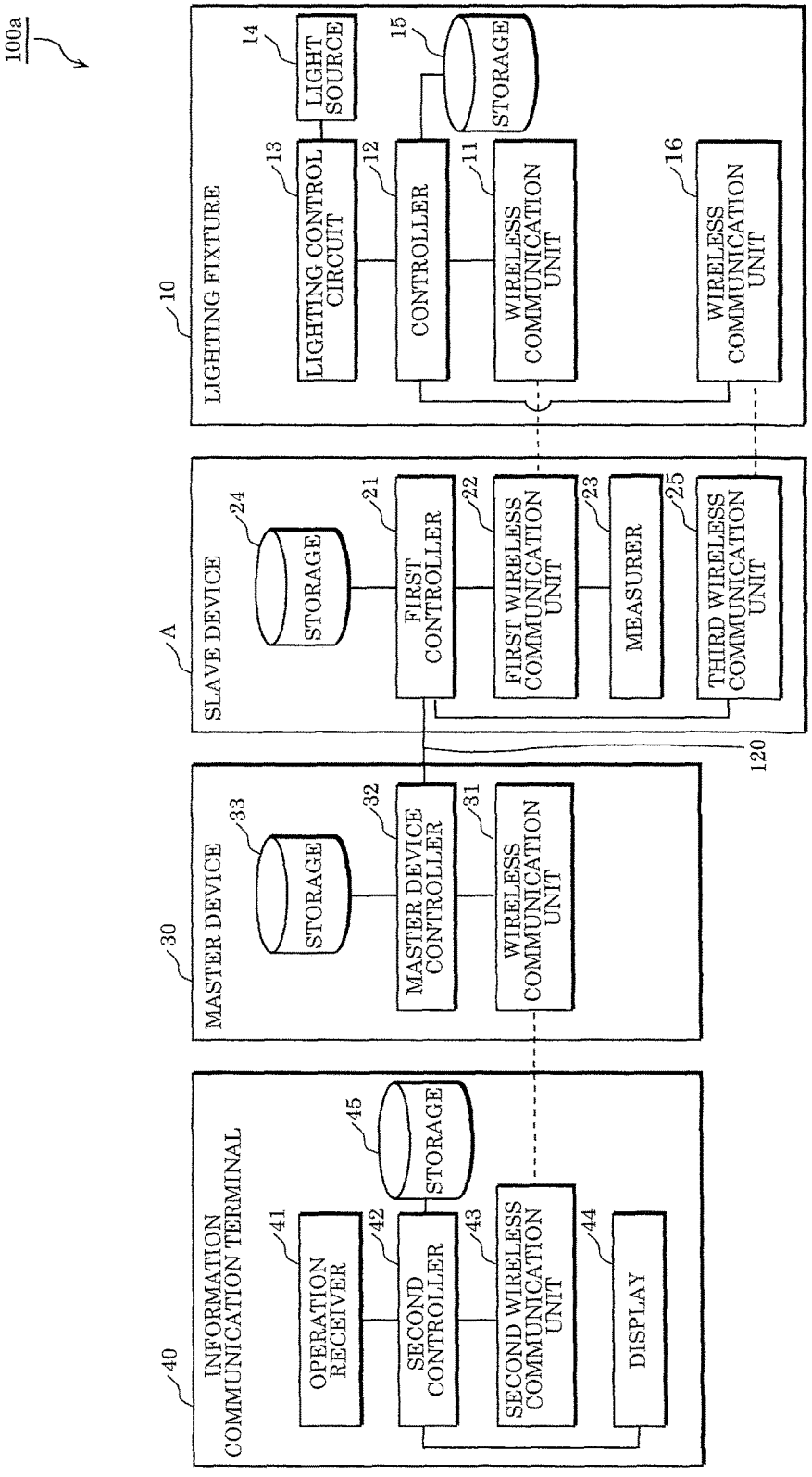
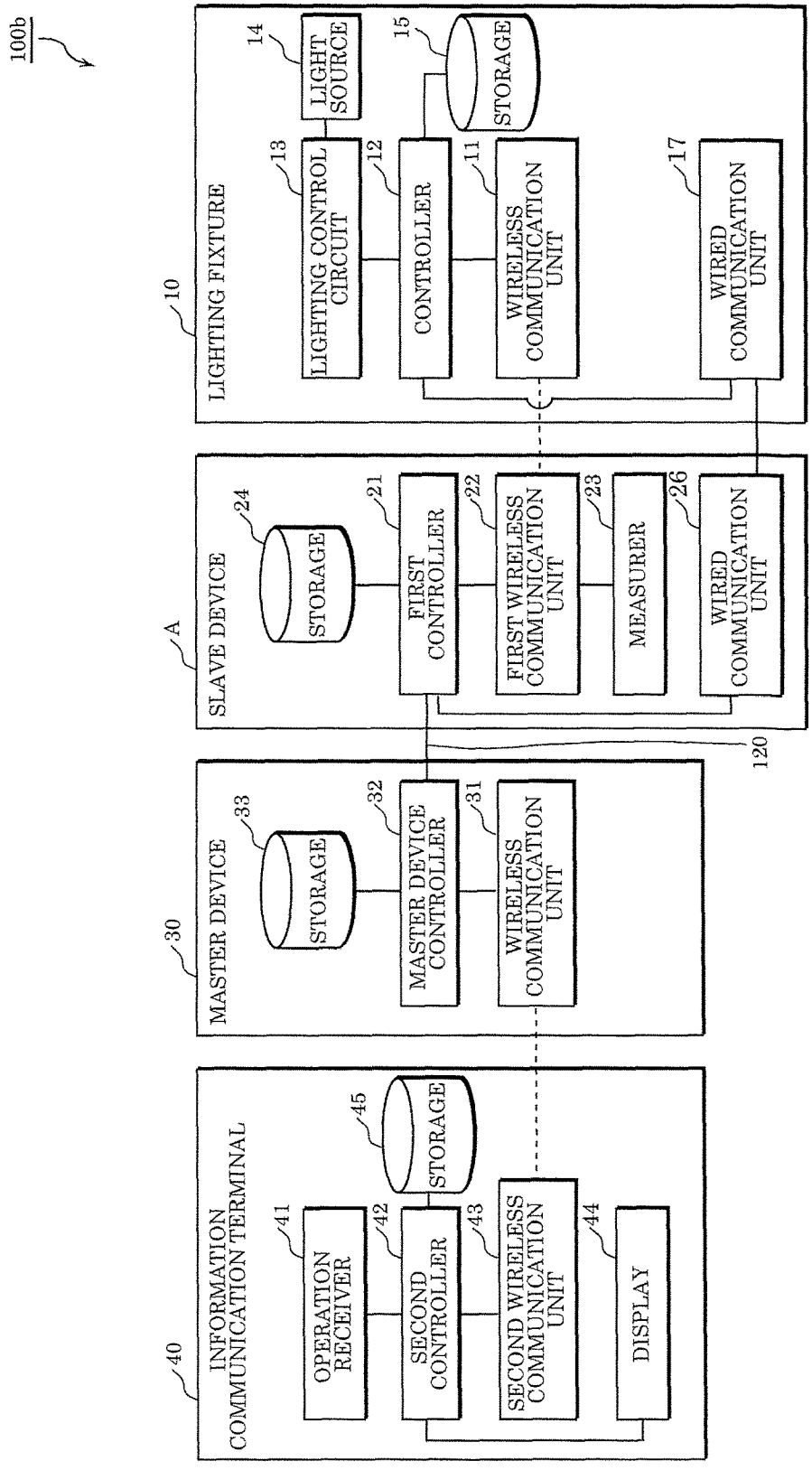

100a
10
LIGHTING FIXTURE
14
LIGHT SOURCE
15
STORAGE
13
LIGHTING CONTROL CIRCUIT
12
CONTROLLER
11
WIRELESS COMMUNICATION UNIT
16
WIRELESS COMMUNICATION UNIT
A
SLAVE DEVICE
24
STORAGE
21
FIRST CONTROLLER
22
FIRST WIRELESS COMMUNICATION UNIT
23
MEASURER
25
THIRD WIRELESS COMMUNICATION UNIT
120
30
MASTER DEVICE
33
STORAGE
32
MASTER DEVICE CONTROLLER
31
WIRELESS COMMUNICATION UNIT
40
INFORMATION COMMUNICATION TERMINAL
45
STORAGE
41
OPERATION RECEIVER
42
SECOND CONTROLLER
43
SECOND WIRELESS COMMUNICATION UNIT
44
DISPLAY

FIG. 11


100b
LIGHTING FIXTURE
10
LIGHT SOURCE
14
STORAGE
15
LIGHTING CONTROL CIRCUIT
13
CONTROLLER
12
WIRELESS COMMUNICATION UNIT
11
WIRED COMMUNICATION UNIT
17
SLAVE DEVICE
A
STORAGE
24
FIRST CONTROLLER
21
FIRST WIRELESS COMMUNICATION UNIT
22
MEASURER
23
WIRED COMMUNICATION UNIT
26
120
MASTER DEVICE
30
STORAGE
33
MASTER DEVICE CONTROLLER
32
WIRELESS COMMUNICATION UNIT
31
INFORMATION COMMUNICATION TERMINAL
40
STORAGE
45
OPERATION RECEIVER
41
SECOND CONTROLLER
42
SECOND WIRELESS COMMUNICATION UNIT
43
DISPLAY
44

ILLUMINATION SYSTEM, ILLUMINATION SETTING METHOD, AND RECORDING MEDIUM

CROSS REFERENCE TO RELATED APPLICATION

This application claims the benefit of priority of Japanese Patent Application Number 2018-024368 filed on Feb. 14, 2018, the entire content of which is hereby incorporated by reference.

BACKGROUND

1. Technical Field

The present disclosure relates to an illumination system, an illumination setting method, and a recording medium.

2. Description of the Related Art

An illumination system that controls a plurality of lighting fixtures in groups is known. Japanese Unexamined Patent Application Publication No. 2017-10852 discloses an illumination system capable of efficiently configuring a setting such as grouping.

SUMMARY

In order for an illumination controller to control a plurality of lighting fixtures, identification information of the plurality of lighting fixtures is required. The identification information is entered by, for example, an installer of the plurality of lighting fixtures, which is a troublesome task when the number of lighting fixtures is large.

The present disclosure provides an illumination system, an illumination setting method, and a recording medium that can easily make associations between positions and identification information of a plurality of lighting fixtures.

An illumination system according to an aspect of the present disclosure is an illumination system including a plurality of lighting fixtures, a plurality of illumination controllers, and an information communication terminal. Each of the plurality of illumination controllers includes: first wireless communication circuitry configured to receive, from each of the plurality of lighting fixtures, a signal including identification information of the lighting fixture, and to measure a received signal strength indication (RSSI) of the signal received; and a first controller that causes the first wireless communication circuitry to transmit the identification information and RSSI information indicating the RSSI measured by the first wireless communication circuitry. The information communication terminal includes: second wireless communication circuitry configured to receive the RSSI information and the identification information, transmitted from each of the plurality of illumination controllers; and a second controller that (i) based on the RSSI information and position information indicating a positional relationship between the plurality of lighting fixtures and the plurality of illumination controllers, identifies a lighting fixture in the position information, which corresponds to a first lighting fixture among the plurality of lighting fixtures, which has a corresponding positional relationship to a given illumination controller among the plurality of illumination controllers, and (ii) associates the lighting fixture identified in the position information with the identification information of the first lighting fixture.

An illumination setting method according to an aspect of the present disclosure is an illumination setting method for use in an illumination system including a plurality of lighting fixtures, a plurality of illumination controllers, and an information communication terminal. The illumination setting method includes: by each of the plurality of illumination controllers, receiving, from each of the plurality of lighting fixtures, a signal including identification information of the lighting fixture, and measuring a received signal strength indication (RSSI) of the signal received from each of the plurality of lighting fixtures; transmitting the identification information and RSSI information indicating the RSSI measured; by the information communication terminal, receiving the RSSI information and the identification information, transmitted from each of the plurality of illumination controllers; based on the RSSI information and position information indicating a positional relationship between the plurality of lighting fixtures and the plurality of illumination controllers, identifying a lighting fixture in the position information, which corresponds to a first lighting fixture among the plurality of lighting fixtures, which has a corresponding positional relationship to a given illumination controller among the plurality of illumination controllers; and associating the lighting fixture identified in the position information with the identification information of the first lighting fixture.

A recording medium according to an aspect of the present disclosure is a non-transitory computer-readable recording medium for use in an information communication terminal included in an illumination system including a plurality of lighting fixtures, a plurality of illumination controllers, and the information communication terminal. The recording medium has a program recorded thereon for causing the information communication terminal to execute an illumination setting method. Each of the plurality of illumination controllers: receives, from each of the plurality of lighting fixtures, a signal including identification information of the lighting fixture, and measures a received signal strength indication (RSSI) of the signal received from each of the plurality of lighting fixtures; and transmits the identification information and RSSI information indicating the RSSI measured. The illumination setting method includes: receiving the RSSI information and the identification information, transmitted from each of the plurality of illumination controllers; based on the RSSI information and position information indicating a positional relationship between the plurality of lighting fixtures and the plurality of illumination controllers, identifying a lighting fixture in the position information, which corresponds to a first lighting fixture among the plurality of lighting fixtures, which has a corresponding positional relationship to a given illumination controller among the plurality of illumination controllers; and associating the lighting fixture identified in the position information with the identification information of the first lighting fixture.

The present disclosure realizes an illumination system, an illumination setting method, and a recording medium that can easily make associations between positions and identification information of a plurality of lighting fixtures.

BRIEF DESCRIPTION OF DRAWINGS

The figures depict one or more implementations in accordance with the present teaching, by way of examples only, not by way of limitations. In the figures, like reference numerals refer to the same or similar elements.

FIG. **1** is schematic diagram of an illumination system according to Embodiment 1;

FIG. **2** is a block diagram illustrating a functional configuration of the illumination system according to Embodiment 1;

FIG. **3** illustrates arrangement of a plurality of lighting fixtures and a plurality of slave devices;

FIG. **4** illustrates position information stored in a storage;

FIG. **5** illustrates a sequence of an association operation;

FIG. **6** is a flow chart illustrating the association processing more specifically;

FIG. **7** illustrates position information in which temporary addresses have been replaced with MAC addresses;

FIG. **8** illustrates arrangement of the plurality of lighting fixtures and the plurality of slave devices, which reflects the MAC addresses;

FIG. **9** is a flowchart of association processing according to a variation of Embodiment 1;

FIG. **10** is a block diagram illustrating a functional configuration of an illumination system according to Embodiment 2; and

FIG. **11** is a block diagram illustrating a functional configuration of an illumination system according to Embodiment 3.

DETAILED DESCRIPTION OF THE EMBODIMENTS

Hereinafter, exemplary embodiments will be described with reference to the drawings. Note that the embodiments below each describe a general or specific example. The numerical values, shapes, materials, elements, the arrangement and connection of the elements, steps, and the processing order of the steps, etc. presented in the embodiments below are mere examples and do not limit the present disclosure. Furthermore, among the structural elements in the embodiments below, those not recited in any one of the independent claims representing the most generic concepts will be described as optional structural elements.

Note also that each figure is a schematic illustration and not necessarily a precise illustration. Furthermore, throughout the figures, the same reference signs are given to essentially the same structural elements, and redundant descriptions may be omitted or simplified.

Embodiment 1

[Configuration]

Hereinafter, a configuration of an illumination system according to Embodiment 1 will be described. FIG. **1** is schematic diagram of the illumination system according to Embodiment 1. FIG. **2** is a block diagram illustrating a functional configuration of the illumination system according to Embodiment 1.

As illustrated in FIG. **1**, illumination system **100** according to Embodiment 1 includes a plurality of lighting fixtures **10**, a plurality of slave devices A to D, master device **30**, and information communication terminal **40**. The plurality of lighting fixtures **10**, the plurality of slave devices A to D, and master device **30** are supplied with alternating-current power from system power source **110**. Master device **30** and each of a plurality of slave devices A to D are connected via signal line **120**. Note that the number of lighting fixtures **10** in FIG. **1** is not accurate. Although FIG. **2** shows only one slave device and one lighting fixture, there are actually a plurality of slave devices A to D and a plurality of lighting fixtures **10**.

In illumination system **100**, each of a plurality of slave devices A to D performs lighting control on target lighting fixture **10** to be controlled by the slave device, based on a control command obtained from master device **30** via signal line **120**. Here, for example, each of a plurality of slave devices A to D designates a media access control (MAC) address of target lighting fixture **10** to be controlled and transmits a command for performing lighting control on lighting fixture **10** having that MAC address. Therefore, MAC addresses of the plurality of lighting fixtures **10** need to be known in advance. The MAC addresses are, for example, entered into information communication terminal **40** by an installer of illumination system **100** at the time of installation and registered in the plurality of slave devices A to D via information communication terminal **40**.

However, when the number of lighting fixtures **10** is large, it is troublesome for the installer to enter the MAC addresses of lighting fixtures **10** one by one. Moreover, when the lighting control is to be performed on the plurality of lighting fixtures **10** in groups according to areas to be illuminated, the installer needs to register the MAC addresses of lighting fixtures **10** in corresponding slave devices while taking the installation positions of lighting fixtures **10** into consideration. That is to say, associations need to be made between the installation positions and the MAC addresses of lighting fixtures **10**, which is also a troublesome task.

In view of the above, illumination system **100** employs a technique for easily making associations between the installation positions and the MAC addresses of the plurality of lighting fixtures **10** (Hereinafter, this technique will also be referred to as an association operation). Hereinafter, each of the structural elements of illumination system **100** will be described in detail with reference to FIG. **1** and FIG. **2**.

[Information Communication Terminal]

First, a configuration of information communication terminal **40** will be described. Information communication terminal **40** receives a user operation and transmits a control instruction signal to master device **30** according to the user operation received. Information communication terminal **40** is, for example, a mobile terminal such as a smartphone, a tablet terminal, or a personal digital assistant (PDA), but may be a stationary terminal such as a personal computer. Further, information communication terminal **40** may be a remote control dedicated to illumination system **100**. Information communication terminal **40** includes operation receiver **41**, second wireless communication unit **43**, second controller **42**, display **44**, and storage **45**.

Operation receiver **41** receives a user operation. Specifically, operation receiver **41** includes a touch panel, for example.

Second controller **42** causes second wireless communication unit **43** to transmit a control instruction signal according to the user operation received by operation receiver **41**. Second controller **42** is realized by, for example, a microcomputer, but may be realized by a processor or a dedicated circuit. Second wireless communication unit **43** is a wireless communication circuit that allows information communication terminal **40** to wirelessly communicate with master device **30**. Second wireless communication unit **43** transmits a control instruction signal to master device **30**, for example.

Display **44** is a display device that displays an image based on control by second controller **42**. Display **44** is realized by a liquid crystal panel or an organic electroluminescent (EL) panel, for example.

Storage **45** is a storage device that stores, for example, a control program executed by second controller **42**. Storage **45** is realized by a semiconductor memory, for example.

[Master Device]

Next, a configuration of master device **30** will be described. Master device **30** transmits a control command to at least a portion of slave devices A to D based on the user operation performed on information communication terminal **40**. Master device **30** may transmit a control command to at least a portion of slave devices A to D based on a user operation performed on a dedicated operation receiving device (specifically, a user interface device such as an operation panel, not illustrated) provided on, for example, a wall of a room in which illumination system **100** is installed. Master device **30** includes wireless communication unit **31**, master controller **32**, and storage **33**.

Wireless communication unit **31** is a wireless communication circuit that allows master device **30** to wirelessly communicate with the operation receiving device or information communication terminal **40**. Wireless communication unit **31** receives a control instruction signal from information communication terminal **40**, for example.

Master controller **32** transmits a control command to wireless communication unit **31** based on the control instruction signal received by wireless communication unit **31**. Master controller **32** is realized by, for example, a microcomputer, but may be realized by a processor or a dedicated circuit.

Storage **33** is a storage device that stores, for example, a control program executed by master controller **32**. Storage **33** is realized by a semiconductor memory, for example.

[Slave Device]

Next, a configuration of slave device A will be described. Note that a detailed description of slave devices B to D will be omitted since slave devices B to D have the same configuration as slave device A. Slave device A performs lighting control on, among the plurality of lighting fixtures **10**, target lighting fixture **10** to be controlled by slave device A. Slave device A is an example of the illumination controller. Slave device A includes first controller **21**, first wireless communication unit **22**, measurer **23**, and storage **24**.

First controller **21** obtains a control command from master device **30** via signal line **120**, and causes first wireless communication unit **22** to transmit a command for performing lighting control based on the control command obtained. First controller **21** is realized by, for example, a microcomputer, but may be realized by a processor or a dedicated circuit.

First wireless communication unit **22** is a wireless communication circuit that allows slave device A to wirelessly communicate with the plurality of lighting fixtures **10**. For example, first wireless communication unit **22** transmits a command for performing lighting control to target lighting fixture **10**.

Measurer **23** measures a received signal strength indication (RSSI) of a signal received by first wireless communication unit **22** from each of the plurality of lighting fixtures **10**. The RSSI is used in the association operation described later. Note that measurer **23** may be realized as a device integrated with first wireless communication unit **22**.

Storage **24** is a storage device that stores, for example, a control program executed by first controller **21**. The RSSI may be temporarily stored in storage **24**. Storage **24** is realized by a semiconductor memory, for example.

[Lighting Fixtures]

First, lighting fixtures **10** will be described. Lighting fixtures **10** are ceiling lights that illuminate a room, and lighting control is performed on lighting fixtures **10** by corresponding slave devices. Note that the mode of lighting fixtures **10** is not limited to the mode illustrated in FIG. **1**. Lighting fixtures **10** may be ceiling lights that are circular in a plan view or downlights, for example.

Each of lighting fixtures **10** includes wireless communication unit **11**, controller **12**, lighting control circuit **13**, light source **14**, and storage **15**. Hereinafter, each of the structural elements of lighting fixture **10** will be described.

First wireless communication unit **11** is a wireless communication circuit that allows lighting fixture **10** to wirelessly communicate with the plurality of slave devices A to D. Wireless communication unit **11** receives a command from a corresponding slave device, for example.

Controller **12** performs lighting control on light source **14** via lighting control circuit **13** based on a command received by wireless communication unit **11**. The lighting control is, for example, dimming control including turn-on and turn-off, but may be toning control if light source **14** is capable of toning. Moreover, the lighting control may be scheduled control, which is to control light source **14** based on a schedule. Controller **12** is realized by, for example, a microcomputer, but may be realized by a processor or a dedicated circuit. Lighting control circuit **13** supplies voltage and current to light source **14** based on the control by controller **12**. Lighting control circuit **13** is specifically a dimming circuit such as a pulse width modulation (PWM) control circuit.

Light source **14** is a white light source for illumination that emits light using the voltage and current supplied from lighting control circuit **13**. Specifically, light source **14** is realized by a fluorescent tube or a light-emitting diode (LED), for example. Light source **14** may be a semiconductor light-emitting element such as a semiconductor laser, or a solid-state light-emitting element such as an organic or inorganic electroluminescent (EL) element.

Storage **15** is a storage device that stores, for example, a control program executed by controller **12**, a dimming parameter, and schedule information. Storage **15** also stores the MAC address of lighting fixture **10**. The MAC address is an example of the identification information. Storage **15** is realized by a semiconductor memory, for example.

[Outline of Association Operation]

Next, the association operation of illumination system **100** will be described. In order to perform the association operation, storage **45** of information communication terminal **40** stores position information indicating arrangement of the plurality of lighting fixtures **10** and the plurality of slave devices A to D in a room in which illumination system **100** is installed. FIG. **3** illustrates arrangement of the plurality of lighting fixtures **10** and the plurality of slave devices A to D. FIG. **4** illustrates the position information stored in storage **45**.

Note that the position information indicates the positions of a plurality of virtual lighting fixtures corresponding to the plurality of physical lighting fixtures **10**, and also indicates the positions of a plurality of virtual slave devices corresponding to the plurality of physical slave devices A to D. Such virtual lighting fixtures are also referred to as lighting fixtures in the position information, and the virtual slave devices are referred to as slave devices in the position information. Furthermore, information for displaying an image showing a two-dimensional arrangement of the plurality of lighting fixtures **10** (in other words, the plurality of virtual lighting fixtures) and the plurality of slave devices A

to D (in other words, the plurality of virtual slave devices) as illustrated in FIG. **3** is in some cases defined as the position information.

FIG. **3** is a top view of the room, and illustrates an example in which the plurality of lighting fixtures **10** are arranged in a matrix. The plurality of slave devices A to D are also arranged in a matrix.

Here, when installing illumination system **100**, the installer etc. enter two-dimensional coordinates of the plurality of lighting fixtures **10** and the plurality of slave devices A to D with respect to the position of slave device A, by operating operation receiver **41**, for example, in order for information communication terminal **40** to recognize the arrangement illustrated in FIG. **3**. Second controller **42** calculates distances from each of the plurality of slave devices A to D to each of the plurality of lighting fixtures **10** based on the two-dimensional coordinates entered. As a result, the position information as illustrated in FIG. **4** is generated. In the position information, a temporary address (1, 2, 3, . . . N−1, N) is given to each of the positions of the plurality of lighting fixtures **10** in order to distinguish the plurality of lighting fixtures **10** from one another. Note that although temporary addresses are given to slave devices A to D as well, the MAC addresses of slave devices A to D are known. The MAC addresses of slave devices A to D are, for example, entered by the installer etc. via information communication terminal **40**.

Note that such entering of the two-dimensional coordinates is performed via an entry screen displayed on display **44**, for example. The entry screen may include an image showing the two-dimensional arrangement of the plurality of lighting fixtures **10** as illustrated in FIG. **3**. The two-dimensional coordinates may be entered after the plurality of lighting fixtures **10** and the plurality of slave devices A to D are installed on the ceiling of the room, or, the two-dimensional coordinates may be entered first and then the plurality of lighting fixtures **10** and the plurality of slave devices A to D may be installed on the ceiling of the room according to the two-dimensional coordinates. The installer need not be concerned about the MAC addresses of the plurality of lighting fixtures **10**, and only has to install the plurality of lighting fixtures **10** and the plurality of slave devices A to D in a manner consistent with the two-dimensional coordinates entered. Further, instead of the two-dimensional coordinates, the distances from each of the plurality of slave devices A to D to each of the plurality of lighting fixtures **10** may be entered directly.

FIG. **5** illustrates a sequence of the association operation performed using such position information as described above. Although FIG. **5** shows slave device A only, there are actually four slave devices A to D. That is to say, each of slave devices A to D performs the same processing as slave device A.

First, operation receiver **41** of information communication terminal **40** receives a start operation that instructs to start the association operation (S**11**). For example, operation receiver **41** receives the start operation given by the installer.

Based on the start operation received by operation receiver **41**, second controller **42** causes second wireless communication unit **43** to transmit a start instruction signal (S**12**). The start instruction signal is relayed by master device **30** (S**13**) and obtained by first controller **21** of slave device A (S**14**). Since the MAC addresses of the plurality of slave devices A to D are known as described above, second controller **42** can transmit the start instruction signal to slave device A.

Based on the start instruction signal obtained, first controller **21** causes first wireless communication unit **22** to broadcast a MAC address request signal (S**15**).

In each of the plurality of lighting fixtures **10**, wireless communication unit **11** receives the MAC address request signal (S**16**). Then, controller **12** reads out the MAC address stored in storage **15** and causes wireless communication unit **11** to transmit a response signal including the MAC address read out (S**17**).

First wireless communication unit **22** of slave device A receives, from each of the plurality of lighting fixtures **10**, a response signal including the MAC address of that lighting fixture **10** (S**18**). At this time, first wireless communication unit **22** receives the response signal, not only from target lighting fixture **10** to be controlled by slave device A, but from all the lighting fixtures included in illumination system **100**.

Measurer **23** measures the RSSI of each response signal received by first wireless communication unit **22** from lighting fixtures **10** (S**19**). At this time, first controller **21** generates RSSI information indicating the RSSI measured, and stores, in storage **24**, the MAC address of each lighting fixture **10** and the RSSI information of the response signal including the MAC address, in association with one another.

First controller **21** reads out, from storage **24**, pairs of the MAC address and the RSSI information of the plurality of lighting fixtures **10**, and causes the first wireless communication unit to transmit the pairs read out (S**20**). The MAC addresses and the RSSI information are relayed by master device **30** (S**21**). Note that although only slave device A is illustrated in FIG. **5**, there are actually four slave devices A to D, and each of slave devices A to D transmits the RSSI information and the MAC address in the same manner as slave device A.

The second wireless communication unit of information communication terminal **40** receives the RSSI information and the MAC addresses transmitted in Step S**20** (S**22**). Based on the RSSI information and the position information, second controller **42** makes associations between the installation positions and the MAC addresses of the plurality of lighting fixtures **10** (S**23**). That is to say, second controller **42** associates each of the plurality of lighting fixtures in the position information with its MAC address. FIG. **6** is a flow chart illustrating the association processing in Step S**23** more specifically.

First, second controller **42** converts the RSSIs indicated by the RSSI information received in Step S**22** into distances (S**31**). Second controller **42**, for example, converts an RSSI into distance d on the basis of the following Equation 1 which is based on the Friis transmission formula.

$$RSSI=TxPower-20\log(d) \quad \text{(Equation 1)}$$

Note that TxPower in Equation 1 is the signal strength of the signal transmitted by wireless communication unit **11** of lighting fixture **10**, and is, more specifically, the RSSI at a position one meter away from lighting fixture **10**. Equation 1 is stored in storage **45** in advance.

In Step S**31**, the distances from each of the plurality of lighting fixtures **10** to each of the plurality of slave devices A to D are calculated. For each of the plurality of lighting fixtures **10**, a set of distances (LA, LB, LC, LD) is calculated, where LA is the distance from that lighting fixture **10** to slave device A, LB is the distance from the same lighting fixture **10** to slave device B, LC is the distance from the same lighting fixture **10** to slave device C, and LD is the distance from the same lighting fixture **10** to slave device D.

Next, second controller **42** compares the distances calculated in Step S**31** and the distances indicated by the position information stored in storage **45** (S**32**). Second controller **42**, for example, compares the set of distances (LA, LB, LC, LD) with sets of distances (La, Lb, Lc, Ld) of a plurality of temporary addresses in the position information, so as to identify a temporary address associated with a set of distances (La, Lb, Lc, Ld) closest to the set of distances (LA, LB, LC, LD). For example, second controller **42** identifies a temporary address at which the square sum of residuals is the smallest, but may identify a temporary address using other matching techniques. If the number of slave devices is three or more, the accuracy of the temporary address identification can be enhanced.

Next, second controller **42** replaces the identified temporary address with a MAC address (S**33**). FIG. **7** illustrates position information in which the temporary addresses have been replaced with MAC addresses. FIG. **8** illustrates arrangement of the plurality of lighting fixtures **10** and the plurality of slave devices A to D, which reflects the MAC addresses.

As illustrated in FIG. **7**, for example, when the set of distances (LA, LB, LC, LD) of lighting fixture **10** having the MAC address "Xxxxxx0051" and the set of distances (La, Lb, Lc, Ld) of the temporary address "1" are closest to each other, second controller **42** replaces the temporary address "I" with the MAC address "Xxxxxx0051". As a result of such processing, the positions and the MAC addresses of the plurality of lighting fixtures **10** are associated with one another as illustrated in FIG. **7** and FIG. **8**.

In the manner as described above, second controller **42** identifies, based on the RSSI information and the position information indicating a positional relationship between the plurality of lighting fixtures **10** and the plurality of slave devices A to D, the position of a first lighting fixture among the plurality of lighting fixtures **10** which has a corresponding positional relationship to a given slave device among the plurality of slave device A to D. Further, second controller **42** associates the installation position of the first lighting fixture with identification information of the first lighting fixture. That is to say, second controller **42** identifies, in the position information, a lighting fixture corresponding to the first lighting fixture, and associates the lighting fixture identified in the position information with the identification information of the first lighting fixture. Illumination system **100** can automatically make associations between the positions and the MAC addresses of the plurality of lighting fixtures **10**. Since the installer is not required to enter the MAC addresses, the time required for installing illumination system **100** is reduced.

Note that second controller **42** may cause display **44** to display an image as illustrated in FIG. **8**. In FIG. **8**, the last four digits of the MAC addresses are shown at the respective positions of the lighting fixtures. This allows the installer to easily recognize the correspondence relationship between the positions and the MAC addresses of the plurality of lighting fixtures **10**.

[Variation]

As described above, although the RSSI is converted into a distance based on Equation 1 shown above, Equation 1 may be corrected based on a correction parameter obtained by actually measuring in advance the RSSI between two devices the distance between which is known. FIG. **9** is a flowchart of association processing according to such a variation.

Second controller **42** calculates a correction parameter based on the RSSI between two devices the distance between which is known (S**34**). Specifically, second controller **42** calculates a correction parameter based on a difference between the known, actual distance and a distance calculated based on the RSSI and Equation 1 above. The correction parameter may be a coefficient by which at least one term in Equation 1 is multiplied, or an offset added to at least one term in Equation 1, or both.

That the distance between two devices is known means that the MAC addresses of the two devices are known in the position information. The distance between the two devices is included in the position information as a result of, for example, the installer entering the MAC addresses of the two devices by operating operation receiver **41**.

The two devices the distance between which is known are, for example, a target slave device among the plurality of slave devices and a target lighting fixture among the plurality of lighting fixtures **10**. In other words, the target lighting fixture is a second lighting fixture. In this case, second wireless communication unit **43** receives, from the target slave device via master device **30**, target RSSI information indicating the RSSI of a signal received by the target slave device from the target lighting fixture. Second controller **42** calculates the correction parameter based on the target RSSI information and the distance from the target slave device to the target lighting fixture indicated by the position information.

Further, the two devices the distance between which is known may be, for example, two slave devices among the plurality of slave devices. In this case, second wireless communication unit **43** receives, from one of the two slave devices, target RSSI information indicating the RSSI of a signal received by the one slave device from the other slave device. Second controller **42** calculates the correction parameter based on the target RSSI information and the distance between the two slave devices indicated by the position information.

Next, second controller **42** converts the RSSI indicated by the RSSI information into a distance (S**31**). At this time, second controller **42** corrects Equation 1 using the correction parameter calculated in Step S**34**, and uses corrected Equation 1. That is to say, second controller **42** converts the RSSI indicated by the RSSI information into a distance using the correction parameter calculated. Subsequent processing is the same as Step S**32** and Step S**33** illustrated in FIG. **6**.

As described above, use of the correction parameter makes it possible to enhance the calculation accuracy of the distance obtained by the RSSI conversion.

[Advantageous Effects, Etc.]

As described above, illumination system **100** includes a plurality of lighting fixtures **10**, a plurality of slave devices A to D, and information communication terminal **40**. The plurality of slave devices A to D are an example of the plurality of illumination controllers. Each of the plurality of slave devices A to D includes: first wireless communication unit **22** configured to receive, from each of the plurality of lighting fixtures **10**, a signal including a MAC address of that lighting fixture **10**, and to measure a received signal strength indication (RSSI) of the signal received; and first controller **21** that causes first wireless communication unit **22** to transmit the MAC address and RSSI information indicating the RSSI measured by first wireless communication unit **22**. The MAC address is an example of the identification information. Information communication terminal **40** includes: second wireless communication unit **43** configured to receive the RSSI information and the MAC address, transmitted from each of the plurality of slave devices A to D; and second controller **42** that (i) based on the

RSSI information and position information indicating a positional relationship between the plurality of lighting fixtures **10** and the plurality of slave devices A to D, identifies lighting fixture **10** in the position information, which corresponds to a first lighting fixture among the plurality of lighting fixtures **10**, which has a corresponding positional relationship to a given slave device among plurality of slave devices A to D and (ii) associates the lighting fixture identified in the position information with the MAC address of the first lighting fixture.

Such illumination system **100** can easily make associations between the positions and the MAC addresses of the plurality of lighting fixtures **10**. Since the installer is not required to enter the MAC addresses, the time required for installing illumination system **100** is reduced.

Further, for example, second controller **42** converts the RSSI indicated by the RSSI information into a distance, and associates the lighting fixture identified in the position information with the MAC address of the first lighting fixture based on the distance and the position information.

By converting the RSSIs into distances, illumination system **100** having such a configuration as above can easily make associations between the positions and the MAC addresses of the plurality of lighting fixtures **10**.

In addition, for example, information communication terminal **40** further includes storage **45** configured to store the position information.

Illumination system **100** having such a configuration as above can easily make associations between the positions and the MAC addresses of the plurality of lighting fixtures **10** based on the position information stored in storage **45**.

For example, the position information indicates distances between each of the plurality of lighting fixtures **10** and each of the plurality of slave devices A to D, and second controller **42** converts the RSSI indicated by the RSSI information into a distance and associates the lighting fixture identified in the position information with the MAC address of the first lighting fixture by comparing the distance with the distances indicated by the position information.

By comparing the distance obtained through the RSSI conversion and the distances indicated by the position information, illumination system **100** having such a configuration as above can make associations between the positions and the MAC addresses of the plurality of lighting fixtures **10**.

For example, second controller **42**: calculates a correction parameter based on (i) target RSSI information indicating an RSSI of a signal received by a target slave device among the plurality of slave devices A to D from a second lighting fixture among the plurality of lighting fixtures **10** and (ii) a distance from the target slave device to the second lighting fixture, indicated by the position information; and converts the RSSI indicated by the RSSI information into a distance using the correction parameter calculated.

This makes it possible to enhance the calculation accuracy in the RSSI-to-distance conversion.

For example, second controller **42**: calculates a correction parameter based on (i) target RSSI information indicating an RSSI of a signal received by one of two slave devices among the plurality of slave devices A to D from the other of the two slave devices and (ii) a distance between the two slave devices that is indicated by the position information; and converts the RSSI indicated by the RSSI information into a distance using the correction parameter calculated.

This makes it possible to enhance the calculation accuracy of the distance obtained by the RSSI conversion.

For example, a temporary address is given to each of a plurality of lighting fixtures in the position information, and second controller **42** associates the lighting fixture identified in the position information with the MAC address of the first lighting fixture by replacing the temporary address given to the first lighting fixture with the MAC address based on the RSSI information and the position information. The temporary address is an example of the temporary identification information.

By replacing the temporary addresses with the MAC addresses, illumination system **100** having such a configuration as above can easily make associations between the positions and the MAC addresses of the plurality of lighting fixtures **10**.

For example, first controller **21** further causes first wireless communication unit **22** to transmit a command for performing lighting control on at least a portion of the plurality of lighting fixtures **10**.

With this, first wireless communication unit **22** that performs communication regarding commands to target lighting fixture **10** to be controlled can further perform communication regarding the association operation, thereby inhibiting addition of structural elements. Accordingly, it is possible to reduce the component cost etc. of illumination system **100**.

Further, an illumination setting method for use in illumination system **100** including a plurality of lighting fixtures **10**, a plurality of slave devices A to D, and information communication terminal **40** is an illumination setting method including: by each of the plurality of slave devices A to D, receiving, from each of the plurality of lighting fixtures **10**, a signal including a MAC address of that lighting fixture **10**, and measuring a received signal strength indication (RSSI) of the signal received from each of the plurality of lighting fixtures **10**; and transmitting the MAC address and RSSI information indicating the RSSI measured. The illumination setting method further includes: by information communication terminal **40**, receiving the RSSI information and the MAC address, transmitted from each of the plurality of slave devices A to D; based on the RSSI information and position information indicating a positional relationship between the plurality of lighting fixtures **10** and the plurality of slave devices A to D, identifying lighting fixture **10** in the position information, which corresponds to a first lighting fixture among the plurality of lighting fixtures **10**, which has a corresponding positional relationship to a given illumination controller among the plurality of illumination controllers; and associating the lighting fixture identified in the position information with the MAC address of the first lighting fixture.

Such an illumination setting method as described above can easily make associations between the positions and the MAC addresses of the plurality of lighting fixtures **10**.

Furthermore, in a program that causes information communication terminal **40** of illumination system **100** including a plurality of lighting fixtures **10**, a plurality of slave devices A to D, and information communication terminal **40** to execute an illumination setting method, the illumination setting method includes: based on RSSI information and position information indicating a positional relationship between the plurality of lighting fixtures **10** and the plurality of slave devices A to D, identifying a lighting fixture in the position information, which corresponds to a first lighting fixture among the plurality of lighting fixtures **10**, which has a corresponding positional relationship to a given slave device among the plurality of slave devices A to D; and

associating the lighting fixture identified in the position information with the MAC address of the first lighting fixture.

Such a program as described above can easily make associations between the positions and the MAC addresses of the plurality of lighting fixtures **10**.

Embodiment 2

In Embodiment 1 described above, first wireless communication unit **22** performs both reception of the signal for measuring the RSSI and transmission of a command to lighting fixtures **10**; however, the transmission of a command to lighting fixtures **10** may be performed by another wireless communication unit different from first wireless communication unit **22**. FIG. **10** is a block diagram illustrating a functional configuration of such an illumination system according to Embodiment 2. Although FIG. **10** shows only one slave device and one lighting fixture **10**, there are actually a plurality of slave devices A to D and a plurality of lighting fixtures **10**.

In illumination system **100***a* illustrated in FIG. **10**, slave device A includes third wireless communication unit **25** different from first wireless communication unit **22**. Although not illustrated, slave devices B to D also include third wireless communication unit **25**.

Third wireless communication unit **25** is a wireless communication circuit that allows slave device A to wirelessly communicate with the plurality of lighting fixtures **10**. Third wireless communication unit **25** is different from first wireless communication unit **22** in at least one of the wireless communication scheme (communication standard) and the frequency band of radio waves used for wireless communication. For example, based on control by first controller **21**, third wireless communication unit **25** transmits a command for performing lighting control to target lighting fixture **10**. In other words, first controller **21** causes third wireless communication unit **25** to transmit a command for performing lighting control on at least a portion of the plurality of lighting fixtures **10**. In Embodiment 2, first wireless communication unit **22** does not transmit the command to target lighting fixture **10**, and is used only for communication regarding the association operation, such as reception of the signal for measuring the RSSI.

Further, in illumination system **100***a*, each of the plurality of lighting fixtures **10** includes wireless communication unit **16** different from wireless communication unit **11**.

Wireless communication unit **16** is a wireless communication circuit that allows lighting fixture **10** to wirelessly communicate with slave device A. Wireless communication unit **16** is different from wireless communication unit **11** in at least one of the wireless communication scheme and the frequency band of radio waves used for wireless communication. Wireless communication unit **16**, for example, receives the command for performing lighting control from slave device A. In Embodiment 2, wireless communication unit **11** does not receive the command for performing lighting control from slave device A, and is used only for communication regarding the association operation, such as transmission of the signal for measuring the RSSI.

As described above, in illumination system **100***a*, each of the plurality of slave devices A to D includes third wireless communication unit **25** different from first wireless communication unit **22** and second wireless communication unit **43**, and first controller **21** further causes third wireless communication unit **25** to transmit a command for performing lighting control on at least a portion of the plurality of lighting fixtures **10**.

With this, each of slave devices A to D can measure the RSSI via first wireless communication unit **22** different from third wireless communication unit **25** used for transmitting a command to lighting fixture **10**.

Note that when, as in Embodiment 2, first wireless communication unit **22** and wireless communication unit **11** are treated as additional structural elements for distance measurement, wireless communication unit **11** may be a beacon transmitter that regularly transmits a MAC address and first wireless communication unit **22** may be a beacon receiver.

Furthermore, in Embodiment 2, each of the plurality of slave devices A to D and each of the plurality of lighting fixtures **10** may include a global positioning system (GPS) module as an additional structural element for distance measurement. In this case, each of the plurality of slave devices A to D and each of the plurality of lighting fixtures **10** may transmit GPS coordinate information to information communication terminal **40**, and information communication terminal **40** may calculate distances from each of the plurality of slave devices A to D to each of the plurality of lighting fixtures **10** based on the GPS coordinate information.

Furthermore, in Embodiment 2, each of the plurality of slave devices A to D and each of the plurality of lighting fixtures **10** may include third wireless communication unit **25** or wireless communication unit **11** conforming to Wi-Fi (registered trademark), and may calculate distances using micro-location technologies such as Wi-Fi (registered trademark) location engine, Wi-Fi (registered trademark) Sniffer, or Wi-Fi (registered trademark)-based real time location system (RTLS).

Embodiment 3

The transmission of a command to lighting fixture **10** may be performed by a wired communication unit. FIG. **11** is a block diagram illustrating a functional configuration of such an illumination system according to Embodiment 3. Although FIG. **11** shows only one slave device and one lighting fixture **10**, there are actually a plurality of slave devices A to D and a plurality of lighting fixtures **10**.

In illumination system **100***b* illustrated in FIG. **11**, slave device A includes wired communication unit **26**. Although not illustrated, slave devices B to D also include wired communication unit **26**.

Wired communication unit **26** is a wired communication circuit that allows slave device A to perform wired communication with the plurality of lighting fixtures **10**. For example, based on control by first controller **21**, wired communication unit **26** transmits a command for performing lighting control to target lighting fixture **10**. In other words, first controller **21** causes wired communication unit **26** to transmit a command for performing lighting control on at least a portion of the plurality of lighting fixtures **10**. In Embodiment 3, first wireless communication unit **22** does not transmit the command to target lighting fixture **10**, and is used only for communication regarding the association operation, such as reception of the signal for measuring the RSSI.

Further, in illumination system **100***b*, each of the plurality of lighting fixtures **10** includes wired communication unit **17**.

Wired communication unit **17** is a wired communication circuit that allows lighting fixture **10** to perform wired communication with slave device A. For example, wired communication unit **17** receives a command for performing lighting control from slave device A. In Embodiment 3, wireless communication unit **11** does not receive the command for performing lighting control from slave device A, and is used only for communication regarding the association operation, such as transmission of the signal for measuring the RSSI.

As described above, in illumination system **100***b*, each of the plurality of slave devices A to D includes wired communication unit **26**, and first controller **21** further causes wired communication unit **26** to transmit a command for performing lighting control on at least a portion of the plurality of lighting fixtures **10**.

With this, each of slave devices A to D can measure the RSSI via first wireless communication unit **22** different from wired communication unit **26** used for transmitting a command to lighting fixture **10**. For example, according to illumination system **100***b*, first wireless communication unit **22** and wireless communication unit **11** are used as structural elements dedicated to the distance measurement (more specifically, the RSSI measurement), and wired communication unit **26** and wired communication unit **17** are used for the command transmission from slave device A to lighting fixture **10**.

Other Embodiments

Although some embodiments have been described above, the present disclosure is not limited to the above embodiments.

For example, in the above embodiments, the identification information has been exemplified as MAC addresses, but the identification information is not limited to MAC addresses as long as the lighting fixtures can be uniquely identified.

Further, according to the above embodiments, the position information indicates the distances between each of the plurality of lighting fixtures and each of the plurality of slave devices, but the position information only needs to indicate a positional relationship between the plurality of lighting fixtures and the plurality of slave devices. The position information only needs to directly or indirectly indicate the distances between each of the plurality of lighting fixtures and each of the plurality of slave devices.

Further, in the above embodiments, the RSSI of the signal including the identification information (specifically, the response signal) is measured, but the RSSI of a signal other than the signal including the identification information may be measured.

Furthermore, the methods for communication between devices described in the above embodiments are mere examples. The methods for communication between devices are not particularly limited. For example, the wireless communication performed between devices uses a communication standard such as specified low power radio, ZigBee (registered trademark), Bluetooth (registered trademark), or Wi-Fi (registered trademark). Note that the wireless communication is specifically radio communication or infrared communication, for example. In addition, the communication standard of the wireless communication performed between the information communication terminal and the master device may be the same as or different from the communication standard of the wireless communication performed between the slave devices and the lighting fixtures.

In the above embodiments, a process performed by a particular processing unit may be performed by another processing unit. Further, the order in which a plurality of processes are performed may be changed, or a plurality of processes may be performed in parallel.

In the above embodiments, the structural elements such as the controller may be realized by executing a software program suitable for each structural element. Each structural element may be realized by means of a program executing unit, such as a CPU or a processor, reading and executing a software program recorded on a recording medium such as a hard disk or a semiconductor memory.

Furthermore, the structural elements such as the controller may be realized by a hardware product. For example, the structural elements such as the controller may be circuits (or integrated circuits). These circuits may constitute a single circuit as a whole or may be individual circuits. Furthermore, each of these circuits may be a general purpose circuit or may be a dedicated circuit.

Note that the general or specific aspects of the present disclosure may be realized by a system, a device, a method, an integrated circuit, a computer program, or a computer-readable recording medium such as a CD-ROM. The general or specific aspects of the present disclosure may also be realized by any combination of a system, a device, a method, an integrated circuit, a computer program, and a recording medium. For example, the present disclosure may be realized as a program for causing an information communication terminal to perform the illumination setting method, or may be realized as a non-transitory recording medium on which such a program is recorded.

The present disclosure also encompasses: embodiments achieved by applying various modifications conceivable to those skilled in the art to each embodiment; and embodiments achieved by arbitrarily combining the structural elements and the functions of each embodiment without departing from the essence of the present disclosure.

While the foregoing has described one or more embodiments and/or other examples, it is understood that various modifications may be made therein and that the subject matter disclosed herein may be implemented in various forms and examples, and that they may be applied in numerous applications, only some of which have been described herein. It is intended by the following claims to claim any and all modifications and variations that fall within the true scope of the present teachings.

What is claimed is:

1. An illumination system, comprising:

a plurality of lighting fixtures;

a plurality of illumination controllers; and

an information communication terminal, wherein

each of the plurality of illumination controllers includes:

first wireless communication circuitry configured to receive, from each of the plurality of lighting fixtures, a signal including identification information of the lighting fixture, and to measure a received signal strength indication (RSSI) of the signal received; and

a first controller that causes the first wireless communication circuitry to transmit the identification information and RSSI information indicating the RSSI measured by the first wireless communication circuitry, and

the information communication terminal includes:

second wireless communication circuitry configured to receive the RSSI information and the identification information, transmitted from each of the plurality of illumination controllers; and

a second controller that (i) based on the RSSI information and position information indicating a positional relationship between the plurality of lighting fixtures and the plurality of illumination controllers, identifies a lighting fixture in the position information, which corresponds to a first lighting fixture among the plurality of lighting fixtures, which has a corresponding positional relationship to a given illumination controller among the plurality of illumination controllers, and (ii) associates the lighting fixture identified in the position information with the identification information of the first lighting fixture.

2. The illumination system according to claim **1**, wherein

the second controller converts the RSSI indicated by the RSSI information into a distance, and associates the lighting fixture identified in the position information with the identification information of the first lighting fixture based on the distance and the position information.

3. The illumination system according to claim **1**, wherein

the information communication terminal further includes a storage configured to store the position information.

4. The illumination system according to claim **2**, wherein

the position information indicates distances between each of the plurality of lighting fixtures and each of the plurality of illumination controllers, and

the second controller converts the RSSI indicated by the RSSI information into a distance, and associates the lighting fixture identified in the position information with the identification information of the first lighting fixture by comparing the distance with the distances indicated by the position information.

5. The illumination system according to claim **2**, wherein

the second controller:

calculates a correction parameter based on (i) target RSSI information indicating an RSSI of a signal received by a target illumination controller among the plurality of illumination controllers from a second lighting fixture among the plurality of lighting fixtures and (ii) a distance from the target illumination controller to the second lighting fixture, indicated by the position information; and

converts the RSSI indicated by the RSSI information into a distance using the correction parameter calculated.

6. The illumination system according to claim **2**, wherein

the second controller:

calculates a correction parameter based on (i) target RSSI information indicating an RSSI of a signal received by one of two illumination controllers among the plurality of illumination controllers from another of the two illumination controllers and (ii) a distance between the two illumination controllers that is indicated by the position information; and

converts the RSSI indicated by the RSSI information into a distance using the correction parameter calculated.

7. The illumination system according to claim **1**, wherein

temporary identification information is given to each of a plurality of lighting fixtures in the position information, and

the second controller associates the lighting fixture identified in the position information with the identification information of the first lighting fixture by replacing the temporary identification information given to the first lighting fixture with the identification information based on the RSSI information and the position information.

8. The illumination system according to claim **1**, wherein

the first controller further causes the first wireless communication circuitry to transmit a command for performing lighting control on at least a portion of the plurality of lighting fixtures.

9. The illumination system according to claim **1**, wherein

each of the plurality of illumination controllers includes third wireless communication circuitry different from the first wireless communication circuitry and the second wireless communication circuitry, and

the first controller further causes the third wireless communication circuitry to transmit a command for performing lighting control on at least a portion of the plurality of lighting fixtures.

10. The illumination system according to claim **1**, wherein

each of the plurality of illumination controllers includes wired communication circuitry, and

the first controller further causes the wired communication circuitry to transmit a command for performing lighting control on at least a portion of the plurality of lighting fixtures.

11. An illumination setting method for use in an illumination system including a plurality of lighting fixtures, a plurality of illumination controllers, and an information communication terminal, the illumination setting method comprising:

by each of the plurality of illumination controllers,

receiving, from each of the plurality of lighting fixtures, a signal including identification information of the lighting fixture, and measuring a received signal strength indication (RSSI) of the signal received from each of the plurality of lighting fixtures;

transmitting the identification information and RSSI information indicating the RSSI measured;

by the information communication terminal,

receiving the RSSI information and the identification information, transmitted from each of the plurality of illumination controllers;

based on the RSSI information and position information indicating a positional relationship between the plurality of lighting fixtures and the plurality of illumination controllers, identifying a lighting fixture in the position information, which corresponds to a first lighting fixture among the plurality of lighting fixtures, which has a corresponding positional relationship to a given illumination controller among the plurality of illumination controllers; and

associating the lighting fixture identified in the position information with the identification information of the first lighting fixture.

12. The illumination setting method according to claim **11**, wherein

in the associating, the RSSI indicated by the RSSI information is converted into a distance, and the lighting fixture identified in the position information is associated with the identification information of the first lighting fixture based on the distance and the position information.

13. The illumination setting method according to claim **12**, wherein

the position information indicates distances between each of the plurality of lighting fixtures and each of the plurality of illumination controllers, and

in the associating included in the illumination setting method, the RSSI indicated by the RSSI information is converted into a distance, and the lighting fixture identified in the position information is associated with

the identification information of the first lighting fixture by comparing the distance with the distances indicated by the position information.

14. A non-transitory computer-readable recording medium for use in an information communication terminal included in an illumination system including a plurality of lighting fixtures, a plurality of illumination controllers, and the information communication terminal, the recording medium having a program recorded thereon for causing the information communication terminal to execute an illumination setting method,

wherein each of the plurality of illumination controllers:

receives, from each of the plurality of lighting fixtures, a signal including identification information of the lighting fixture, and measures a received signal strength indication (RSSI) of the signal received from each of the plurality of lighting fixtures; and

transmits the identification information and RSSI information indicating the RSSI measured, and

the illumination setting method includes:

receiving the RSSI information and the identification information, transmitted from each of the plurality of illumination controllers;

based on the RSSI information and position information indicating a positional relationship between the plurality of lighting fixtures and the plurality of illumination controllers, identifying a lighting fixture in the position information, which corresponds to a first lighting fixture among the plurality of lighting fixtures, which has a corresponding positional relationship to a given illumination controller among the plurality of illumination controllers; and

associating the lighting fixture identified in the position information with the identification information of the first lighting fixture.

15. The recording medium according to claim **14**, wherein

in the associating included in the illumination setting method, the RSSI indicated by the RSSI information is converted into a distance, and the lighting fixture identified in the position information is associated with the identification information of the first lighting fixture based on the distance and the position information.

16. The recording medium according to claim **15**, wherein

the position information indicates distances between each of the plurality of lighting fixtures and each of the plurality of illumination controllers, and

in the associating included in the illumination setting method, the RSSI indicated by the RSSI information is converted into a distance, and the lighting fixture identified in the position information is associated with the identification information of the first lighting fixture by comparing the distance with the distances indicated by the position information.

17. An illumination system, comprising:

a plurality of lighting fixtures;

a plurality of illumination controllers; and

an information communication terminal, wherein

each of the plurality of illumination controllers includes:

first wireless communication circuitry configured to receive, from each of the plurality of lighting fixtures, a signal including identification information of the lighting fixture, and to measure a received signal strength indication (RSSI) of the signal received; and

a first controller that causes the first wireless communication circuitry to transmit the identification information and RSSI information indicating the RSSI measured by the first wireless communication circuitry, and

the information communication terminal includes:

second wireless communication circuitry configured to receive the RSSI information and the identification information, transmitted from each of the plurality of illumination controllers;

a storage that stores position information indicating a positional relationship between the plurality of lighting fixtures and the plurality of illumination controllers; and

a second controller that identifies a lighting fixture in the position information, which corresponds to a lighting fixture having a corresponding positional relationship to a given illumination controller among the plurality of illumination controllers, and associates, in the position information, the identified lighting fixture with the identification information of the first lighting fixture.

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